# Autoclave Engineers Valves, Fittings and Tubing Electronic Catalog

Since it's inception in 1945, Autoclave Engineers has been dedicated to manufacturing high pressure valving systems which operate safely and reliably under extreme variations in temperature, pressure, and environmental conditions. Today, Autoclave is a world leader in providing dependable high pressure valves, fittings and tubing, serving applications in high-pressure industries.

Within this CD ROM, you will find all of the same literature as in our printed catalog, available in a searchable, indexed, and printable electronic format.

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Autoclave Engineers
Fluid Components
Division of Snap-tite, Inc.
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Electronic Catalog

# Autoclave Engineers Valves, Fittings and Tubing Electronic Catalog

## GETTING STARTED:

Welcome to the Autoclave Engineers, Fluid Components Divisions Electronic Catalog (ECat for short). Within this CD ROM you will find all of the same literature as in our printed catalog, available now to you in an easy-to-use format. Navigation is simplified when using the bookmarks provided and keyword searching is a breeze with the SEARCH feature of ADOBE ACROBAT®.

Should this be your first introduction to Autoclave Engineers Fluid Components division, we welcome and thank you for taking your valuable time to investigate the features and quality of our products. Autoclave Engineers has been manufacturing Valves, Fittings, and Tubing for high pressure applications for over 60 years and has accumulated one of the largest and complete product offerings of its type in the world today.

This new catalog is quite extensive and you should be made aware that the organization has changed somewhat from earlier catalogs. As you may have noticed in the Table of Contents, the products are now organized by type or function. Within each of these groupings where applicable, they have been sub-categorized into their separate pressure groups:

Low Pressure ---------- to 15,000 psi (1034 bar)
Medium Pressure ---------- to 20,000 psi (1379 bar)
High Pressure ---------- to 150,000 psi (10342 bar)

NAVIGATION through the ECat is made easy by using the bookmarks found on the left margin. Hotlinks are also provided on the index pages everywhere the pointer turns to a hand, including the tabs found on the right margin of the main index page.

Should you want to PRINT or EMAIL a specific brochure of the catalog, separate files have been provided that can be opened by going to the Individual Brochure Links found on the next page. You can save the file to your hard drive or use the SEND MAIL feature of ACROBAT®.

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# Autoclave Engineers Valves, Fittings and Tubing Electronic Catalog

**INDIVIDUAL BROCHURE LINKS: (brochures in blue are linked to separate files that can be copied to your hard drive or sent as email attachments)**

**Needle Valves**

- 10V & SW Series Low Pressure to 15,000 psi (1034 bar)
- SM Series Medium Pressure to 20,000 psi (1379 bar)
- 30SC to 150V High Pressure to 150,000 psi (10342 bar)
- MVE/MV Series Mini Valves to 15,000 psi (1034 bar)
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# Autoclave Engineers Valves, Fittings and Tubing Electronic Catalog

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# Valves, Fittings, and Tubing Catalog

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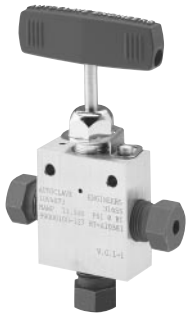
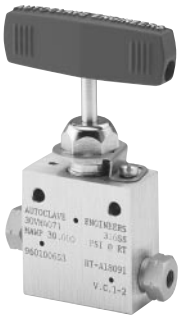
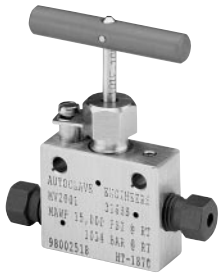
# Needle Valve

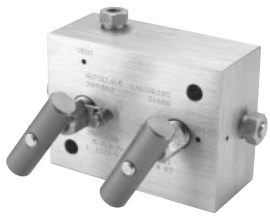
# Index











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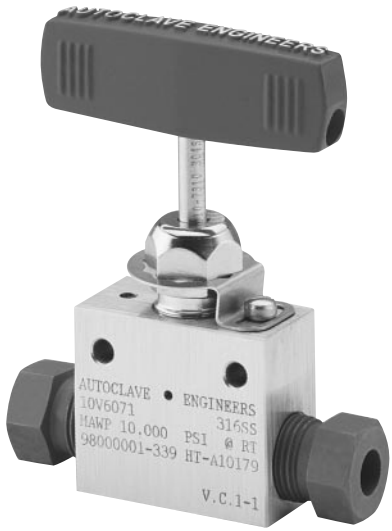
# Needle Valves

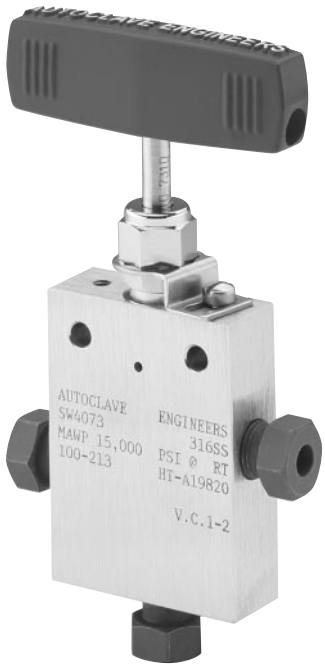
**Low Pressure**

# 10V & SW Series

*Pressures to 15,000 psi (1034 bar)*

Since 1945 Autoclave Engineers has designed and built premium quality valves, fittings and tubing. This commitment to engineering and manufacturing excellence has earned Autoclave a reputation for reliable efficient product performance. Autoclave Engineers has long been established as the world leader in high pressure fluid handling components for the chemical/petrochemical, research, and oil and gas industries.




## *Low Pressure Valve Features:*

- 10V Series valve design provides in-line tube connections for 1/4” to 1/2” tube sizes.
- SW Series valve design provides increased flow capabilities.
- Tubing sizes from 1/8” to 1/2”.
- Rising stem/barstock body design.
- Non-rotating stem prevents stem/seat galling.
- Metal-to-metal seating achieves bubble-tight shut-off, longer stem/seat life in abrasive flow, greater durability for repeated on/off cycles and excellent corrosion resistance.
- PTFE (Teflon) encapsulated packing provides dependable stem and body sealing.
- Stem sleeve and packing gland materials have been selected to achieve extended thread cycle life and reduced handle torque.
- Choice of Vee or Regulating stem tips.
- Available in five body patterns.

Autoclave valves are complemented by a complete line of low pressure fittings, tubing, check valves and line filters. The 10V and SW series use Autoclave’s SpeedBite connection. This single-ferrule compression sleeve connection delivers fast, easy make-up and reliable bubble-tight performance in liquid or gas service.

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# Valve Series - 10V Series

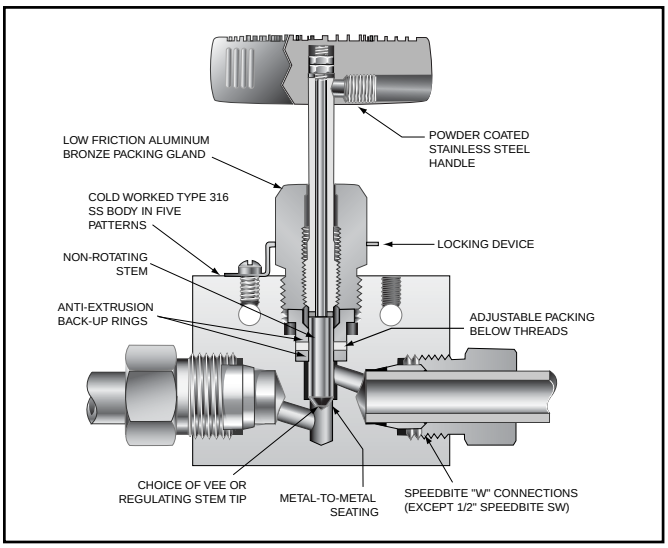
## Pressures to 15,000 psi (1034 bar)

| Tube Outside Diameter Size Inches | Connection Type | Orifice Size Inches (mm) | Rated $C_V$* | Pres./Temp. Rating psi (bar) @ Room Temperature** |
|---|---|---|---|---|
| 1/8 | W125 | 0.094 (2.39) | 0.12 | 15,000 (1034) |
| 1/4 | W250 | 0.125 (3.18) | 0.20 | 15,000 (1034) |
| 3/8 | W375 | 0.125 (3.18) | 0.20 | 15,000 (1034) |
| 1/2 | SW500 | 0.250 (6.35) | 0.86 | 10,000 (690) |

*Notes:*

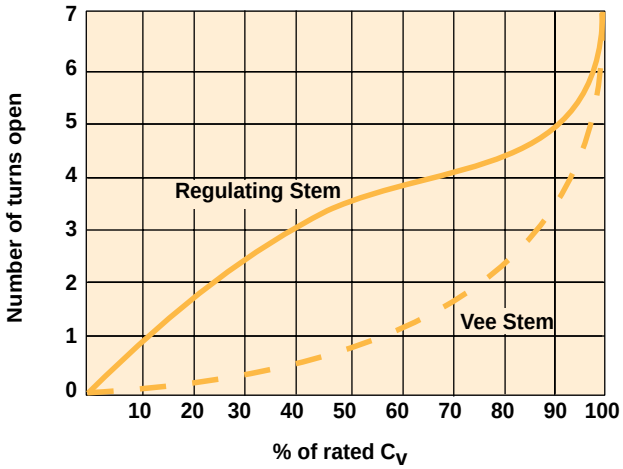
* *$C_V$ values shown are for 2-way straight valve pattern. For 2-way angle patterns, increase $C_V$ value 50%. (Based on water)*

** *For complete temperature ratings see pressure/temperature rating guide in Technical Information section.*


To ensure proper fit use Autoclave tubing

### Generalized Flow Coefficient Curves ($C_V$)




## Ordering Procedure

For complete information on available stem types, optional connections and additional valve options, see Needle Valve Options section or contact your Sales Representative. 10V Series valves are furnished complete with connection components, unless otherwise specified.

Typical catalog number: **10V4071**

**10V** — **Valve Series**

**4** — **Outside Diameter Tube Size**

**2**-1/8”
**4**-1/4”
**6**-3/8”
**8**-1/2”

*Note: Contact Sales for 1/16”tube size or see MVE Series.*

**07** — **Stem/Seat Type**

**07** - non-rotating Vee stem (on-off service)
**08** - non-rotating regulating stem (tapered tip for regulating and shutoff)
**87** - Vee stem with replaceable seat
**88** - Regulating stem with replaceable seat

**1** — **Body Pattern**

**1** - two-way straight
**2** - two-way angle
**3** - three-way, two on pressure
**4** - three-way, one on pressure
**5** - three-way, two stem manifold valve

—

**Options** — **Options**

For extreme temperature and other options, see Valve Options.

## Valve Options

**Extreme Temperatures**

Standard Autoclave valves with Teflon packing may be operated to 450°F (232°C). High temperature packing and/or extended stuffing box is available for service from 0°F (-17.8°C) to 650°F (343°C) by adding the following suffixes to catalog order number.†

**TG** standard valve with Teflon glass packing to 600°F (316°C).

**GY** standard valve with graphite braided yarn packing to 650°F (343°C).

†*Autoclave Engineers does not recommend compression sleeve connections below 0°F (-17.8°C) or above 650°F (343°C). For additional valve options, contact your Sales Representative.*

## Valve Maintenance

Repair Kits: add "R" to the front of valve catalog number for proper repair kit. (Example: **R10V4071**)

Valve Bodies: Valve bodies are available. Order using the eight (8) digit part number found on the valve drawing or contact your Sales Representative for information.

Consult your Autoclave representative for pricing on repair kits and valve bodies. Refer to the Tools, Installation, Operation and Maintenance section for proper maintenance procedures.

| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions - inches (mm) A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | Block Thickness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2-Way Straight** | | | | | | | | | | | | | | | | | |
| **10V2071** | **VEE** | 1/8** | 0.094 | 1.50 | 0.75 | 0.31 | 1.06 | 0.81 | 1.38 | 3.00 | 0.62 | 0.17 | 3.75 | 0.56 | 0.31 | 0.62 | **See Figure 1** |
| **10V2081** | **REG** | (3.18) | (2.39) | (38.10) | (19.05) | (7.87) | (26.92) | (20.57) | (35.05) | (76.20) | (15.75) | (4.32) | (95.25) | (14.22) | (7.87) | (15.75) | |
| **10V4071** | **VEE** | 1/4 | 0.125 | 2.00 | 1.00 | 0.56 | 1.19 | | 1.69 | 3.00 | 0.97 | 0.22 | 4.44 | 0.69 | 0.38 | 1.00 | |
| **10V4081** | **REG** | (6.35) | (3.18) | (50.80) | (25.40) | (14.22) | (30.23) | | (42.93) | (76.20) | (24.64) | (5.59) | (112.78) | (17.53) | (9.65) | (25.40) | |
| **10V6071** | **VEE** | 3/8 | 0.125 | 2.00 | 1.00 | 0.62 | 1.19 | | 1.69 | 3.00 | 0.97 | 0.22 | 4.31 | 0.69 | 0.38 | 1.00 | |
| **10V6081** | **REG** | (9.53) | (3.18) | (50.80) | (25.40) | (15.75) | (30.23) | | (42.93) | (76.20) | (24.64) | (5.59) | (109.47) | (17.53) | (9.65) | (25.40) | |
| **10V8071** | **VEE** | 1/2 | 0.250 | 2.50 | 1.25 | 0.53 | 1.25 | | 1.81 | 3.00 | 0.97 | 0.22 | 4.44 | 0.69 | 0.38 | 1.00 | |
| **10V8081** | **REG** | (12.70) | (6.35) | (63.50) | (31.75) | (13.46) | (31.75) | | (45.97) | (76.20) | (24.64) | (5.59) | (112.78) | (17.53) | (9.65) | (25.40) | |
| **2-Way Angle** | | | | | | | | | | | | | | | | | |
| **10V2072** | **VEE** | 1/8 | 0.094 | 1.50 | 0.75 | 0.31 | 0.81 | | 1.56 | 3.00 | 0.62 | 0.17 | 3.94 | 0.50 | 0.31 | 0.62 | **See Figure 2** |
| **10V2082** | **REG** | (3.18) | (2.39) | (38.1) | (19.05) | (7.87) | (20.57) | | (39.62) | (76.20) | (15.75) | (4.32) | (100.08) | (12.70) | (7.87) | (15.75) | |
| **10V4072** | **VEE** | 1/4 | 0.125 | 2.00 | 1.00 | 0.56 | 1.19 | | 2.19 | 3.00 | 0.97 | 0.22 | 4.81 | 0.69 | 0.31 | 1.00 | |
| **10V4082** | **REG** | (6.35) | (3.18) | (50.80) | (25.40) | (14.2) | (30.23) | | (55.63) | (76.20) | (24.64) | (5.59) | (122.17) | (17.53) | (7.87) | (25.40) | |
| **10V6072** | **VEE** | 3/8 | 0.125 | 2.00 | 1.00 | 0.62 | 1.19 | | 2.19 | 3.00 | 0.97 | 0.22 | 4.81 | 0.69 | 0.31 | 1.00 | |
| **10V6082** | **REG** | (9.53) | (3.18) | (50.80) | (25.40) | (15.7) | (30.23) | | (55.63) | (76.20) | (24.64) | (5.59) | (122.17) | (17.53) | (7.87) | (25.40) | |
| **10V8072** | **VEE** | 1/2 | 0.250 | 2.50 | 1.25 | 0.53 | 1.25 | | 2.50 | 3.00 | 0.97 | 0.22 | 5.06 | 0.69 | 0.38 | 1.00 | |
| **10V8082** | **REG** | (12.70) | (6.35) | (63.50) | (31.75) | (13.5) | (31.75) | | (63.50) | (76.20) | (24.64) | (5.59) | (128.52) | (17.53) | (9.65) | (25.40) | |
| **3-Way / 2 on Pressure** | | | | | | | | | | | | | | | | | |
| **10V2073** | **VEE** | 1/8** | 0.094 | 1.50 | 0.75 | 0.31 | 1.06 | 0.81 | 1.69 | 3.00 | 0.62 | 0.17 | 4.06 | 0.50 | 0.31 | 0.62 | **See Figure 3** |
| **10V2083** | **REG** | (3.18) | (2.39) | (38.10) | (19.05) | (7.87) | (26.92) | 20.57 | (42.93) | (76.20) | (15.75) | (4.32) | (103.12) | (12.70) | (7.87) | (15.75) | |
| **10V4073** | **VEE** | 1/4 | 0.125 | 2.00 | 1.00 | 0.56 | 1.19 | | 2.19 | 3.00 | 0.97 | 0.22 | 4.81 | 0.69 | 0.38 | 1.00 | |
| **10V4083** | **REG** | (6.35) | (3.18) | (50.80) | (25.40) | (14.22) | (30.23) | | (55.63) | (76.20) | (24.64) | (5.59) | (122.17) | (17.53) | (9.65) | (25.40) | |
| **10V6073** | **VEE** | 3/8 | 0.125 | 2.00 | 1.00 | 0.62 | 1.19 | | 2.19 | 3.00 | 0.97 | 0.22 | 4.81 | 0.69 | 0.38 | 1.00 | |
| **10V6083** | **REG** | (9.53) | (3.18) | (50.80) | (25.40) | (15.75) | (30.23) | | (55.63) | (76.20) | (24.64) | (5.59) | (122.17) | (17.53) | (9.65) | (25.40) | |
| **10V8073** | **VEE** | 1/2 | 0.250 | 2.50 | 1.25 | 0.53 | 1.19 | | 2.44 | 3.00 | 0.97 | 0.22 | 5.06 | 0.69 | 0.38 | 1.00 | |
| **10V8083** | **REG** | (12.70) | (6.35) | (63.50) | (31.75) | (13.46) | (30.23) | | (61.98) | (76.20) | (24.64) | (5.59) | (128.52) | (17.53) | (9.65) | (25.40) | |

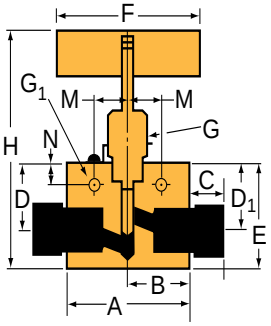
*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*
*Panel mounting drill size: 0.22" all valves.*

** H Dimension is with stem in closed position.*
*** 1/8" straight and 3-Way/2 on pressure valves have offset tube connections.*

**For prompt service, Autoclave stocks select products. Consult factory.**

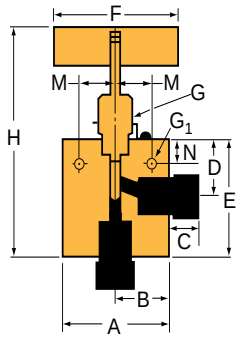
*All dimensions for reference only and subject to change.*

**Figure 1**



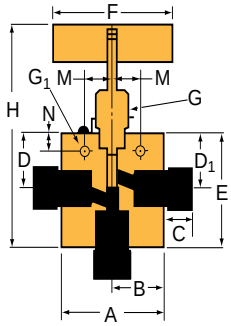

**2-Way Straight**

**Figure 2**




**2-Way Angle**

**Figure 3**




**3-Way / 2 on Pressure**

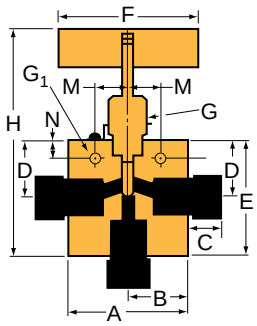
| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions - inches (mm) | | | | | | | | | | | | | Block Thick-ness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | | | |
| **3-Way / 1 on Pressure** | | | | | | | | | | | | | | | | | | |
| **10V2074** | **VEE** | 1/8 | 0.094 | 1.50 | 0.75 | 0.31 | 0.81 | | 1.56 | 3.00 | 0.62 | 0.17 | 3.94 | 0.50 | 0.31 | 0.62 | **See Figure 4** | |
| **10V2084** | **REG** | (3.18) | (2.39) | (38.1) | (19.05) | (7.87) | (20.57) | | (39.62) | (76.20) | (15.75) | (4.32) | (100.08) | (12.70) | (7.87) | (15.7) | | |
| **10V4074** | **VEE** | 1/4 | 0.125 | 2.00 | 1.00 | 0.56 | 1.19 | | 2.19 | 3.00 | 0.97 | 0.22 | 4.81 | 0.69 | 0.38 | 1.00 | | |
| **10V4084** | **REG** | (6.35) | (3.18) | (50.8) | (25.40) | (14.22) | (30.23) | | (55.63) | (76.20) | (24.64) | (5.59) | (122.17) | (17.53) | (9.65) | (25.40) | | |
| **10V6074** | **VEE** | 3/8 | 0.125 | 2.00 | 1.00 | 0.62 | 1.19 | | 2.19 | 3.00 | 0.97 | 0.22 | 4.81 | 0.69 | 0.38 | 1.00 | | |
| **10V6084** | **REG** | (9.53) | (3.18) | (50.8) | (25.40) | (15.75) | (30.23) | | (55.63) | (76.20) | (24.64) | (5.59) | (122.17) | (17.53) | (9.65) | (25.40) | | |
| **10V8074** | **VEE** | 1/2 | 0.250 | 2.50 | 1.25 | 0.53 | 1.19 | | 2.44 | 3.00 | 0.97 | 0.22 | 5.06 | 0.69 | 0.38 | 1.00 | | |
| **10V8084** | **REG** | (12.70) | (6.35) | (63.5) | (31.75) | (13.46) | (30.23) | | (61.98) | (76.20) | (24.64) | (5.59) | (128.52) | (17.53) | (9.65) | (25.40) | | |
| **2-Way Angle / Replaceable Seat** | | | | | | | | | | | | | | | | | | |
| **10V2872** | **VEE** | 1/8 | 0.094 | 1.50 | 0.75 | 0.31 | 0.81 | 1.28 | 1.56 | 3.00 | 0.62 | 0.17 | 4.50 | 0.50 | 0.31 | 0.62 | **See Figure 5** | |
| **10V2882** | **REG** | (3.18) | (2.39) | (38.10) | (19.05) | (7.87) | (20.57) | (32.51) | (39.62) | (76.20) | (15.75) | (4.32) | (114.30) | (12.70) | (7.87) | (15.75) | | |
| **10V4872** | **VEE** | 1/4 | 0.125 | 2.00 | 1.00 | 0.56 | 1.12 | 2.13 | 2.25 | 3.00 | 0.97 | 0.22 | 6.00 | 0.69 | 0.38 | 1.00 | | |
| **10V4882** | **REG** | (6.35) | (3.18) | (50.80) | (25.40) | (14.22) | (28.45) | (54.10) | (57.15) | (76.20) | (24.64) | (5.59) | (152.40) | (17.53) | (9.65) | (25.40) | | |
| **10V6872** | **VEE** | 3/8 | 0.125 | 2.00 | 1.00 | 0.62 | 1.12 | 2.28 | 2.25 | 3.00 | 0.97 | 0.22 | 6.00 | 0.69 | 0.38 | 1.00 | | |
| **10V6882** | **REG** | (9.53) | (3.18) | (50.80) | (25.40) | (15.75) | (28.45) | (57.91) | (57.15) | (76.20) | (24.64) | (5.59) | (152.40) | (17.53) | (9.65) | (25.40) | | |
| **10V8872** | **VEE** | 1/2 | 0.250 | 2.50 | 1.25 | 0.53 | 1.00 | 2.50 | 2.38 | 3.00 | 0.97 | 0.28 | 6.06 | 0.69 | 0.38 | 1.00 | | |
| **10V8882** | **REG** | (12.70) | (6.35) | (63.50) | (31.75) | (13.46) | (25.45) | (63.50) | (60.45) | (76.20) | (24.64) | (7.11) | (153.92) | (17.53) | (9.65) | (25.40) | | |
| **3-Way / 2-Stem Manifold** | | | | | | | | | | | | | | | | | | |
| **10V2075** | **VEE** | 1/8 | 0.094 | 1.50 | 0.75 | 0.31 | 1.12 | 0.81 | 2.25 | 3.00 | 0.62 | 0.17 | 4.63 | 0.50 | 0.31 | 0.62 | **See Figure 6** | |
| **10V2085** | **REG** | (3.18) | (2.39) | (38.10) | (19.05) | (7.87) | (28.45) | (20.57) | (57.15) | (76.20) | (15.75) | (4.32) | (117.60) | (12.70) | (7.87) | (15.7) | | |
| **10V4075** | **VEE** | 1/4 | 0.125 | 2.00 | 1.00 | 0.56 | 1.69 | 1.09 | 3.38 | 3.00 | 0.97 | 0.22 | 5.82 | 0.69 | 0.38 | 1.00 | | |
| **10V4085** | **REG** | (6.35) | (3.18) | (50.80) | (25.40) | (14.22) | (42.93) | (27.69) | (85.85) | (76.20) | (24.64) | (5.59) | (147.83) | (17.53) | (9.65) | (25.40) | | |
| **10V6075** | **VEE** | 3/8 | 0.125 | 2.00 | 1.00 | 0.62 | 1.69 | 1.09 | 3.38 | 3.00 | 0.97 | 0.22 | 5.82 | 0.69 | 0.38 | 1.00 | | |
| **10V6085** | **REG** | (9.53) | (3.18) | (50.80) | (25.40) | (15.75) | (42.93) | (27.69) | (85.85) | (76.20) | (24.64) | (5.59) | (147.83) | (17.53) | (9.65) | (25.40) | | |
| **10V8075** | **VEE** | 1/2 | 0.250 | 2.50 | 1.25 | 0.53 | 1.69 | 1.03 | 3.38 | 3.00 | 0.97 | 0.22 | 5.82 | 0.69 | 0.38 | 1.00 | | |
| **10V8085** | **REG** | (12.70) | (6.35) | (63.50) | (31.75) | (13.46) | (42.93) | (26.16) | (85.85) | (76.20) | (24.64) | (5.59) | (147.83) | (17.53) | (9.65) | (25.40) | | |

*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*
*Panel mounting drill size: 0.22" all valves.*

** H Dimension is with stem in closed position.*
*All dimensions for reference only and subject to change.*

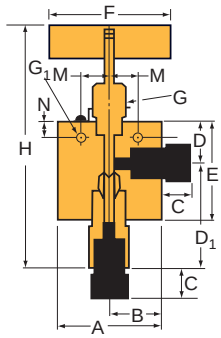
**For prompt service, Autoclave stocks select products. Consult factory.**

**Figure 4**



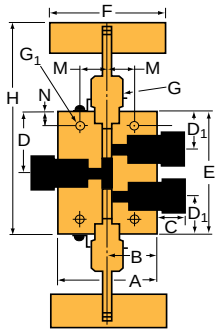

**3-Way / 1 on Pressure**

**Figure 5**




**2-Way Angle / Replaceable Seat**

**Figure 6**




**3-Way / 2-Stem Manifold**

# Needle Valves - SW Series

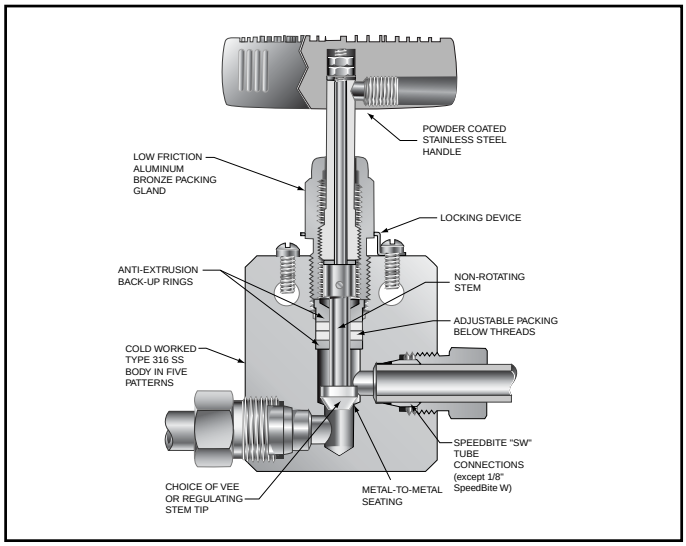
## Pressures to 15,000 psi (1034 bar)

| Tube Outside Diameter Size Inches | Connection Type | Orifice Size Inches (mm) | Rated $C_V$* | Pressure/ Temperature Rating psi (bar) @ Room Temperature** |
|---|---|---|---|---|
| 1/8 | W125— Refer to 10V Series Valves — | | | |
| 1/4 | SW250 | 0.188 (4.77) | 0.65 | 15,000 (1034) |
| 3/8 | SW375 | 0.250 (6.35) | 0.95 | 15,000 (1034) |
| 1/2 | SW500 | 0.375 (9.52) | 1.90 | 10,000 (690) |

*Notes:*

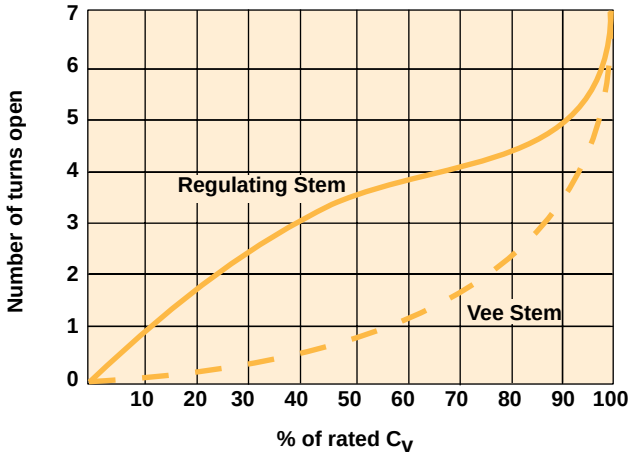
* *$C_V$ values shown are for 2-way straight valve pattern. For 2-way angle patterns, increase $C_V$ value 50%. (Based on water)*

** *For complete temperature ratings see pressure/temperature rating guide in Technical Information section.*


To ensure proper fit use Autoclave tubing

### Generalized Flow Coefficient Curves ($C_V$)




## Ordering Procedure

For complete information on available stem types, optional connections and additional valve options, see Needle Valve Options section or contact your Sales Representative. SW Series valves are furnished complete with connection components, unless otherwise specified.

Typical catalog number: **SW4071**

**SW** — **Valve Series**

**4** — **Outside Diameter Tube Size**

**4**-1/4”
**6**-3/8”
**8**-1/2”

**07** — **Stem/Seat Type**

**07** - non-rotating Vee stem (on off service)
**08** - non-rotating regulating stem (tapered tip for regulating and shutoff)
**87** - Vee stem with replaceable seat
**88** - Regulating stem with replaceable seat

**1** — **Body Pattern**

**1** - two-way straight
**2** - two-way angle
**3** - three-way, two on pressure
**4** - three-way, one on pressure
**5** - three-way, two stem manifold valve

—

**Options** — **Options**

For extreme temperature and other options, see Valve Options.

## Valve Options

**Extreme Temperatures**
Standard Autoclave valves with Teflon packing may be operated to 450°F (232°C). High temperature packing and/or extended stuffing box are available for service from 0°F (-17.8°C) to 650°F (343°C) by adding the following suffixes to catalog order number.†
**TG** standard valve with Teflon glass packing to 600°F (316°C).
**GY** standard valve with graphite braided yarn packing to 650°F (343°C).

†*Autoclave Engineers does not recommend compression sleeve connections below 0°F (-17.8°C) or above 650°F (343°C). For additional valve options, contact your Sales Representative.*

## Valve Maintenance

Repair Kits: add "R" to the front of valve catalog number for proper repair kit. (Example: **RSW4071**)

Valve Bodies: Valve bodies are available. Order using the eight (8) digit part number found on the valve drawing or contact your Sales Representative for information.

Consult your Autoclave representative for pricing on repair kits and valve bodies. Refer to the Tools, Installation, Operation and Maintenance section for proper maintenance procedures.

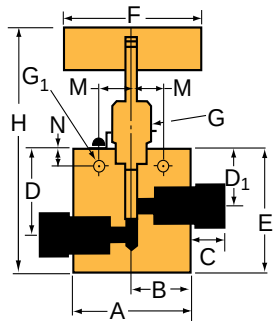
| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions - inches (mm) A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | Block Thickness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2-Way Straight** | | | | | | | | | | | | | | | | | |
| **SW4071** | **VEE** | 1/4 | 0.187 | 2.00 | 1.00 | 0.38 | 1.62 | 1.19 | 2.00 | 3.00 | 0.75 | 0.22 | 4.50 | 0.62 | 0.38 | 0.75 | |
| **SW4081** | **REG** | (6.35) | (4.75) | (50.80) | (25.40) | (9.65) | (41.15) | (30.23) | (50.80) | (76.20) | (19.05) | (5.59) | (114.30) | (15.75) | (9.65) | (19.05) | |
| **SW6071** | **VEE** | 3/8 | 0.250 | 2.00 | 1.00 | 0.47 | 1.62 | 1.19 | 2.00 | 3.00 | 0.75 | 0.22 | 4.50 | 0.62 | 0.38 | 0.75 | **See Figure 1** |
| **SW6081** | **REG** | (9.53) | (6.35) | (50.80) | (25.40) | (11.94) | (41.15) | (30.23) | (50.80) | (76.20) | (19.05) | (5.59) | (114.30) | (15.75) | (9.65) | (19.05) | |
| **SW8071** | **VEE** | 1/2 | 0.375 | 2.50 | 1.25 | 0.53 | 2.38 | 1.75 | 2.88 | 4.00 | 1.00 | 0.34 | 5.95 | 0.69 | 0.50 | 1.00 | |
| **SW8081** | **REG** | (12.70) | (9.53) | (63.50) | (31.75) | (13.46) | (60.45) | (44.45) | (73.15) | (101.60) | (25.40) | (8.64) | (151.37) | (17.53) | (12.70) | (25.40) | |
| **2-Way Angle** | | | | | | | | | | | | | | | | | |
| **SW4072** | **VEE** | 1/4 | 0.187 | 2.00 | 1.00 | 0.38 | 1.19 | | 2.43 | 3.00 | 0.75 | 0.22 | 5.00 | 0.62 | 0.38 | 0.75 | |
| **SW4082** | **REG** | (6.35) | (4.75) | (50.80) | (25.40) | (9.65) | (30.23) | | (61.72) | (76.20) | (19.05) | (5.59) | (127.00) | (15.75) | (9.65) | (19.05) | |
| **SW6072** | **VEE** | 3/8 | 0.250 | 2.00 | 1.00 | 0.47 | 1.19 | | 2.19 | 3.00 | 0.75 | 0.22 | 5.00 | 0.62 | 0.38 | 0.75 | **See Figure 2** |
| **SW6082** | **REG** | (9.53) | (6.35) | (50.80) | (25.40) | (11.94) | (30.23) | | (55.63) | (76.20) | (19.05) | (5.59) | (127.00) | (15.75) | (9.65) | (19.05) | |
| **SW8072** | **VEE** | 1/2 | 0.375 | 2.50 | 1.25 | 0.53 | 1.75 | | 3.38 | 4.00 | 1.00 | 0.34 | 6.45 | 0.69 | 0.50 | 1.00 | |
| **SW8082** | **REG** | (12.70) | (9.53) | (63.50) | (31.75) | (13.46) | (44.45) | | (85.85) | (101.60) | (25.40) | (8.64) | (163.83) | (17.53) | (12.70) | (25.40) | |
| **3-Way / 2 on Pressure** | | | | | | | | | | | | | | | | | |
| **SW4073** | **VEE** | 1/4 | 0.187 | 2.00 | 1.00 | 0.38 | 1.62 | 1.19 | 2.62 | 3.00 | 0.75 | 0.22 | 5.18 | 0.62 | 0.38 | 0.75 | |
| **SW4083** | **REG** | (6.35) | (4.75) | (50.80) | (25.40) | (9.65) | (41.15) | (30.23) | (66.55) | (76.20) | (19.05) | (5.59) | (131.57) | (15.75) | (9.65) | (19.05) | |
| **SW6073** | **VEE** | 3/8 | 0.250 | 2.00 | 1.00 | 0.47 | 1.62 | 1.19 | 2.62 | 3.00 | 0.75 | 0.22 | 5.13 | 0.62 | 0.38 | 0.75 | **See Figure 3** |
| **SW6083** | **REG** | (9.53) | (6.35) | (50.80) | (25.40) | (11.94) | (41.15) | (30.23) | (66.55) | (76.20) | (19.05) | (5.59) | (130.30) | (15.75) | (9.65) | (19.05) | |
| **SW8073** | **VEE** | 1/2 | 0.375 | 2.50 | 1.25 | 0.53 | 2.38 | 1.75 | 3.62 | 4.00 | 1.00 | 0.34 | 6.70 | 0.69 | 0.50 | 1.00 | |
| **SW8083** | **REG** | (12.70) | (9.53) | (63.50) | (31.75) | (13.46) | (60.45) | (44.45) | (91.95) | (101.60) | (25.40) | (8.64) | (170.18) | (17.53) | (12.70) | (25.40) | |

*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*
*Panel mounting drill size: 0.22" all valves.*

** H Dimension is with stem in closed position.*
*All dimensions for reference only and subject to change.*

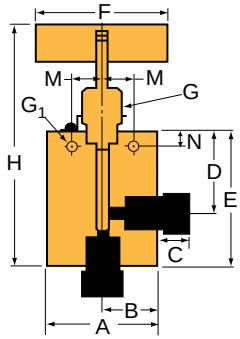
**For prompt service, Autoclave stocks select products. Consult factory.**

**Figure 1**



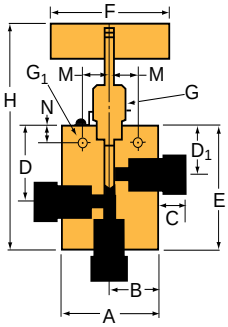

**2-Way Straight**

**Figure 2**




**2-Way Angle**

**Figure 3**




**3-Way / 2 on Pressure**

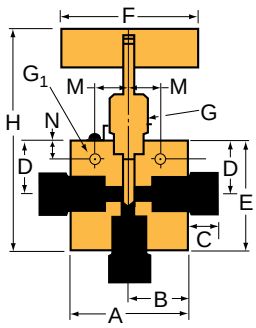
| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions -inches (mm) A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | Block Thick-ness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **3-Way / 1 on Pressure** | | | | | | | | | | | | | | | | | |
| **SW4074** | **VEE** | 1/4 | 0.187 | 2.00 | 1.00 | 0.38 | 1.19 | | 2.43 | 3.00 | 0.75 | 0.22 | 5.00 | 0.62 | 0.38 | 0.75 | **See Figure 4** |
| **SW4084** | **REG** | (6.35) | (4.75) | (50.80) | (25.40) | (9.65) | (30.23) | | (61.72) | (76.20) | (19.05) | (5.59) | (127.00) | (15.75) | (9.65) | (19.05) | |
| **SW6074** | **VEE** | 3/8 | 0.250 | 2.00 | 1.00 | 0.47 | 1.19 | | 2.43 | 3.00 | 0.75 | 0.22 | 5.00 | 0.62 | 0.38 | 0.75 | |
| **SW6084** | **REG** | (9.53) | (6.35) | (50.80) | (25.40) | (11.94) | (30.23) | | (61.72) | (76.20) | (19.05) | (5.59) | (127.00) | (15.75) | (9.65) | (19.05) | |
| **SW8074** | **VEE** | 1/2 | 0.375 | 2.50 | 1.25 | 0.53 | 1.75 | | 3.38 | 4.00 | 1.00 | 0.34 | 6.45 | 0.69 | 0.50 | 1.00 | |
| **SW8084** | **REG** | (12.70) | (9.53) | (63.50) | (31.75) | (13.46) | (44.45) | | (85.85) | (101.60) | (25.40) | (8.64) | (163.83) | (17.53) | (12.70) | (25.40) | |
| **2-Way Angle / Replaceable Seat** | | | | | | | | | | | | | | | | | |
| **SW4872** | **VEE** | 1/4 | 0.187 | 2.00 | 1.00 | 0.38 | 1.19 | 1.88 | 2.25 | 3.00 | 0.75 | 0.22 | 5.75 | 0.62 | 0.38 | 0.75 | **See Figure 5** |
| **SW4882** | **REG** | (6.35) | (4.75) | (50.80) | (25.40) | (9.65) | (30.23) | (47.75) | (57.15) | (76.20) | (19.05) | (5.59) | (146.05) | (15.75) | (9.65) | (19.05) | |
| **SW6872** | **VEE** | 3/8 | 0.250 | 2.00 | 1.00 | 0.47 | 1.19 | 2.19 | 2.25 | 3.00 | 0.75 | 0.22 | 5.75 | 0.62 | 0.38 | 0.75 | |
| **SW6882** | **REG** | (9.53) | (6.35) | (50.80) | (25.40) | (11.94) | (30.23) | (55.62) | (57.15) | (76.20) | (19.05) | (5.59) | (146.05) | (15.75) | (9.65) | (19.05) | |
| **SW8872** | **VEE** | 1/2 | 0.375 | 2.50 | 1.25 | 0.53 | 1.75 | 2.50 | 3.25 | 4.00 | 1.00 | 0.34 | 7.51 | 0.69 | 0.50 | 1.00 | |
| **SW8882** | **REG** | (12.70) | (9.53) | (63.50) | (31.75) | (13.46) | (44.45) | (63.50) | (82.55) | (101.60) | (25.40) | (8.64) | (190.75) | (17.53) | (12.70) | (25.40) | |
| **3-Way / 2-Stem Manifold** | | | | | | | | | | | | | | | | | |
| **SW4075** | **VEE** | 1/4 | 0.187 | 2.00 | 1.00 | 0.38 | 1.68 | 1.19 | 3.38 | 3.00 | 0.75 | 0.22 | 5.94 | 0.62 | 0.38 | 0.75 | **See Figure 6** |
| **SW4085** | **REG** | (6.35) | (4.75) | (50.80) | (25.40) | (9.65) | (42.67) | (30.23) | (85.85) | (76.20) | (19.05) | (5.59) | (150.88) | (15.75) | (9.65) | (19.05) | |
| **SW6075** | **VEE** | 3/8 | 0.250 | 2.00 | 1.00 | 0.47 | 1.68 | 1.19 | 3.38 | 3.00 | 0.75 | 0.22 | 5.94 | 0.62 | 0.38 | 0.75 | |
| **SW6085** | **REG** | (9.53) | (6.35) | (50.80) | (25.40) | (11.94) | (42.67) | (30.23) | (85.85) | (76.20) | (19.05) | (5.59) | (150.88) | (15.75) | (9.65) | (19.05) | |
| **SW8075** | **VEE** | 1/2 | 0.375 | 2.50 | 1.25 | 0.53 | 2.56 | 1.75 | 5.12 | 4.00 | 1.00 | 0.34 | 8.20 | 0.69 | 0.50 | 1.00 | |
| **SW8085** | **REG** | (12.70) | (9.53) | (63.50) | (31.75) | (13.46) | (65.02) | (44.45) | (130.05) | (101.60) | (25.40) | (8.64) | (208.28) | (17.53) | (12.70) | (25.40) | |

*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*
*Panel mounting drill size: 0.22" all valves.*

** H Dimension is with stem in closed position.*
*All dimensions for reference only and subject to change.*

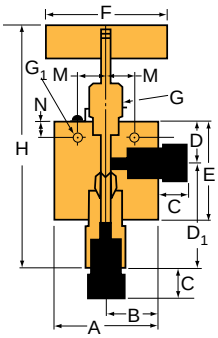
**For prompt service, Autoclave stocks select products. Consult factory.**

**Figure 4**



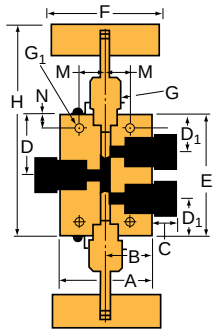

**3-Way / 1 on Pressure**

**Figure 5**




**2-Way Angle / Replaceable Seat**

**Figure 6**




**3-Way / 2-Stem Manifold**



All general terms and conditions of sale, including limitations of our liability, apply to all products and services sold.

# Needle Valves

**Medium Pressure**

# SM Series

*Pressures to 20,000 psi (1379 bar)*


Since 1945 Autoclave Engineers has designed and built premium quality valves, fittings and tubing. This commitment to engineering and manufacturing excellence has earned Autoclave a reputation for reliable efficient product performance. Autoclave Engineers has long been established as the world leader in high pressure fluid handling components for the chemical/petrochemical, waterblast, research, and oil and gas industries.

## Medium Pressure Valve Features:

- Largest-port valves available for medium pressure applications.
- Tubing sizes available from 1/4" to 1".
- Rising stem/barstock body design.
- Non-rotating stem prevents stem/seat galling.
- New one piece stem design permits ease of assembly and packing replacement.
- Metal-to-metal seating achieves bubble-tight shut-off, longer stem/seat life in abrasive flow, greater durability for repeated on/off cycles and excellent corrosion resistance.
- PTFE (Teflon) encapsulated packing provides dependable stem and body sealing.
- Stem sleeve and packing gland materials have been selected to achieve extended thread cycle life and reduced handle torque.
- Choice of Vee or Regulating stem tip.
- Available in five body patterns.

Autoclave valves are complemented by a complete line of fittings, tubing, check valves and line filters. The SM Series uses Autoclave's Medium pressure connection. The coned-and-threaded connection features orifice sizes to match the high flow characteristics of this series.

***Note: SM Series replaces 20SC Series.***

Autoclave Engineers
Fluid Components
Division of Snap-tite, Inc.
*www.autoclaveengineers.com*

# Needle Valves - SM Series

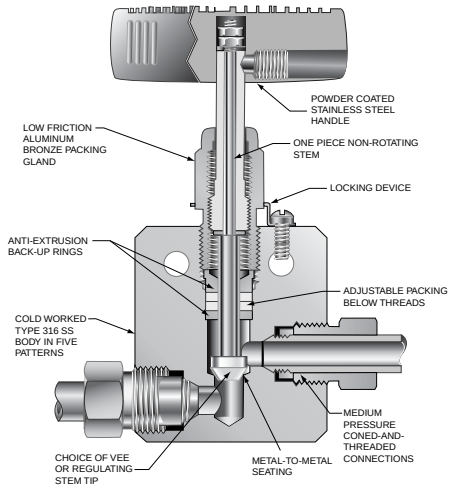
## Pressures to 20,000 psi (1379 bar)

| Tube Outside Diameter Size Inches | Connection Type | Orifice Size Inches (mm) | Rated $C_V$* | Pressure/ Temperature Rating psi (bar) @ Room Temperature** |
|---|---|---|---|---|
| 1/4 | SF250CX20 | 0.125 (3.18) | 0.31 | 20,000 (1379) |
| 3/8 | SF375CX20 | 0.219 (5.56) | 0.75 | 20,000 (1379) |
| 9/16 | SF562CX20 | 0.312 (7.92) | 1.30 | 20,000 (1379) |
| 3/4 | SF750CX20 | 0.438 (11.13) | 2.50 | 20,000 (1379) |
| 1 | SF1000CX20 | 0.562 (14.27) | 4.40 | 20,000 (1379) |
| 9/16 | SF562CX10 | 0.359 (9.12) | 1.75 | 10,000 (690) |
| 3/4 | SF750CX10 | 0.516 (13.10) | 2.80 | 10,000 (690) |
| 1 | SF1000CX10 | 0.688 (17.48) | 5.20 | 10,000 (690) |

*Notes:*

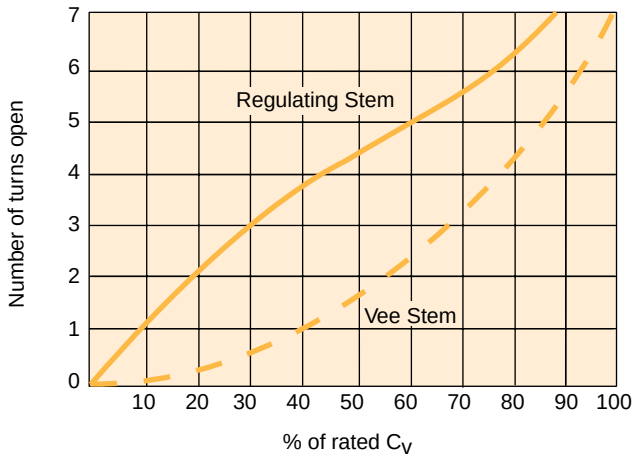
* *$C_V$ values shown are for 2-way straight valve pattern. For 2-way angle patterns, increase $C_V$ value 50%. (Based on water)*

** *For complete temperature ratings see pressure/temperature rating guide in Technical Information section.*


To ensure proper fit use Autoclave tubing

### Generalized Flow Coefficient Curves ($C_V$)




## Ordering Procedure

For complete information on available stem types, optional connections and additional valve options, see Needle Valve Options section or contact your Sales Representative. 10SM and 20SM Series valves are furnished complete with connection components, unless otherwise specified.

Typical catalog number: **20SM4071**

**20SM** — Valve Series
- **10SM**
- **20SM**

**4** — Outside Diameter Tube Size
- **4**-1/4"
- **6**-3/8"
- **9**-9/16"
- **12**-3/4"
- **16**-1"

**07** — Stem/Seat Type
- **07** - non-rotating Vee stem (on-off service)
- **08** - non-rotating regulating stem (tapered tip for regulating and shutoff)
- **87** - Vee stem with replaceable seat
- **88** - Regulating stem with replaceable seat

**1** — Body Pattern
- **1** - two-way straight
- **2** - two-way angle
- **3** - three-way, two on pressure
- **4** - three-way, one on pressure
- **5** - three-way, two stem manifold valve

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**Options** — Options

For extreme temperature and other options, see Valve Options.

## Valve Options

**Extreme Temperatures**
Standard Autoclave valves with Teflon packing may be operated to 450°F (232°C). High temperature packing and/or extended stuffing box are available for service from -423°F (-252°C) to 1200°F (649°C) by adding the following suffixes to catalog order number.
**TG** standard valve with Teflon glass packing to 600°F (316°C).
**GY** standard valve with graphite braided yarn packing to 800°F (427°C).
*Note: 3/4" rated 8000 psi (552 bar) and 1" rated 6000 psi (412 bar) maximum with graphite yarn packing.†*
**HT** extended stuffing box valve with graphite braided yarn packing to 1200°F (649°C).
**B** standard valve with cryogenic trim materials and Teflon packing to -100°F (-73°C).
**LT** extended stuffing box valve with Teflon packing and cryogenic trim materials to -423°F (-252°C).
*† This packing will affect the pressure rating. Refer to Technical Information section.*

*See needle valve options for stem and seat coating for erosive service.*

## Valve Maintenance

Repair Kits: add "R" to the front of valve catalog number for proper repair kit. (Example: **R20SM4071**)

Valve Bodies: Valve bodies are available. Order using the eight (8) digit part number found on the valve drawing or contact your Sales Representative for information.

Consult your Autoclave representative for pricing on repair kits and valve bodies. Refer to the Tools, Installation, Operation and Maintenance section for proper maintenance procedures.

*Note: Caution should be exercised in proper selection of medium pressure tubing based on actual operating conditions. Two tubing series available in some sizes: 10,000 psi (690 bar) and 20,000 psi (1380 bar).*

### 2-Way Straight

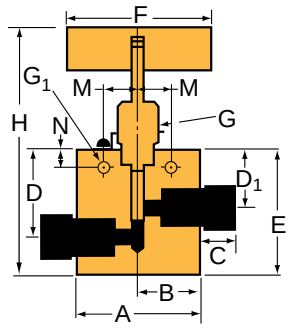
| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions - inches (mm) A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | Block Thick-ness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20SM4071 | VEE | 1/4 | 0.125 | 2.00 | 1.00 | 0.38 | 1.19 | 1.62 | 2.00 | 3.00 | 0.75 | 0.22 | 4.69 | 0.62 | 0.38 | 0.75 | See Figure 1 |
| 20SM4081 | REG | (6.35) | (3.18) | (50.80) | (25.40) | (9.65) | (30.23) | (41.15) | (50.80) | (76.20) | (19.05) | (5.59) | (119.13) | (15.75) | (9.65) | (19.05) | |
| 20SM6071 | VEE | 3/8 | 0.219 | 2.00 | 1.00 | 0.47 | 1.62 | 1.19 | 2.00 | 3.00 | 0.75 | 0.22 | 4.63 | 0.62 | 0.38 | 0.75 | |
| 20SM6081 | REG | (9.53) | (5.56) | (50.80) | (25.40) | (11.94) | (41.15) | (30.23) | (50.80) | (76.20) | (19.05) | (5.59) | (117.48) | (15.75) | (9.65) | (19.05) | |
| 20SM9071 | VEE | 9/16 | 0.312 | 2.50 | 1.25 | 0.53 | 2.38 | 1.75 | 2.88 | 4.00 | 1.00 | 0.34 | 5.93 | 0.69 | 0.50 | 1.00 | |
| 20SM9081 | REG | (14.29) | (7.92) | (63.50) | (31.75) | (13.46) | (60.45) | (44.45) | (73.15) | (101.60) | (25.40) | (8.64) | (150.86) | (17.53) | (12.70) | (25.40) | |
| 20SM12071 | VEE | 3/4 | 0.438 | 3.00 | 1.50 | 0.62 | 3.00 | 2.25 | 3.75 | 10.25 | 1.12 | 0.44 | 7.00 | 0.88 | 0.63 | 1.38 | |
| 20SM12081 | REG | (19.05) | (11.13) | (76.20) | (38.10) | (15.75) | (76.20) | (57.15) | (95.25) | (260.35) | (28.45) | (11.18) | (177.80) | (22.35) | (16.00) | (35.05) | |
| 20SM16071 | VEE | 1 | 0.562 | 4.12 | 2.06 | 0.63 | 3.75 | 2.81 | 4.63 | 10.25 | 1.62 | 0.56 | 9.00 | 1.25 | 1.13 | 1.75 | |
| 20SM16081 | REG | (25.40) | (14.27) | (104.65) | (52.32) | (16.00) | (95.25) | (71.37) | (117.60) | (260.35) | (41.15) | (14.22) | (228.84) | (31.75) | (28.70) | (44.4 5) | |
| 10SM9071 | VEE | 9/16 | 0.359 | 2.50 | 1.25 | 0.53 | 2.38 | 1.75 | 2.88 | 4.00 | 1.00 | 0.34 | 5.93 | 0.69 | 0.50 | 1.00 | |
| 10SM9081 | REG | (14.29) | (9.12) | (63.50) | (31.75) | (13.46) | (60.45) | (44.45) | (73.15) | (101.60) | (25.40) | (8.64) | (150.86) | (17.53) | (12.70) | (25.40) | |
| 10SM12071 | VEE | 3/4 | 0.516 | 3.00 | 1.50 | 0.62 | 3.00 | 2.25 | 3.75 | 10.25 | 1.12 | 0.44 | 7.00 | 0.88 | 0.63 | 1.38 | |
| 10SM12081 | REG | (19.05) | (13.11) | (76.20) | (38.10) | (15.75) | (76.20) | (57.15) | (95.25) | (260.35) | (28.45) | (11.18) | (177.80) | (22.35) | (16.00) | (35.05) | |
| 10SM16071 | VEE | 1 | 0.688 | 4.12 | 2.06 | 0.63 | 3.75 | 2.81 | 4.63 | 10.25 | 1.62 | 0.56 | 9.00 | 1.25 | 1.13 | 1.75 | |
| 10SM16081 | REG | (25.40) | (17.48) | (104.65) | (52.32) | (16.00) | (95.25) | (71.37) | (117.60) | (260.35) | (41.15) | (14.22) | (228.84) | (31.75) | (28.70) | (44.45) | |

*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*
*Panel mounting drill size: 0.22" all valves.*

** H Dimension is with stem in closed position.*
*All dimensions for reference only and subject to change.*

**For prompt service, Autoclave stock select products. Consult factory.**

**Figure 1**




**2-Way Straight**

## 2-Way Angle

| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions - inches (mm) A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | Block Thickness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20SM4072 | VEE | 1/4 | 0.125 | 2.00 | 1.00 | 0.38 | 1.19 | | 2.44 | 3.00 | 0.75 | 0.22 | 4.81 | 0.62 | 0.38 | 0.75 | |
| 20SM4082 | REG | (6.35) | (3.18) | (50.80) | (25.40) | (9.65) | (30.23) | | (61.90) | (76.20) | (19.05) | (5.59) | (122.25) | (15.75) | (9.65) | (19.05) | |
| 20SM6072 | VEE | 3/8 | 0.219 | 2.00 | 1.00 | 0.47 | 1.19 | | 2.44 | 3.00 | 0.75 | 0.22 | 4.81 | 0.62 | 0.38 | 0.75 | |
| 20SM6082 | REG | (9.53) | (5.56) | (50.80) | (25.40) | (11.94) | (30.23) | | (61.90) | (76.20) | (19.05) | (5.59) | (122.25) | (15.75) | (9.65) | (19.05) | |
| 20SM9072 | VEE | 9/16 | 0.312 | 2.50 | 1.25 | 0.53 | 1.75 | | 3.38 | 4.00 | 1.00 | 0.34 | 6.43 | 0.69 | 0.50 | 1.00 | |
| 20SM9082 | REG | (14.29) | (7.92) | (63.50) | (31.75) | (13.46) | (44.45) | | (85.85) | (101.60) | (25.40) | (8.64) | (163.56) | (17.53) | (12.70) | (25.40) | |
| 20SM12072 | VEE | 3/4 | 0.438 | 3.00 | 1.50 | 0.62 | 2.25 | | 4.25 | 10.25 | 1.12 | 0.44 | 7.50 | 0.88 | 0.63 | 1.38 | |
| 20SM12082 | REG | (19.05) | (11.13) | (76.20) | (38.10) | (15.75) | (57.15) | | (107.95) | (260.35) | (28.45) | (11.18) | (190.50) | (22.35) | (16.00) | (35.05) | See Figure 2 |
| 20SM16072 | VEE | 1 | 0.562 | 4.12 | 2.06 | 0.63 | 2.81 | | 5.12 | 10.25 | 1.62 | 0.56 | 9.00 | 1.25 | 1.13 | 1.75 | |
| 20SM16082 | REG | (25.40) | (14.27) | (104.65) | (52.32) | (16.00) | (71.37) | | (130.05) | (260.35) | (41.15) | (14.22) | (228.84) | (31.75) | (28.70) | (44.4 5) | |
| 10SM9072 | VEE | 9/16 | 0.359 | 2.50 | 1.25 | 0.53 | 1.75 | | 3.38 | 4.00 | 1.00 | 0.34 | 6.43 | 0.69 | 0.50 | 1.00 | |
| 10SM9082 | REG | (14.29) | (9.12) | (63.50) | (31.75) | (13.46) | (44.45) | | (85.85) | (101.60) | (25.40) | (8.64) | (163.56) | (17.53) | (12.70) | (25.40) | |
| 10SM12072 | VEE | 3/4 | 0.516 | 3.00 | 1.50 | 0.62 | 2.25 | | 4.25 | 10.25 | 1.12 | 0.44 | 7.50 | 0.88 | 0.63 | 1.38 | |
| 10SM12082 | REG | (19.03) | (13.11) | (76.20) | (38.10) | (15.75) | (57.15) | | (107.95) | (260.35) | (28.45) | (11.18) | (190.50) | (22.35) | (16.00) | (35.05) | |
| 10SM16072 | VEE | 1 | 0.688 | 4.12 | 2.06 | 0.63 | 2.81 | | 5.12 | 10.25 | 1.62 | 0.56 | 9.00 | 1.25 | 1.13 | 1.75 | |
| 10SM16082 | REG | (25.40) | (17.48) | (104.65) | (52.32) | (16.00) | (71.37) | | (130.05) | (260.35) | (41.15) | (14.22) | (228.84) | (31.75) | (28.70) | (44.45) | |

## 3-Way / 2 on Pressure

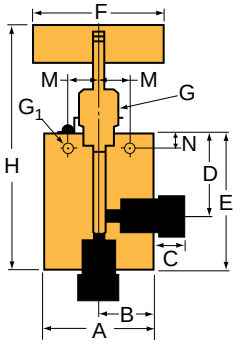
| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20SM4073 | VEE | 1/4 | 0.125 | 2.00 | 1.00 | 0.38 | 1.63 | 1.19 | 2.63 | 3.00 | 0.75 | 0.22 | 5.00 | 0.62 | 0.38 | 0.75 | |
| 20SM4083 | REG | (6.35) | (3.18) | (50.80) | (25.40) | (9.65) | (41.28) | (30.23) | (66.68) | (76.20) | (19.05) | (5.59) | (127.00) | (15.75) | (9.65) | (19.05) | |
| 20SM6073 | VEE | 3/8 | 0.219 | 2.00 | 1.00 | 0.47 | 1.63 | 1.19 | 2.63 | 3.00 | 0.75 | 0.22 | 5.00 | 0.62 | 0.38 | 0.75 | |
| 20SM6083 | REG | (9.53) | (5.56) | (50.80) | (25.40) | (11.94) | (41.28) | (30.23) | (66.68) | (76.20) | (19.05) | (5.59) | (127.00) | (15.75) | (9.65) | (19.05) | |
| 20SM9073 | VEE | 9/16 | 0.312 | 2.50 | 1.25 | 0.53 | 2.38 | 1.75 | 3.63 | 4.00 | 1.00 | 0.34 | 6.51 | 0.69 | 0.50 | 1.00 | |
| 20SM9083 | REG | (14.29) | (7.92) | (63.50) | (31.75) | (13.46) | (60.45) | (44.45) | (92.08) | (101.60) | (25.40) | (8.64) | (165.59) | (17.53) | (12.70) | (25.40) | |
| 20SM12073 | VEE | 3/4 | 0.438 | 3.00 | 1.50 | 0.62 | 3.00 | 2.25 | 4.63 | 10.25 | 1.12 | 0.44 | 7.88 | 0.88 | 0.63 | 1.38 | |
| 20SM12083 | REG | (19.05) | (11.13) | (76.20) | (38.10) | (15.75) | (76.20) | (57.15) | (117.48) | (260.35) | (28.45) | (11.18) | (200.03) | (22.35) | (16.00) | (35.05) | See Figure 3 |
| 20SM16073 | VEE | 1 | 0.562 | 4.12 | 2.06 | 0.63 | 3.75 | 2.81 | 5.88 | 10.25 | 1.62 | 0.56 | 9.75 | 1.25 | 1.13 | 1.75 | |
| 20SM16083 | REG | (25.40) | (14.27) | (104.65) | (52.32) | (16.00) | (95.25) | (71.37) | (149.35) | (260.35) | (41.15) | (14.22) | (247.89) | (31.75) | (28.70) | (44.4 5) | |
| 10SM9073 | VEE | 9/16 | 0.359 | 2.50 | 1.25 | 0.53 | 2.38 | 1.75 | 3.63 | 4.00 | 1.00 | 0.34 | 6.52 | 0.69 | 0.50 | 1.00 | |
| 10SM9083 | REG | (14.29) | (9.12) | (63.50) | (31.75) | (13.46) | (60.45) | (44.45) | (92.08) | (101.60) | (25.40) | (8.64) | (165.59) | (17.53) | (12.70) | (25.40) | |
| 10SM12073 | VEE | 3/4 | 0.516 | 3.00 | 1.50 | 0.62 | 3.00 | 2.25 | 4.63 | 10.25 | 1.12 | 0.44 | 7.88 | 0.88 | 0.63 | 1.38 | |
| 10SM12083 | REG | (19.03) | (13.11) | (76.20) | (38.10) | (15.75) | (76.20) | (57.15) | (117.48) | (260.35) | (28.45) | (11.18) | (200.03) | (22.35) | (16.00) | (35.05) | |
| 10SM16073 | VEE | 1 | 0.688 | 4.12 | 2.06 | 0.63 | 3.75 | 2.81 | 5.88 | 10.25 | 1.62 | 0.56 | 9.75 | 1.25 | 1.13 | 1.75 | |
| 10SM16083 | REG | (25.40) | (17.48) | (104.65) | (52.32) | (16.00) | (95.25) | (71.37) | (149.35) | (260.35) | (41.15) | (14.22) | (247.89) | (31.75) | (28.70) | (44.45) | |

*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*
*Panel mounting drill size: 0.22" all valves.*

** H Dimension is with stem in closed position.*
*All dimensions for reference only and subject to change.*

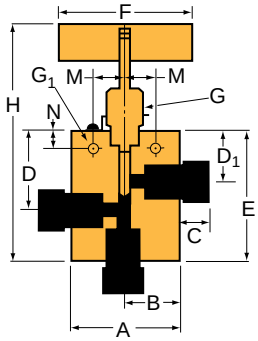
**For prompt service, Autoclave stock select products. Consult factory.**

**Figure 2**




**2-Way Angle**

**Figure 3**




**3-Way / 2 on Pressure**

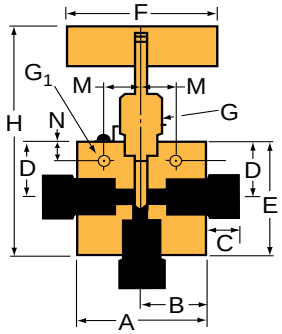
| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions - inches (mm) | | | | | | | | | | | | Block Thick-ness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | | |
| **3-Way / 1 on Pressure** | | | | | | | | | | | | | | | | | |
| 20SM4074 | VEE | 1/4 | 0.125 | 2.00 | 1.00 | 0.38 | 1.19 | | 2.44 | 3.00 | 0.75 | 0.22 | 4.81 | 0.62 | 0.38 | 0.75 | See Figure 4 |
| 20SM4084 | REG | (6.35) | (3.18) | (50.80) | (25.40) | (9.65) | (30.23) | | (61.90) | (76.20) | (19.05) | (5.59) | (122.25) | (15.75) | (9.65) | (19.05) | |
| 20SM6074 | VEE | 3/8 | 0.219 | 2.00 | 1.00 | 0.47 | 1.19 | | 2.44 | 3.00 | 0.75 | 0.22 | 4.81 | 0.62 | 0.38 | 0.75 | |
| 20SM6084 | REG | (9.53) | (5.56) | (50.80) | (25.40) | (11.94) | (30.23) | | (61.90) | (76.20) | (19.05) | (5.59) | (122.25) | (15.75) | (9.65) | (19.05) | |
| 20SM9074 | VEE | 9/16 | 0.312 | 2.50 | 1.25 | 0.53 | 1.75 | | 3.38 | 4.00 | 1.00 | 0.34 | 6.31 | 0.69 | 0.50 | 1.00 | |
| 20SM9084 | REG | (14.29) | (7.92) | (63.50) | (31.75) | (13.46) | (44.45) | | (85.85) | (101.60) | (25.40) | (8.64) | (160.56) | (17.53) | (12.70) | (25.40) | |
| 20SM12074 | VEE | 3/4 | 0.438 | 3.00 | 1.50 | 0.62 | 2.25 | | 4.25 | 10.25 | 1.12 | 0.44 | 7.50 | 0.88 | 0.63 | 1.38 | |
| 20SM12084 | REG | (19.05) | (11.13) | (76.20) | (38.10) | (15.75) | (57.15) | | (107.95) | (260.35) | (28.45) | (11.18) | (190.50) | (22.35) | (16.00) | (35.05) | |
| 20SM16074 | VEE | 1 | 0.562 | 4.12 | 2.06 | 0.63 | 2.81 | | 5.12 | 10.25 | 1.62 | 0.56 | 9.09 | 1.25 | 1.13 | 1.75 | |
| 20SM16084 | REG | (25.40) | (14.27) | (104.65) | (52.32) | (16.00) | (71.37) | | (130.05) | (260.35) | (41.15) | (14.22) | (231.13) | (31.75) | (28.70) | (44.4 5) | |
| 10SM9074 | VEE | 9/16 | 0.359 | 2.50 | 1.25 | 0.53 | 1.75 | | 3.38 | 4.00 | 1.00 | 0.34 | 6.31 | 0.69 | 0.50 | 1.00 | |
| 10SM9084 | REG | (14.29) | (9.12) | (63.50) | (31.75) | (13.46) | (44.45) | | (85.85) | (101.60) | (25.40) | (8.64) | (160.56) | (17.53) | (12.70) | (25.40) | |
| 10SM12074 | VEE | 3/4 | 0.516 | 3.00 | 1.50 | 0.62 | 2.25 | | 4.25 | 10.25 | 1.12 | 0.44 | 7.50 | 0.88 | 0.63 | 1.38 | |
| 10SM12084 | REG | (19.03) | (13.11) | (76.20) | (38.10) | (15.75) | (57.15) | | (107.95) | (260.35) | (28.45) | (11.18) | (190.50) | (22.35) | (16.00) | (35.05) | |
| 10SM16074 | VEE | 1 | 0.688 | 4.12 | 2.06 | 0.63 | 2.81 | | 5.12 | 10.25 | 1.62 | 0.56 | 9.09 | 1.25 | 1.13 | 1.75 | |
| 10SM16084 | REG | (25.40) | (17.48) | (104.65) | (52.32) | (16.00) | (71.37) | | (130.05) | (260.35) | (41.15) | (14.22) | (231.13) | (31.75) | (28.70) | (44.45) | |
| **2-Way Angle / Replaceable Seat** | | | | | | | | | | | | | | | | | |
| 20SM4872 | VEE | 1/4 | 0.125 | 2.00 | 1.00 | 0.38 | 1.19 | 2.13 | 2.25 | 3.00 | 0.75 | 0.22 | 5.75 | 0.62 | 0.38 | 0.75 | See Figure 5 |
| 20SM4882 | REG | (6.35) | (3.18) | (50.80) | (25.40) | (9.65) | (30.23) | (53.98) | (57.15) | (76.20) | (19.05) | (5.59) | (146.05) | (15.75) | (9.65) | (19.05) | |
| 20SM6872 | VEE | 3/8 | 0.219 | 2.00 | 1.00 | 0.47 | 1.19 | 2.13 | 2.25 | 3.00 | 0.75 | 0.22 | 5.75 | 0.62 | 0.38 | 0.75 | |
| 20SM6882 | REG | (9.53) | (5.56) | (50.80) | (25.40) | (11.94) | (30.23) | (53.98) | (57.15) | (76.20) | (19.05) | (5.59) | (146.05) | (15.75) | (9.65) | (19.05) | |
| 20SM9872 | VEE | 9/16 | 0.312 | 2.50 | 1.25 | 0.53 | 1.75 | 2.50 | 3.13 | 4.00 | 1.00 | 0.34 | 7.34 | 0.69 | 0.50 | 1.00 | |
| 20SM9882 | REG | (14.29) | (7.92) | (63.50) | (31.75) | (13.46) | (44.45) | (63.50) | (79.38) | (101.60) | (25.40) | (8.64) | (186.68) | (17.53) | (12.70) | (25.40) | |
| 20SM12872 | VEE | 3/4 | 0.438 | 3.00 | 1.50 | 0.62 | 2.25 | 3.44 | 4.25 | 10.25 | 1.12 | 0.44 | 9.00 | 0.88 | 0.63 | 1.38 | |
| 20SM12882 | REG | (19.05) | (11.13) | (76.20) | (38.10) | (15.75) | (57.15) | (87.38) | (107.95) | (260.35) | (28.45) | (11.18) | (228.60) | (22.35) | (16.00) | (35.05) | |
| 20SM16872 | VEE | 1 | 0.562 | 4.12 | 2.06 | 0.63 | 2.69 | 4.38 | 5.25 | 10.25 | 1.62 | 0.56 | 11.00 | 1.25 | 1.13 | 1.75 | |
| 20SM16882 | REG | (25.40) | (14.27) | (104.65) | (52.32) | (16.00) | (68.33) | (111.13) | (133.35) | (260.35) | (41.15) | (14.22) | (279.64) | (31.75) | (28.70) | (44.4 5) | |
| 10SM9872 | VEE | 9/16 | 0.359 | 2.50 | 1.25 | 0.53 | 1.75 | 2.50 | 3.38 | 4.00 | 1.00 | 0.34 | 7.34 | 0.69 | 0.50 | 1.00 | |
| 10SM9882 | REG | (14.29) | (9.12) | (63.50) | (31.75) | (13.46) | (44.45) | (63.50) | (85.85) | (101.60) | (25.40) | (8.64) | (186.68) | (17.53) | (12.70) | (25.40) | |
| 10SM12872 | VEE | 3/4 | 0.516 | 3.00 | 1.50 | 0.62 | 2.25 | 3.44 | 4.25 | 10.25 | 1.12 | 0.44 | 9.00 | 0.88 | 0.63 | 1.38 | |
| 10SM12882 | REG | (19.03) | (13.11) | (76.20) | (38.10) | (15.75) | (57.15) | (87.38) | (107.95) | (260.35) | (28.45) | (11.18) | (228.60) | (22.35) | (16.00) | (35.05) | |
| 10SM16872 | VEE | 1 | 0.688 | 4.12 | 2.06 | 0.63 | 2.69 | 4.38 | 5.25 | 10.25 | 1.62 | 0.56 | 11.00 | 1.25 | 1.13 | 1.75 | |
| 10SM16882 | REG | (25.40) | (17.48) | (104.65) | (52.32) | (16.00) | (68.33) | (111.13) | (133.35) | (260.35) | (41.15) | (14.22) | (279.64) | (31.75) | (28.70) | (44.45) | |

*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*
*Panel mounting drill size: 0.22" all valves.*

** H Dimension is with stem in closed position.*
*All dimensions for reference only and subject to change.*

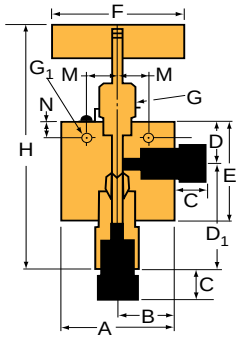
**For prompt service, Autoclave stock select products. Consult factory.**

**Figure 4**




**3-Way / 1 on Pressure**

**Figure 5**




**2-Way Angle / Replaceable Seat**

## 3-Way Angle / 2-Stem Manifold

| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions - inches (mm) A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | Block Thick-ness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20SM4075 | VEE | 1/4 | 0.125 | 2.00 | 1.00 | 0.38 | 1.69 | 1.19 | 3.38 | 3.00 | 0.75 | 0.22 | 8.13 | 0.62 | 0.38 | 0.75 | |
| 20SM4085 | REG | (6.35) | (3.18) | (50.80) | (25.40) | (9.65) | (42.85) | (30.15) | (85.73) | (76.20) | (19.05) | (5.59) | (206.38) | (15.75) | (9.65) | (19.05) | |
| 20SM6075 | VEE | 3/8 | 0.219 | 2.00 | 1.00 | 0.47 | 1.69 | 1.19 | 3.38 | 3.00 | 0.75 | 0.22 | 8.13 | 0.62 | 0.38 | 0.75 | |
| 20SM6085 | REG | (9.53) | (5.56) | (50.80) | (25.40) | (11.94) | (42.85) | (30.15) | (85.73) | (76.20) | (19.05) | (5.59) | (206.38) | (15.75) | (9.65) | (19.05) | |
| 20SM9075 | VEE | 9/16 | 0.312 | 2.50 | 1.25 | 0.53 | 2.56 | 1.75 | 5.13 | 4.00 | 1.00 | 0.34 | 11.31 | 0.69 | 0.50 | 1.00 | |
| 20SM9085 | REG | (14.29) | (7.92) | (63.50) | (31.75) | (13.46) | (65.07) | (44.45) | (130.18) | (101.60) | (25.40) | (8.64) | (287.56) | (17.53) | (12.70) | (25.40) | |
| 20SM12075 | VEE | 3/4 | 0.438 | 3.00 | 1.50 | 0.62 | 3.25 | 2.25 | 6.50 | 10.25 | 1.12 | 0.44 | 13.00 | 0.88 | 0.63 | 1.38 | |
| 20SM12085 | REG | (19.05) | (11.13) | (76.20) | (38.10) | (15.75) | (82.55) | (57.15) | (165.10) | (260.35) | (28.45) | (11.18) | (330.20) | (22.35) | (16.00) | (35.05) | |
| 20SM16075 | VEE | 1 | 0.562 | 4.12 | 2.06 | 0.63 | 3.75 | 2.81 | 7.50 | 10.25 | 1.62 | 0.56 | 15.44 | 1.25 | 1.13 | 1.75 | |
| 20SM16085 | REG | (25.40) | (14.27) | (104.65) | (52.32) | (16.00) | (95.25) | (71.37) | (190.50) | (260.35) | (41.15) | (14.22) | (292.42) | (31.75) | (28.70) | (44.4 5) | |
| 10SM9075 | VEE | 9/16 | 0.359 | 2.50 | 1.25 | 0.53 | 2.56 | 1.75 | 5.13 | 4.00 | 1.00 | 0.34 | 11.31 | 0.69 | 0.50 | 1.00 | |
| 10SM9085 | REG | (14.29) | (9.12) | (63.50) | (31.75) | (13.46) | (65.07) | (44.45) | (130.18) | (101.60) | (25.40) | (8.64) | (287.56) | (17.53) | (12.70) | (25.40) | |
| 10SM12075 | VEE | 3/4 | 0.516 | 3.00 | 1.50 | 0.62 | 3.25 | 2.25 | 6.50 | 10.25 | 1.12 | 0.44 | 13.00 | 0.88 | 0.63 | 1.38 | |
| 10SM12085 | REG | (19.03) | (13.11) | (76.20) | (38.10) | (15.75) | (82.55) | (57.15) | (165.10) | (260.35) | (28.45) | (11.18) | (330.20) | (22.35) | (16.00) | (35.05) | |
| 10SM16075 | VEE | 1 | 0.688 | 4.12 | 2.06 | 0.63 | 3.75 | 2.81 | 7.50 | 10.25 | 1.62 | 0.56 | 15.44 | 1.25 | 1.13 | 1.75 | |
| 10SM16085 | REG | (25.40) | (17.48) | (104.65) | (52.32) | (16.00) | (95.25) | (71.37) | (190.50) | (260.35) | (41.15) | (14.22) | (392.42) | (31.75) | (28.70) | (44.45) | |

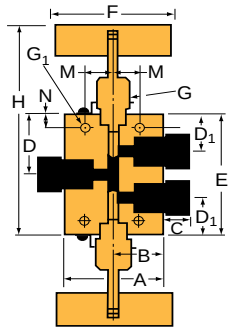
**See Figure 6**

*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*
*Panel mounting drill size: 0.22" all valves.*

** H Dimension is with stem in closed position.*
*All dimensions for reference only and subject to change.*

**For prompt service, Autoclave stock select products. Consult factory.**

**Figure 6**




**3-Way / 2-Stem Manifold**

# Needle Valves

**High Pressure**

## 30SC, 30VM, 40VM, 60VM, 100VM, & 150V Series

*Pressures to 150,000 psi (10342 bar)*

Since 1945, Autoclave Engineers has designed and built premium quality valves, fittings and tubing. This commitment to engineering and manufacturing excellence has earned Autoclave a reputation for reliable and efficient product performance. Autoclave Engineers has long been established as the worldwide leader in high pressure fluid handling components for the chemical/petrochemical, research, oil and gas, waterjet, and waterblast industries.

Autoclave Engineers
Fluid Components
Division of Snap-tite, Inc.
*www.autoclaveengineers.com*

# Needle Valves - High Pressure

## High Pressure Valve Features

- Tubing sizes from 1/4” to 1”.
- Non-rotating stem prevents stem/seat galling.
- Rising stem/barstock body design.
- Metal-to-metal seating achieves bubble-tight shut-off, longer stem/seat life in abrasive flow, greater durability for repeated on/off cycles and excellent corrosion resistance.
- For dependable stem and body sealing 30SC and 30VM valves are furnished with PTFE (Teflon) encapsulated packing; the 40VM and 60VM valves feature nylon/leather packing below threads.
- Stem sleeve and packing gland materials have been selected to achieve extended thread cycle life and reduced handle torque.
- Choice of Vee or Regulating stem tips.

### Series 100VM: Pressures to 100,000 psi (6895 bar) features:

- Cold-worked type 316 stainless steel body with aluminum bronze packing gland and non-rotating stem.
- Nylon and leather packing below stem threads.

### Series 150V: Pressures to 150,000 psi (10342 bar) features:

- Cylindrical body of high strength alloy steel with stainless steel packing gland. Tool steel non-rotating stem with replaceable seat of nickel maraging steel. Stem must be actuated with torque wrench (refer to Tools, Installation, Operation and Maintenance section).
- Wedge-type Teflon and leather packing below stem threads with beryllium-copper Autoclave Anti-Extrusion Back up Rings.
- Vee stem tip only

Autoclave valves are complemented by a complete line of high pressure fittings and tubing. The high pressure series uses Autoclave’s coned-and-threaded connections for dependable performance in gas or liquid service.

# Needle Valves - 30SC Series

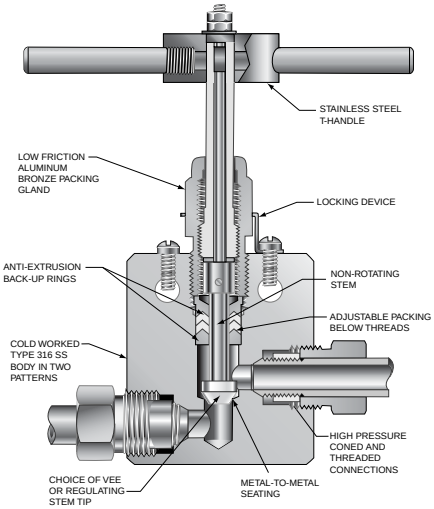
## Pressures to 30,000 psi (2068 bar)

| Tube Outside Diameter Size Inches | Connection Type | Orifice Size Inches (mm) | Rated $C_V$* | Pressure/ Temperature Rating psi (bar) @ Room Temperature** |
|---|---|---|---|---|
| 1 | SF1000CX43 | .438 (11.12) | 2.6 | 30,000 (2068) |

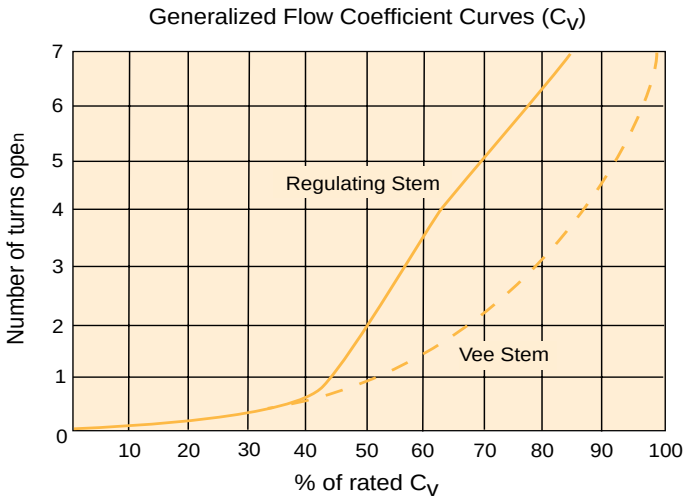
*Notes:*

* *$C_V$ values shown are for 2-way straight valve pattern. For 2-way angle patterns, increase $C_V$ value 50%.*

** *For complete temperature ratings see pressure/temperature rating guide in Technical Information section.*


To ensure proper fit use Autoclave tubing




## Ordering Procedure

For complete information on available stem types, optional connections and additional valve options, see Needle Valve Options section or contact your Sales Representative. The 30SC Series valves are furnished complete with connection components, unless otherwise specified.

Typical catalog number: **30SC16071**

**30SC** — **Valve Series**

**16** — **Outside Diameter Tube Size**

**16**-1”

**07** — **Stem/Seat Type**

- **07** - non-rotating Vee stem (on-off service)
- **08** - non-rotating regulating stem (tapered tip for regulating and shutoff)
- **87** - Vee stem with replaceable seat
- **88** - Regulating stem with replaceable seat

**1** — **Body Pattern**

- **1** - two-way straight
- **2** - two-way angle

—

**Options** — **Options**

For extreme temperature and other options, see Valve Options.

## Valve Options

**Extreme Temperatures**
Standard Autoclave valves with Teflon packing may be operated to 450°F (232°C). High temperature packing is available for service from -423°F (-252°C) to 1200°F (649°C) by adding the following suffixes to catalog order number.

**TG** - standard valve with Teflon glass packing to 600°F (316°C).
**GY** - standard valve with graphite braided yarn packing to 800°F (427°C).
**HT** - extended stuffing box valve with graphite braided yarn packing to 1200°F (649°C).
**B** - standard valve with cryogenic trim material and Teflon packing to -100°F (-73°C).
**LT** - extended stuffing box valve with Teflon packing & Cryogenic trim materials to -423°F (-252°C).

## Valve Maintenance

Repair Kits: add "R" to the front of valve catalog number for proper repair kit. (Example: **R30SC16071**)

Valve Bodies: Valve bodies are available. Order using the eight (8) digit part number found in the valve drawing or contact your Sales Representative for information.

Consult your Autoclave representative for pricing on repair kits and valve bodies. Refer to the Tools, Installation, Operation and Maintenance section for proper maintenance procedures.

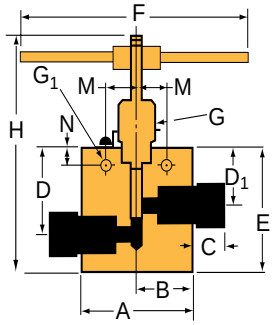
| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions - inches (mm) | | | | | | | | | | | | Block Thick-ness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | | |
| **2-Way Straight** | | | | | | | | | | | | | | | | | |
| 30SC16071 | VEE | 1" | 0.438 | 4.13 | 2.06 | 0.72 | 3.50 | 2.75 | 4.44 | 10.25 | 1.62 | 0.56 | 8.42 | 1.25 | 1.12 | 1.75 | See Figure 1 |
| 30SC16081 | REG | (25.40) | (11.12) | (104.90) | (52.32) | (18.28) | (88.90) | (69.85) | (112.77) | (260.35) | (41.14) | (14.22) | (213.86) | (31.75) | (28.44) | (44.45) | |
| **2-Way Angle** | | | | | | | | | | | | | | | | | |
| 30SC16072 | VEE | 1" | 0.438 | 4.13 | 2.06 | 0.72 | 2.75 | | 5.12 | 10.25 | 1.62 | 0.56 | 9.35 | 1.25 | 1.12 | 1.75 | See Figure 2 |
| 30SC16082 | REG | (25.40) | (11.12) | (104.90) | (52.32) | (18.28) | (69.85) | | (130.04) | (260.35) | (41.14) | (14.22) | (237.49) | (31.75) | (28.44) | (44.45) | |
| **2-Way Angle/Replaceable Seat** | | | | | | | | | | | | | | | | | |
| 30SC16872 | VEE | 1" | 0.438 | 4.13 | 2.06 | 0.72 | 2.81 | 4.31 | 5.12 | 7.00 | 1.62 | 0.56 | 10.56 | 1.25 | 1.12 | 1.75 | See Figure 3 |
| 30SC16882 | REG | (25.40) | (11.12) | (104.90) | (52.32) | (18.28) | (71.37) | (109.47) | (130.04) | (177.80) | (41.14) | (14.22) | (268.22) | (31.75) | (28.44) | (44.45) | |

*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*
*Panel mounting drill size: 0.22" all valves.*

*All dimensions for reference only and subject to change.*
**H Dimesion is with stem in closed position*

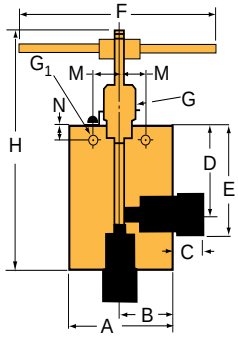
**For prompt service, Autoclave stocks select products. Consult factory.**

**Figure 1**



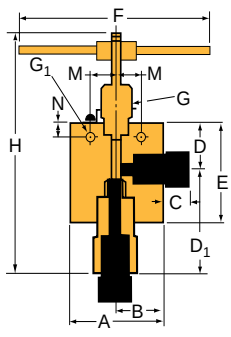

**2-Way Straight**

**Figure 2**




**2-Way Angle**

**Figure 3**




**2-Way Angle / Replaceable Seat**

# Needle Valves - 30VM Series

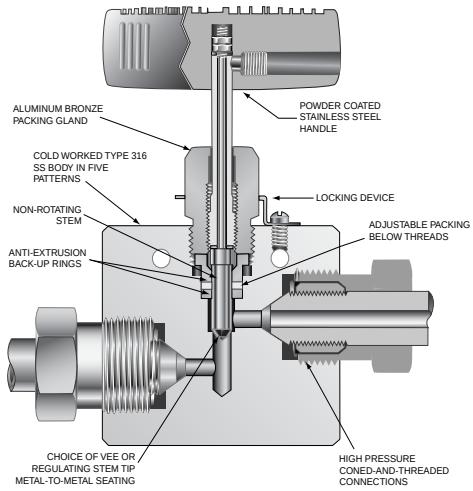
## Pressures to 30,000 psi (2068 bar)

| Tube Outside Diameter Size Inches | Connection Type | Orifice Size Inches (mm) | Rated $C_V$* | Pressure/ Temperature Rating psi (bar) @ Room Temperature** |
|---|---|---|---|---|
| 1/4 | F250C | 0.094 (2.39) | 0.12 | 30,000 (2068) |
| 3/8 | F375C | 0.125 (3.18) | 0.23 | 30,000 (2068) |
| 9/16 | F562C | 0.125 (3.18) | 0.33 | 30,000 (2068) |

*Notes:*

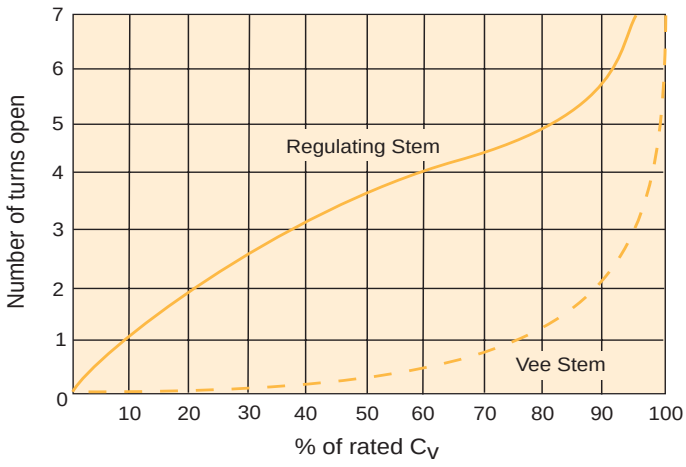
* *$C_V$ values shown are for 2-way straight valve pattern. For 2-way angle patterns, increase $C_V$ value 50%.*

** *For complete temperature ratings see pressure/temperature rating guide in Technical Information section.*


To ensure proper fit use Autoclave tubing

**Generalized Flow Coefficient Curves ($C_V$)**




## Ordering Procedure

For complete information on available stem types, optional connections and additional valve options, see Needle Valve Options section or contact your Sales Representative. The 30VM Series valves are furnished complete with connection components, unless otherwise specified.

Typical catalog number: **30VM4071**

**30VM** — **Valve Series**

**4** — **Outside Diameter Tube Size**

**4**-1/4”
**6**-3/8”
**9**-9/16”

**07** — **Stem/Seat Type**

**07** - non-rotating Vee stem (on-off service)
**08** - non-rotating regulating stem (tapered tip for regulating and shutoff)
**87** - Vee stem with replaceable seat
**88** - Regulating stem with replaceable seat

**1** — **Body Pattern**

**1** - two-way straight
**2** - two-way angle
**3** - three-way, two on pressure
**4** - three-way, one on pressure
**5** - three-way, two-stem manifold valve

—

**Options** — **Options**

For extreme temperature and other options, see Valve Options.

## Valve Options

**Extreme Temperatures**

Standard Autoclave valves with Teflon packing may be operated to 450°F (232°C). High temperature packing is available for service from -423°F (-252°C) to 1200°F (644°C) by adding the following suffixes to catalog order number.

**TG** - standard valve with Teflon glass packing to 600°F (316°C).
**GY** - standard valve with graphite braided yarn packing to 800°F (427°C).
**HT** - extended stuffing box valve with graphite braided yarn packing to 1200°F (649°C).
**B** - standard valve with cryogenic trim material and Teflon packing to -100°F (-73°C).
**LT** - extended stuffing box valve with Teflon packing & Cryogenic trim materials to -423°F (-252°C).

## Valve Maintenance

Repair Kits: add "R" to the front of valve catalog number for proper repair kit. (Example: **R30VM4071**)

Valve Bodies: Valve bodies are available. Order using the eight (8) digit part number found in the valve drawing or contact your Sales Representative for information.

Consult your Autoclave representative for pricing on repair kits and valve bodies. Refer to the Tools, Installation, Operation and Maintenance section for proper maintenance procedures.

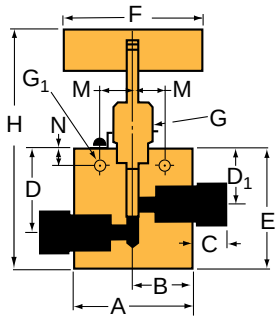
| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions - inches (mm) | | | | | | | | | | | | Block Thick-ness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | | |
| **2-Way Straight** | | | | | | | | | | | | | | | | | |
| 30VM4071 | VEE | 1/4 | 0.094 | 2.00 | 1.00 | 0.50 | 1.50 | 1.12 | 2.00 | 3.00 | 1.00 | 0.22 | 4.62 | 0.69 | 0.38 | 1.00 | See Figure 1 |
| 30VM4081 | REG | (6.35) | (2.39) | (50.80) | (25.40) | (12.70) | (38.10) | (28.45) | (50.80) | (76.20) | (25.40) | (5.59) | (117.35) | (17.53) | (9.65) | (25.40) | |
| 30VM6071 | VEE | 3/8 | 0.125 | 2.00 | 1.00 | 0.53 | 1.50 | 1.12 | 2.00 | 3.00 | 1.00 | 0.22 | 4.68 | 0.69 | 0.38 | 1.00 | |
| 30VM6081 | REG | (9.53) | (3.18) | (50.80) | (25.40) | (13.46) | (38.10) | (28.45) | (50.80) | (76.20) | (25.40) | (5.59) | (118.87) | (17.53) | (9.65) | (25.40) | |
| 30VM9071 | VEE | 9/16 | 0.125 | 2.62 | 1.31 | 0.81 | 1.56 | 1.12 | 2.44 | 3.00 | 1.00 | 0.28 | 5.06 | 0.69 | 0.38 | 1.50 | |
| 30VM9081 | REG | (14.29) | (3.18) | (66.55) | (33.27) | (20.57) | (39.62) | (28.45) | (61.98) | (76.20) | (25.40) | (7.11) | (128.52) | (17.53) | (9.65) | (38.10) | |
| **2-Way Angle** | | | | | | | | | | | | | | | | | |
| 30VM4072 | VEE | 1/4 | 0.094 | 2.00 | 1.00 | 0.50 | | 1.12 | 2.00 | 3.00 | 1.00 | 0.22 | 4.62 | 0.69 | 0.38 | 1.00 | See Figure 2 |
| 30VM4082 | REG | (6.35) | (2.39) | (50.80) | (25.40) | (12.70) | | (28.45) | (50.80) | (76.20) | (25.40) | (5.59) | (117.35) | (17.53) | (9.65) | (25.40) | |
| 30VM6072 | VEE | 3/8 | 0.125 | 2.00 | 1.00 | 0.53 | | 1.12 | 2.12 | 3.00 | 1.00 | 0.22 | 4.74 | 0.69 | 0.38 | 1.00 | |
| 30VM6082 | REG | (9.53) | (3.18) | (50.80) | (25.40) | (13.46) | | (28.45) | (53.85) | (76.20) | (25.40) | (5.59) | (120.40) | (17.53) | (9.65) | (25.40) | |
| 30VM9072 | VEE | 9/16 | 0.125 | 2.62 | 1.31 | 0.81 | | 1.12 | 2.44 | 3.00 | 1.00 | 0.28 | 5.06 | 0.69 | 0.38 | 1.50 | |
| 30VM9082 | REG | (14.29) | (3.18) | (66.55) | (33.27) | (20.57) | | (28.45) | (61.98) | (76.20) | (25.40) | (7.11) | (128.52) | (17.53) | (9.65) | (38.10) | |
| **3-Way / 2 on Pressure** | | | | | | | | | | | | | | | | | |
| 30VM4073 | VEE | 1/4 | 0.094 | 2.00 | 1.00 | 0.50 | 1.50 | 1.12 | 2.12 | 3.00 | 1.00 | 0.22 | 4.74 | 0.69 | 0.38 | 1.00 | See Figure 3 |
| 30VM4083 | REG | (6.35) | (2.39) | (50.80) | (25.40) | (12.70) | (38.10) | (28.45) | (53.85) | (76.20) | (25.40) | (5.59) | (120.40) | (17.53) | (9.65) | (25.40) | |
| 30VM6073 | VEE | 3/8 | 0.125 | 2.00 | 1.00 | 0.53 | 1.50 | 1.12 | 2.50 | 3.00 | 1.00 | 0.22 | 5.12 | 0.69 | 0.38 | 1.00 | |
| 30VM6083 | REG | (9.53) | (3.18) | (50.80) | (25.40) | (13.46) | (38.10) | (28.45) | (63.50) | (76.20) | (25.40) | (5.59) | (130.05) | (17.53) | (9.65) | (25.40) | |
| 30VM9073 | VEE | 9/16 | 0.125 | 2.62 | 1.31 | 0.81 | 1.56 | 1.12 | 2.88 | 3.00 | 1.00 | 0.28 | 5.49 | 0.69 | 0.38 | 1.50 | |
| 30VM9083 | REG | (14.29) | (3.18) | (66.55) | (33.27) | (20.57) | (39.62) | (28.45) | (73.15) | (76.20) | (25.40) | (7.11) | (139.45) | (17.53) | (9.65) | (38.10) | |

*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*
*Panel mounting drill size: 0.22" all valves.*

*All dimensions for reference only and subject to change.*
** H Dimension is with stem in the closed position.*

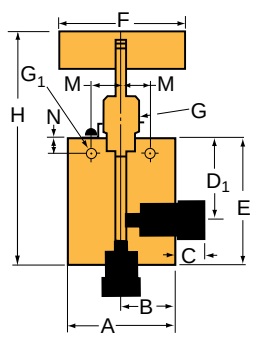
**For prompt service, Autoclave stocks select products. Consult factory.**

**Figure 1**



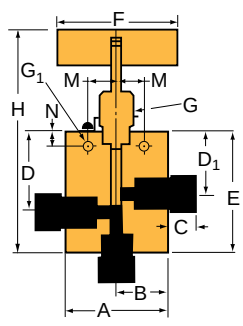

**2-Way Straight**

**Figure 2**




**2-Way Angle**

**Figure 3**




**3-Way / 2 on Pressure**

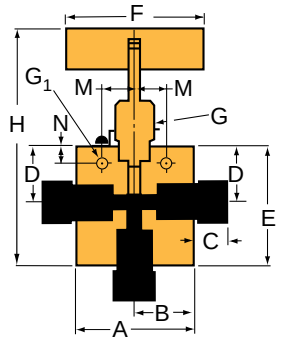
| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions - inches (mm) | | | | | | | | | | | | Block Thick-ness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | | |
| **3-Way / 1 on Pressure** | | | | | | | | | | | | | | | | | |
| 30VM4074 | VEE | 1/4 | 0.094 | 2.00 | 1.00 | 0.50 | 1.12 | | 2.00 | 3.00 | 1.00 | 0.22 | 4.62 | 0.69 | 0.38 | 1.00 | |
| 30VM4084 | REG | (6.35) | (2.39) | (50.80) | (25.40) | (12.70) | (28.45) | | (50.80) | (76.20) | (25.40) | (5.59) | (117.35) | (17.53) | (9.65) | (25.40) | |
| 30VM6074 | VEE | 3/8 | 0.125 | 2.00 | 1.00 | 0.53 | 1.12 | | 2.12 | 3.00 | 1.00 | 0.22 | 4.74 | 0.69 | 0.38 | 1.00 | **See Figure 4** |
| 30VM6084 | REG | (9.53) | (3.18) | (50.80) | (25.40) | (13.46) | (28.45) | | (53.85) | (76.20) | (25.40) | (5.59) | (120.40) | (17.53) | (9.65) | (25.40) | |
| 30VM9074 | VEE | 9/16 | 0.125 | 2.62 | 1.31 | 0.81 | 1.12 | | 2.44 | 3.00 | 1.00 | 0.28 | 5.12 | 0.69 | 0.38 | 1.50 | |
| 30VM9084 | REG | (14.29) | (3.18) | (66.55) | (33.27) | (20.57) | (28.45) | | (61.98) | (76.20) | (25.40) | (7.11) | (130.05) | (17.53) | (9.65) | (38.10) | |
| **2-Way Angle / Replaceable Seat** | | | | | | | | | | | | | | | | | |
| 30VM4872 | VEE | 1/4 | 0.094 | 2.00 | 1.00 | 0.50 | 1.12 | 2.06 | 2.38 | 3.00 | 1.00 | 0.22 | 5.80 | 0.69 | 0.38 | 1.00 | |
| 30VM4882 | REG | (6.35) | (2.39) | (50.80) | (25.40) | (12.70) | (28.45) | (52.32) | (60.45) | (76.20) | (25.40) | (5.59) | (147.32) | (17.53) | (9.65) | (25.40) | |
| 30VM6872 | VEE | 3/8 | 0.125 | 2.00 | 1.00 | 0.53 | 1.12 | 2.31 | 2.38 | 3.00 | 1.00 | 0.22 | 6.05 | 0.69 | 0.38 | 1.00 | **See Figure 5** |
| 30VM6882 | REG | (9.53) | (3.18) | (50.80) | (25.40) | (13.46) | (28.45) | (58.67) | (60.45) | (76.20) | (25.40) | (5.59) | (153.67) | (17.53) | (9.65) | (25.40) | |
| 30VM9872 | VEE | 9/16 | 0.125 | 2.62 | 1.31 | 0.81 | 1.19 | 2.62 | 2.44 | 3.00 | 1.00 | 0.28 | 6.45 | 0.69 | 0.38 | 1.50 | |
| 30VM9882 | REG | (14.29) | (3.18) | (66.55) | (33.27) | (20.57) | (30.23) | (66.55) | (61.98) | (76.20) | (25.40) | (7.11) | (163.83) | (17.53) | (9.65) | (38.10) | |
| **3-Way / 2-Stem Manifold** | | | | | | | | | | | | | | | | | |
| 30VM4075 | VEE | 1/4 | 0.094 | 2.00 | 1.00 | 0.50 | 1.53 | 1.12 | 3.06 | 3.00 | 1.00 | 0.22 | 5.68 | 0.69 | 0.38 | 1.00 | |
| 30VM4085 | REG | (6.35) | (2.39) | (50.80) | (25.40) | (12.70) | (38.86) | (28.45) | (77.72) | (76.20) | (25.40) | (5.59) | (144.27) | (17.53) | (9.65) | (25.40) | |
| 30VM6075 | VEE | 3/8 | 0.125 | 2.00 | 1.00 | 0.53 | 1.62 | 1.12 | 3.25 | 3.00 | 1.00 | 0.22 | 5.87 | 0.69 | 0.38 | 1.00 | **See Figure 6** |
| 30VM6085 | REG | (9.53) | (3.18) | (50.80) | (25.40) | (13.46) | (41.15) | (28.45) | (82.55) | (76.20) | (25.40) | (5.59) | (149.10) | (17.53) | (9.65) | (25.40) | |
| 30VM9075 | VEE | 9/16 | 0.125 | 2.62 | 1.31 | 0.81 | 1.88 | 1.12 | 3.75 | 3.00 | 1.00 | 0.28 | 6.37 | 0.69 | 0.38 | 1.50 | |
| 30VM9085 | REG | (14.29) | (3.18) | (66.55) | (33.27) | (20.57) | (47.75) | (28.45) | (95.25) | (76.20) | (25.40) | (7.11) | (161.80) | (17.53) | (9.65) | (38.10) | |

*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*
*Panel mounting drill size: 0.22" all valves.*

*All dimensions for reference only and subject to change.*
** H Dimension is with stem in the closed position.*

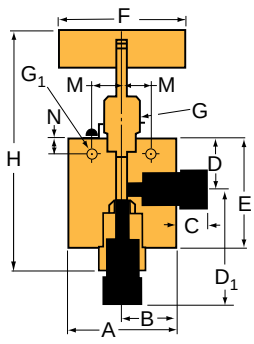
**For prompt service, Autoclave stocks select products. Consult factory.**

**Figure 4**



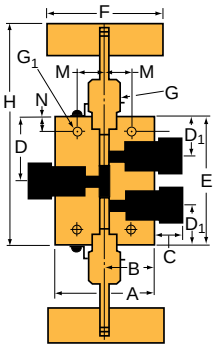

**3-Way / 1 on Pressure**

**Figure 5**




**2-Way Angle / Replacable Seat**

**Figure 6**




**3-Way / 2-Stem Manifold**

# Needle Valves - 40VM Series

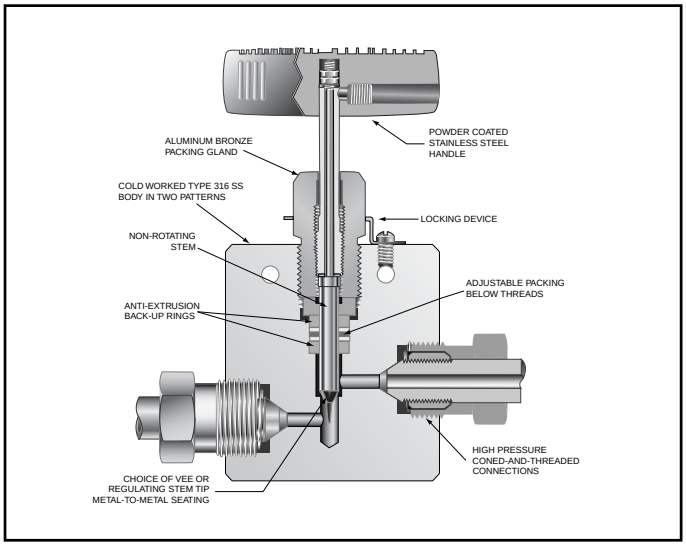
## Pressures to 40,000 psi (2760 bar)

| Tube Outside Diameter Size Inches | Connection Type | Orifice Size Inches (mm) | Rated $C_V$* | Pressure/ Temperature Rating psi (bar) @ Room Temperature** |
|---|---|---|---|---|
| 9/16 | F562C40 | 0.109 (2.77) | 0.28 | 40,000 (2760) |

*Notes:*

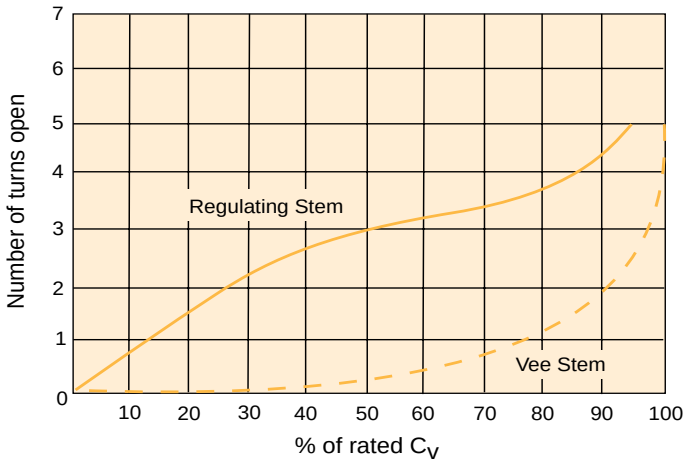
* *$C_V$ values shown are for 2-way straight valve pattern. For 2-way angle patterns, increase $C_V$ value 50%.*

** *For complete temperature ratings see pressure/temperature rating guide in Technical Information section.*


To ensure proper fit use Autoclave tubing

Generalized Flow Coefficient Curves ($C_V$)




## Ordering Procedure

For complete information on available stem types, optional connections and additional valve options, see Needle Valve Options Section or contact your Sales Representative. The 40VM Series valves are furnished complete with connection components, unless otherwise specified.

Typical catalog number: **40VM9071**

**40VM** — **Valve Series**

**9** — **Outside Diameter Tube Size**

**9**-9/16”

**07** — **Stem/Seat Type**

**07** - non-rotating Vee stem (on-off service)

**08** - non-rotating regulating stem (tapered tip for regulating and shutoff)

**1** — **Body Pattern**

**1** - two-way straight

**2** - two-way angle

**5** - three-way, two-stem manifold valve

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**Options** — **Options**

For extreme temperature and other options, see Valve Options.

## Valve Options

**Extreme Temperatures**

Standard Autoclave valves with Teflon packing may be operated to 450°F (232°C). High temperature packing is available for service from -423°F (-252°C) to 1200°F (649°C) by adding the following suffixes to catalog order number.

**TG** - standard valve with Teflon glass packing to 600°F (316°C).
**GY** - standard valve with graphite braided yarn packing to 800°F (427°C).
**HT** - extended stuffing box valve with graphite braided yarn packing to 1200°F (649°C).
**B** - standard valve with cryogenic trim material and Teflon packing to -100°F (-73°C).
**LT** - extended stuffing box valve with Teflon packing & Cryogenic trim materials to -423°F (-252°C).

## Valve Maintenance

Repair Kits: add "R" to the front of valve catalog number for proper repair kit. (Example: **R40VM9071**)

Valve Bodies: Valve bodies are available. Order using the eight (8) digit part number found in the valve drawing or contact your Sales Representative for information.

Consult your Autoclave representative for pricing on repair kits and valve bodies. Refer to the Tools, Installation, Operation and Maintenance section for proper maintenance procedures.

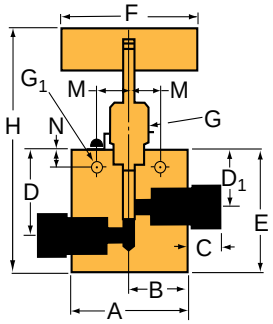
| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions - inches (mm) | | | | | | | | | | | | Block Thick-ness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | | |
| **2-Way Straight** | | | | | | | | | | | | | | | | | |
| 40VM9071 | VEE | 9/16 | 0.109 | 2.62 | 1.31 | 0.72 | 1.75 | 1.31 | 2.50 | 3.00 | 1.00 | 0.28 | 5.06 | 0.69 | 0.38 | 1.50 | See Figure 1 |
| 40VM9081 | REG | (14.3) | (2.77) | (66.55) | (33.27) | (18.29) | (44.45) | (33.27) | (63.50) | (76.20) | (25.40) | (7.11) | (128.52) | (17.53) | (9.65) | (38.10) | |
| **2-Way Angle** | | | | | | | | | | | | | | | | | |
| 40VM9072 | VEE | 9/16 | 0.109 | 2.62 | 1.31 | 0.72 | 1.31 | | 2.81 | 3.00 | 1.00 | 0.28 | 5.37 | 0.69 | 0.38 | 1.50 | See Figure 2 |
| 40VM9082 | REG | (14.3) | (2.77) | (66.55) | (33.27) | (18.29) | (33.27) | | (71.37) | (76.20) | (25.40) | (7.11) | (136.40) | (17.53) | (9.65) | (38.10) | |
| **3-Way / 2 Stem Manifold** | | | | | | | | | | | | | | | | | |
| 40VM9075 | VEE | 9/16 | 0.109 | 2.62 | 1.31 | 0.72 | 2.06 | 1.31 | 4.12 | 3.00 | 1.00 | 0.28 | 9.12 | 0.69 | 0.38 | 1.50 | See Figure 3 |
| 40VM9085 | REG | (14.3) | (2.77) | (66.55) | (33.27) | (18.29) | (52.32) | (33.27) | (104.65) | (76.20) | (25.40) | (7.11) | (231.65) | (17.53) | (9.65) | (38.10) | |

*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*
*Panel mounting drill size: 0.22" all valves.*

*All dimensions for reference only and subject to change.*
** H Dimension is with stem in the closed position*

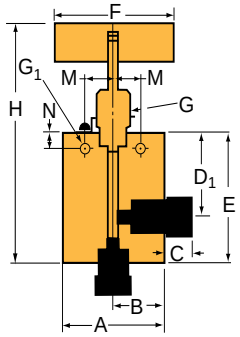
**For prompt service, Autoclave stocks select products. Consult factory.**

**Figure 1**



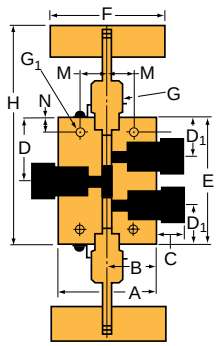

**2-Way Straight**

**Figure 2**




**2-Way Angle**

**Figure 3**




**3-Way / 2 Stem Manifold**

# Needle Valves - 60VM Series

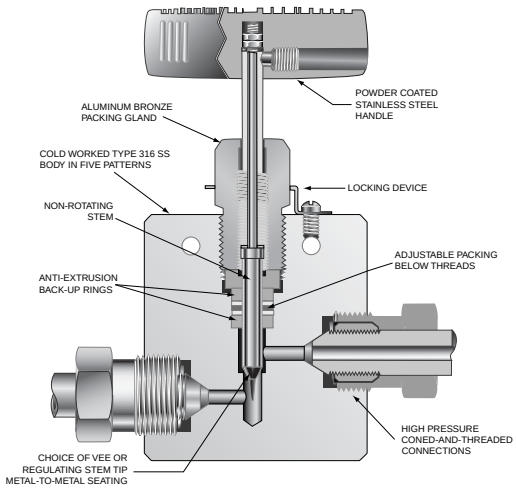
## Pressures to 60,000 psi (4137 bar)

| Tube Outside Diameter Size Inches | Connection Type | Orifice Size Inches (mm) | Rated $C_V$* | Pressure/ Temperature Rating psi (bar) @ Room Temperature** |
|---|---|---|---|---|
| 1/4 | F250C | 0.062 (1.57) | 0.08 | 60,000 (4137) |
| 3/8 | F375C | 0.062 (1.57) | 0.09 | 60,000 (4137) |
| 9/16 | F562C | 0.078 (1.98) | 0.14 | 60,000 (4137) |

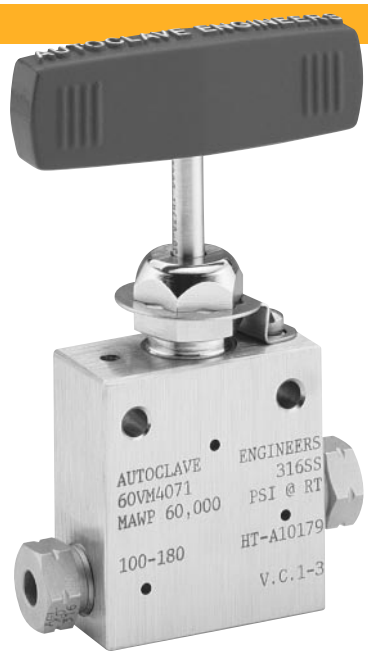
*Notes:*

* *$C_V$ values shown are for 2-way straight valve pattern. For 2-way angle patterns, increase $C_V$ value 50%.*

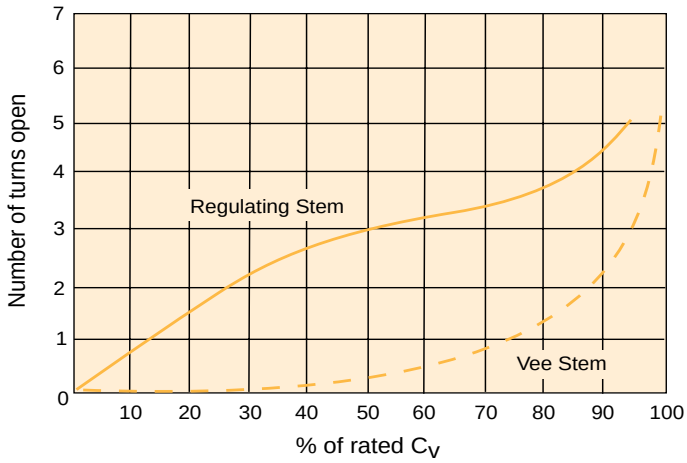
** *For complete temperature ratings see pressure/temperature rating guide in Technical Information section.*




To ensure proper fit use Autoclave tubing




Generalized Flow Coefficient Curves ($C_V$)




## Ordering Procedure

For complete information on available stem types, optional connections and additional valve options, see Needle Valve Options section or contact your Sales Representative. The 60VM Series valves are furnished complete with connection components, unless otherwise specified.

Typical catalog number: **60VM4071**

**60VM** — **Valve Series**

**4** — **Outside Diameter Tube Size**

**4**-1/4”
**6**-3/8”
**9**-9/16”

**07** — **Stem/Seat Type**

**07** - non-rotating Vee stem (on-off service)
**08** - non-rotating regulating stem (tapered tip for regulating and shutoff)
**87** - Vee stem with replaceable seat
**88** - Regulating stem with replaceable seat

**1** — **Body Pattern**

**1** - two-way straight
**2** - two-way angle
**3** - three-way, two on pressure
**4** - three-way, one on pressure
**5** - three-way, two-stem manifold valve

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**Options** — **Options**

For extreme temperature and other options, see Valve Options.

## Valve Options

**Extreme Temperatures**

Standard Autoclave valves with Teflon packing may be operated to 450°F (232°C). High temperature packing is available for service from -423°F (-252°C) to 1200°F (649°C) by adding the following suffixes to catalog order number.

**TG** - standard valve with Teflon glass packing to 600°F (316°C).
**GY** - standard valve with graphite braided yarn packing to 800°F (427°C).
**HT** - extended stuffing box valve with graphite braided yarn packing to 1200°F (649°C).
**B** - standard valve with cryogenic trim material and Teflon packing to -100°F (-73°C).
**LT** - extended stuffing box valve with Teflon packing & Cryogenic trim materials to -423°F (-252°C).

## Valve Maintenance

Repair Kits: add "R" to the front of valve catalog number for proper repair kit. (Example: **R60VM4071**)

Valve Bodies: Valve bodies are available. Order using the eight (8) digit part number found in the valve drawing or contact your Sales Representative for information.

Consult your Autoclave representative for pricing on repair kits and valve bodies. Refer to the Tools, Installation, Operation and Maintenance section for proper maintenance procedures.

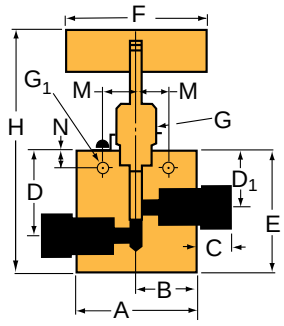
| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions - inches (mm) | | | | | | | | | | | | Block Thick-ness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | | |
| **2-Way Straight** | | | | | | | | | | | | | | | | | |
| 60VM4071 | VEE | 1/4 | 0.062 | 2.00 | 1.00 | 0.50 | 1.69 | 1.31 | 2.12 | 3.00 | 1.00 | 0.22 | 4.75 | 0.69 | 0.38 | 1.00 | See Figure 1 |
| 60VM4081 | REG | (6.35) | (1.57) | (50.80) | (25.40) | (12.70) | (42.93) | (33.27) | (53.85) | (76.20) | (25.40) | (5.59) | (120.65) | (17.53) | (9.65) | (25.40) | |
| 60VM6071 | VEE | 3/8 | 0.062 | 2.00 | 1.00 | 0.53 | 1.69 | 1.31 | 2.25 | 3.00 | 1.00 | 0.22 | 4.87 | 0.69 | 0.38 | 1.00 | |
| 60VM6081 | REG | (9.53) | (1.57) | (50.80) | (25.40) | (13.46) | (42.93) | (33.27) | (57.15) | (76.20) | (25.40) | (5.59) | (123.70) | (17.53) | (9.65) | (25.40) | |
| 60VM9071 | VEE | 9/16 | 0.078 | 2.62 | 1.31 | 0.72 | 1.75 | 1.31 | 2.50 | 3.00 | 1.00 | 0.28 | 5.13 | 0.69 | 0.38 | 1.50 | |
| 60VM9081 | REG | (14.29) | (1.98) | (66.55) | (33.27) | (18.29) | (45.45) | (33.27) | (63.50) | (76.20) | (25.40) | (7.11) | (130.30) | (17.53) | (9.65) | (38.10) | |
| **2-Way Angle** | | | | | | | | | | | | | | | | | |
| 60VM4072 | VEE | 1/4 | 0.062 | 2.00 | 1.00 | 0.50 | | 1.31 | 2.38 | 3.00 | 1.00 | 0.22 | 5.00 | 0.69 | 0.38 | 1.00 | See Figure 2 |
| 60VM4082 | REG | (6.35) | (1.57) | (50.80) | (25.40) | (12.70) | | (33.27) | (60.45) | (76.20) | (25.40) | (5.59) | (127.00) | (17.53) | (9.65) | (25.40) | |
| 60VM6072 | VEE | 3/8 | 0.062 | 2.00 | 1.00 | 0.53 | | 1.31 | 2.62 | 3.00 | 1.00 | 0.22 | 5.25 | 0.69 | 0.38 | 1.00 | |
| 60VM6082 | REG | (9.53) | (1.57) | (50.80) | (25.40) | (13.46) | | (33.27) | (66.55) | (76.20) | (25.40) | (5.59) | (133.35) | (17.53) | (9.65) | (25.40) | |
| 60VM9072 | VEE | 9/16 | 0.078 | 2.62 | 1.31 | 0.72 | | 1.31 | 2.81 | 3.00 | 1.00 | 0.28 | 5.44 | 0.69 | 0.38 | 1.50 | |
| 60VM9082 | REG | (14.29) | (1.98) | (66.55) | (33.27) | (18.29) | | (33.27) | (71.37) | (76.20) | (25.40) | (7.11) | (138.18) | (17.53) | (9.65) | (38.10) | |
| **3-Way / 2 on Pressure** | | | | | | | | | | | | | | | | | |
| 60VM4073 | VEE | 1/4 | 0.062 | 2.00 | 1.00 | 0.50 | 1.69 | 1.31 | 2.12 | 3.00 | 1.00 | 0.22 | 4.75 | 0.69 | 0.38 | 1.00 | See Figure 3 |
| 60VM4083 | REG | (6.35) | (1.57) | (50.80) | (25.40) | (12.70) | (42.93) | (33.27) | (53.85) | (76.20) | (25.40) | (5.59) | (120.65) | (17.53) | (9.65) | (25.40) | |
| 60VM6073 | VEE | 3/8 | 0.062 | 2.00 | 1.00 | 0.53 | 1.69 | 1.31 | 2.25 | 3.00 | 1.00 | 0.22 | 4.87 | 0.69 | 0.38 | 1.00 | |
| 60VM6083 | REG | (9.53) | (1.57) | (50.80) | (25.40) | (13.46) | (42.93) | (33.27) | (57.15) | (76.20) | (25.40) | (5.59) | (123.70) | (17.53) | (9.65) | (25.40) | |
| 60VM9073 | VEE | 9/16 | 0.078 | 2.62 | 1.31 | 0.72 | 1.75 | 1.31 | 2.50 | 3.00 | 1.00 | 0.28 | 5.13 | 0.69 | 0.38 | 1.50 | |
| 60VM9083 | REG | (14.29) | (1.98) | (66.55) | (33.27) | (18.29) | (45.45) | (33.27) | (63.50) | (76.20) | (25.40) | (7.11) | (130.30) | (17.53) | (9.65) | (38.10) | |

*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*
*Panel mounting drill size: 0.22" all valves.*

*All dimensions for reference only and subject to change.*
** H Dimension is with stem in the closed position.*

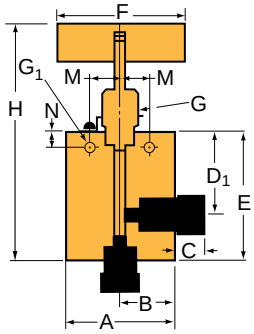
**For prompt service, Autoclave stocks select products. Consult factory.**

**Figure 1**



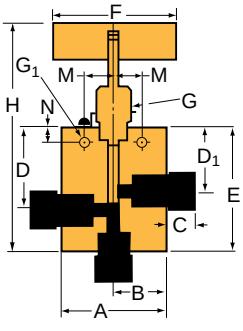

**2-Way Straight**

**Figure 2**




**2-Way Angle**

**Figure 3**




**3-Way / 2 on Pressure**

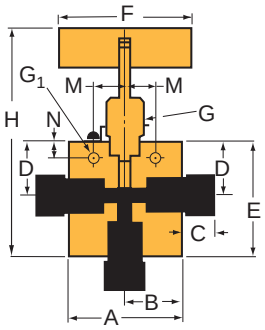
| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions - inches (mm) | | | | | | | | | | | | Block Thick-ness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | | |
| **3-Way / 1 on Pressure** | | | | | | | | | | | | | | | | | |
| 60VM4074 | VEE | 1/4 | 0.062 | 2.00 | 1.00 | 0.50 | 1.31 | | 2.38 | 3.00 | 1.00 | 0.22 | 5.00 | 0.69 | 0.38 | 1.00 | See Figure 4 |
| 60VM4084 | REG | (6.35) | (1.57) | (50.80) | (25.40) | (12.70) | (33.27) | | (60.45) | (76.20) | (25.40) | (5.59) | (127.00) | (17.53) | (9.65) | (25.40) | |
| 60VM6074 | VEE | 3/8 | 0.062 | 2.00 | 1.00 | 0.53 | 1.31 | | 2.62 | 3.00 | 1.00 | 0.22 | 5.25 | 0.69 | 0.38 | 1.00 | |
| 60VM6084 | REG | (9.53) | (1.57) | (50.80) | (25.40) | (13.46) | (33.27) | | (66.55) | (76.20) | (25.40) | (5.59) | (133.35) | (17.53) | (9.65) | (25.40) | |
| 60VM9074 | VEE | 9/16 | 0.078 | 2.62 | 1.31 | 0.72 | 1.31 | | 2.81 | 3.00 | 1.00 | 0.28 | 5.44 | 0.69 | 0.38 | 1.50 | |
| 60VM9084 | REG | (14.29) | (1.98) | (66.55) | (33.27) | (18.29) | (33.27) | | (71.37) | (76.20) | (25.40) | (7.11) | (138.18) | (17.53) | (9.65) | (38.10) | |
| **2-Way Angle / Replaceable Seat** | | | | | | | | | | | | | | | | | |
| 60VM4872 | VEE | 1/4 | 0.062 | 2.00 | 1.00 | 0.50 | 1.31 | 2.12 | 2.62 | 3.00 | 1.00 | 0.22 | 6.28 | 0.69 | 0.38 | 1.00 | See Figure 5 |
| 60VM4882 | REG | (6.35) | (1.57) | (50.80) | (25.40) | (12.70) | (33.27) | (53.85) | (66.55) | (76.20) | (25.40) | (5.59) | (159.51) | (17.53) | (9.65) | (25.40) | |
| 60VM6872 | VEE | 3/8 | 0.062 | 2.00 | 1.00 | 0.53 | 1.31 | 2.36 | 2.62 | 3.00 | 1.00 | 0.22 | 6.52 | 0.69 | 0.38 | 1.00 | |
| 60VM6882 | REG | (9.53) | (1.57) | (50.80) | (25.40) | (13.46) | (33.27) | (59.94) | (66.55) | (76.20) | (25.40) | (5.59) | (165.60) | (17.53) | (9.65) | (25.40) | |
| 60VM9872 | VEE | 9/16 | 0.078 | 2.62 | 1.31 | 0.72 | 1.31 | 2.68 | 2.62 | 3.00 | 1.00 | 0.28 | 6.90 | 0.69 | 0.38 | 1.50 | |
| 60VM9882 | REG | (14.29) | (1.98) | (66.55) | (33.27) | (18.29) | (33.27) | (68.07) | (66.55) | (76.20) | (25.40) | (7.11) | (175.26) | (17.53) | (9.65) | (38.10) | |
| **3-Way / 2-Stem Manifold** | | | | | | | | | | | | | | | | | |
| 60VM4075 | VEE | 1/4 | 0.062 | 2.00 | 1.00 | 0.50 | 1.72 | 1.31 | 3.44 | 3.00 | 1.00 | 0.22 | 6.07 | 0.69 | 0.38 | 1.00 | See Figure 6 |
| 60VM4085 | REG | (6.35) | (1.57) | (50.80) | (25.40) | (12.70) | (43.69) | (33.27) | (87.38) | (76.20) | (25.40) | (5.59) | (154.18) | (17.53) | (9.65) | (25.40) | |
| 60VM6075 | VEE | 3/8 | 0.062 | 2.00 | 1.00 | 0.53 | 1.88 | 1.31 | 3.75 | 3.00 | 1.00 | 0.22 | 6.37 | 0.69 | 0.38 | 1.00 | |
| 60VM6085 | REG | (9.53) | (1.57) | (50.80) | (25.40) | (13.46) | (47.75) | (33.27) | (95.25) | (76.20) | (25.40) | (5.59) | (161.80) | (17.53) | (9.65) | (25.40) | |
| 60VM9075 | VEE | 9/16 | 0.078 | 2.62 | 1.31 | 0.72 | 2.06 | 1.31 | 4.12 | 3.00 | 1.00 | 0.28 | 6.37 | 0.69 | 0.38 | 1.50 | |
| 60VM9085 | REG | (14.29) | (1.98) | (66.55) | (33.27) | (18.29) | (52.32) | (33.27) | (104.65) | (76.20) | (25.40) | (7.11) | (161.80) | (17.53) | (9.65) | (38.10) | |

*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*
*Panel mounting drill size: 0.22" all valves.*

*All dimensions for reference only and subject to change.*
** H Dimension is with stem in the closed position.*

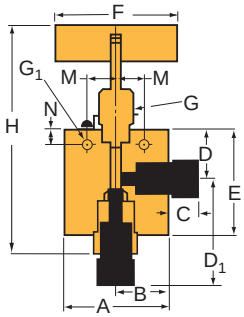
**For prompt service, Autoclave stocks select products. Consult factory.**

**Figure 4**



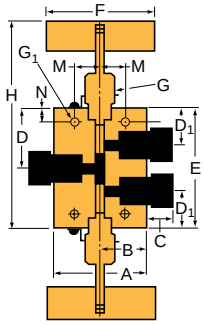

**3-Way / 1 on Pressure**

**Figure 5**




**2-Way Angle / Replaceable Seat**

**Figure 6**




**3-Way / 2 Stem Manifold**

# Needle Valves - 100VM & 150V Series

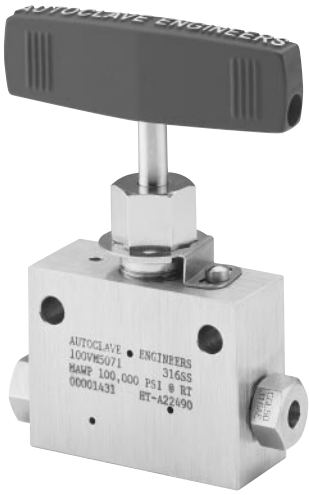
## Pressures to 150,000 psi (10350 bar)

| Tube Outside Diameter Size Inches | Connection Type | Orifice Size Inches (mm) | Rated $C_V$* | Pressure/ Temperature Rating psi (bar) @ Room Temperature** |
|---|---|---|---|---|
| Series 100VM | | | | |
| 5/16 | F312C150 | 0.062 (1.57) | .09 | 100,000 (6895) |
| Series 150V | | | | |
| 5/16 | F312C150 | 0.062 (1.57) | .06 | 150,000 (10342) |

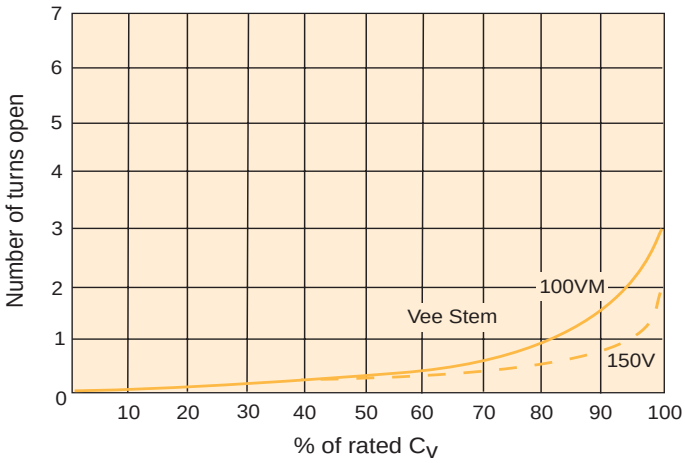
*Notes:*

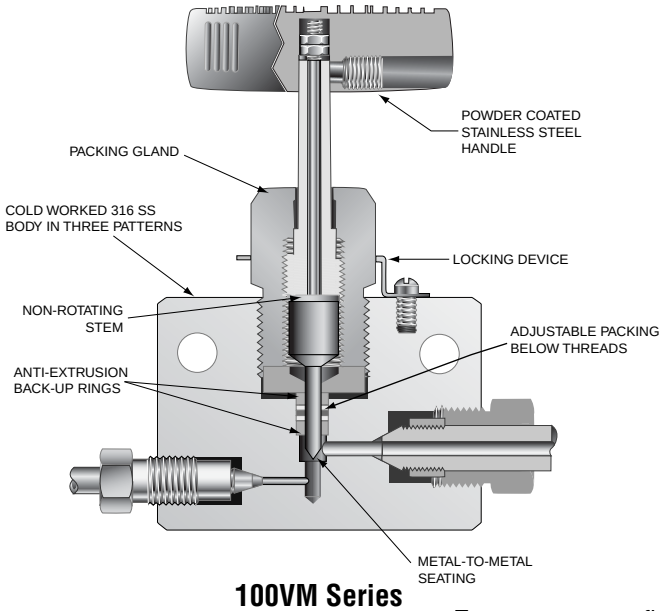
* *$C_V$ values shown are for 2-way straight valve pattern. For 2-way angle patterns, increase $C_V$ value 50%.*

** *For complete temperature ratings see pressure/temperature rating guide in Technical Information section.*

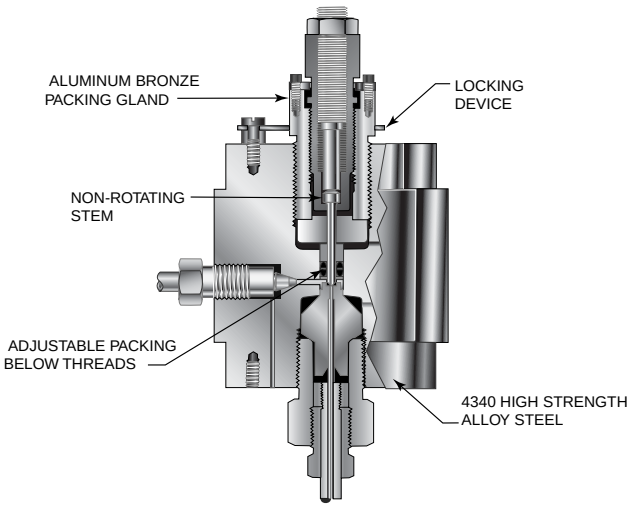



### Generalized Flow Coefficient Curves ($C_V$)




**100VM Series**




Notes: Torque wrench required to operate valves.

**150V Series**

To ensure proper fit use Autoclave tubing

## Ordering Procedure

For complete information on available stem types, optional connections and additional valve options, see Needle Valve Options section or contact your Sales Representative. The 100V Series valves are furnished complete with connection components, unless otherwise specified.

Typical catalog number: **100VM5071**

**100VM** — **Valve Series**
100VM
150V

**5** — **Outside Diameter Tube Size**
**5**-5/16"

**07** — **Stem Type**
**07** - non-rotating Vee stem (on off service)

**1** — **Body Pattern**
**1** - two-way straight
**2** - two-way angle
**3** - three-way, two on pressure

**Options** — **Options**
For extreme temperature and other options, see Valve Options.

## Valve Options

**Extreme Temperatures**
Standard AE valves with Teflon packing may be operated to 450°F (232°C), and to 230°F (110°C) with nylon-leather packing. For other packing options consult the factory.

## Valve Maintenance

Repair Kits: add "R" to the front of valve catalog number for proper repair kit. (Example: **R100VM15071**)

Valve Bodies: Valve bodies are available. Order using the eight (8) digit part number found in the valve drawing or contact your Sales Representative for information.

Consult your Autoclave representative for pricing on repair kits and valve bodies. Refer to the Tools, Installation, Operation and Maintenance section for proper maintenance procedures.

### 2-Way Straight

| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions - inches (mm) A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | Block Thick-ness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 100VM5071 | VEE | 5/16 | 0.094 | 3.00 | 1.50 | 0.52 | 1.75 | 1.44 | 2.25 | 4.00 | 1.12 | 0.34 | 5.32 | 1.12 | 0.50 | 1.38 | See Figure 1 |
| | | (7.93) | (2.39) | (76.20) | (38.10) | (13.21) | (44.45) | (36.58) | (57.15) | (101.60) | (28.45) | (8.64) | (135.13) | (28.45) | (12.70) | (35.05) | |

### 2-Way Angle

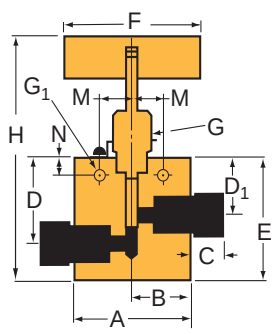
| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 100VM5072 | VEE | 5/16 | 0.094 | 2.25 | 1.50 | 0.52 | 1.44 | | 2.88 | 4.00 | 1.12 | 0.34 | 6.05 | 0.94 | 0.38 | 1.38 | See Figure 2 |
| | | (7.93) | (2.39) | (57.15) | (38.10) | (13.21) | (36.58) | | (73.15) | (101.60) | (28.45) | (8.64) | (153.67) | (23.88) | (9.65) | (35.05) | |

*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*
*Panel mounting drill size: 0.22" all valves.*

*All dimensions for reference only and subject to change.*
** H Dimension is with stem in the closed position.*

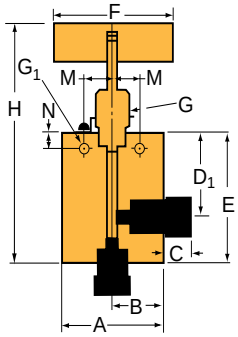
**For prompt service, Autoclave stocks select products. Consult factory.**

**Figure 1**




**2-Way Straight**

**Figure 2**




**2-Way Angle**

| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions - inches (mm) | | | | | | | | | | | | | Block Thick-ness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | | | |

## 3-Way / 2 On Pressure

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 100VM5073 | VEE | 5/16 | 0.094 | 3.00 | 1.50 | 0.52 | 1.75 | 1.44 | 3.25 | 4.00 | 1.12 | 0.34 | 6.31 | 1.12 | 0.50 | 1.38 | See Figure 3 |
| | | (7.93) | (2.39) | (76.20) | (38.10) | (13.21) | (44.45) | (36.58) | (82.55) | (101.60) | (28.45) | (8.64) | (160.27) | (28.45) | (12.70) | (35.05) | |

## 2-Way Angle / Replaceable Seat

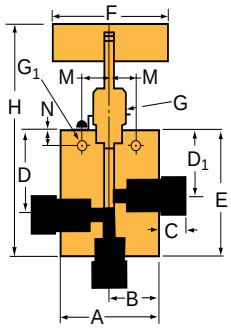
| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 150V5072 | VEE | 5/16 | 0.062 | 3.75 | 1.88 | | 2.25 | 2.63 | 4.00 | | 1.44 | | 7.12 | 1.25 | | | See Figure 4 |
| | | (7.93) | (1.57) | (95.25) | (47.63) | | (57.15) | (66.80) | (101.60) | | (36.50) | | (180.85) | (31.75) | | | |

*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*
*Panel mounting drill size: 0.22" all valves.*

*All dimensions for reference only and subject to change.*
** H Dimension is with stem in the closed position.*

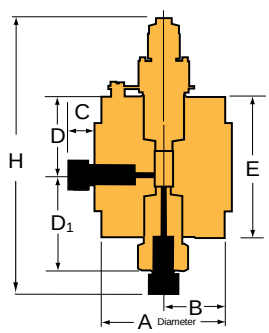
**For prompt service, Autoclave stocks select products. Consult factory.**

**Figure 3**




**3-Way / 2 on Pressure**

**Figure 4**



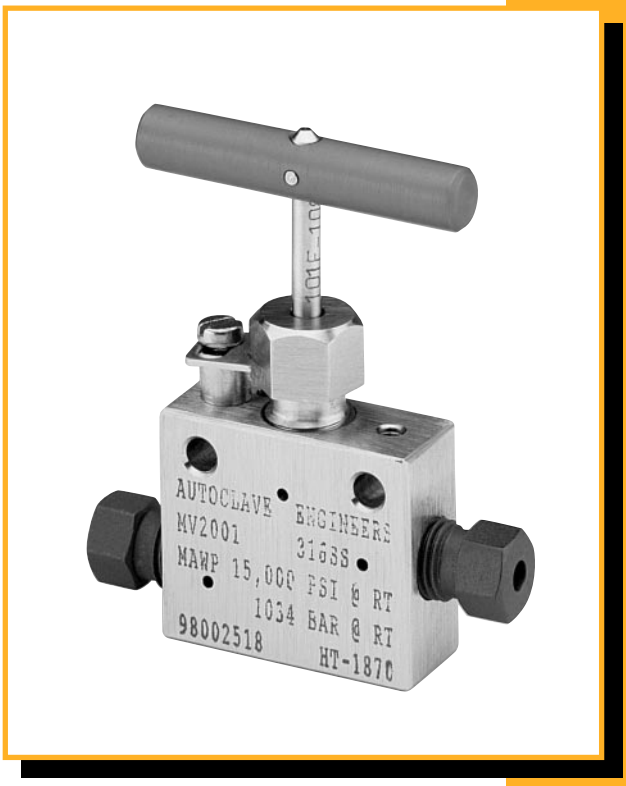

**2-Way Angle / Replaceable Seat**

# Needle Valves

**Mini Valves**

# MVE/MV Series

*Pressures to 15,000 psi (1034 bar)*




Since 1945 Autoclave Engineers has designed and built premium quality valves, fittings and tubing. This commitment to engineering and manufacturing excellence has earned Autoclave a reputation for reliable efficient product performance. Autoclave Engineers has long been established as the world leader in high pressure fluid handling components for the chemical/petrochemical, research, and oil and gas industries.

## Mini Valve Features:

- Mini valve provides a rugged compact design.
- Tubing sizes available are 1/16” and 1/8”.
- Rising stem/barstock body design.
- Metal-to-metal seating achieves bubble-tight shut-off, longer stem/seat life in abrasive flow, greater durability for repeated on/off cycles and excellent corrosion resistance.
- PTFE (Teflon) encapsulated packing provides dependable stem and body sealing.
- Stem and packing gland design have been selected to achieve extended thread cycle life and reduced handle torque.
- Vee stem tip provided.
- Available in five body patterns.
- Mini valves available with metric tube glands.

Autoclave valves are complemented by a complete line of mini fittings and tubing. The MVE/MV Series uses Autoclave’s SpeedBite connection. This single-ferrule compression sleeve connection delivers fast, easy make-up and reliable bubble-tight performance in liquid or gas service.

Autoclave Engineers
Fluid Components
Division of Snap-tite, Inc.
www.autoclaveengineers.com

# Needle Valves - MVE/MV Series

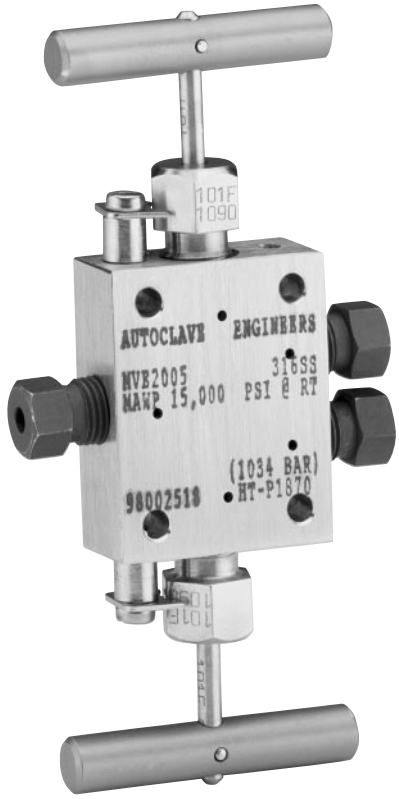
## Pressures to 15,000 psi (1034 bar)

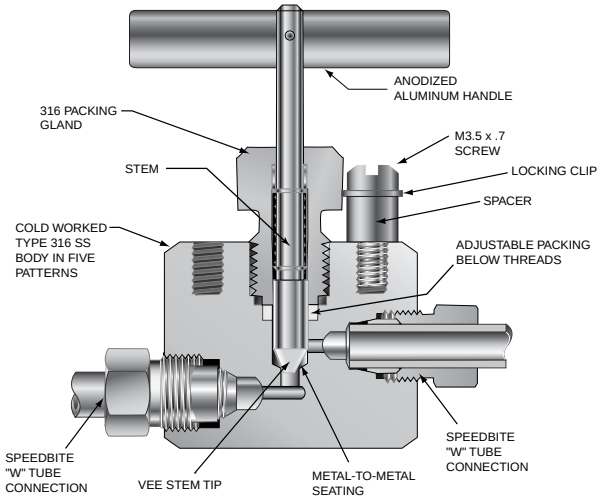
| Tube Outside Diameter Size Inches | Connection Type | Orifice Size Inches (mm) | Rated $C_V$* | Pressure/ Temperature Rating psi (bar) @ Room Temperature** |
|---|---|---|---|---|
| 1/16 | W062 | 0.055 (1.40) | 0.05 | 15,000 (1034) |
| 1/8 | W125 | 0.078 (1.98) | 0.11 | 15,000 (1034) |

*Notes:*

* *$C_V$ values shown are for 2-way straight valve pattern. For 2-way angle patterns, increase $C_V$ value 50%. (Based on water)*

** *For complete temperature ratings see pressure/temperature rating guide in Technical Information section.*




To ensure proper fit use Autoclave tubing

## Ordering Procedure

For complete information on valve options, contact your Sales Representative. MVE Series valves are furnished complete with connection components, unless otherwise specified.

Typical catalog number: **MVE2001**

**MVE** — **Valve Series**

**MVE** - 3/8 Hex tubing glands

**MV** - 10mm Hex tubing glands

**2** — **Outside Diameter Tube Size**

**1**-1/16”

**2**-1/8”

**00** — **Stem Type**

**00** - rotating Vee stem (on-off service)

**01** - rotating Regulating stem (tapered tip for regulating and shut-off)

**1** — **Body Pattern**

**1** - two-way straight

**2** - two-way angle

**3** - three-way, two on pressure

**4** - three way, one on pressure

**5** - three-way, two stem manifold valve

—

**Options** — **Options**

For extreme temperature and other options, see Valve Options.

## Valve Options

**Extreme Temperatures**
Standard Autoclave valves with Teflon packing may be operated to 450°F (232°C). High temperature packing is available for service from 0°F (-17.8°C) to 600°F (316°C) by adding the following suffixes to catalog order number.†
**TG** standard valve with Teflon glass packing to 600°F (316°C).

†*Autoclave Engineers does not recommend compression sleeve connections below 0°F (-17.8°C) or above 650°F (343°C). For additional valve options, contact your Sales Representative.*

## Valve Maintenance

Refer to the Tools, Installation, Operation and Maintenance section for proper maintenance procedures.

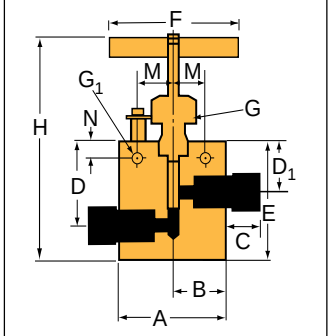
| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions - inches (mm) A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | Block Thickness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2-Way Straight** | | | | | | | | | | | | | | | | | |
| MVE1001 | VEE | 1/16 | 0.055 | 1.38 | 0.69 | 0.45 | 0.81 | 0.56 | 1.13 | 1.75 | 0.56 | 0.16 | 2.38 | 0.45 | 0.20 | 0.56 | See Figure 1 |
| MV1001 | VEE | (1.57) | (1.40) | (34.93) | (17.45) | (11.43) | (20.65) | (14.30) | (28.58) | (44.45) | (14.27) | (4.04) | (60.38) | (11.49) | (5.16) | (14.27) | |
| MVE2001 | VEE | 1/8 | 0.094 | 1.38 | 0.69 | 0.45 | 0.81 | 0.56 | 1.13 | 1.75 | 0.56 | 0.16 | 2.38 | 0.45 | 0.20 | 0.56 | |
| MV2001 | VEE | (3.18) | (2.39) | (34.93) | (17.45) | (11.43) | (20.65) | (14.30) | (28.58) | (44.45) | (14.27) | (4.04) | (60.38) | (11.49) | (5.16) | (14.27) | |
| **2-Way Angle** | | | | | | | | | | | | | | | | | |
| MVE1002 | VEE | 1/16 | 0.055 | 1.00 | 0.69 | 0.45 | 0.56 | | 1.38 | 1.75 | 0.56 | 0.16 | 2.63 | 0.45 | 0.22 | 0.56 | See Figure 2 |
| MV1002 | VEE | (1.57) | (1.40) | (25.40) | (17.45) | (11.43) | (14.30) | | (34.93) | (44.45) | (14.27) | (4.04) | (66.75) | (11.49) | (5.54) | (14.27) | |
| MVE2002 | VEE | 1/8 | 0.094 | 1.00 | 0.69 | 0.45 | 0.56 | | 1.38 | 1.75 | 0.56 | 0.16 | 2.38 | 0.45 | 0.22 | 0.56 | |
| MV2002 | VEE | (3.18) | (2.39) | (25.40) | (17.45) | (11.43) | (14.30) | | (34.93) | (44.45) | (14.27) | (4.04) | (60.38) | (11.49) | (5.54) | (14.27) | |
| **3-Way / 2 on Pressure** | | | | | | | | | | | | | | | | | |
| MVE1003 | VEE | 1/16 | 0.055 | 1.38 | 0.69 | 0.45 | 0.81 | 0.56 | 1.44 | 1.75 | 0.56 | 0.16 | 2.69 | 0.45 | 0.20 | 0.56 | See Figure 3 |
| MV1003 | VEE | (1.57) | (1.40) | (34.93) | (17.45) | (11.43) | (20.65) | (14.30) | (36.50) | (44.45) | (14.27) | (4.04) | (68.30) | (11.49) | (5.16) | (14.27) | |
| MVE2003 | VEE | 1/8 | 0.094 | 1.38 | 0.69 | 0.45 | 0.81 | 0.56 | 1.44 | 1.75 | 0.56 | 0.16 | 2.69 | 0.45 | 0.20 | 0.56 | |
| MV2003 | VEE | (3.18) | (2.39) | (34.93) | (17.45) | (11.43) | (20.65) | (14.30) | (36.50) | (44.45) | (14.27) | (4.04) | (68.30) | (11.49) | (5.16) | (14.27) | |

*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*
*Panel mounting screws are M3.5 x .7 thd.*
*Tube glands are 3/8" hex on standard MVE models*
*Tube glands are 10mm hex on MV models.*

** H Dimension is with stem in closed position.*
*All dimensions for reference only and subject to change.*

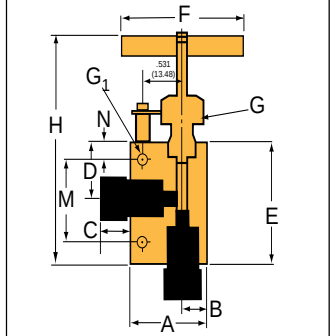
**For prompt service, Autoclave stocks select products. Consult factory.**

**Figure 1**



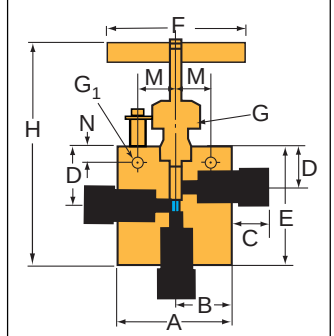

**2-Way Straight**

**Figure 2**




**2-Way Angle**

**Figure 3**




**3-Way / 2 on Pressure**

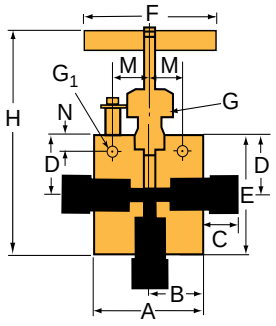
| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions - inches (mm) A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | Block Thick-ness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **3-Way / 1 on Pressure** | | | | | | | | | | | | | | | | | |
| **MVE1004** | **VEE** | 1/16 | 0.055 | 1.38 | 0.69 | 0.45 | 0.56 | 0.56 | 1.44 | 1.75 | 0.56 | 0.16 | 2.69 | 0.45 | 0.20 | 0.56 | **See Figure 4** |
| **MV1004** | **VEE** | (1.57) | (1.40) | (34.93) | (17.45) | (11.43) | (14.22) | (14.30) | (36.50) | (44.45) | (14.27) | (4.04) | (68.30) | (11.49) | (5.16) | (14.27) | |
| **MVE2004** | **VEE** | 1/8 | 0.094 | 1.38 | 0.69 | 0.45 | 0.56 | 0.56 | 1.44 | 1.75 | 0.56 | 0.16 | 2.69 | 0.45 | 0.20 | 0.56 | |
| **MV2004** | **VEE** | (3.18) | (2.39) | (34.93) | (17.45) | (11.43) | (14.22) | (14.30) | (36.50) | (44.45) | (14.27) | (4.04) | (68.30) | (11.49) | (5.16) | (14.27) | |
| **3-Way / 2-Stem Manifold** | | | | | | | | | | | | | | | | | |
| **MVE1005** | **VEE** | 1/16 | 0.055 | 1.38 | 0.69 | 0.45 | 0.81 | 0.56 | 1.63 | 1.75 | 0.56 | 0.16 | 4.11 | 0.45 | 0.20 | 0.56 | **See Figure 5** |
| **MV1005** | **VEE** | (1.57) | (1.40) | (34.93) | (17.45) | (11.43) | (20.65) | (14.30) | (41.28) | (44.45) | (14.27) | (4.04) | (104.44) | (11.49) | (5.16) | (14.27) | |
| **MVE2005** | **VEE** | 1/8 | 0.094 | 1.38 | 0.69 | 0.45 | 0.81 | 0.56 | 1.63 | 1.75 | 0.56 | 0.16 | 4.11 | 0.45 | 0.20 | 0.56 | |
| **MV2005** | **VEE** | (3.18) | (2.39) | (34.93) | (17.45) | (11.43) | (20.65) | (14.30) | (41.28) | (44.45) | (14.27) | (4.04) | (104.44) | (11.49) | (5.16) | (14.27) | |

*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*
*Panel mounting screws are M3.5 x .7 thd.*
*Tube glands are 3/8 hex on standard MVE models*
*Tube glands are 10mm hex on MV models*

** H Dimension is with stem in closed position.*
*All dimensions for reference only and subject to change.*

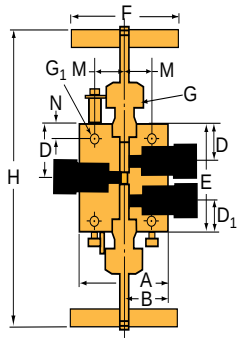
**For prompt service, Autoclave stocks select products. Consult factory.**

**Figure 4**




**3-Way / 1 on Pressure**

**Figure 5**




**3-Way / 2-Stem Manifold**

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# Needle Valves

**MicroMetering**

## VRMM Series

*Pressures to 60,000 psi (4137 bar)*


MicroMetering valves are designed for applications where more precise control of small flows is required than is possible with a standard regulating stem. Barrel and Thimble micrometer design permits settings to be repeated.

Metering is effected by a finely tapered stem acting in a precisely mated replaceable seat. Very fine stem position is achieved utilizing a 40 TPI thread. The Barrel and Thimble are set for proper metering at the factory.

These valves are designed for metering only and cannot be used as a shutoff valve. Minimum flow is factory set and occurs at "0" position. DO NOT OPERATE THE VALVE BELOW THE ZERO POSITION OR DAMAGE WILL RESULT. When shutoff action is required, a correlated shutoff valve from AE series 10V, 30VM or 60VM should be installed in series with the MicroMetering valve.

### MicroMetering Valve Features:

- Barrel and Thimble design permits repeatable settings.
  - Barrel divisions every 0.025"
  - 25 Thimble divisions, each representing 0.001" stem travel
  - One revolution = 0.025" stem travel
- Cold-worked type 316 stainless steel body with stainless steel packing gland. Stem and seat are cold-worked type 316 stainless steel.
- Packing below stem threads is Teflon for the 10VRMM and 30VRMM valves and nylon-leather for the 60VRMM. For packing options, see Technical Information Section.
- SpeedBite "W" connections are used on the 10VRMM and AE High Pressure coned-and-threaded connections on 30VRMM and 60VRMM.

Autoclave valves are complemented by a complete line of fittings, tubing, check valves and line filters.

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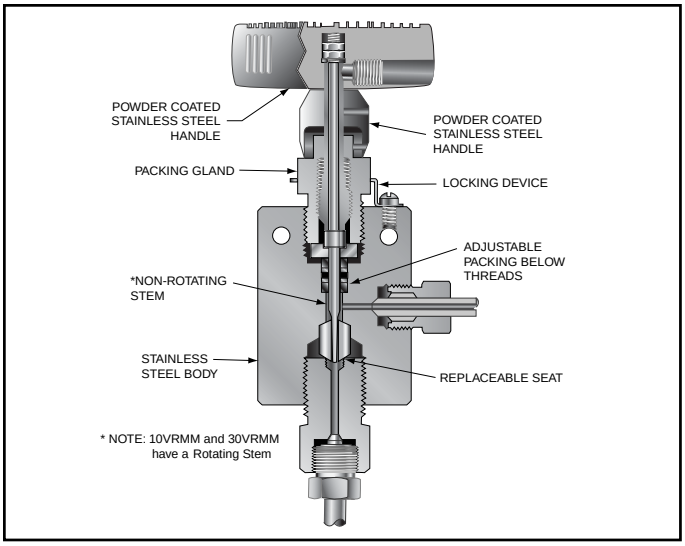
# Needle Valves - MicroMetering

## Pressures to 60,000 psi (4137 bar)

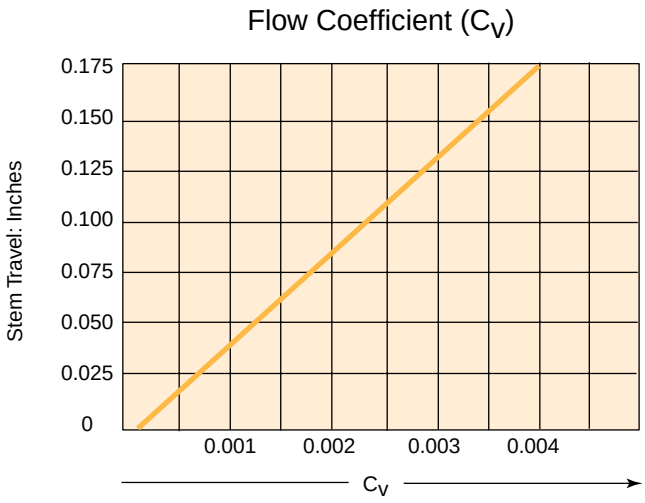
| | Tube Outside Diameter Size Inches | Connection Type | Orifice Size Inches (mm) | Rated $C_V$ | Pressure/ Temperature Rating psi (bar) @ Room Temperature** |
|---|---|---|---|---|---|
| 10VRMM | 1/8 | W125 | 0.062 (1.57) | 0.004 | 15,000 (1034) |
| 30VRMM | 1/4 | F250C | 0.062 (1.57) | 0.004 | 30,000 (2069) |
| 60VRMM | 1/4 | F250C | 0.062 (1.57) | 0.004 | 60,000 (4137) |
| 60VRMM | 3/8 | F375C | 0.062 (1.57) | 0.004 | 60,000 (4137) |

*Note:*

***For complete temperature ratings see pressure/temperature rating guide in Technical Information section.*




To ensure proper fit use Autoclave tubing




## Ordering Procedure

For complete information on available stem types, optional connections and additional valve options, see Needle Valve Options section or contact your Sales Representative. VRMM Series valves are furnished complete with connection components, unless otherwise specified.

Typical catalog number: **60VRMM4882**

**60VRMM** — **Valve Series**
**10VRMM**
**30VRMM**
**60VRMM**

**4** — **Outside Diameter Tube Size**
**2**-1/8”
**4**-1/4”
**6**-3/8”

**88** — **Stem/Seat Type**
**81** - Rotating regulating one piece stem with replaceable seat.
**88** - Non-Rotating regulating stem with replaceable seat.

**2** — **Body Pattern**
**2** - two-way angle

—

**Options** — **Options**
For extreme temperature and other options, see Valve Options.

NOTE:
Ordering procedure for information only. Modles available are shown in tables on next page.

## Valve Options

**Extreme Temperatures**

Standard Autoclave valves with Teflon packing may be operated to 450°F (232°C). High temperature packing and/or extended stuffing box is available for service from -423°F (-252°C) to 1200°F (649°C) by adding the following suffixes to catalog order number.†

**TG** - standard valve with Teflon glass packing to 600°F (316°C).
**GY** - standard valve with graphite braided yarn packing to 800°F (427°C).
**HT** - extended stuffing box valve with graphite braided yarn packing to 1200°F (649°C).
**B** - standard valve with cryogenic trim material and Teflon packing to -100°F (-73°C).
**LT** - extended stuffing box valve with Teflon packing & Cryogenic trim materials to -423°F (-252°C).

†*Autoclave Engineers does not recommend compression sleeve connections below 0°F (-17.8°C) or above 650°F (343°C). For additional valve options, contact your Sales Representative.*

*See Needle Valve options for stem and seat coatings for erosive service.*

## Valve Maintenance

Repair Kits: add "R" to the front of valve catalog number for proper repair kit. (Example: **R60VRMM**)

Valve Bodies: Valve bodies are available. Order using the eight (8) digit part number found on the valve drawing or contact your Sales Representative for information.

Consult your Autoclave representative for pricing on repair kits and valve bodies. Refer to the Tools, Installation, Operation and Maintenance section for proper maintenance procedures.

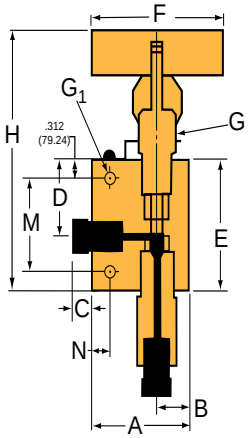
| Catalog Number | Outside Diameter Tube | Orifice Diameter | Dimensions - inches (mm) A | B | C | D | E | F | G | $G_1$ | H* | M | N | Block Thickness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10VRMM2812 | 1/8 | 0.062 | 1.50 | 0.88 | 0.31 | 0.94 | 1.56 | 3.00 | 0.62 | 0.16 | 5.06 | 1.00 | 0.19 | 0.75 | See Figure 1 |
| | (3.17) | (1.57) | (38.10) | (22.35) | (7.87) | (23.87) | (39.62) | (76.20) | (15.74) | (4.06) | (128.52) | (25.40) | (4.83) | (19.05) | |
| * Note: M dimension is distance between holes for mounting bracket. | | | | | | | | | | | | | | | |
| 30VRMM4812 | 1/4 | 0.062 | 2.00 | 1.00 | 0.50 | 1.12 | 2.00 | 3.00 | 0.97 | 0.22 | 5.06 | 0.69 | 0.50 | 1.00 | See Figure 2 |
| | (6.35) | (1.57) | (50.80) | (25.40) | (12.70) | (28.44) | (50.80) | (76.20) | (24.63) | (5.58) | (128.52) | (17.25) | (12.70) | (25.40) | |
| 60VRMM4882 | 1/4 | 0.062 | 2.00 | 1.00 | 0.50 | 1.31 | 2.63 | 3.00 | 0.97 | 0.22 | 6.06 | 0.69 | 0.38 | 1.00 | |
| | (6.35) | (1.57) | (50.80) | (25.40) | (12.70) | (33.27) | (66.80) | (76.20) | (24.63) | (5.58) | (153.92) | (17.25) | (9.65) | (25.40) | |
| 60VRMM6882 | 3/8 | 0.062 | 2.00 | 1.00 | 0.53 | 1.31 | 2.63 | 3.00 | 0.97 | 0.22 | 6.06 | 0.69 | 0.38 | 1.00 | |
| | (9.53) | (1.57) | (50.80) | (25.40) | (13.46) | (33.27) | (66.80) | (76.20) | (24.63) | (5.58) | (153.92) | (17.25) | (9.65) | (25.40) | |

*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*
*Panel mounting drill size: 0:22" all valves.*

** H Dimension is with stem in closed position.*
*All dimensions for reference only and subject to change.*

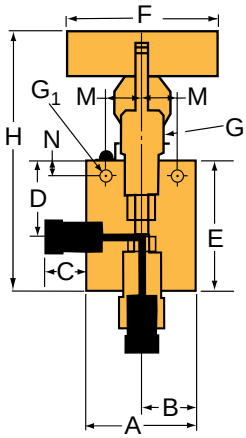
**For prompt service, Autoclave stocks select products. Consult factory.**

**Figure 1**




**10VRMM**

**Figure 2**




**30VRMM/60VRMM**

# Needle Valves

**Block and Bleed**

# *MVBB Series*

*Pressures to 20,000 psi (1379 bar)*


Autoclave series MVBB block and bleed valve is a two stem manifold valve providing an economical and convenient method of blocking, bleeding and calibrating pressure transmitters and gauges. The valve utilizes the mini valve packing and stem design making it compact and easy to use. The valve can be surface or panel mounted for safe operation. In addition, manifold style valves reduce the number of fittings and space required for installation.

## *Block and Bleed Features:*

- MVBB Series valve design provides large valve performance in a small package
- Tubing sizes: 1/4”
- Rising stem/barstock body design.
- Metal-to-metal seating achieves bubble-tight shut-off, longer stem/seat life in abrasive flow, greater durability for repeated on/off cycles and excellent corrosion resistance.
- PTFE (Teflon) encapsulated packing provides dependable stem and body sealing.
- Stem and packing gland design have been selected to achieve extended thread cycle life and reduced handle torque.

Autoclave valves are complemented by a complete line of fittings, tubings and accessories. The MVBB Series uses Autoclave’s medium pressure connections. This coned and threaded connection provides a reliable bubble-tight seal for dependable performance in gas or liquid service.

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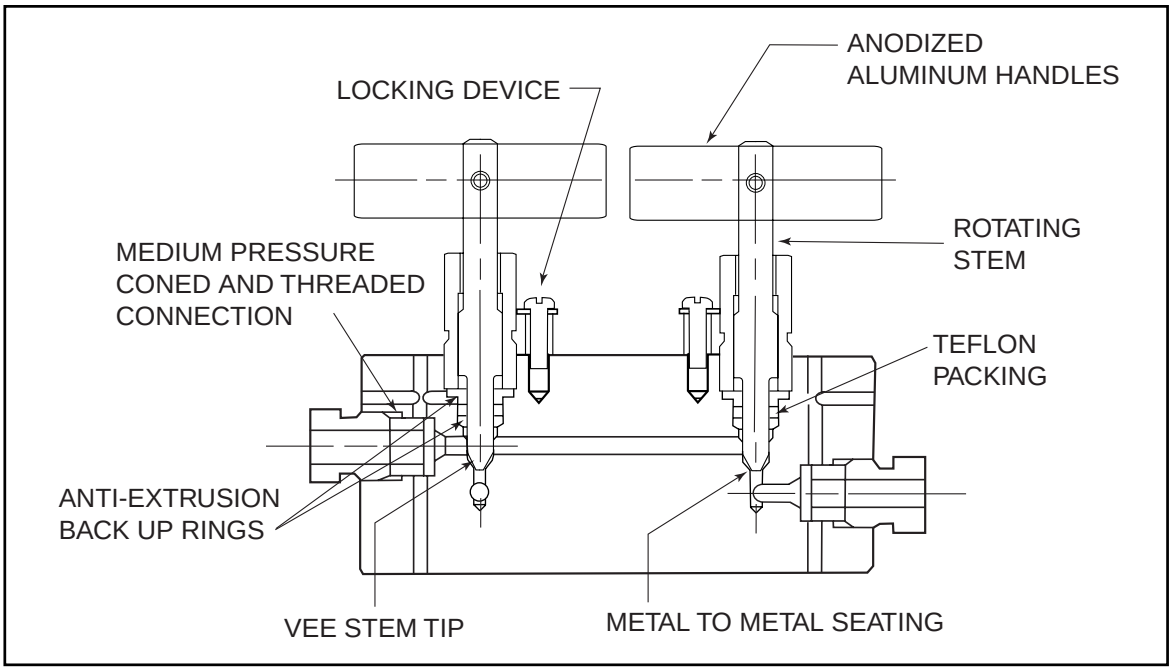
# Needle Valves - MVBB Series

## Pressures to 20,000 psi (1379 bar)

| Tube Outside Diameter Size Inches | Connection Type | Orifice Size Inches (mm) | Rated $C_V$ | Pressure/ Temperature Rating psi (bar) @ Room Temperature** |
|---|---|---|---|---|
| 1/4 | SF250CX | 0.093 (2.36) | 0.20 | 20,000 (1379) |

*Notes:*

*** For complete temperature ratings see pressure/temperature rating guide in Technical Information section.*


To ensure proper fit use Autoclave tubing

## Valve Options

**Extreme Temperatures**
Standard Autoclave valves with Teflon packing may be operated to 450°F (232°C). High temperature packing is available for service from 0°F (-17.8°C) to 800°F (427°C) by adding the following suffixes to catalog order number.

**TG** standard valve with Teflon glass packing to 600°F (316°C)

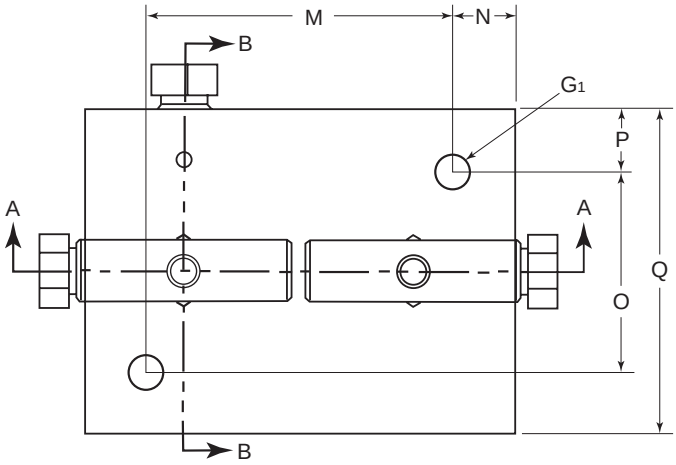
**GY** standard valve with Graphite braided yarn packing to 800°F (427°C).

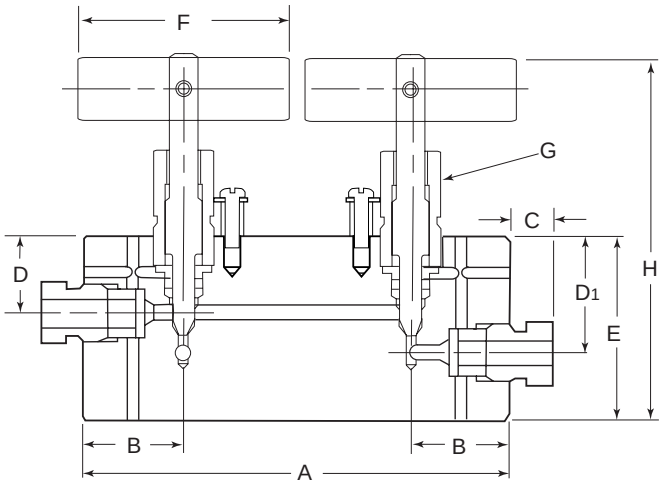
*For additional valve options, contact your Sales Representative.*

*Note: Refer to the Tools, Installation, Operation and Maintenance section for proper maintenance procedures.*

| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions - inches (mm) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | O | P | Q |
| **20MVBB** | **VEE** | 1/4 | 0.094 | 3.50 | 0.813 | 0.38 | 0.938 | 0.625 | 1.50 | 1.75 | 0.56 | 0.281 | 2.94 | 2.50 | 0.485 | 1.63 | .500 | 2.625 |
| | | (6.35) | (2.39) | (88.90) | (20.65) | (9.65) | (23.83) | (15.88) | (38.10) | (44.45) | (14.27) | (7.14) | (74.68) | (63.50) | (12.32) | (41.40) | 12.70 | 66.68 |
| | | | | | | | | | | | | | | | | | | |

For complete information on available options, contact your Sales representative. MVBB Series valves are furnished with connection components unless otherwise specified.




*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*

** H Dimension is with stem in closed position.*
*All dimensions for reference only and subject to change.*

**For prompt service, Autoclave stocks select products. Consult factory.**

# Needle Valves

**Extreme Temperature**

# *HT, LT and PV Series*

*Pressures to 60,000 psi (4137 bar)*

Autoclave Engineers has two different styles of valves for extreme temperature. Standard valves can be supplied with packing for operation from -100°F (-73°C) to 800°F (427°C), or with the addition of an extended packing housing for operation from -423°F (-252°C) to 1200°F (649°C). The extended packing housing provides the means of removing the packing from the extreme temperature medium. Machined grooves on the housing act as a heatsink to remove heat or cold.
The second, which is economically priced, is a modified standard designed for the power industry. It operates to 1200°F (649°C) with graphite packing and no extended packing housing.

## *Extreme Temperature Valve Features:*

- The extreme temperature option can be ordered on low, medium, high, micro-metering and other valve series.
- Reliable long life operation with extended stuffing box at very high and low temperatures.
- Design available for operation to 1200°F (649°C) without extended packing housing.
- Available with a variety of tubing connections and orifice sizes.
- Non-rotating stem.
- Wide range of material options
- Adjustable packing below threads.
- Metal to metal seating.
- Anti-extrusion back-up rings.

Autoclave valves are complemented by a complete line of fittings, tubing, and accessories.

## *Applications:*

- Hot well condenser
- Super-heated steam hookup/ measurement
- Supercritical fluid processing
- Boiler ignition system

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# Needle Valve - HT, LT Series

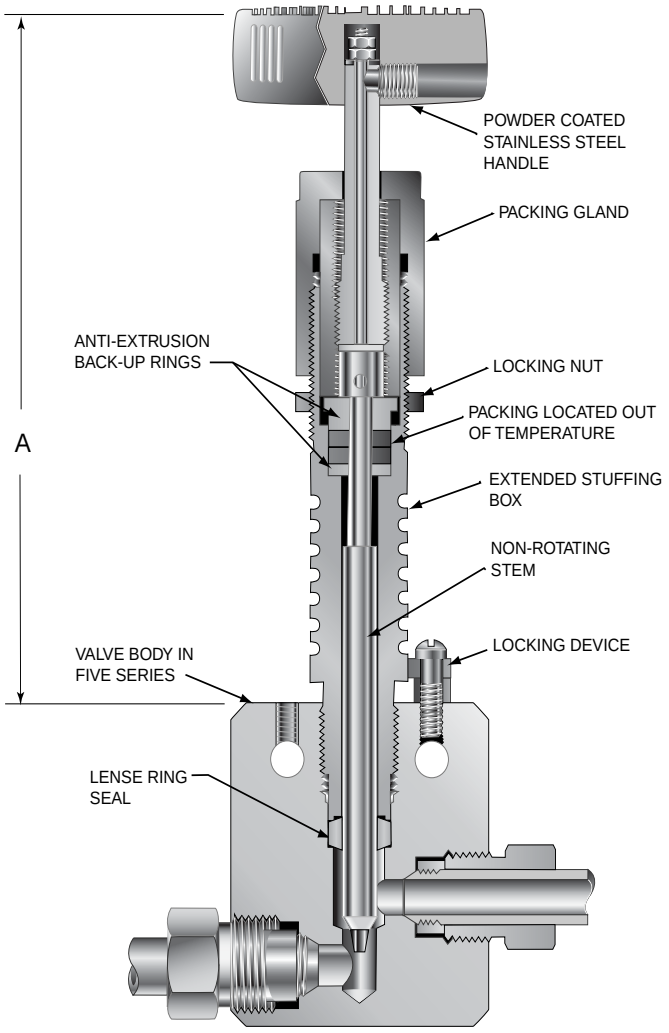
## Standard Valve with Stuffing Box option - Pressures to 60,000 psi (4137 bar)

### High Temperature Valves to 1200°F (649°C)

**High Temperature Packing Option**
Standard Autoclave valves can be operated up to 800°F (427°C) at the packing with appropriate packing materials. See table in Technical Section for temperature ratings and ordering information.

**High Temperature Extended Stuffing Box Option "HT"**
For operation above 800°F (427°C) at the packing, optional extended stuffing box removes packing and stem threads from the hot zone. The "HT" option is standard graphite-yarn packing; add "HT" to valve order number. For other packing materials, add both "HT" and the suffix for the desired packing material (See table in Technical Section).

**High or Low Temperature Air Operated Valves** with extended stuffing box can be ordered by adding suffix "HT" to Air Operated Valve order number.




### Cryogenic Valves to -423°F (256°C)

**Low Temperature Trim Materials Option "B"**
While all WETTED parts in most AE valves are type 316SS, some TRIM parts are constructed of mechanically preferable materials. For low temperature to -100°F (-73°C), type 316SS trim parts and Teflon packing can be furnished (except Series 100V and 150V). To order, add suffix "B" to valve order number.

**Cryogenic Extended Stuffing Box Option "LT"**
For operation below -100°F (-73°C) or for rigorous cycling, an extended stuffing box removes packing from the extreme low temperature zone. The "LT" option also includes many type 316 SS trim parts and Teflon packing. Add "LT" suffix to valve order number.

| Valve Series | O.D. Tube Size inches | Dimension "A" inches (mm) |
|---|---|---|
| 10V | 1/8<br>1/4<br>3/8<br>1/2 | 5.38 (136.65)<br>5.94 (150.87)<br>5.94 (150.87)<br>5.94 (150.87) |
| SW | 1/4<br>3/8<br>1/2 | 5.50 (139.70)<br>5.50 (139.70)<br>6.31 (160.27) |
| 10SM & 20SM | 1/4<br>3/8<br>9/16<br>3/4<br>1 | 5.50 (139.70)<br>5.50 (139.70)<br>6.31 (160.27)<br>6.31 (160.27)<br>6.31 (160.27) |
| 30SC | 1 | 9.52 (241.80) |
| 30VM | 1/4<br>3/8<br>9/16 | 5.94 (150.87)<br>5.94 (150.87)<br>5.94 (150.87) |
| 40VM | 9/16 | 6.19 (157.22) |
| 60VM | 1/4<br>3/8<br>9/16 | 5.87 (149.10)<br>5.94 (150.87)<br>6.19 (157.22) |
| 10VRMM | 1/8 | 5.38 (136.65) |
| 30VRMM | 1/4 | 5.94 (150.87) |
| 60VRMM | 1/4<br>3/8 | 6.06 (153.92)<br>6.06 (153.92) |

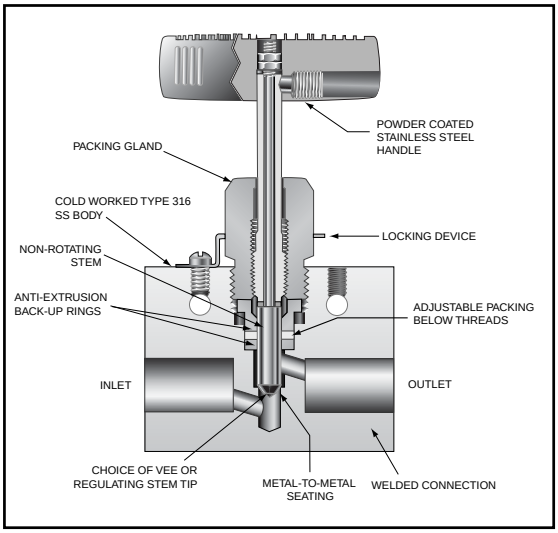
**Note:** Caution should be exercised in proper selection of medium pressure tubing based on actual operating conditions. Two series available: 10,000 psi (690 bar) and 20,000 psi (1379 bar).
***Handle Extenders*** *are available to facilitate extreme temperature operation of valves and for remote actuation through an insulating wall or barricade.* See appropriate valve ordering section.
* See Valve Actuators section.
All dimensions for reference only and subject to change.

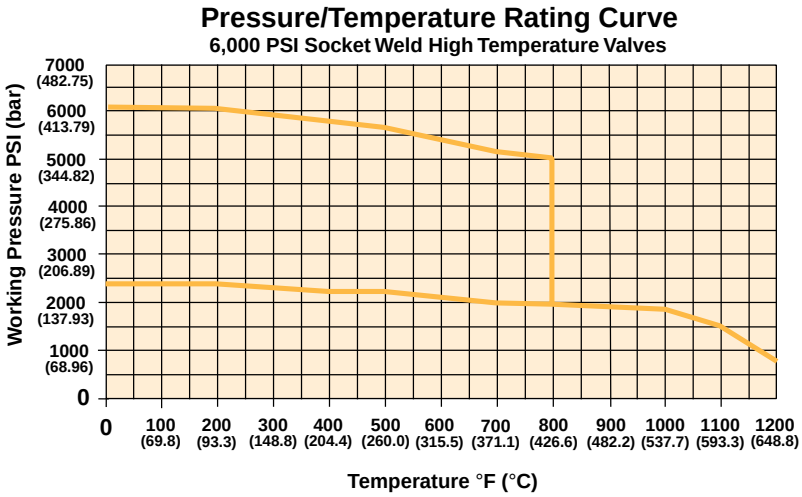
# Needle Valve - PV Series

## Pressures to 6,000 psi (414 bar)

| Tube Outside Diameter | Connection Type | Orifice Size | Pres./Temp. Rating psi (bar) @ Room Temperature** |
|---|---|---|---|
| 1/4 | TW/PW | 3/16” | 6,000 (414) |
| 3/8 | TW/PW | 1/4” | 6,000 (414) |
| 1/2 | TW/PW | 1/4” | 6,000 (414) |
| 3/4 | TW/PW | 1/2” | 6,000 (414) |
| 10mm | TW | 6.50mm | 6,000 (414) |
| 12mm | TW | 6.50mm | 6,000 (414) |
| 14mm | TW | 6.50mm or 9.0mm | 6,000 (414) |
| 16mm | TW | 9.00mm or 11.0mm | 6,000 (414) |

TW - Tube Weld
PW - Pipe Weld
*Note: **For temperature ratings see pressure/temperature rating guide chart below..*


See Technical Information section for curve details.

## Ordering Procedure

For complete information on available stem types, optional connections and additional valve options, see Needle Valve Options section or contact your Sales Representative.

Typical catalog number: **PV4TW6MG**

**PV** — Valve Series

**4** — Outside Diameter Tube Size
- **4**-1/4”
- **6**-3/8”
- **8**-1/2”
- **12**- 3/4”
- **A**-10mm
- **B**-12mm
- **C**-14mm
- **D**-16mm

**TW** — Connection Type
- **TW** - Tube Socket Weld
- **PW** - Pipe Socket Weld

Outlet See Note — Size/Type

**6M** — Port Size
- **3** -3/16”
- **4** -1/4”
- **8** -1/2”
- **6M** - 6.5mm
- **9M** - 9.0mm
- **11M** - 11.0mm

—

**G** — Packing
- **GF** -Grafoil

Note: Use if outlet connection is different - *Example: PV4TW**ATW**6M-G*

## Valve Options

For optional connection sizes, connection types,material or other options not listed contact your sales representative. Consult factory for availability of dissimilar end connections.

## Valve Maintenance

Repair Kits: add “R” to the front of valve catalog number for proper repair kit. (Example: **RPV4TWG**)

Valve Bodies: Valve bodies are available. Order using the eight (8) digit part number found on the valve drawing or contact your Sales Representative for information.

Consult your Autoclave representative for pricing on repair kits and valve bodies. Refer to the Tools, Installation, Operation and Maintenance section for proper maintenance procedures.

### 2-Way Straight

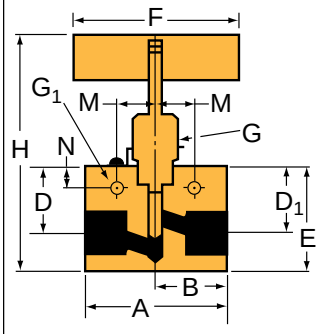
| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions - inches (mm) A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | Block Thickness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PV4TW3G | VEE | 1/4 | 0.187 | 2.00 | 1.00 | | 1.41 | 1.41 | 2.00 | 3.00 | 0.75 | 0.22 | 4.43 | 0.62 | 0.38 | 0.75 | See Figure 1 |
| | | (6.35) | (4.75) | (50.80) | (25.40) | | (35.81) | (35.81) | (50.80) | (76.20) | (19.05) | (5.59) | (112.52) | (15.75) | (9.65) | (19.05) | |
| PVT6TW4G | VEE | 3/8 | 0.250 | 2.00 | 1.00 | | 1.41 | 1.41 | 2.00 | 3.00 | 0.75 | 0.22 | 4.43 | 0.62 | 0.38 | 0.75 | |
| | | (9.53) | (6.35) | (50.80) | (25.40) | | (35.81) | (35.81) | (50.80) | (76.20) | (19.05) | (5.59) | (112.52) | (15.75) | (9.65) | (19.05) | |
| | | Metric (In) | | | | | | | | | | | | | | | |
| PVCTW6MG | VEE | 14.00 | 6.5 | 50.80 | 25.40 | | 35.81 | 35.81 | 50.80 | 76.20 | 19.05 | 5.59 | 111.00 | 15.75 | 9.65 | 19.05 | |
| | | (0.55) | (0.26) | (2.00) | (1.00) | | (1.41) | (1.41) | (2.00) | (3.00) | (0.75) | (0.22) | (4.37) | (0.62) | (0.38) | (0.75) | |
| PVCTW9MG | VEE | 14.00 | 9.0 | 63.50 | 31.75 | | 52.32 | 52.32 | 73.15 | 101.60 | 22.23 | 5.59 | 148.34 | 17.53 | 12.70 | 25.40 | |
| | | (0.55) | (0.35) | (2.50) | (1.25) | | (2.06) | (2.06) | (2.88) | (4.00) | (0.88) | (0.22) | (5.84) | (0.69) | (0.50) | (1.00) | |

*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*
*Panel mounting drill size: 0.22” all valves.*

** H Dimension is with stem in closed position.*
*All dimensions for reference only and subject to change.*

**For prompt service, Autoclave stocks select products. Consult factory.**

**Figure 1**




**2-Way Straight**

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# Needle Valves

**Diverter**

## 20DV Series

*Pressures to 20,000 psi (1379 bar)*

Autoclave Engineers diverter valves provide the ability to direct incoming flow to one of two outlets. Flow is changed by rotating the handle in or out causing a double-ended stem to block the flow path to the outlet not needed. Diverter valves eliminate the need for multiple valves and the possibility of error in flow direction changes.

### AE Diverter Valve Features:

- Diverts incoming flow to one of two outlet lines.
- Tubing sizes from 9/16 to 1".
- Rising stem/barstock body design.
- Non-rotating stem prevents stem/seat galling.
- Metal-to-metal seating achieves bubble-tight shut-off, longer stem/seat life in abrasive flow, greater durability for repeated on/off cycles and excellent corrosion resistance.
- PTFE (Teflon) encapsulated packing provides dependable stem and body sealing.
- Stem sleeve and packing gland materials have been selected to achieve extended thread cycle life and reduced handle torque.

Autoclave valves are complemented by a complete line of fittings, tubing, and accessories. The 20DV series uses Autoclave's medium pressure connection. This coned and threaded connection provides a reliable bubble-tight seal for dependable performance to 20,000 psi (1379).

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Fluid Components
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*www.autoclaveengineers.com*

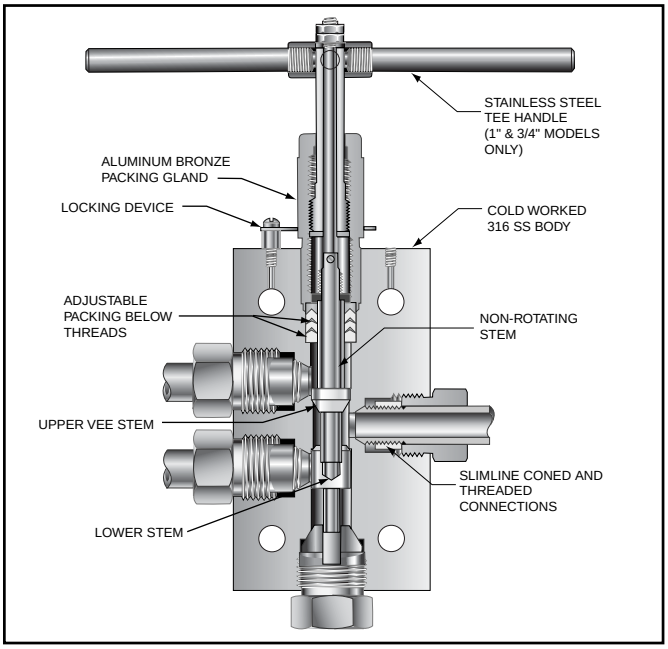
# Valve Series - 20DV Series

## Pressures to 20,000 psi (1379 bar)

| Tube Outside Diameter Size Inches | Connection Type | Orifice Size Inches (mm) | Rated $C_V$ | Pres./Temp. Rating psi (bar) @ Room Temperature** |
|---|---|---|---|---|
| 9/16 | SF562CX | 0.359 (9.12) | 1.5 | 20,000 (1379) |
| 3/4 | SF750CX | 0.516 (13.10) | 2.9 | 20,000 (1379) |
| 1 | SF1000CX | 0.688 (17.47) | 4.5 | 20,000 (1379) |

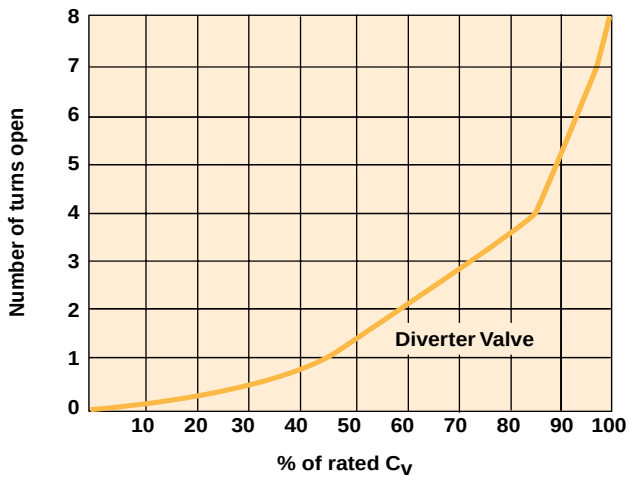
*Notes:*

*** For complete temperature ratings see pressure/temperature rating guide in Technical Information section.*




To ensure proper fit use Autoclave tubing

### Generalized Flow Coefficient Curves ($C_V$)




## Ordering Procedure

For complete information on available stem types, optional connections and additional valve options, see Needle Valve Options section or contact your Sales Representative. The 20DV Series valves are furnished complete with connection components, unless otherwise specified.

Typical catalog number: **20DV16077**

**20DV** — **Valve Series**

**16** — **Outside Diameter Tube Size**
**9**-9/16"
**12**-3/4"
**16**-1"

**07** — **Stem Type**
**07** - non-rotating Vee stem (on off service)

**7** — **Body Pattern**
**7** - diverter

—

**Options** — **Options**
For extreme temperature and other options, see Valve Options.

## Valve Options

**Extreme Temperatures**
Standard Autoclave valves with Teflon packing may be operated to 450°F (232°C). High temperature packing and/or extended stuffing box is available for service from -423°F (-252°C) to 1200°F (648°C) by adding the following suffixes to catalog order number.

**HT** extended stuffing box valve with graphite braided yarn packing to 1200°F (648°C).
**B** standard valve with cryogenic trim materials and Teflon packing to -100°F (-73°C).
**LT** extended stuffing box valve with Teflon packing and cryogenic trim materials to -423°F (-252°C).

## Valve Maintenance

Repair Kits: add "R" to the front of valve catalog number for proper repair kit. (Example: **R20DV16077**)

Valve Bodies: Valve bodies are available. Order using the eight (8) digit part number found on the valve drawing or contact your Sales Representative for information.

Consult your Autoclave representative for pricing on repair kits and valve bodies. Refer to the Tools, Installation, Operation and Maintenance section for proper maintenance procedures.

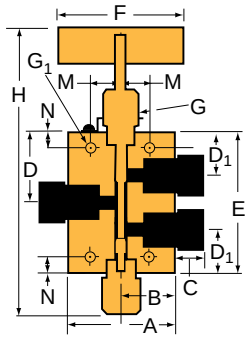
| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions - inches (mm) A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | Block Thick-ness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20DV9077 | VEE | 9/16 | 0.359 | 2.50 | 1.25 | 0.53 | 2.41 | 1.75/1.63 | 4.69 | 4.00 | 1.00 | 0.34 | 8.88 | 0.69 | 0.50 | 1.00 | |
| | | (14.29) | (9.12) | (63.50) | (31.75) | (13.46) | (61.21) | (44.45/41.40) | (119.13) | (101.60) | (25.40) | (8.64) | (225.55) | (17.53) | (12.70) | (25.40) | |
| 20DV12077 | VEE | 3/4 | 0.516 | 3.00 | 1.50 | 0.62 | 3.00 | 2.13/1.81 | 5.69 | 10.25 | 1.12 | 0.44 | 10.12 | 0.88 | 0.62 | 1.38 | See Figure 1 |
| | | (19.05) | (13.11) | (76.20) | (38.10) | (15.75) | (76.20) | (54.10/45.97) | (144.53) | (260.35) | (28.45) | (11.18) | (257.05) | (22.35) | (15.75) | (35.05) | |
| 20DV16077 | VEE | 1 | 0.750 | 4.12 | 2.06 | 0.72 | 3.75 | 2.81/2.62 | 7.25 | 10.25 | 1.62 | 0.56 | 12.79 | 1.25 | 1.12 | 1.75 | |
| | | (25.40) | (19.05) | (104.65) | (52.33) | (18.29) | (95.25) | (71.37/66.55) | (184.15) | (260.35) | (41.15) | (14.22) | (324.87) | (31.75) | (28.45) | (44.45) | |

*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*
*Panel mounting drill size: 0.22" all valves.*

** H Dimension is with stem in closed position.*
*All dimensions for reference only and subject to change.*

**For prompt service, Autoclave stocks select products. Consult factory.**

**Figure 1**




**Diverter 20DV Series**

# Needle Valves

**Yoke**

## Y Series

*Pressures to 50,000 psi (3447 bar)*

Autoclave Engineers' yoke valves are extra heavy-duty, plant grade instrument valves for industrial and severe service applications. Yoke valves feature low closing torque for ease of operation and are designed for use with Autoclave  medium and high pressure tubing and fittings.

### Yoke Valve Features:

- Tubing sizes from 9/16" to 1".
- Rising stem/barstock body design.
- Non-rotating stem prevents stem/seat galling.
- Metal-to-metal seating achieves bubble-tight shut-off, longer stem/seat life in abrasive flow, greater durability for repeated on/off cycles and excellent corrosion resistance.
- PTFE (Teflon) encapsulated packing provides dependable stem and body sealing.
- Non-rotating stem prevents stem/seat galling
- Stem sleeve and packing gland materials have been selected to achieve extended thread cycle life and reduced handle torque.
- Choice of Vee or Regulating stem tips.
- Available in two body patterns.
- Optional materials for cryogenic and other applications.

Autoclave valves are complemented by a complete line of fittings, tubing, and accessories.

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# Valve Series - Y Series

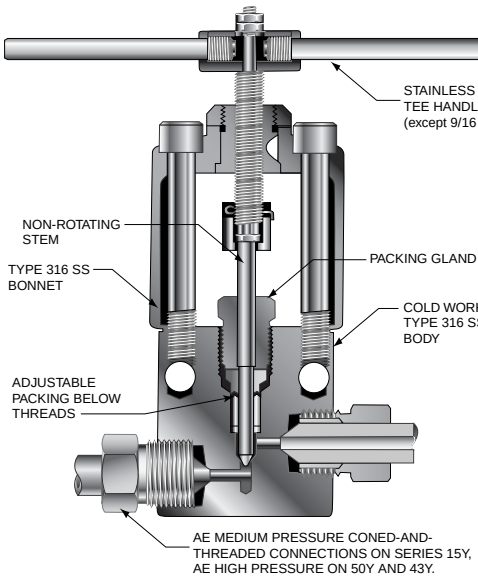
## Pressures to 50,000 psi (3447 bar)

| Tube Outside Diameter Size Inches | Connection Type | Orifice Size Inches (mm) | Rated $C_V$ * | Pres./Temp. Rating psi (bar) @ Room Temperature** |
|---|---|---|---|---|
| 9/16 | 562C | 0.188 (4.76) | 0.66 | 50,000 (3447) |
| 3/4 | S750CX | 0.438 (11.13) | 2.41 | 15,000 (1034) |
| 1 | S1000CX | 0.562(14.27) | 3.15 | 15,000 (1034) |
| 1 | 1000C43 | 0.375 (9.53) | 2.3 | 43,000 (2965) |

*Notes:*

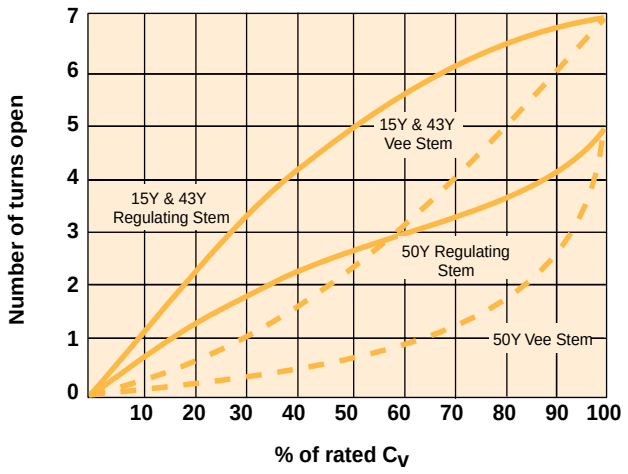
**$C_V$ values shown are for 2-way straight valve pattern. For 2-way angle patterns, increase $C_V$ value 50%.*

***For complete temperature ratings see pressure/temperature rating guide in Technical Information section.*




To ensure proper fit use Autoclave tubing

### Generalized Flow Coefficient Curves ($C_V$)




## Ordering Procedure

For complete information on available stem types, optional connections and additional valve options, see Needle Valve Options section or contact your Sales Representative. The Y Series valves are furnished complete with connection components, unless otherwise specified.

Typical catalog number: **50Y9071**

**50Y** — **Valve Series**
- **15Y**
- **43Y**
- **50Y**

**9** — **Outside Diameter Tube Size**
- **9**-9/16”
- **12**-3/4”
- **1**-1.0”

**07** — **Stem/Seat Type**
- **07** - non-rotating Vee stem (on-off service)
- **08** - non-rotating Regulating stem (tapered tip for Regulating and shutoff)
- **87** - Vee stem with replaceable seat
- **88** - Regulating stem with replaceable seat

**1** — **Body Pattern**
- **1** - two-way straight
- **2** - two-way angle

—

**Options** — **Options**

For extreme temperature and other options, see Valve Options.

## Valve Options

**Extreme Temperatures**

Standard Autoclave valves with Teflon packing may be operated to 450°F (232°C). High temperature packing is available for service from 0°F (-17.8°C) to 600°F (316°C) by adding the following suffixes to catalog order number.

**TG** standard valve with Teflon glass packing to 600°F (316°C).
**B** standard valve with cryogenic trim materials and Teflon packing to -100°F (-73°C).

## Valve Maintenance

Repair Kits: add "R" to the front of valve catalog number for proper repair kit. (Example: **R50Y9071**)

Valve Bodies: Valve bodies are available. Order using the eight (8) digit part number found on the valve drawing or contact your Sales Representative for information.

Consult your Autoclave representative for pricing on repair kits and valve bodies. Refer to the Tools, Installation, Operation and Maintenance section for proper maintenance procedures.

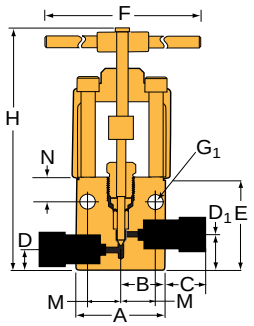
| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions - inches (mm) A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | Block Thick-ness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2-Way Straight** | | | | | | | | | | | | | | | | | |
| 15Y12071 | VEE | 3/4 | 0.438 | 3.00 | 1.50 | 0.63 | 2.75 | 2.00 | 3.50 | 8.00 | | 0.28 | 9.38 | 1.13 | 0.88 | 1.38 | See Figure 1 |
| 15Y12081 | REG | (19.05) | (11.13) | (76.20) | (38.10) | (15.88) | (69.85) | 50.80 | (88.90) | (203.20) | | (7.11) | (238.25) | (28.58) | (22.23) | (34.93) | |
| 15Y16071 | VEE | 1.00 | 0.562 | 4.13 | 2.06 | 0.63 | 3.25 | 3.25 | 4.13 | 10.25 | | 0.28 | 10.00 | 1.50 | 1.13 | 1.75 | |
| 15Y16081 | REG | (25.40) | (14.27) | (104.78) | (52.39) | (15.88) | (82.55) | 82.55 | (104.78) | (260.35) | | (7.11) | (254.00) | (38.10) | (28.58) | (44.45) | |
| 43Y16071 | VEE | 1.00 | 0.375 | 4.13 | 2.07 | 0.72 | 3.00 | 2.25 | 3.88 | 10.25 | | 0.28 | 9.56 | 1.50 | 1.00 | 1.75 | |
| 43Y16081 | REG | (25.40) | (9.53) | (104.90) | (52.45) | (18.29) | (76.20) | 57.15 | (98.55) | (260.35) | | (7.11) | (242.82) | (38.10) | (25.40) | (44.45) | |
| 50Y9071 | VEE | 9/16 | 0.188 | 3.00 | 1.50 | 0.56 | 2.56 | 2.00 | 3.25 | 13.00 | | 0.50 | 8.69 | 1.13 | 0.88 | 1.38 | |
| 50Y9081 | REG | (14.27) | (4.78) | (76.20) | (38.10) | (14.27) | (65.07) | 50.80 | (82.55) | (330.20) | | (12.70) | (220.73) | (28.58) | (22.23) | (34.93) | |
| **2-Way Angle** | | | | | | | | | | | | | | | | | |
| 15Y12072 | VEE | 3/4 | 0.438 | 3.00 | 1.50 | 0.63 | 2.00 | | 3.75 | 8.00 | | 0.28 | 9.63 | 1.13 | 0.88 | 1.38 | See Figure 2 |
| 15Y12082 | REG | (19.05) | (11.13) | (76.20) | (38.10) | (15.88) | 50.80 | | (95.25) | (203.20) | | (7.11) | (244.48) | (28.58) | (22.23) | (34.93) | |
| 15Y16072 | VEE | 1.00 | 0.562 | 4.13 | 2.06 | 0.63 | 2.25 | | 4.13 | 10.25 | | 0.28 | 10.38 | 1.50 | 1.13 | 1.75 | |
| 15Y16082 | REG | (25.40) | (14.27) | (104.90) | (52.39) | (15.88) | 57.15 | | (104.78) | (260.35) | | (7.11) | (263.53) | (38.10) | (28.58) | (44.45) | |
| 43Y16072 | VEE | 1.00 | 0.375 | 4.13 | 2.07 | 0.72 | 2.25 | | 5.12 | 10.25 | | 0.28 | 10.80 | 1.50 | 1.00 | 1.75 | |
| 43Y16082 | REG | (25.40) | (9.53) | (104.90) | (52.45) | (18.29) | 57.15 | | (130.05) | (260.35) | | (7.11) | (274.32) | (38.10) | (25.40) | (44.45) | |
| 50Y9072 | VEE | 9/16 | 0.188 | 3.00 | 1.50 | 0.56 | 2.56 | | 3.50 | 13.00 | | 0.50 | 8.81 | 1.13 | 0.88 | 1.38 | |
| 50Y9082 | REG | (14.27) | (4.78) | (76.20) | (38.10) | (14.27) | 65.07 | | (88.90) | (330.20) | | (12.70) | (223.82) | (28.58) | (22.23) | (34.93) | |
| **2-Way Angle/Replaceable Seat** | | | | | | | | | | | | | | | | | |
| 15Y12872 | VEE | 3/4 | 0.438 | 3.00 | 1.50 | 0.63 | 1.94 | | 4.00 | 8.00 | | 0.28 | 11.31 | 1.13 | 0.88 | 1.38 | See Figure 3 |
| 15Y12882 | REG | (19.05) | (11.13) | (76.20) | (38.10) | (15.88) | (49.28) | | (101.60) | (203.20) | | (7.11) | (287.27) | (28.58) | (22.23) | (34.93) | |
| 15Y16872 | VEE | 1.00 | 0.562 | 4.13 | 2.06 | 0.63 | 2.06 | | 4.13 | 10.25 | | 0.28 | 11.75 | 1.50 | 1.03 | 1.75 | |
| 15Y16882 | REG | (25.40) | (14.27) | (104.78) | (52.39) | (15.88) | (52.32) | | (104.78) | (260.35) | | (7.11) | (298.45) | (38.10) | (26.16) | (44.45) | |
| 43Y16872 | VEE | 1.00 | 0.375 | 4.13 | 2.07 | 0.72 | 2.25 | | 6.27 | 10.25 | | 0.28 | 11.95 | 1.50 | 1.00 | 1.75 | |
| 43Y16882 | REG | (25.40) | (9.53) | (104.78) | (52.45) | (18.29) | (57.15) | | (159.26) | (260.35) | | (7.11) | (303.53) | (38.10) | (25.40) | (44.45) | |
| 50Y9872 | VEE | 9/16 | 0.188 | 3.00 | 1.50 | 0.56 | 2.00 | | 3.38 | 4.00 | | 0.28 | 12.12 | 1.13 | 1.06 | 1.38 | |
| 50Y9882 | REG | (14.27) | (4.78) | (76.20) | (38.10) | (14.27) | (50.80) | | (85.73) | (101.60) | | (7.11) | (307.85) | (28.58) | (26.97) | (34.93) | |

*G - Bracket mounting hole size*

** H Dimension is with stem in closed position.*
*All dimensions for reference only and subject to change.*

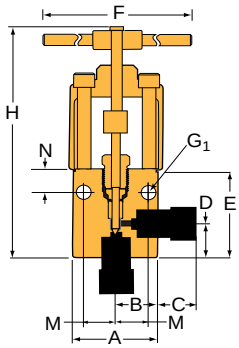
**For prompt service, Autoclave stocks select products. Consult factory.**

**Figure 1**



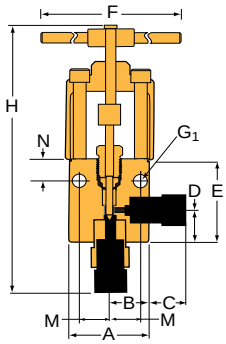

**2-Way Straight**

**Figure 2**




**2-Way Angle**

**Figure 3**




**2-Way Angle/Replaceable Seat**

# Needle Valves

## Options

Autoclave Engineer's Needle Valves can be supplied with a number of options to meet your requirements. These include various materials of construction, packing material, high temperature packing, handle colors, stem options, custom valves, pneumatic actuators, and a number of other options.

The following pages provide details on these options. For additional or technical information not found in this section, please consult the factory or local distributor.

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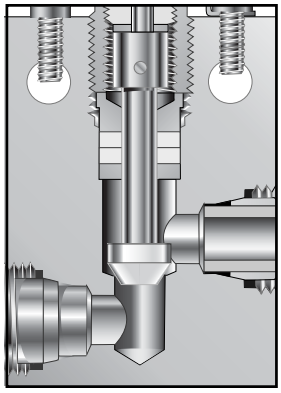
# Needle Valves - Stem Options

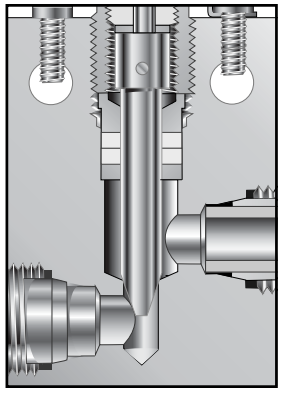
## Three Stem Types

Three types of stems are offered by Autoclave Engineers: Vee, Regulating and MicroMetering. Both Vee and Regulating stems are interchangable on most AE valves and provide bubble-tight shut-off against liquids and gases.



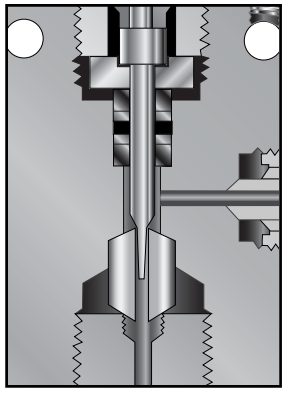
### VEE Stem

The Vee stem is used for direct on-off, metal-to-metal shut-off with quick-opening flow characteristics.



### Regulating Stem

In some applications, more precise flow control is required than is possible with a Vee stem. For these cases, Autoclave offers a non-rotating, two-piece regulating stem which can be used for both control and shut-off. This stem has a 4° taper at the tip in conjunction with a standard 60° section for shut-off. While it is not as precise as the control associated with the MicroMetering stem, especially with smaller flows, it does offer substantially better control than the Vee stem.



### MicroMetering Stem

Where precise control of small flows is required, Autoclave offers special MicroMetering valves. For complete information on MicroMetering valves, refer to Micro-Metering in the Needle Valve section.

## Optional Materials

To order optional materials for wetted parts, add the following designations to the order number.

| | |
|---|---|
| 316L | Type 316 extra low carbon stainless steel |
| HB | *Hastelloy B-2 |
| HC | *Hastelloy C276 wetted parts |
| IN | *Inconel 600 |
| IN625 | *Inconel 625 |
| IN825 | *Incoloy 825 |
| KMO | *Monel K500 |
| MO | *Monel 400 or 450 |
| NI | Nickel 200 |
| TI | Titanium grade 2 |

*Note: For duplex, super duplex and other materials contact your sales representative.*

* *Trademark names*

## Air Operated Valves

Refer to Valve Actuators section for available models.

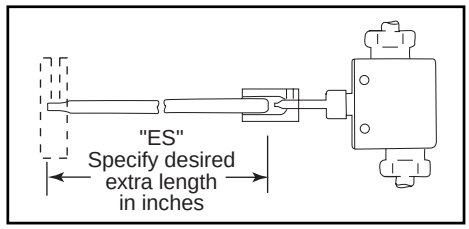
## Packing Options

Refer to the valve model required, and see valve options in that section.

## Optional Connections

In addition to standard tube connections, Autoclave Engineers can supply many valve and fitting series with such optional end connections as Female or Male NPT, Socket Weld to O.D. tube size, or nominal pipe size, Female “AN” (MS 33649), Male “AN (MS 33656), Butt Weld and British straight thread. Contact factory for current information. Metric sizes can be supplied on most Autoclave valves and fittings on special order.

**Stem and Handle Extenders**
Stem Extenders are offered for high or low temperature operation on most Autoclave valves. They are also useful for remote actuation, such as behind a barricade. To order any valve with a Stem Extender, add “ES” and the length (6”, 12”, 18” or 24”) to the beginning of the valve catalog number: e.g. ES12-30VM407. Other lengths on special order.




**Abrasive or Highly Erosive Service Option**
For service conditions where high flows, erosive mediums, or high pressures cause premature wear on stems and seats, N-Dura coating can be supplied to increase component life.

N-Dura coating is specifically used to enhance stem and seat life by providing a protective coating over a base substrate. This creates a thin, hard, protective coating with no effects of brittleness. The coating will not peel, chip or flake off the base material. The coating hardness is in a range of minimum 85 Rc surpassing other coatings and most materials.

The additional performance characteristics provided with the coating are reduced friction, corrosion resistance exceeding 400 stainless steel, and operating temperature ranges from -300°F to 1200°F.
The coating has been tested in erosive applications, yielding far better results than Stellite®, which has been utilized extensively in these applications. With few exceptions, most major ferrous and non ferrous materials can be successfully coated.

Most valves in this catalog are available with N-Dura coated stems or with both N-Dura coated stems and replaceable seats. This coating is available for all stem options. To order both N-Dura stems on any valve pattern, add suffix “CS” to the catalog model number. To order both N-Dura coated stems and N-Dura coated replaceable seats (available on 2-way angle replaceable seat pattern only) add suffix “CSS” to the catalog number. Stellite® is available as a special upon request.

**Optional Valve Handles**
Blue powder coated stainless handles are standard on the majority of the valve series. Stainess handles can be purchased in different colors if required, contact the factory for color options.

**Exception: Heavy-duty Stainless Steel T-handles assemblies** are standard on our larger valves, see detailed information on each section for handles used.

# Valve Actuator

## Index



Autoclave Engineers

Fluid Components
Division of Snap-tite, Inc.

*www.autoclaveengineers.com*

*02-0132CE-0302*

# Pneumatic Valve Actuator

*Pressures to 150,000 psi (10342 bar)*

The need to control process and vent valves from a remote location makes air operated valves a vital component to many processing operations.

All Autoclave Engineer's valves are available with diaphragm or piston type actuators. Five sizes of air actuators (light, heavy light, medium, heavy duty or extra heavy) are offered to meet the service requirements of Autoclave Engineer's Low, Medium and High Pressure valves. Both air-to-open (normally closed) and air-to-close (normally open) designs are included in the product line.

For most Autoclave Engineers valve series there is a choice of two or more actuator designs. This provides the most efficient and economical pneumatic valve operation for any combination of process requirements and available air pressure.

Actuators are available for outdoor service. These operators provide corrosion resistant components and prevent the ingress of outside elements.

Solenoid valve packages are available for on/off control of the supply air to the valve actuator. Packages contain the solenoid valve and fittings required to connect the air operator.

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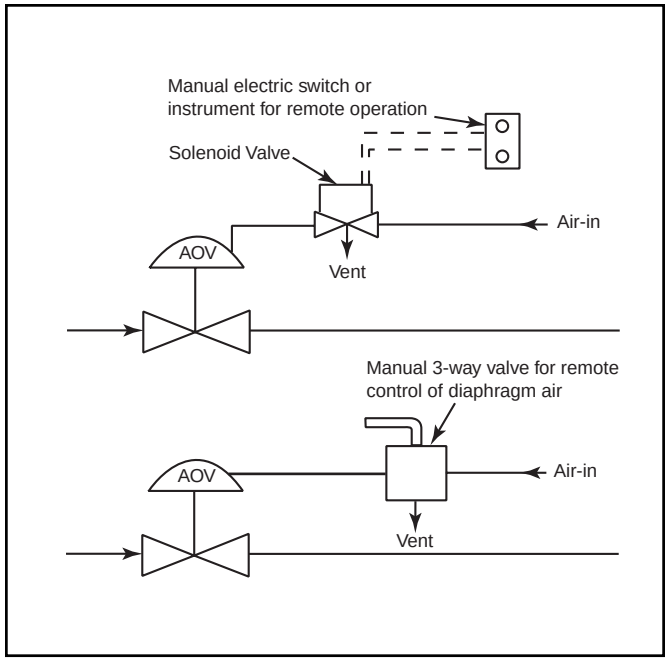
www.autoclaveengineers.com

## Pressures to 150,000 psi (10342 bar)

### Pneumatic Actuator

*Pressures to 150,000 psi (10342 bar)*

Five sizes of air operators (light, heavy light, medium, heavy duty or extra heavy) are offered for remote on-off operation or automatic operation of Autoclave Engineer's low, medium or high pressure valves. The actuators are available in air-to-open (normally closed) and air-to-close (normally open) designs.




### Remote on-off

Autoclave Engineer's air-operated valves (**ATO**- Air-To-Open or **ATC**-Air-To-Close) can be controlled by a 3-way manual low pressure valve or by a low pressure solenoid valve. These are actuated by either a manual switch or an automatic control instrument. Autoclave Engineer's air-operated, high pressure valves permit process control from a remotely located panel without the necessity of piping high pressure lines to the control panel. Safety is greatly increased and process "hold-up" is reduced.

Prudent selection of ATO or ATC valves, together with the air controlling devices, permits the design of systems to "fail safe" in either the closed or open condition in the event of loss of operating air, or electrical failure, or malfunction.

Where explosion proof conditions are a requirement, pneumatic actuated valves can be considered. Remote mounting of the solenoid valve removes the potential from the hazardous area.

### Ordering Procedure

To order a valve with an air operator, select the duty rating and type of the air operator from the chart below. Add the air operator identifying suffix to the catalog number of the Autoclave Engineer's valve. To order a 2-way straight, 30VM vee stem, 9/16" valve with a medium duty air-to-close air operator, specify: ex: **30VM9071-C1S** for a yoke style piston air actuated valve or **30VM9071-CM** for an integral style diaphragm air operated valve.

To order the same valve with an extended high temperature stuffing box, add HT to the ordering number: ex: **30VM9071-C1SHT** or **30VM9071-CMHT**.

To order a dual air operator manifold valve, specify both operators. The same valve with a medium duty ATC on one stem and a medium duty ATO on the other, specify: ex: **30VM9075-C1SO1S.**

To order a valve with operators for outdoor service add an "OD" suffix to the catalog number.

| Duty Rating | Operator | Type | Ordering Suffix |
|---|---|---|---|
| Light | Diaphragm | Air-to-open | OL |
| | | Air-to-close | CL |
| | Piston | Air-to-open | OLP |
| | | Air-to-close | CLP |
| Heavy-Light | Piston | Air-to-open | OHLP |
| Medium | Diaphragm | Air-to-open | OM |
| | | Air-to-close | CM |
| | Piston | Air-to-open | O1S |
| | | Air-to-close | C1S |
| Heavy | Diaphragm | Air-to-open | OH |
| | | Air-to-close | CH |
| | Piston | Air-to-open | O2S |
| | | Air-to-close | C2S |
| Extra Heavy | Piston | Air-to-open | HO2S |
| | | Air-to-close | HC2S |

# Pneumatic Valve Actuators - Actuator Quick Selector Guide

This table allows the designer to quickly select an appropriate air actuator based on valve style and size, maximum system operating pressure and maximum available air pressure. For example, if the system operating pressure is 25,000 psi (1724 bar) and the available air pressure is 60 psi (4.14 bar) and an air-to-open (spring fail closed) valve is required, a 30VM or 60VM valve with a heavy duty air operator can be used. More specific sizing data is available in the sizing charts on the following pages.

| Valve Series | Tube Outside Diameter in (mm) | Air-to-Close | | | | | | | | Air-to-Open | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Light | | Medium | | Heavy | | Extra Heavy | | Light | | Medium | | Heavy | | Extra Heavy | |
| | | System Pressure psi (bar) | Air Pressure psi (bar) | System Pressure psi (bar) | Air Pressure psi (bar) | System Pressure psi (bar) | Air Pressure psi (bar) | System Pressure psi (bar) | Air Pressure psi (bar) | System Pressure psi (bar) | Air Pressure psi (bar) | System Pressure psi (bar) | Air Pressure psi (bar) | System Pressure psi (bar) | Air Pressure psi (bar) | System Pressure psi (bar) | Air Pressure psi (bar) |
| 10V | 1/8 (3.18) | 15,000 (1034.20) | 100 (6.89) | 15,000 (1034.20) | 30 (2.07) | | | | | 8,200 (565.36) | 60 (4.14) | 15,000 (1034.20) | 45 (3.10) | | | | |
| | 1/4 (6.35) | 10,000 (689.46) | 100 (6.89) | 15,000 (1034.20) | 40 (2.75) | | | | | 5,600 (386.10) | 60 (4.14) | 15,000 (1034.20) | 65 (4.48) | | | | |
| | 3/8 (9.52) | 10,000 (689.46) | 100 (6.89) | 15,000 (1034.20) | 40 (2.75) | | | | | 5,600 (386.10) | 60 (4.14) | 15,000 (1034.20) | 65 (4.48) | | | | |
| | 1/2 (12.70) | | | 10,000 (689.46) | 65 (4.48) | | | | | | | 10,000 (689.46) | 95 (6.55) | | | | |
| SW | 1/4 (6.35) | | | 15,000 (1034.20) | 65 (4.48) | | | | | | | 15,000 (1034.20) | 100 (6.89) | | | | |
| | 3/8 (9.52) | | | 15,000 (1034.20) | 90 (6.21) | 15,000 (1034.20) | 50 (3.45) | | | | | 10,000 (689.46) | 95 (6.55) | 15,000 (1034.20) | 75 (5.17) | | |
| | 1/2 (12.70) | | | 8,500 (586.05) | 100 (6.89) | 10,000 (689.46) | 60 (4.14) | | | | | 6,000 (413.68) | 95 (6.55) | 10,000 (689.46) | 75 (5.17) | | |
| 10SM | 9/16 (14.27) | | | 8,600 (592.94) | 100 (6.89) | 10,000 (689.46) | 55 (3.79) | 10,000 (689.46) | 20 (1.38) | | | 7,900 (544.68) | 95 (6.55) | 10,000 (689.46) | 75 (5.17) | 10,000 (689.46) | 40 (2.76) |
| | 3/4 (19.05) | | | 4,800 (330.94) | 100 (6.89) | 10,000 (689.46) | 100 (6.89) | 10,000 (689.46) | 35 (2.41) | | | | | 7,000 (482.63) | 75 (5.17) | 10,000 (689.46) | 60 (4.14) |
| | 1 (25.40) | | | 2,800 (193.05) | 100 (6.89) | 6,300 (434.36) | 100 (6.89) | 10,000 (689.46) | 35 (2.41) | | | | | 4,300 (296.47) | 75 (5.17) | 10,000 (689.46) | 85 (5.86) |
| 20SM | 1/4 (6.35) | | | 20,000 (1378.93) | 95 (6.55) | 20,000 (1378.93 | 50 (3.45) | | | | | 20,000 (1378.93) | 95 (6.55) | 20,000 (1378.93) | 50 (3.45) | | |
| | 3/8 (9.52) | | | 19,000 (1309.98) | 100 (6.89) | 20,000 (1378.93 | 55 (3.79) | | | | | 18,250 (1258.27) | 95 (6.55) | 18,250 (1258.27) | 50 (3.45) | | |
| | 9/16 (14.27) | | | 10,700 (737.73) | 100 (6.89) | 20,000 (1378.93) | 85 (5.86) | 20,000 (1378.93) | 30 (2.07) | | | 9,800 (675.68) | 95 (6.55) | 15,700 (1082.46) | 75 (5.17) | 20,000 (1378.93) | 55 (3.79) |
| | 3/4 (19.05) | | | 6,100 (420.57) | 100 (6.89) | 13,600 (937.67) | 100 (6.89) | 20,000 (1378.93) | 50 (3.45) | | | | | 9,200 (634.31) | 75 (5.17) | 20,000 (1378.93) | 80 (5.52) |
| | 1 (25.40) | | | 3,900 (268.89) | 100 (6.89) | 8,800 (606.73) | 100 (6.89) | 20,000 (1378.93) | 75 (5.17) | | | | | 6,100 (420.57) | 75 (5.17) | 20,000 (1378.93) | 100 (6.89) |
| 30SC | 1 (25.40) | | | | | | | 30,000 (2068.39) | 80 (5.52) | | | | | | | 30,000 (2068.39) | 100 (6.89) |

Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

# Pneumatic Valve Actuators - Actuator Quick Selector Guide

| Valve Series | Tube Outside Diameter in (mm) | Air-to-Close | | | | | | | | Air-to-Open | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Light | | Medium | | Heavy | | Extra Heavy | | Light | | Medium | | Heavy | | Extra Heavy | |
| | | System Pressure psi (bar) | Air Pressure psi (bar) | System Pressure psi (bar) | Air Pressure psi (bar) | System Pressure psi (bar) | Air Pressure psi (bar) | System Pressure psi (bar) | Air Pressure psi (bar) | System Pressure psi (bar) | Air Pressure psi (bar) | System Pressure psi (bar) | Air Pressure psi (bar) | System Pressure psi (bar) | Air Pressure psi (bar) | System Pressure psi (bar) | Air Pressure psi (bar) |
| | | | | | | | | | | | | | | | | | |
| 30VM | 1/4 (6.35) | | | 30,000 (2068.39) | 50 (3.45) | 30,000 (2068.39) | 30 (2.07) | | | | | 30,000 (2068.39) | 75 (5.17) | 30,000 (2068.39) | 40 (2.76) | | |
| | 3/8 (9.52) | | | 30,000 (2068.39) | 75 (5.17) | 30,000 (2068.39) | 40 (2.76) | | | | | 30,000 (2068.39) | 95 (6.55) | 30,000 (2068.39) | 50 (3.45) | | |
| | 9/16 (14.27) | | | 30,000 (2068.39) | 75 (5.17) | 30,000 (2068.39) | 40 (2.76) | | | | | 30,000 (2068.39) | 95 (6.55) | 30,000 (2068.39) | 50 (3.45) | | |
| 40VM | 9/16 (14.27) | | | | | 40,000 (2757.86) | 45 (3.10) | | | | | | | 40,000 (2757.86) | 55 (3.79) | | |
| 60VM | 1/4 (6.35) | | | 60,000 (4136.79) | 75 (5.17) | 60,000 (4136.79) | 40 (2.76) | | | | | 60,000 (4136.79) | 95 (6.55) | 60,000 (4136.79) | 50 (3.45) | | |
| | 3/8 (9.52) | | | 60,000 (4136.79) | 75 (5.17) | 60,000 (4136.79) | 40 (2.76) | | | | | 60,000 (4136.79) | 95 (6.55) | 60,000 (4136.79) | 50 (3.45) | | |
| | 9/16 (14.27) | | | 60,000 (4136.79) | 90 (6.21) | 60,000 (4136.79) | 45 (3.10) | | | | | 60,000 (4136.79) | 95 (6.55) | 60,000 (4136.79) | 50 (3.45) | | |
| 100VM | 5/16 (7.92) | | | 100,000 (6894.55) | 100 (6.89) | 100,000 (6894.65) | 50 (3.45) | | | | | | | 100,000 (6894.65) | 70 (4.83) | | |
| 150V | 5/16 (7.92) | | | | | 150,000 (10341.97) | 80 (5.52) | | | | | | | 150,000 (10341.97) | 75 (5.17) | | |

| MVE/MV Mini Valves Series | | | Air-to-Open | | |
|---|---|---|---|---|---|
| | | | Heavy-Light | | |
| MVE | 1/16 (1.57) | | 15,000 (1034.20) | 100 (6.89) | |
| MV | 1/8 (3.18) | | 15,000 (1034.20) | 100 (6.89) | |

Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

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For prompt service, Autoclave stocks select products. Consult your local representative.

# Pneumatic Valve Actuators - Piston Style Pneumatic

## Pressures to 150,000 psi (10342 bar)

Piston type air-operated valves offer a unique, reliable design providing for a long and dependable life. These valves are more compact than diaphragm valves and are appropriate for applications such as high-flow gas and liquid delivery systems to reactors and mixer/vaporizers.

Autoclave Engineer's piston type actuators feature:

- Small, compact, piston actuator
- Air-to-open or -close with spring return
- Yoke design for separation of process and air pressure †
- Ease of stem replacement
- Stem position indicator is standard †
- Positive shut-off metal-to-metal seating
- High actuator cycle life


## Air Operator Materials

Cylinder, piston, cover plates, spring housing

- Anodized aluminum (for corrosion and wear resistance).

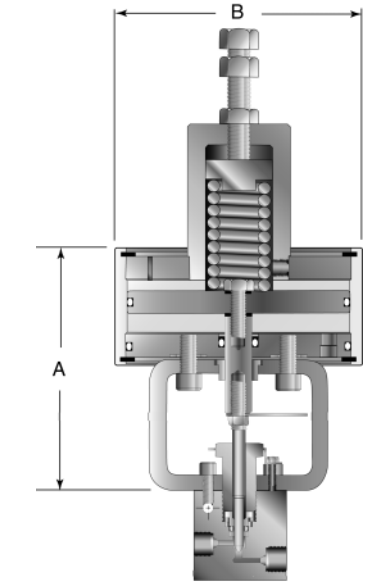
Yoke

- Painted Steel

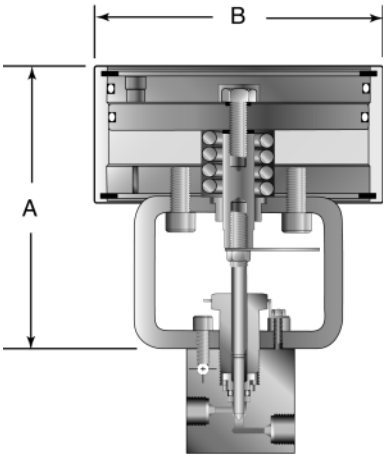
## Technical Data

**Air Operator**

- Maximum allowable working pressure: 100 psi (6.89 bar)
- Allowable piston temperature range: -20°F to 200°F (-29°C to 93°C)
- Area of piston:
  - Light duty - 4.9 sq. in (31.6 sq. cm)
  - Heavy-Light duty - 5.4 sq. in (34.8 sq. cm)
  - Medium duty - 19.6 sq. in (126.5 sq. cm)
  - Heavy duty - 39.2 sq. in (252.9 sq. cm)
  - Extra Heavy duty - 112 sq. in (722.6 sq. cm)
- Approximate air usage/cycle @ 100 psi (6.89 bar):
  - Light duty - .003 SCF (.00008 SCM)
  - Heavy-Light duty - .007 SCF (.0002 SCM)
  - Medium duty - .04 SCF (.0011 SCM)
  - Heavy duty - .08 SCF (.0022 SCM)
  - Extra Heavy duty - .67 SCF (.019 SCM)
- Tested to 100,000 cycles at 100 psi (6.89 bar) with no leakage or signs of wear or fatigue.




Air-to-Open (ATO)




Air-to-Close (ATC)

| Duty Rating | Type | Ordering Suffix | Dimensions: inches (mm) | |
|---|---|---|---|---|
| | | | A | B |
| Light | Air-to-open | OLP | 5.50 (139.70) | 2.81 (71.37) |
| | Air-to-close | CLP | 3.94 (100.08) | 2.81 (71.37) |
| † Heavy-Light | Air-to-open | OHLP | 3.84 (97.67) | 3.06 (77.72) |
| Medium | Air-to-open | O1S | 8.25 (209.55) | 5.69 (144.52) |
| | Air-to-close | C1S | 5.50 (139.70) | 5.69 (144.52) |
| Heavy | Air-to-open | O2S | 11.88 (301.75) | 5.69 (144.52) |
| | Air-to-close | C2S | 8.50 (215.90) | 5.69 (144.52) |
| Extra Heavy | Air-to-open | HO2S | 18.50 (469.90) | 9.44 (239.78) |
| | Air-to-close | HC2S | 11.94 (303.27) | 9.44 (239.78) |

† The standard Heavy-Light operator does not utilize the yoke design. A yoke design is available upon request.

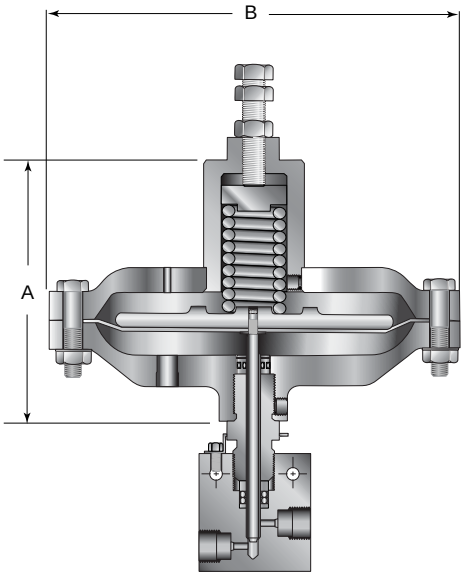
# Pneumatic Valve Actuators - Diaphragm Style Pneumatic

## Pressures to 150,000 psi (10342 bar)

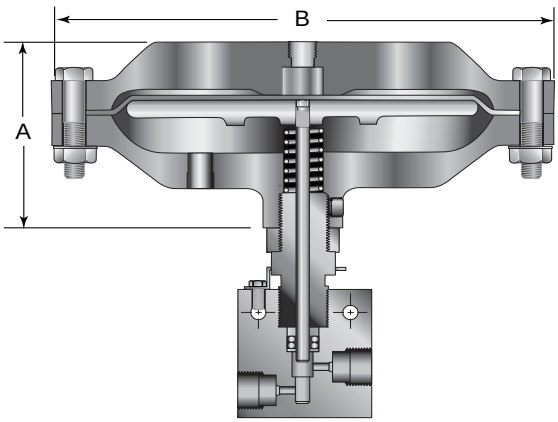
Diaphragm type air-operated valves are an efficient and economical means for “remote on-off” control of a wide range of process requirements. Diaphragm type actuators are designed to provide a dependable alternative to piston type actuators.

Autoclave Engineer’s diaphragm type air actuators feature:

- Economical diaphragm design
- Air-to-open or -close with spring return
- Integral connection of valve and operator for height resticted applications.
- Oversized weep holes for separation of process and air operator pressures.
- Stem position indicator optional
- Medium actuator cycle life




Air-to-Open (ATO)




Air-to-Close (ATC)

## Air Operator Materials

Upper and lower housing, spring housing

- Anodized aluminum

Diaphragm plate

- Cast ductile iron.

## Technical Data

**Air Operator**

- Maximum allowable working pressure: 100 psi (6.89 bar)
- Allowable diaphragm temperature range: -40°F to 200°F (-40°C to 93°C)
- Area of diaphragm:
  - Light duty - 4.9 sq. in (31.6 sq. cm)
  - Medium duty - 19.6 sq. in (126.5 sq. cm)
  - Heavy duty - 45.66 sq. in (294.58 sq. cm)
- Approximate air usage/cycle @ 100 psi (6.89 bar):
  - Light duty - .007 SCF (.00019 SCM)
  - Medium duty - .07 SCF (.0019 SCM)
  - Heavy duty - .2 SCF (.0056 SCM)

| Duty Rating | Type | Ordering Suffix | Dimensions: inches (mm) | |
|---|---|---|---|---|
| | | | A | B |
| Light | Air-to-open | OL | 5.00 (127.00) | 4.25 (107.95) |
| | Air-to-close | CL | 2.38 (60.45) | 4.25 (107.95) |
| Medium | Air-to-open | OM | 8.00 (203.20) | 7.38 (187.45) |
| | Air-to-close | CM | 3.75 (95.25) | 7.38 (187.45) |
| Heavy | Air-to-open | OH | 8.75 (222.25) | 10.00 (254.00) |
| | Air-to-close | CH | 4.69 (119.13) | 10.00 (254.00) |

# Pneumatic Valve Actuators - Air Operator Sizing Data

## Air-to-Close

### Series 10V and SW Valves

| Valve Series | Operator Duty | | System Pressure KSI (Mpa) | | | | | | | | | | | Maximum Pressure psi (bar)* | Stem Travel in (mm) | Flow Coefficient** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-4 (6.89-27.57) | 6 (41.37) | 8 (55.16) | 10 (68.95) | 12 (82.74) | 14 (96.53) | 15 (103.42 | | | | | | | |
| 10V2 | Light Duty | Air Pressure psi (bar) | 30 (2.04) | 40 (2.72) | 55 (3.74) | 65 (4.42) | 85 (5.86) | 95 (6.46) | 100 (6.80) | | | | | 15,000 (1034.20) | 0.16 (4.06) | 0.12 |
| | Medium Duty | | 25 (1.70) | 25 (1.70) | 25 (1.70) | 25 (1.70) | 25 (1.70) | 25 (1.70) | 30 (2.04) | | | | | | | |
| 10V4 | Light Duty | | 40 (2.72) | 60 (4.08) | 75 (5.10) | 95 (6.46) | | | | | | | | 10,000 (689.46) | 0.19 (4.83) | 0.20 |
| | Medium Duty | | 30 (2.04) | 30 (2.04) | 30 (2.04) | 30 (2.04) | 35 (2.38) | 35 (2.38) | 40 (2.72) | | | | | 15,000 (1034.20) | | |
| 10V6 | Light Duty | | 40 (2.72) | 60 (4.08) | 75 (5.10) | 100 (6.80) | | | | | | | | 10,000 (689.46) | 0.19 (4.83) | 0.20 |
| | Medium Duty | | 30 (2.04) | 30 (2.04) | 30 (2.04) | 35 (2.38) | 35 (2.38) | 35 (2.38) | 40 (2.72) | | | | | 15,000 (1034.20) | | |
| 10V8 | Medium Duty | | 50 (3.40) | 50 (3.40) | 55 (3.79) | 65 (4.48) | | | | | | | | 5,500 (379.21) | 0.31 (7.90) | 0.086 |
| SW4 | Medium Duty | | 40 (2.72) | 40 (2.72) | 40 (2.72) | 50 (3.40) | 55 (4.08) | 60 (4.14) | 65 (4.48) | | | | | 15,000 (1034.20) | 0.25 (6.40) | 0.065 |
| SW6 | Medium Duty | | 50 (3.40) | 50 (3.40) | 55 (3.74) | 70 (4.76) | 75 (5.10) | 85 (5.86) | 90 (6.21) | | | | | 10,000 (689.46) | 0.25 (6.40) | 0.095 |
| | Heavy Duty | | 20 (1.38) | 25 (1.72) | 30 (2.07) | 35 (2.41) | 40 (2.76) | 45 (3.10) | 50 (3.45) | | | | | 15,000 (1034.20) | 0.25 (6.40) | |
| SW8 | Medium Duty | | 65 (4.42) | 70 (4.76) | 100 (6.80) | | | | | | | | | 8,500 (586.46) | 0.38 (9.70) | 1.90 |
| | Heavy Duty | | 35 (2.38) | 35 (2.38) | 50 (3.40) | 60 (4.14) | | | | | | | | 10,000 (698.46) | | |

### Series 10SM

| Valve Series | Operator Duty | | System Pressure KSI (Mpa) | | | | | | | | | | | Maximum Pressure psi (bar)* | Stem Travel in (mm) | Flow Coefficient** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-3 (6.89-20.68 | 4 (27.58) | 6 (41.37) | 8 (55.16) | 10 (68.95) | 12 (82.74) | 14 (96.53) | 16 (110.31) | 18 (124.10) | 20 (137.89) | | | | |
| 10SM9 | Medium Duty | Air Pressure psi (bar) | 65 (4.42) | 65 (4.42) | 75 (5.10) | 100 (6.80) | | | | | | | | 8,600 (592.94) | 0.38 (9.65) | 1.75 |
| | Heavy Duty | | 35 (2.38) | 35 (2.38) | 40 (2.72) | 50 (3.40) | 55 (3.74) | | | | | | | 10,000 (689.46) | | |
| | Extra Heavy Duty | | 15 (1.02) | 15 (1.02) | 15 (1.02) | 20 (1.38) | 20 (1.38) | | | | | | | 10,000 (689.46) | | |
| 10SM12 | Medium Duty | | 90 (6.12) | 100 (6.80) | | | | | | | | | | 4,800 (330.94) | 0.44 (11.18) | 2.80 |
| | Heavy Duty | | 45 (3.06) | 45 (3.06) | 60 (4.08) | 80 (5.44) | 100 (6.80) | | | | | | | 10,000 (689.46) | | |
| | Extra Heavy Duty | | 20 (1.36) | 20 (1.36) | 25 (1.70) | 30 (2.04) | 35 (2.38) | | | | | | | 10,000 (689.46) | | |
| 10SM16 | Medium Duty | | 100 (6.80) | | | | | | | | | | | 2,800 (193.05) | 0.56 (14.22) | 5.20 |
| | Heavy Duty | | 60 (4.08) | 70 (4.76) | 100 (6.80) | | | | | | | | | 6,300 (434.36) | | |
| | Extra Heavy Duty | | 25 (1.70) | 25 (1.70) | 35 (2.38) | 45 (3.06) | 55 (3.06) | | | | | | | 10,000 (689.46) | | |

*Note: System operating pressure are shown for piston style operators. The maximum system operating pressure for some diaphragm operators is slightly reduced (approximately 10%).*

*Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

*** $C_V$ data is for 2-way straight valves. For angle pattern, add approximately 50% to the $C_V$ valve.*

## Air-to-Close - Series 20SM Valves

| Valve Series | Operator Duty | | System Pressure KSI (Mpa) | | | | | | | | | | | Maximum Pressure psi (bar)* | Stem Travel in (mm) | Flow Coefficient** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-3 (6.89-20.68) | 4 (27.58) | 6 (41.37) | 8 (55.16) | 10 (68.95) | 12 (82.74) | 14 (96.53) | 16 (110.31) | 18 (124.10) | 20 (137.89) | | | | |
| 20SM4 | Medium Duty | Air Pressure psi (bar) | 40 (2.72) | 40 (2.72) | 40 (2.724) | 40 (2.72) | 50 (3.40) | 60 (4.08) | 70 (4.76) | 80 (5.44) | 85 (5.78) | 95 (6.46) | | 20,000 (1378.93) | 0.25 (6.35) | 0.31 |
| | Heavy Duty | | 20 (1.36) | 20 (1.36) | 20 (1.36) | 20 (1.36) | 25 (1.70) | 30 (2.04) | 35 (2.38) | 40 (2.72) | 45 (3.06) | 50 (3.40) | | | | |
| 20SM6 | Medium Duty | | 45 (3.06) | 45 (3.06) | 45 (3.06) | 45 (3.06) | 55 (3.74) | 65 (4.42) | 75 (5.10) | 85 (5.78) | 95 (6.46) | 100 (6.80) | | 19,000 (1309.98) | 0.25 (6.35) | 0.75 |
| | Heavy Duty | | 25 (1.70) | 25 (1.70) | 25 (1.70) | 25 (1.70) | 30 (2.04) | 35 (2.38) | 40 (2.72) | 45 (3.06) | 50 (3.40) | 55 (3.74) | | 18,000 (1360.54) | | |
| 20SM9 | Medium Duty | | 60 (4.08) | 60 (4.08) | 65 (4.42) | 80 (5.44) | 100 (6.80) | | | | | | | 10,700 (737.73) | 0.38 (9.65) | 1.30 |
| | Heavy Duty | | 30 (2.04) | 30 (2.04) | 30 (2.04) | 40 (2.72) | 50 (3.40) | 55 (3.74) | 60 (4.08) | 70 (4.76) | 80 (5.44) | 85 (5.78) | | 20,000 (1378.93) | | |
| | Extra Heavy Duty | | 15 (1.02) | 15 (1.02) | 15 (1.02) | 15 (1.02) | 20 (1.36) | 20 (1.36) | 25 (1.70) | 25 (1.70) | 30 (2.04) | 30 (2.04) | | 20,000 (1378.93) | | |
| 20SM12 | Medium Duty | | 80 (5.44) | 80 (5.44) | 100 (6.80) | | | | | | | | | 6,100 (420.57) | 0.44 (11.18) | 2.50 |
| | Heavy Duty | | 40 (2.72) | 40 (2.72) | 50 (3.40) | 60 (4.08) | 75 (5.10) | 90 (6.12) | 100 (6.80) | | | | | 13,600 (937.67) | | |
| | Extra Heavy Duty | | 15 (1.02) | 15 (1.02) | 20 (1.36) | 25 (1.70) | 30 (2.04) | 35 (2.38) | 40 (2.72) | 45 (3.06) | 50 (3.40) | 50 (3.40) | | 20,000 (1378.93) | | |
| 20SM16 | Medium Duty | | 100 (6.80) | 100 (6.80) | | | | | | | | | | 3,900 (268.89) | 0.56 (14.22) | 3.40 |
| | Heavy Duty | | 50 (3.40) | 50 (3.40) | 70 (4.76) | 100 (6.80) | | | | | | | | 8,800 (606.73) | | |
| | Extra Heavy Duty | | 20 (1.36) | 20 (1.36) | 25 (1.70) | 35 (2.38) | 40 (2.72) | 50 (3.40) | 55 (3.74) | 60 (4.08) | 70 (4.76) | 75 (5.10) | | 20,000 (1378.93) | | |

## Series 30SC Valves

| Valve Series | Operator Duty | | System Pressure KSI (Mpa) | | | | | | | | | | | Maximum Pressure psi (bar)* | Stem Travel in (mm) | Flow Coefficient** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-10 (6.89-68.94) | 15 (103.42) | 16 (110.31) | 18 (124.10) | 20 (137.89) | 22 (151.68) | 24 (165.47) | 26 (179.26) | 28 (193.05) | 30 (206.84) | | | | |
| 30SC16 | Extra Heavy Duty | Air Pressure psi (bar) | 30 (2.04) | 40 (2.72) | 45 (3.06) | 50 (3.40) | 55 (3.74) | 60 (4.08) | 65 (4.42) | 70 (4.76) | 75 (5.10) | 80 (5.44) | | 30,000 (2068.39) | 0.50 (12.70) | 2.61 |

## Series 30VM Valves

| Valve Series | Operator Duty | | System Pressure KSI (Mpa) | | | | | | | | | | | Maximum Pressure psi (bar)* | Stem Travel in (mm) | Flow Coefficient** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-10 (6.89-68.94) | 12 (82.74) | 14 (96.53) | 16 (110.31) | 18 (124.10) | 20 (137.89) | 22 (151.68) | 24 (165.47) | 26 (179.26) | 28 (193.05) | 30 (206.84) | | | |
| 30VM4 | Medium Duty | Air Pressure psi (bar) | 25 (1.70) | 25 (1.70) | 25 (1.70) | 30 (2.04) | 35 (2.38) | 35 (2.38) | 40 (2.72) | 45 (3.06) | 50 (3.40) | 50 (3.40) | 55 (3.74) | 30,000 (2068.39) | 0.19 (4.83) | 0.12 |
| | Heavy Duty | | 15 (1.02) | 15 (1.02) | 15 (1.02) | 15 (1.02) | 20 (1.36) | 20 (1.36) | 20 (1.36) | 25 (1.70) | 25 (1.70) | 25 (1.70) | 30 (2.04) | | | |
| 30VM6 & 30VM9 | Medium Duty | | 30 (2.04) | 30 (3.06) | 35 (2.38) | 40 (2.72) | 45 (3.06) | 50 (3.40) | 55 (3.74) | 60 (4.08) | 65 (4.42) | 70 (4.76) | 75 (5.10) | 30,000 (2068.39) | 0.19 (4.83) | 0.23 (30VM6) |
| | Heavy Duty | | 15 (1.02) | 15 (1.02) | 20 (1.36) | 20 (1.36) | 25 (1.70) | 25 (1.70) | 30 (2.04) | 30 (2.04) | 35 (2.38) | 35 (2.38) | 40 (2.72) | | | 0.33 (30VM9) |

*All ratings for reference only and subject to change.*

*Note: System operating pressure are shown for piston style operators. The maximum system operating pressure for some diaphragm operators is slightly reduced (approximately 10%).*

*Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*

For prompt service, Autoclave stocks select products. Consult your local representative.

** $C_V$ *data is for 2-way straight valves.*

*For angle pattern, add approximately 50% to the* $C_V$ *valve.*

## Air-to-Close - Series 40VM Valves

| Valve Series | Operator Duty | | System Pressure KSI (Mpa) | | | | | | | | Maximum Pressure psi (bar)* | Stem Travel in (mm) | Flow Coefficient** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-10 (6.89-68.94) | 15 (103.42) | 20 (137.89) | 25 (172.37) | 30 (206.84) | 35 (241.31) | 40 (275.79) | | | | |
| 40VM9 | Medium Duty | Air Pressure psi (bar) | 40 (2.72) | 50 (3.40) | 60 (4.08) | 70 (4.76) | 80 (5.44) | 90 (6.12) | 90 (6.12) | | 40,000 (2757.86) | 0.25 (6.35) | 0.28 |
| | Heavy Duty | | 20 (1.36) | 25 (1.70) | 30 (2.04) | 35 (2.38) | 40 (2.72) | 45 (3.06) | 45 (3.06) | | | | |

## Series 60VM Valves

| Valve Series | Operator Duty | | System Pressure KSI (Mpa) | | | | | | | | | | Maximum Pressure psi (bar)* | Stem Travel in (mm) | Flow Coefficient** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-20 (6.89-137.89) | 25 (172.37) | 30 (206.84) | 35 (241.31) | 40 (275.79) | 45 (310.26) | 50 (344.73) | 55 (379.21) | 60 (413.68) | | | | |
| 60VM4 & 60VM6 | Medium Duty | Air Pressure psi (bar) | 30 (2.04) | 30 (2.04) | 35 (2.38) | 45 (3.06) | 50 (3.40) | 55 (3.74) | 60 (4.08) | 70 (4.76) | 75 (5.10) | | 60,000 (4136.79) | 0.25 (6.35) | 0.08 (60VM4) |
| | Heavy Duty | | 15 (1.02) | 15 (1.02) | 20 (1.36) | 25 (1.70) | 25 (1.70) | 30 (2.04) | 30 (2.04) | 35 (2.38) | 40 (2.72) | | | | 0.09 (60VM6) |
| 60VM9 | Medium Duty | | 35 (2.38) | 40 (2.72) | 50 (3.40) | 55 (3.74) | 65 (4.42) | 70 (4.76) | 75 (5.10) | 85 (5.78) | 90 (6.12) | | 60,000 (4136.79) | 0.25 (6.35) | 0.14 |
| | Heavy Duty | | 20 (1.36) | 20 (1.36) | 25 (1.70) | 30 (2.04) | 35 (2.38) | 35 (2.38) | 40 (2.72) | 45 (3.06) | 45 (3.06) | | | | |

## Series 100VM & 150V Valves

| Valve Series | Operator Duty | | System Pressure KSI (Mpa) | | | | | | | | | Maximum Pressure psi (bar)* | Stem Travel in (mm) | Flow Coefficient** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-40 (6.89-275.79) | 50 (344.73) | 60 (413.68) | 70 (482.63) | 80 (551.57) | 90 (620.52) | 100 (689.46) | 150 (1034.20) | | | | |
| 100VM5 | Medium Duty | Air Pressure psi (bar) | 50 (3.45) | 55 (3.79) | 65 (4.48) | 75 (5.17) | 85 (5.86) | 95 (6.55) | 100 (6.89) | | | 100,000 (6894.65) | 0.12 (3.05) | 0.09 |
| | Heavy Duty | | 30 (2.07) | 30 (2.07) | 35 (2.41) | 40 (2.76) | 40 (2.76) | 45 (3.10) | 50 (3.45) | | | | | |
| 150V5 | Heavy Duty | | 35 (2.38) | 40 (2.72) | 45 (3.06) | 45 (3.06) | 50 (3.40) | 55 (3.74) | 60 (4.08) | 100 (6.80) | | 150,000 (10341.97) | 0.12 (3.05) | 0.06 |

*Note: System operating pressure are shown for piston style operators. The maximum system operating pressure for some diaphragm operators is slightly reduced (approximately 10%).*

*** $C_V$ data is for 2-way straight valves. For angle pattern, add approximately 50% to the $C_V$ valve.*

***CAUTION:** While testing has shown O-rings to provide satisfactory service life, both cyclic and shelf life may vary widely with differing service conditions, properties of reactants, pressure and temperature cycling and age of the O-ring, FREQUENT INSPECTIONS SHOULD BE MADE to detect any deterioration, and O-rings replaced as required.*

*Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

# Pneumatic Valve Actuators - Air Operator Sizing Data

## Air-to-Open

### Series 10V Valves

| Valve Series | Operator Duty | | System Pressure KSI (Mpa) | | | | | | | | | | | Maximum Pressure psi (bar)* | Flow Coefficient Cv** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-6 (6.89-41.37) | 8 (110.31) | 10 (124.10) | 12 (82.74) | 14 (96.53) | 15 (103.42) | | | | | | | |
| 10V2 | Light Duty | Air Pressure: psi (bar) | 60 (4.08) | 60 (4.08) | | | | | | | | | | 8,200 (565.36) | 0.12 to 0.09*** |
| | | Spring Pre-Compression: in. (mm) | 0.31 (7.87) | 0.38 (9.65) | | | | | | | | | | | |
| | | Stem Travel in (mm) | 0.12 (3.05) | 0.06 (1.52) | | | | | | | | | | | |
| | Medium Duty | Air Pressure: psi (bar) | 40 (2.72) | 40 (2.72) | 40 (2.72) | 40 (2.72) | 40 (2.72) | 45 (3.10) | | | | | | 15,000 (1034.20) | 0.12 |
| | | Spring Pre-Compression: in. (mm) | 0.12 (3.05) | 0.12 (3.05) | 0.12 (3.05) | 0.12 (3.05) | 0.12 (3.05) | 0.16 (4.06) | | | | | | | |
| | | Stem Travel in (mm) | 0.12 (3.05) | 0.12 (3.05) | 0.12 (3.05) | 0.12 (3.05) | 0.12 (3.05) | 0.12 (3.05) | | | | | | | |
| 10V4 10V6 | Light Duty | Air Pressure: psi (bar) | 60 (4.08) | | | | | | | | | | | 5,600 (386.46) | 0.02 to 0.17*** |
| | | Spring Pre-Compression: in. (mm) | 0.38 (9.65) | | | | | | | | | | | | |
| | | Stem Travel in (mm) | 0.06 (1.52) | | | | | | | | | | | | |
| 10V4 | Medium Duty | Air Pressure: psi (bar) | 45 (3.06) | 45 (3.06) | 50 (3.45) | 55 (3.79) | 60 (4.14) | 65 (4.48) | | | | | | 15,000 (1034.20) | 0.20 |
| | | Spring Pre-Compression: in. (mm) | 0.12 (3.05) | 0.12 (3.05) | 0.14 (3.65) | 0.18 (4.75) | 0.20 (5.08) | 0.22 (5.59) | | | | | | | |
| | | Stem Travel in (mm) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | | | | | | | |
| 10V6 | Medium Duty | Air Pressure: psi (bar) | 45 (3.06) | 45 (3.06) | 50 (3.45) | 55 (3.74) | 60 (4.14) | 65 (4.48) | | | | | | 15,000 (1034.20) | 0.20 |
| | | Spring Pre-Compression: in. (mm) | 0.12 (3.05) | 0.12 (3.05) | 0.14 (3.56) | 0.18 (4.57) | 0.20 (5.08) | 0.22 (5.57) | | | | | | | |
| | | Stem Travel in (mm) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | | | | | | | |
| 10V8 | Medium Duty | Air Pressure: psi (bar) | 75 (5.10) | 85 (5.86) | 95 (6.55) | | | | | | | | | 10,000 (689.46) | 0.86 |
| | | Spring Pre-Compression: in. (mm) | 0.25 (6.35) | 0.30 (7.62) | 0.38 (9.65) | | | | | | | | | | |
| | | Stem Travel in (mm) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | | | | | | | | | | |
| | Heavy Duty | Air Pressure: psi (bar) | 50 (3.45) | 55 (3.79) | 60 (4.14) | | | | | | | | | 10,000 (689.46) | 0.86 |
| | | Spring Pre-Compression: in. (mm) | 0.14 (3.56) | 0.20 (5.08) | 0.24 (6.10) | | | | | | | | | | |
| | | Stem Travel in (mm) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | | | | | | | | | | |

*Note: System operating pressure are shown for piston style operators. The maximum system operating pressure for some diaphragm operators is slightly reduced (approximately 10%).*

*** $C_V$ data is for 2-way straight valves. For angle pattern, add approximately 50% to the $C_V$ valve.*

**** $C_V$ varies because of spring compression limitations. The flow coefficient range is given for the maximum stem travel (lowest system pressure) to minimum travel (highest system pressure).*

***CAUTION:** While testing has shown O-rings to provide satisfactory service life, both cyclic and shelf life may vary widely with differing service conditions, properties of reactants, pressure and temperature cycling and age of the O-ring, FREQUENT INSPECTIONS SHOULD BE MADE to detect any deterioration, and O-rings replaced as required.*

*Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

# Air-to-Open

## Series SW Valves

| Valve Series | Operator Duty | | System Pressure KSI (Mpa) | | | | | | | | | | | Maximum Pressure psi (bar)* | Flow Coefficient Cv** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-6 (6.89-41.37) | 8 (55.16) | 10 (68.95) | 12 (82.74) | 14 (96.53) | 15 (103.41) | | | | | | | |
| SW4 | Medium Duty | Air Pressure: psi (bar) | 65 (4.42) | 65 (4.42) | 75 (5.10) | 85 (5.78) | 95 (6.55) | 95 (6.55) | | | | | | 15,000 (1034.20) | 0.065 |
| | | Spring Pre-Compression: in. (mm) | 0.19 (4.83) | 0.19 (4.83) | 0.25 (6.35) | 0.31 (7.87) | 0.36 (9.14) | 0.38 (9.14) | | | | | | | |
| | | Stem Travel in (mm) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 025 (6.35) | 025 (6.35) | 025 (6.35) | | | | | | | |
| SW6 | Medium Duty | Air Pressure: psi (bar) | 75 (5.10) | 75 (5.10) | 95 (6.46) | 95 (6.46) | 95 (6.46) | 100 (6.80) | | | | | | 15,000 (1034.20) | 0.12 |
| | | Spring Pre-Compression: in. (mm) | 0.25 (6.35) | 0.25 (6.35) | 0.28 (7.11) | 0.44 (11.17) | 0.52 (13.21) | 0.56 (14.22) | | | | | | | |
| | | Stem Travel in (mm) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.19 (4.83) | 0.10 (2.54) | 0.06 (1.53) | | | | | | | |
| SW6 | Heavy Duty | Air Pressure: psi (bar) | 50 (3.45) | 55 (3.79) | 60 (4.14) | 65 (4.48) | 70 (4.83) | 75 (5.17) | | | | | | 15,000 (1034.20) | 0.12 |
| | | Spring Pre-Compression: in. (mm) | 0.14 (3.56) | 0.19 (4.83) | 0.24 (6.10) | 0.28 (7.11) | 0.34 (8.64) | 0.36 (9.14) | | | | | | | |
| | | Stem Travel in (mm) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | | | | | | | |
| SW8 | Medium Duty | Air Pressure: psi (bar) | 95 (6.48) | 95 (6.48) | | | | | | | | | | 8,000 (551.57) | 1.75 |
| | | Spring Pre-Compression: in. (mm) | 0.38 (9.65) | 0.56 (14.22) | | | | | | | | | | | |
| | | Stem Travel in (mm) | 0.25 (6.35) | 0.05 (1.53) | | | | | | | | | | | |
| | Medium Duty | Air Pressure: psi (bar) | 50 (3.40) | | | | | | | | | | | | |
| SW8 | Heavy Duty | Air Pressure: psi (bar) | 65 (4.48) | 75 (5.17) | 75 (5.17) | | | | | | | | | 10,000 (689.46) | 1.75 |
| | | Spring Pre-Compression: in. (mm) | 0.28 (7.11) | 0.38 (9.65) | 0.44 (11.18) | | | | | | | | | | |
| | | Stem Travel in (mm) | 0.25 (6.35) | 0.25 (6.35) | 0.19 (4.83) | | | | | | | | | | |

## Series MVE/MV Valves

| Valve Series | Operator Duty | | System Pressure KSI (Mpa) | | | | | | | | | | | Maximum Pressure psi (bar)* | Flow Coefficient Cv** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-6 (6.89-41.37) | 8 (55.15) | 10 (68.95) | 12 (82.74) | 14 (96.53) | 15 (103.41) | | | | | | | |
| MVE1 MV1 | Heavy-Light Duty | Air Pressure: psi (bar) | 60 (4.08) | 65 (4.42) | 75 (5.10) | 85 (5.78) | 90 (6.12) | 100 (6.80) | | | | | | 15,000 (1034.20) | MVE1/MV1 (0.05) |
| | | Spring Pre-Compression: in. (mm) | 0.073 (1.85) | 0.094 (2.39) | 0.125 (3.18) | 0.147 (3.73) | 0.172 (4.37) | 0.188 (4.78) | | | | | | | |
| MVE2 MV2 | | Stem Travel in (mm) | 0.094 (2.39) | 0.094 (2.39) | 0.094 (2.39) | 0.094 (2.39) | 0.094 (2.39) | 0.094 (2.39) | | | | | | | MVE2/MV2 (0.11) |



*Note: System operating pressure are shown for piston style operators. The maximum system operating pressure for some diaphragm operators is slightly reduced (approximately 10%).*

***$C_V$ data is for 2-way straight valves. For angle pattern, add approximately 50% to the $C_V$ valve.*

***CAUTION:** While testing has shown O-rings to provide satisfactory service life, both cyclic and shelf life may vary widely with differing service conditions, properties of reactants, pressure and temperature cycling and age of the O-ring, FREQUENT INSPECTIONS SHOULD BE MADE to detect any deterioration, and O-rings replaced as required.*

*Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
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## Air-to-Open - Series 10SM and 20SM Valves

| Valve Series | Operator Duty | | System Pressure KSI (Mpa) | | | | | | | | | | | Maximum Pressure psi (bar)* | Flow Coefficient Cv** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-4 (6.89-27.58) | 6 (41.37) | 8 (55.15) | 10 (68.95) | 12 (82.74) | 14 (96.53) | 16 (110.31) | 18 (124.10) | 20 (137.89) | | | | |
| 10SM9 | Medium Duty | Air Pressure: psi (bar) | 95 (6.46) | 95 (6.46) | 95 (6.46) | | | | | | | | | 7,900 (544.68) | 1.74 to 0.72*** |
| | | Spring Pre-Compression: in. (mm) | 0.38 (9.65) | 0.44 (11.18) | 0.56 (14.22) | | | | | | | | | | |
| | | Stem Travel in (mm) | 0.25 (6.35) | 0.19 (4.83) | 0.06 (1.52) | | | | | | | | | | |
| | Heavy Duty | Air Pressure: psi (bar) | 55 (3.74) | 65 (4.42) | 70 (4.76) | 75 (5.10) | | | | | | | | 10,000 (689.46) | 1.74 to 0.72*** |
| | | Spring Pre-Compression: in. (mm) | 0.22 (5.59) | 0.28 (7.11) | 0.34 (8.64) | 0.44 (11.18) | | | | | | | | | |
| | | Stem Travel in (mm) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.19 (4.83) | | | | | | | | | |
| | Extra Heavy Duty | Air Pressure: psi (bar) | 25 (1.70) | 30 (2.04) | 35 (2.38) | 40 (2.72) | | | | | | | | 10,000 (689.46) | 1.75 |
| | | Spring Pre-Compression: in. (mm) | 0.16 (4.06) | 0.19 (4.83) | 0.25 (6.35) | 0.28 (7.11) | | | | | | | | | |
| | | Stem Travel in (mm) | 0.38 (9.65) | 0.38 (9.65) | 0.38 (9.65) | 0.38 (9.65) | | | | | | | | | |
| 10SM12 | Heavy Duty | Air Pressure: psi (bar) | 70 (4.76) | 75 (5.10) | | | | | | | | | | 7,000 (482.63) | 2.23 to 0.78*** |
| | | Spring Pre-Compression: in. (mm) | 0.24 (6.10) | 0.56 (14.22) | | | | | | | | | | | |
| | | Stem Travel in (mm) | 0.25 (6.35) | 0.06 (1.52) | | | | | | | | | | | |
| | Extra Heavy Duty | Air Pressure: psi (bar) | 40 (2.72) | 50 (3.40) | 55 (3.74) | 60 (4.08) | | | | | | | | 10,000 (689.46) | 2.80 |
| | | Spring Pre-Compression: in. (mm) | 0.22 (5.59) | 0.31 (7.87) | 0.44 (11.18) | 0.53 (13.46) | | | | | | | | | |
| | | Stem Travel in (mm) | 0.44 (11.18) | 0.44 (11.18) | 0.44 (11.18) | 0.44 (11.18) | | | | | | | | | |
| 10SM16 | Heavy Duty | Air Pressure: psi (bar) | 75 (5.10) | | | | | | | | | | | 4,300 (296.47) | 0.79 |
| | | Spring Pre-Compression: in. (mm) | 0.56 (14.22) | | | | | | | | | | | | |
| | | Stem Travel in (mm) | 0.06 (1.52) | | | | | | | | | | | | |
| | Extra Heavy Duty | Air Pressure: psi (bar) | 55 (3.74) | 65 (4.42) | 75 (5.10) | 85 (5.78) | | | | | | | | 10,000 (689.46) | 5.20 |
| | | Spring Pre-Compression: in. (mm) | 0.34 (8.64) | 0.53 (13.46) | 0.69 (17.53) | 0.88 (22.35) | | | | | | | | | |
| | | Stem Travel in (mm) | 0.50 (12.70) | 0.50 (12.70) | 0.50 (12.70) | 0.50 (12.70) | | | | | | | | | |
| 20SM4 | Medium Duty | Air Pressure: psi (bar) | 65 (4.42) | 65 (4.42) | 65 (4.42) | 75 (5.10) | 85 (5.78) | 95 (6.46) | 95 (6.46) | 95 (6.46) | 95 (6.46) | | | 20,000 (1378.93) | 0.31 to 0.22*** |
| | | Spring Pre-Compression: in. (mm) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | 0.25 (6.35) | 0.31 (7.87) | 0.38 (9.65) | 0.44 (11.18) | 0.50 (12.70) | 0.56 (14.22) | | | | |
| | | Stem Travel in (mm) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.19 (4.83) | 0.12 (3.05) | 0.06 (1.52) | | | | |
| | Heavy Duty | Air Pressure: psi (bar) | 35 (2.38) | 35 (2.38) | 35 (2.38) | 40 (2.72) | 45 (3.06) | 50 (3.40) | 50 (3.40) | 50 (3.40) | 50 (3.40) | | | | |

*Note: System operating pressure are shown for piston style operators. The maximum system operating pressure for some diaphragm operators is slightly reduced (approximately 10%).*

*** $C_V$ data is for 2-way straight valves. For angle pattern, add approximately 50% to the $C_V$ valve.*

**** $C_V$ varies because of spring compression limitations. The flow coefficient range is given for the maximum stem travel (lowest system pressure) to minimum travel (highest system pressure).*

***CAUTION:** While testing has shown O-rings to provide satisfactory service life, both cyclic and shelf life may vary widely with differing service conditions, properties of reactants, pressure and temperature cycling and age of the O-ring, FREQUENT INSPECTIONS SHOULD BE MADE to detect any deterioration, and O-rings replaced as required.*

*Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
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## Air-to-Open - Series 10SM and 20SM Valves

| Valve Series | Operator Duty | | System Pressure KSI (Mpa) | | | | | | | | | | | Maximum Pressure psi (bar)* | Flow Coefficient Cv** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-4 (6.89-27.58) | 6 (41.37) | 8 (55.15) | 10 (68.95) | 12 (82.74) | 14 (96.53) | 16 (110.31) | 18 (124.10) | 20 (137.89) | | | | |
| 20SM6 | Medium Duty | Air Pressure: psi (bar) | 65 (4.42) | 65 (4.42) | 75 (5.10) | 85 (5.78) | 95 (6.46) | 95 (6.46) | 95 (6.46) | 95 (6.46) | | | | 18,250 (1258.27) | 0.75 to 0.57*** |
| | | Spring Pre-Compression: in. (mm) | 0.19 (4.83) | 0.19 (4.83) | 0.25 (6.35) | 0.31 (7.87) | 0.38 (9.65) | 0.44 (11.18) | 0.50 (12.70) | 0.56 (14.22) | | | | | |
| | | Stem Travel in (mm) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.19 (4.83) | 0.12 (3.05) | 0.06 (1.52) | | | | | |
| | Heavy Duty | Air Pressure: psi (bar) | 35 (2.38) | 35 (2.38) | 40 (2.72) | 45 (3.06) | 50 (3.40) | 50 (3.40) | 50 (3.40) | 50 (3.40) | | | | | |
| 20SM9 | Medium Duty | Air Pressure: psi (bar) | 85 (5.78) | 90 (6.12) | 95 (6.46) | 95 (6.46) | | | | | | | | 9,800 (675.68) | 1.29 to 0.53*** |
| | | Spring Pre-Compression: in. (mm) | 0.31 (7.87) | 0.34 (8.64) | 0.47 (11.94) | 0.56 (14.22) | | | | | | | | | |
| | | Stem Travel in (mm) | 0.25 (6.35) | 0.25 (6.35) | 0.15 (3.81) | 0.06 (1.52) | | | | | | | | | |
| | Heavy Duty | Air Pressure: psi (bar) | 50 (3.40) | 55 (3.74) | 65 (4.42) | 70 (4.76) | 75 (5.10) | 75 (5.10) | 75 (5.10) | | | | | 15,700 (1082.46) | 1.29 to 0.53*** |
| | | Spring Pre-Compression: in. (mm) | 0.19 (4.83) | 0.22 (5.59) | 0.28 (7.11) | 0.34 (8.64) | 0.44 (11.18) | 0.50 (12.70) | 0.56 (14.22) | | | | | | |
| | | Stem Travel in (mm) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.19 (4.83) | 0.12 (3.05) | 0.60 (15.24) | | | | | | |
| | Extra Heavy Duty | Air Pressure: psi (bar) | 30 (2.04) | 35 (2.38) | 35 (2.38) | 40 (2.72) | 40 (2.72) | 45 (3.06) | 50 (3.40) | 50 (3.40) | 55 (3.74) | | | 20,000 (1378.93) | 1.30 |
| | | Spring Pre-Compression: in. (mm) | 0.13 (3.30) | 0.16 (4.06) | 0.19 (4.83) | 0.25 (6.35) | 0.28 (7.11) | 0.34 (8.64) | 0.38 (9.65) | 0.44 (11.18) | 0.47 (11.94) | | | | |
| | | Stem Travel in (mm) | 0.38 (9.65) | 0.38 (9.65) | 0.38 (9.65) | 0.38 (9.65) | 0.38 (9.65) | 0.38 (9.65) | 0.38 (9.65) | 0.38 (9.65) | | | | | |
| 20SM12 | Heavy Duty | Air Pressure: psi (bar) | 65 (4.42) | 75 (5.10) | 75 (5.10) | | | | | | | | | 9,200 (634.31) | 0.80 to 0.78*** |
| | | Spring Pre-Compression: in. (mm) | 0.28 (7.11) | 0.38 (9.65) | 0.56 (14.22) | | | | | | | | | | |
| | | Stem Travel in (mm) | 0.25 (6.35) | 0.25 (6.35) | 0.06 (1.52) | | | | | | | | | | |
| | Extra Heavy Duty | Air Pressure: psi (bar) | 40 (2.72) | 45 (3.06) | 50 (3.40) | 55 (3.74) | 60 (4.08) | 65 (4.42) | 70 (4.76) | 75 (5.10) | 80 (5.44) | | | 20,000 (1378.93) | 2.50 |
| | | Spring Pre-Compression: in. (mm) | 0.19 (4.83) | 0.25 (6.35) | 0.31 (7.87) | 0.41 (10.41) | 0.50 (12.70) | 0.56 (14.22) | 0.66 (16.76) | 0.72 (18.29) | 0.81 (20.57) | | | | |
| | | Stem Travel in (mm) | 0.44 (11.18) | 0.44 (11.18) | 0.44 (11.18) | 0.44 (11.18) | 0.44 (11.18) | 0.44 (11.18) | 0.44 (11.18) | 0.44 (11.18) | 0.44 (11.18) | | | | |
| 20SM16 | Heavy Duty | Air Pressure: psi (bar) | 75 (5.10) | 75 (5.10) | | | | | | | | | | 6,100 (420.57) | 2.73 to .15*** |
| | | Spring Pre-Compression: in. (mm) | 0.38 (9.65) | 0.56 (14.22) | | | | | | | | | | | |
| | | Stem Travel in (mm) | 0.25 (6.35) | 0.06 (1.52) | | | | | | | | | | | |
| | Extra Heavy Duty | Air Pressure: psi (bar) | 50 (3.40) | 55 (3.74) | 65 (4.42) | 70 (4.76) | 80 (5.44) | 85 (5.78) | 90 (6.12) | 100 (6.80) | 100 (6.80) | | | 20,000 (1378.93) | 3.40 |
| | | Spring Pre-Compression: in. (mm) | 0.25 (6.35) | 0.38 (9.65) | 0.50 (12.70) | 0.63 (16.00) | 0.75 (19.05) | 0.84 (21.34) | 0.97 (24.64) | 1.09 (27.69) | 1.22 (30.99) | | | | |
| | | Stem Travel in (mm) | 0.50 (12.70) | 0.50 (12.70) | 0.50 (12.70) | 0.50 (12.70) | 0.50 (12.70) | 0.50 (12.70) | 0.50 (12.70) | 0.50 (12.70) | 0.50 (12.70) | | | | |

*Note: System operating pressure are shown for piston style operators. The maximum system operating pressure for some diaphragm operators is slightly reduced (approximately 10%).*

*** $C_V$ data is for 2-way straight valves. For angle pattern, add approximately 50% to the $C_V$ valve.*

**** $C_V$ varies because of spring compression limitations. The flow coefficient range is given for the maximum stem travel (lowest system pressure) to minimum travel (highest system pressure).*

***CAUTION:** While testing has shown O-rings to provide satisfactory service life, both cyclic and shelf life may vary widely with differing service conditions, properties of reactants, pressure and temperature cycling and age of the O-ring, FREQUENT INSPECTIONS SHOULD BE MADE to detect any deterioration, and O-rings replaced as required.*

*Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

## Air-to-Open - Series 30SC Valves

| Valve Series | Operator Duty | | System Pressure KSI (Mpa) | | | | | | | | | | | Maximum Pressure psi (bar)* | Flow Coefficient Cv** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-15 (6.89-103.42) | 16 (110.31) | 18 (124.10) | 20 (137.89) | 22 (151.68) | 24 (165.47) | 26 (179.26) | 28 (193.05) | 30 (206.84) | | | | |
| 30SC16 | X Heavy Duty | Air Pressure: psi (bar) | 70 (4.76) | 75 (5.10) | 75 (5.10) | 80 (5.44) | 85 (5.78) | 95 (6.46) | 100 (6.80) | 100 (6.80) | 100 (6.80) | | | 30,000 (2068.39) | 2.61 |
| | | Spring Pre-Compression: in. (mm) | 0.56 (14.22) | 0.62 (15.75) | 0.68 (17.27) | 0.75 (19.05) | 0.88 (22.35) | 0.94 (23.88) | 1.00 (25.40) | 1.06 (26.92) | 1.38 (35.05) | | | | |
| | | Stem Travel in (mm) | 0.50 (12.70) | 0.50 (12.70) | 0.50 (12.70) | 0.50 (12.70) | 0.50 (12.70) | 0.50 (12.70) | 0.50 (12.70) | 0.50 (12.70) | 0.50 (12.70) | | | | |

## Series 30VM Valves

| Valve Series | Operator Duty | | System Pressure KSI (Mpa) | | | | | | | | | | | Maximum Pressure psi (bar)* | Flow Coefficient Cv** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-10 (6.89-68.95) | 12 (82.74) | 14 (96.53) | 16 (110.31) | 18 (124.10) | 20 (137.89) | 22 (151.68) | 24 (165.47) | 26 (179.26) | 28 (193.05) | 30 (206.84) | | |
| 30VM4 | Medium Duty | Air Pressure: psi (bar) | 45 (3.06) | 45 (3.06) | 55 (3.74) | 55 (3.74) | 55 (3.74) | 55 (3.74) | 65 (4.42) | 65 (4.42) | 65 (4.42) | 65 (4.42) | 75 (5.10) | 30,000 (2068.39) | 0.12 |
| | | Spring Pre-Compression: in. (mm) | 0.12 (3.05) | 0.12 (3.05) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.31 (7.87) | | |
| | | Stem Travel in (mm) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | | |
| | Heavy Duty | Air Pressure: psi (bar) | 25 (1.70) | 25 (1.70) | 30 (2.04) | 30 (2.04) | 30 (2.04) | 30 (2.04) | 35 (2.38) | 35 (2.38) | 35 (2.38) | 35 (2.38) | 40 (2.72) | | |
| 30VM6 & 30VM9 | Medium Duty | Air Pressure: psi (bar) | 45 (3.06) | 55 (3.74) | 55 (3.74) | 65 (4.42) | 65 (4.42) | 75 (5.10) | 75 (5.10) | 75 (5.10) | 85 (5.78) | 85 (5.78) | 95 (6.46) | 30,000 (2068.39) | 0.33 (30VM6) 0.33 (30VM9) |
| | | Spring Pre-Compression: in. (mm) | 0.12 (3.05) | 0.19 (4.83) | 0.19 (4.83) | 0.25 (6.35) | 0.25 (6.35) | 0.31 (7.87) | 0.31 (7.87) | 0.31 (7.87) | 0.38 (9.65) | 0.38 (9.65) | 0.44 (11.18) | | |
| | | Stem Travel in (mm) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | | |
| | Heavy Duty | Air Pressure: psi (bar) | 25 (1.70) | 30 (2.04) | 30 (2.04) | 35 (2.38) | 35 (2.38) | 40 (2.72) | 40 (2.72) | 40 (2.72) | 45 (3.06) | 45 (3.06) | 50 (3.40) | | |

## Series 40VM Valves

| Valve Series | Operator Duty | | System Pressure KSI (Mpa) | | | | | | | | | | | Maximum Pressure psi (bar)* | Flow Coefficient Cv** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-10 (6.89-68.95) | 15 (103.42) | 20 (137.89) | 25 (172.37) | 30 (206.84) | 35 (241.31) | 40 (275.79) | | | | | | |
| 40VM9 | Medium Duty | Air Pressure: psi (bar) | 60 (4.08) | 70 (4.76) | 75 (5.10) | 85 (5.78) | 95 (6.46) | 100 (6.80) | 100 (6.80) | | | | | 40,000 (2757.86) | 0.28 |
| | | Spring Pre-Compression: in (mm) | 0.12 (3.05) | 0.18 (4.57) | 0.25 (6.35) | 0.31 (7.87) | 0.38 (9.65) | 0.43 (10.92) | 0.5 (12.70) | | | | | | |
| | | Stem Travel in (mm) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | | | | | | |
| | Heavy Duty | Air Pressure: psi (bar) | 30 (2.04) | 35 (2.38) | 40 (2.72) | 45 (3.06) | 50 (3.40) | 50 (3.40) | 55 (3.74) | | | | | | |

*Note: System operating pressure are shown for piston style operators. The maximum system operating pressure for some diaphragm operators is slightly reduced (approximately 10%).*

*** $C_V$ data is for 2-way straight valves. For angle pattern, add approximately 50% to the $C_V$ valve.*

***CAUTION:** While testing has shown O-rings to provide satisfactory service life, both cyclic and shelf life may vary widely with differing service conditions, properties of reactants, pressure and temperature cycling and age of the O-ring, FREQUENT INSPECTIONS SHOULD BE MADE to detect any deterioration, and O-rings replaced as required.*

*Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

## Air-to-Open - Series 60VM Valves

| Valve Series | Operator Duty | | System Pressure KSI (Mpa) | | | | | | | | | | | Maximum Pressure psi (bar)* | Flow Coefficient Cv** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-15 (6.89-103.42) | 20 (137.89) | 25 (172.37) | 30 (206.84) | 35 (241.31) | 40 (275.79) | 45 (310.26) | 50 (344.73) | 55 (379.21) | 60 (413.68) | | | |
| 60VM4 & 60VM6 | Medium Duty | Air Pressure: psi (bar) | 55 (3.74) | 65 (4.42) | 65 (4.42) | 65 (4.42) | 75 (5.10) | 75 (5.10) | 85 (5.78) | 85 (5.78) | 85 (5.78) | 95 (6.46) | | 60,000 (4136.79) | 0.08 (60VM4) |
| | | Spring Pre-Compression: in. (mm) | 0.12 (3.05) | 0.19 (4.83) | 0.19 (4.83) | 0.19 (4.83) | 0.25 (6.35) | 0.25 (6.35) | 0.31 (7.87) | 0.31 (7.87) | 0.31 (7.87) | 0.38 (9.65) | | | |
| | | Stem Travel in (mm) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | | | |
| | Heavy Duty | Air Pressure: psi (bar) | 30 (2.04) | 35 (2.38) | 35 (2.38) | 35 (2.38) | 40 (2.72) | 40 (2.72) | 45 (3.06) | 45 (3.06) | 45 (3.06) | 50 (3.40) | | | 0.09 (60VM6) |
| 60VM9 | Medium Duty | Air Pressure: psi (bar) | 55 (3.74) | 65 (4.42) | 65 (4.42) | 75 (5.10) | 75 (5.10) | 85 (5.78) | 95 (6.46) | 95 (6.46) | 95 (6.46) | 95 (6.46) | | 60,000 (4136.79) | 0.14 |
| | | Spring Pre-Compression: in. (mm) | 0.12 (3.05) | 0.19 (4.83) | 0.19 (4.83) | 0.25 (6.35) | 0.25 (6.35) | 0.31 (7.87) | 0.38 (9.65) | 0.38 (9.65) | 0.44 (11.18) | 0.50 (12.70) | | | |
| | | Stem Travel in (mm) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.25 (6.35) | 0.19 (4.83) | 0.12 (3.05) | | | |
| | Heavy Duty | Air Pressure: psi (bar) | 30 (2.04) | 35 (2.38) | 35 (2.38) | 40 (2.72) | 40 (2.72) | 45 (3.06) | 50 (3.40) | 50 (3.40) | 50 (3.40) | 50 (3.40) | | | |

## Series 100VM and 150V Valves

| Valve Series | Operator Duty | | System Pressure KSI (Mpa) | | | | | | | | | | | Maximum Pressure psi (bar)* | Flow Coefficient Cv** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-20 (6.89-137.89) | 40 (275.79) | 60 (13.68) | 80 (551.57) | 90 (620.52) | 100 (689.46) | 125 (861.83) | 150 (1034.20) | | | | | |
| 100VM5 | Heavy Duty | Air Pressure: psi (bar) | 35 (2.41) | 40 (2.76) | 50 (3.45) | 60 (4.14) | 70 (4.83) | 70 (4.83) | | | | | | 100,000 (6894.65) | 0.09 to 0.07*** |
| | | Spring Pre-Compression: in. (mm) | 0.12 (3.05) | 0.19 (4.83) | 0.25 (6.35) | 0.31 (7.87) | 0.38 (9.65) | 0.38 (9.65) | | | | | | | |
| | | Stem Travel in (mm) | 0.12 (3.05) | 0.12 (3.05) | 0.12 (3.05) | 0.12 (3.05) | 0.12 (3.05) | 0.12 (3.05) | | | | | | | |
| 150V5 | Heavy Duty | Air Pressure: psi (bar) | 30 (2.04) | 40 (2.72) | 45 (3.06) | 55 (3.74) | 60 (4.08) | 60 (4.08) | 70 (4.76) | 75 (5.10) | | | | 150,000 (10341.97) | 0.06 |
| | | Spring Pre-Compression: in. (mm) | 0.12 (3.05) | 0.19 (4.83) | 0.25 (6.35) | 0.31 (7.87) | 0.38 (9.65) | 0.38 (9.65) | 0.44 (11.18) | 0.56 (14.22) | | | | | |
| | | Stem Travel in (mm) | 0.12 (3.05) | 0.12 (3.05) | 0.12 (3.05) | 0.12 (3.05) | 0.12 (3.05) | 0.12 (3.05) | 0.12 (3.05) | 0.06 (1.52) | | | | | |

*Note: System operating pressure are shown for piston style operators. The maximum system operating pressure for some diaphragm operators is slightly reduced (approximately 10%).*

*** $C_V$ data is for 2-way straight valves. For angle pattern, add approximately 50% to the $C_V$ valve.*

**** $C_V$ varies because of spring compression limitations. The flow coefficient range is given for the maximum stem travel (lowest system pressure) to minimum travel (highest system pressure).*

***CAUTION:** While testing has shown O-rings to provide satisfactory service life, both cyclic and shelf life may vary widely with differing service conditions, properties of reactants, pressure and temperature cycling and age of the O-ring, FREQUENT INSPECTIONS SHOULD BE MADE to detect any deterioration, and O-rings replaced as required.*

*Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

# Pneumatic Valve Actuators - Solenoid Valve Packages

## Valve Packages

Solenoid valves are used to suppy on/off control of air to the valve actuator. They are normally mounted on the valve actuator, but can also be mounted remotely. Solenoid valves can be supplied in different voltages and configurations if required.

Solenoid manifolds are available and used when a large number of valve actuators require control or to contain power to a local area reducing assembly time. Remote mounted solenoids also permit the use of actuated valves in hazardous sensitive locations.

For additional information and options contact the nearest representative or the factory.

| Piston and Diaphragm Operators: Light and Heavy-Light Duty | | | | Package Contents |
|---|---|---|---|---|
| Package Model Number | Description | Orifice in (mm) | Voltage Rating | (1) solenoid valve<br>(1) 1/8" NPT brass nipple x 1.0" (25.40 mm) long<br>(1) 1/8" NPT brass nipple x 2.0" (50.80 mm) long<br>(1) 1/8" NPT brass elbow<br>(1) 1/8" NPT x 1/4" tube "push to connect" fitting |
| 90121 | Snap-tite 8 Series 3 Way N/C | 0.093 (2.36) | 120/60 VAC | |
| 90122 | Snap-tite 8 Series 3 Way N/C | 0.093 (2.36) | 24 DC | |
| 90123 | Snap-tite 8 Series 3 Way N/C | 0.093 (2.36) | 240/60, 220/50VAC | |

| Piston and Diaphragm Operators: Medium and Heavy Duty | | | | Package Contents |
|---|---|---|---|---|
| Package Model Number | Description | Orifice in (mm) | Voltage Rating | (1) solenoid valve<br>(1) 3/8" NPT brass nipple x 1.0" (25.40 mm) long<br>(1) 3/8" NPT brass nipple x 2.0" (50.80 mm) long<br>(1) 3/8" NPT brass elbow<br>(1) 3/8" NPT x 1/4" tube "push to connect" fitting<br>(1) 1/8" NPT brass nipple x 1.0" (25.4 mm) long.<br>(1) 3/8" to 1/8" NPT reducer. |
| 90126 | Snap-tite 22 Series 3 Way N/C | 0.156 (3.96) | 120/60 VAC | |
| 90127 | Snap-tite 22 Series 3 Way N/C | 0.156 (3.96) | 24 DC | |
| 90128 | Snap-tite 22 Series 3 Way N/C | 0.156 (3.96) | 240/60, 220/50VAC | |

| Piston Operators: Extra Heavy Duty | | | | Package Contents |
|---|---|---|---|---|
| Package Model Number | Description | Orifice in (mm) | Voltage Rating | (1) solenoid valve<br>(1) 3/8" NPT brass nipple x 1.0" (25.40 mm) long<br>(1) 3/8" NPT brass nipple x 2.0" (50.80 mm) long<br>(1) 3/8" NPT brass elbow<br>(1) 3/8" NPT x 3/8" tube "push to connect" fitting |
| 90350 | Snap-tite 25 Series 3 Way N/C | 0.62(15.88) | 120/60 VAC | |
| 90351 | Snap-tite 25 Series 3 Way N/C | 0.62 (15.88) | 24 DC | |
| 90352 | Snap-tite 25 Series 3 Way N/C | 0.62 (15.88) | 240/60, 230/50VAC | |

N/C - Normally Closed

For prompt service, Autoclave stocks select products. Consult your local representative.

Note: All solenoids are 3 way normally closed - free venting • Solenoid Manifolds are also available, consult factory

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# Fittings and Tubing

# Index

## Low Pressure Fittings and Tubing:

***Pressures to 15,000 psi (1034 bar)***

- *Elbows, Tees, Crosses, Straight and Bulkhead Couplings.*
- *Tubing*
- *Check Valves & Filters*

## Medium Pressure Fittings and Tubing:

***Pressures to 20,000 psi (1379 bar)***

- *Elbows, Tees, Crosses, Straight, Union, and Bulkhead Couplings.*
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***Pressures to 150,000 psi (10347 bar)***

- *Elbows, Tees, Crosses, Straight, Union, and Bulkhead Couplings.*
- *Tubing and Nipples*
- *Check Valves & Filters*
- *Anti-Vibration Collet and Gland Assembly*


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Fluid Components
Division of Snap-tite, Inc.
*www.autoclaveengineers.com*

# Low Pressure

*Pressures to 15,000 psi (1034 bar)*


Since 1945 Autoclave Engineers has designed and built premium quality valves, fittings and tubing. This commitment to engineering and manufacturing excellence has earned Autoclave a reputation for reliable, efficient product performance. Autoclave Engineers has long been established as the world leader in high pressure fluid handling components for the chemical/petrochemical, research, and oil and gas industries.

## *Low Pressure Fittings and Tubing Features:*

- Single-ferrule compression sleeve.
- Fast easy make-up of connection.
- Available sizes are 1/16”, 1/8”, 1/4”, 3/8”, & 1/2”.
- Fittings manufactured from cold worked 316 stainless steel.
- Tubing is manufactured from annealed stainless steel.
- All items available in special materials.
- Operating temperatures from 0°F (-17.8°C) to 650°F (343°C).
- Molybdenum disulfide-coated gland nuts to prevent galling.

The Low Pressure Series uses Autoclave’s SpeedBite connection. This single-ferrule compression sleeve connection delivers fast, easy make-up and reliable bubble-tight performance, in liquid or gas service.

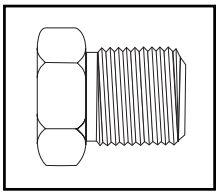
Autoclave Engineers
Fluid Components
Division of Snap-tite, Inc.
*www.autoclaveengineers.com*

## Pressures to 15,000 psi (1034 bar)

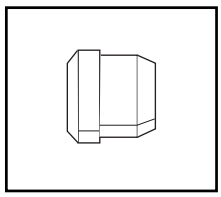
Autoclave Engineers Low Pressure Fittings are designed for use with low pressure valves and tubing. These fittings feature improved SpeedBite compression connections with larger orifices for excellent flow capabilities. Autoclave fittings and components are manufactured of cold-worked type 316 stainless steel. Optional materials are available upon request.

## Connection Components

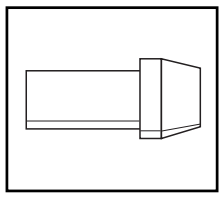
All valves and fittings are supplied complete with appropriate glands and compression sleeves. To order these components separately, use order numbers listed. When using plug, sleeve is not required.



**Gland**
SMN ( )



**Sleeve**
SSL ( )



**Plug**
SP ( )

Add tube size ( )
1/8" - 20
1/4" - 40
3/8" - 60
1/2" - 80

Example:
1/4" Gland - SMN 40

Note: Special material glands may be supplied with four flats in place of standard hex.

† When ordering glands separately for 10V Series 1/4" and 3/8" valves, substitute 10N for SMN.

1/16" tubing system components are available in the mini-fitting series. 1/16" tubing components can be used in 10V Series valves and fittings if required. Consult factory for information on 1/16" tubing assembly in 1/8" tubing components.

To ensure proper fit use Autoclave Engineers tubing. For mounting hole option add suffix PM to catalog number. Consult factory for mounting hole dimensions.

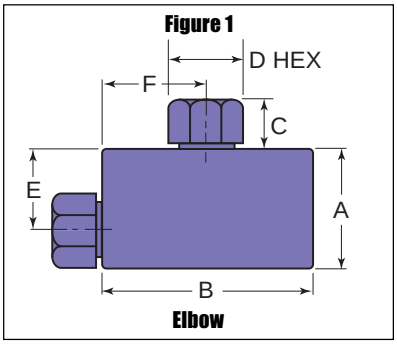
### Elbow

| Catalog Number | Connection Type | Outside Diameter Tube | Pressure Rating psi (bar)* | Minimum Opening | Dimensions - inches (mm) A | B | C | D Typical | E | F | G Thickness | Block Thickness | Fitting Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SL2200 | W125 | 1/8 | 15,000 | 0.094 | 1.00 | 1.50 | 0.31 | 0.50 | 0.75 | 0.75 | | 0.62 | |
| | | **(3.18)** | **(1034.19)** | **(2.39)** | **(25.40)** | **(38.10)** | **(7.87)** | **(12.70)** | **(19.05)** | **(19.05)** | | **(15.75)** | |
| SL4400 | SW250 | 1/4 | 15,000 | 0.188 | 1.38 | 2.00 | 0.44 | 0.63 | 1.00 | 1.00 | | 0.75 | |
| | | **(6.35)** | **(1034.19)** | **(4.78)** | **(35.05)** | **(50.80)** | **(11.18)** | **(15.88)** | **(25.40)** | **(25.40)** | | **(19.05)** | **See Figure 1** |
| SL6600 | SW375 | 3/8 | 15,000 | 0.250 | 1.38 | 2.00 | 0.53 | 0.75 | 1.00 | 1.00 | | 0.75 | |
| | | **(9.53)** | **(1034.19)** | **(6.35)** | **(35.05)** | **(50.80)** | **(13.46)** | **(19.05)** | **(25.40)** | **(25.40)** | | **(19.05)** | |
| SL8800 | SW500 | 1/2 | 10,000 | 0.375 | 1.75 | 2.50 | 0.53 | 0.93 | 1.25 | 1.25 | | 1.00 | |
| | | **(12.70)** | **(689.46)** | **(9.53)** | **(44.45)** | **(63.50)** | **(13.46)** | **(23.62)** | **(31.75)** | **(31.75)** | | **(25.40)** | |

*Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products.
Consult your local representative.

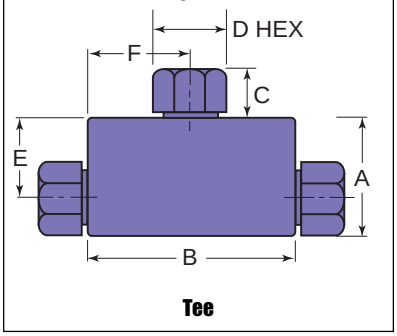
**Figure 1**




Elbow

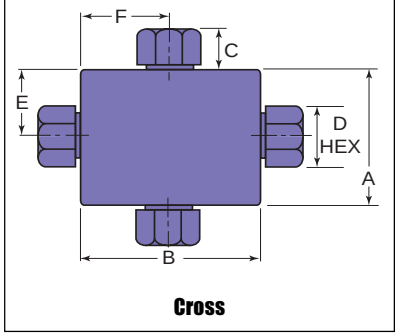
| Catalog Number | Connection Type | Outside Diameter Tube | Pressure Rating psi (bar)* | Minimum Opening | Dimensions - inches (mm) A | B | C | D Typical | E | F | G Thickness | Block Thickness | Fitting Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Tee** | | | | | | | | | | | | | |
| ST2220 | W125 | 1/8 | 15,000 | 0.094 | 1.00 | 1.50 | 0.31 | 0.50 | 0.75 | 0.75 | | 0.62 | See Figure 2 |
| | | **(3.18)** | **(1034.19)** | **(2.39)** | **(25.40)** | **(38.10)** | **(7.87)** | **(12.70)** | **(19.05)** | **(19.05)** | | **(15.75)** | |
| ST4440 | SW250 | 1/4 | 15,000 | 0.188 | 1.38 | 2.00 | 0.44 | 0.63 | 1.00 | 1.00 | | 0.75 | |
| | | **(6.35)** | **(1034.19)** | **(4.78)** | **(35.05)** | **(50.80)** | **(11.18)** | **(15.88)** | **(25.40)** | **(25.40)** | | **(19.05)** | |
| ST6660 | SW375 | 3/8 | 15,000 | 0.250 | 1.38 | 2.00 | 0.53 | 0.75 | 1.00 | 1.00 | | 0.75 | |
| | | **(9.53)** | **(1034.19)** | **(6.35)** | **(35.05)** | **(50.80)** | **(13.46)** | **(19.05)** | **(25.40)** | **(25.40)** | | **(19.05)** | |
| ST8880 | SW500 | 1/2 | 10,000 | 0.375 | 1.75 | 2.50 | 0.53 | 0.93 | 1.25 | 1.25 | | 1.00 | |
| | | **(12.70)** | **(689.46)** | **(9.53)** | **(44.45)** | **(63.50)** | **(13.46)** | **(23.62)** | **(31.75)** | **(31.75)** | | **(25.40)** | |
| **Cross** | | | | | | | | | | | | | |
| SX2222 | W125 | 1/8 | 15,000 | 0.094 | 1.50 | 1.50 | 0.31 | 0.50 | 0.75 | 0.75 | | 0.62 | See Figure 3 |
| | | **(3.18)** | **(1034.19)** | **(2.39)** | **(38.10)** | **(38.10)** | **(7.87)** | **(12.70)** | **(19.05)** | **(19.05)** | | **(15.75)** | |
| SX4444 | SW250 | 1/4 | 15,000 | 0.188 | 2.00 | 2.00 | 0.44 | 0.63 | 1.00 | 1.00 | | 0.75 | |
| | | **(6.35)** | **(1034.19)** | **(4.78)** | **(50.80)** | **(50.80)** | **(11.18)** | **(15.88)** | **(25.40)** | **(25.40)** | | **(19.05)** | |
| SX6666 | SW375 | 3/8 | 15,000 | 0.250 | 2.00 | 2.00 | 0.53 | 0.75 | 1.00 | 1.00 | | 0.75 | |
| | | **(9.53)** | **(1034.19)** | **(6.35)** | **(50.80)** | **(50.80)** | **(13.46)** | **(19.05)** | **(25.40)** | **(25.40)** | | **(19.05)** | |
| SX8888 | SW500 | 1/2 | 10,000 | 0.375 | 2.50 | 2.50 | 0.53 | 0.93 | 1.25 | 1.25 | | 1.00 | |
| | | **(12.70)** | **(689.46)** | **(9.53)** | **(63.50)** | **(63.50)** | **(13.46)** | **(23.62)** | **(31.75)** | **(31.75)** | | **(25.40)** | |
| **Straight Coupling** | | | | | | | | | | | | | |
| 15F2211 | W125 | 1/8 | 15,000 | 0.094 | 0.50 | 1.25 | 0.31 | 0.50 | | | | | See Figure 4 |
| | | **(3.18)** | **(1034.19)** | **(2.39)** | **(12.70)** | **(31.75)** | **(7.87)** | **(12.70)** | | | | | |
| 6F4422 | SW250 | 1/4 | 15,000 | 0.188 | 0.62 | 1.62 | 0.44 | 0.63 | | | | | |
| | | **(6.35)** | **(1034.19)** | **(4.78)** | **(15.75)** | **(41.15)** | **(11.18)** | **(15.88)** | | | | | |
| 6F6622 | SW375 | 3/8 | 15,000 | 0.250 | 0.75 | 1.75 | 0.53 | 0.75 | | | | | |
| | | **(9.53)** | **(1034.19)** | **(6.35)** | **(19.05)** | **(44.45)** | **(13.46)** | **(19.05)** | | | | | |
| 4F8822 | SW500 | 1/2 | 10,000 | 0.375 | 1.00 | 2.00 | 0.53 | 0.93 | | | | | |
| | | **(12.70)** | **(689.46)** | **(9.53)** | **(25.40)** | **(50.80)** | **(13.46)** | **(23.62)** | | | | | |
| **Bulkhead Coupling** | | | | | | | | | | | | | |
| 15BF2211 | W125 | 1/8 | 15,000 | 0.094 | 0.690 | 1.75 | 0.31 | 0.50 | 0.38 | 0.75 | 0.38 | | See Figure 5 |
| | | **(3.18)** | **(1034.19)** | **(2.39)** | **(17.53)** | **(44.45)** | **(7.87)** | **(12.70)** | **(9.65)** | **(19.05)** | **(9.65)** | | |
| 6BF4422 | SW250 | 1/4 | 15,000 | 0.188 | 0.940 | 1.88 | 0.44 | 0.63 | 0.50 | 1.00 | 0.38 | | |
| | | **(6.35)** | **(1034.19)** | **(4.78)** | **(23.88)** | **(47.75)** | **(11.18)** | **(15.88)** | **(12.70)** | **(25.40)** | **(9.65)** | | |
| 6BF6622 | SW375 | 3/8 | 15,000 | 0.250 | 0.940 | 1.88 | 0.53 | 0.75 | 0.50 | 1.00 | 0.38 | | |
| | | **(9.53)** | **(1034.19)** | **(6.35)** | **(23.88)** | **(47.75)** | **(13.46)** | **(19.05)** | **(12.70)** | **(25.40)** | **(9.65)** | | |
| 4BF8822 | SW500 | 1/2 | 10,000 | 0.375 | 1.120 | 2.38 | 0.53 | 0.93 | 0.78 | 1.38 | 0.38 | | |
| | | **(12.70)** | **(689.46)** | **(9.53)** | **(28.45)** | **(60.45)** | **(13.46)** | **(23.62)** | **(19.81)** | **(35.05)** | **(9.65)** | | |

**Figure 2**



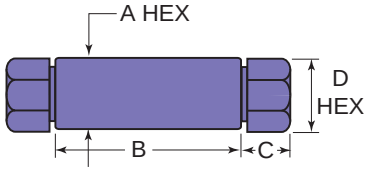

**Tee**

**Figure 3**



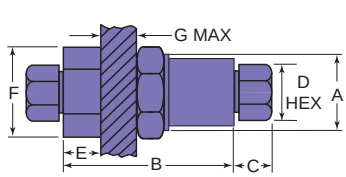

**Cross**

**Figure 4**




**Straight Coupling**

**Figure 5**



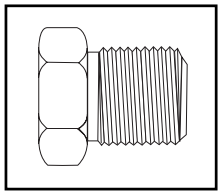

**Bulkhead Coupling**

*Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products.
Consult your local representative.

## Pressure to 15,000 psi (1034 bar)

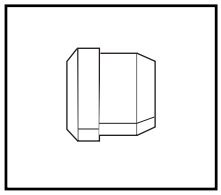
All Autoclave Engineers valves and fittings are supplied complete with appropriate glands and compression sleeves. To order these components separately, use order numbers listed. When using plug, sleeve is not required.



### Gland
SMN ( )

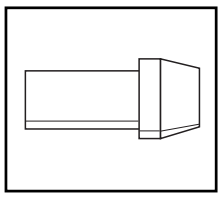
Add gland size ( ) Example: SMN - 10-38
- 1/16" - 10-38
- 1/16" - 10-10mm
- 1/8" - 20-38
- 1/8" - 20-10mm

Note: Gland sizes differ as folllows:
- 38 is 3/8 hex
- 10 mm is 10 millimeter hex



### Sleeve
SSL ( )

Add tube size for sleeve and plug ( ) Example: 1/8" Sleeve SSL20
- 1/16" - 10
- 1/8" - 20



### Plug
SP ( )

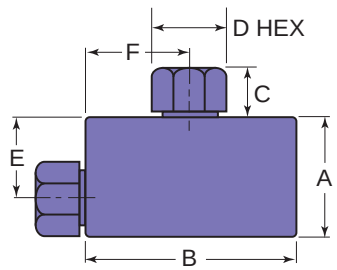
Note: Special material glands may be supplied with four flats in place of standard hex.

| Catalog Number | Connection Type | Outside Diameter Tube | Pressure Rating psi (bar)* | Minimum Opening | Dimensions - inches (mm) | | | | | | | Block Thickness | Fitting Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | A | B | C | D Typical | E | F | | | |
| **Elbow** | | | | | | | | | | | | | |
| | | | | | **3/8 inch hex glands** | | | | | | | | |
| MLE1100 | W062 | 1/16 | 15,000 | 0.055 | 1.00 | 1.00 | 0.31 | 0.38 | 0.69 | 0.69 | | 0.56 | **See Figure 1** |
| | | **(1.59)** | **(1034.20)** | **(1.40)** | **(25.40)** | **(25.40)** | **(7.87)** | **(9.65)** | **(17.45)** | **(17.45)** | | **(14.27)** | |
| MLE2200 | W125 | 1/8 | 15,000 | 0.093 | 1.00 | 1.00 | 0.31 | 0.38 | 0.69 | 0.69 | | 0.56 | |
| | | **(3.18)** | **(1034.20)** | **(2.36)** | **(25.40)** | **(25.40)** | **(7.87)** | **(9.65)** | **(17.45)** | **(17.45)** | | **(14.27)** | |
| | | | | | **10 millimeter hex glands** | | | | | | | | |
| ML1100 | W062 | 1/16 | 15,000 | 0.055 | 1.00 | 1.00 | 0.31 | 0.39 | 0.69 | 0.69 | | 0.56 | |
| | | **(1.59)** | **(1034.20)** | **(1.40)** | **(25.40)** | **(25.40)** | **(7.87)** | **(10.00)** | **(17.45)** | **(17.45)** | | **(14.27)** | |
| ML2200 | W125 | 1/8 | 15,000 | 0.093 | 1.00 | 1.00 | 0.31 | 0.39 | 0.69 | 0.69 | | 0.56 | |
| | | **(3.18)** | **(1034.20)** | **(2.36)** | **(25.40)** | **(25.40)** | **(7.87)** | **(10.00)** | **(17.45)** | **(17.45)** | | **(14.27)** | |

*Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

**Figure 1**



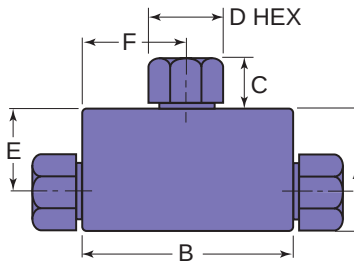

**Elbow**

| Catalog Number | Connection Type | Outside Diameter Tube | Pressure Rating psi (bar)* | Minimum Opening | Dimensions - inches (mm) A | B | C | D Typical | E | F | | Block Thickness | Fitting Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Tee** | | | | | | | | | | | | | |
| | | | | | **3/8 inch hex glands** | | | | | | | | |
| MTE1110 | W062 | 1/16 | 15,000 | 0.055 | 1.00 | 1.38 | 0.31 | 0.38 | 0.69 | 0.69 | | 0.56 | **See Figure 2** |
| | | **(1.59)** | **(1034.20)** | **(1.40)** | **(25.40)** | **(34.93)** | **(7.87)** | **(9.65)** | **(17.45)** | **(17.45)** | | **(14.27)** | |
| MTE2220 | W125 | 1/8 | 15,000 | 0.093 | 1.00 | 1.38 | 0.31 | 0.38 | 0.69 | 0.69 | | 0.56 | |
| | | **(3.18)** | **(1034.20)** | **(2.36)** | **(25.40)** | **(34.93)** | **(7.87)** | **(9.65)** | **(17.45)** | **(17.45)** | | **(14.27)** | |
| | | | | | **10 millimeter hex glands** | | | | | | | | |
| MT1110 | W062 | 1/16 | 15,000 | 0.055 | 1.00 | 1.38 | 0.31 | 0.39 | 0.69 | 0.69 | | 0.56 | |
| | | **(1.59)** | **(1034.20)** | **(1.40)** | **(25.40)** | **(34.93)** | **(7.87)** | **(10.00)** | **(17.45)** | **(17.45)** | | **(14.27)** | |
| MT2220 | W125 | 1/8 | 15,000 | 0.093 | 1.00 | 1.38 | 0.31 | 0.39 | 0.69 | 0.69 | | 0.56 | |
| | | **(3.18)** | **(1034.20)** | **(2.36)** | **(25.40)** | **(34.93)** | **(7.87)** | **(10.00)** | **(17.45)** | **(17.45)** | | **(14.27)** | |
| **Cross** | | | | | | | | | | | | | |
| | | | | | **3/8 inch hex glands** | | | | | | | | |
| MXE1111 | W062 | 1/16 | 15,000 | 0.055 | 1.38 | 1.38 | 0.31 | 0.38 | 0.69 | 0.69 | | 0.56 | **See Figure 3** |
| | | **(1.59)** | **(1034.20)** | **(1.40)** | **(34.93)** | **(34.93)** | **(7.87)** | **(9.65)** | **(17.45)** | **(17.45)** | | **(14.27)** | |
| MXE2222 | W125 | 1/8 | 15,000 | 0.093 | 1.38 | 1.38 | 0.31 | 0.38 | 0.69 | 0.69 | | 0.56 | |
| | | **(3.18)** | **(1034.20)** | **(2.36)** | **(34.93)** | **(34.93)** | **(7.87)** | **(9.65)** | **(17.45)** | **(17.45)** | | **(14.27)** | |
| | | | | | **10 millimeter hex glands** | | | | | | | | |
| MX1111 | W062 | 1/16 | 15,000 | 0.055 | 1.38 | 1.38 | 0.31 | 0.39 | 0.69 | 0.69 | | 0.56 | |
| | | **(1.59)** | **(1034.20)** | **(1.40)** | **(34.93)** | **(34.93)** | **(7.87)** | **(10.00)** | **(17.45)** | **(17.45)** | | **(14.27)** | |
| MX2222 | W125 | 1/8 | 15,000 | 0.093 | 1.38 | 1.38 | 0.31 | 0.39 | 0.69 | 0.69 | | 0.56 | |
| | | **(3.18)** | **(1034.20)** | **(2.36)** | **(34.93)** | **(34.93)** | **(7.87)** | **(10.00)** | **(17.45)** | **(17.45)** | | **(14.27)** | |
| **Straight Couplings** | | | | | | | | | | | | | |
| | | | | | **3/8 inch hex glands** | | | | | | | | |
| MCE1100 | W062 | 1/16 | 15,000 | 0.055 | 0.63 | 1.38 | 0.31 | 0.38 | | | | | **See Figure 4** |
| | | **(1.59)** | **(1034.20)** | **(1.40)** | **(15.88)** | **(34.93)** | **(7.87)** | **(9.65)** | | | | | |
| MCE2200 | W125 | 1/8 | 15,000 | 0.093 | 0.63 | 1.38 | 0.31 | 0.38 | | | | | |
| | | **(3.18)** | **(1034.20)** | **(2.36)** | **(15.88)** | **(34.93)** | **(7.87)** | **(9.65)** | | | | | |
| | | | | | **10 millimeter hex glands** | | | | | | | | |
| MC1100 | W062 | 1/16 | 15,000 | 0.055 | 0.63 | 1.38 | 0.31 | 0.39 | | | | | |
| | | **(1.59)** | **(1034.20)** | **(1.40)** | **(15.88)** | **(34.93)** | **(7.87)** | **(10.00)** | | | | | |
| MC2200 | W125 | 1/8 | 15,000 | 0.093 | 0.63 | 1.38 | 0.31 | 0.39 | | | | | |
| | | **(3.18)** | **(1034.20)** | **(2.36)** | **(15.88)** | **(34.93)** | **(7.87)** | **(10.00)** | | | | | |

*Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

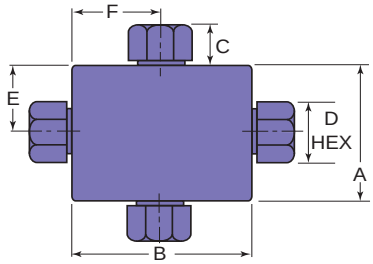
*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

**Figure 2**



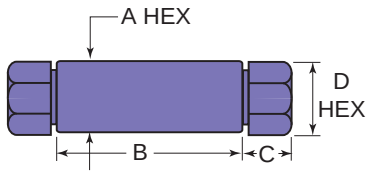

**Tee**

**Figure 3**




**Cross**

**Figure 4**




**Straight Coupling**

## Pressures to 15,000 psi (1034 bar)

Autoclave Engineers offers a complete selection of annealed, seamless stainless steel tubing designed to match the performance standards of Autoclave low pressure valves and fittings. Autoclave low pressure tubing is furnished in random lengths between 20 feet (6 meters) and 27 feet (8.2 meters). The average is 24 feet (7.3 meters). The tubing is available in five sizes and a variety of materials. In order to ensure proper sleeve "bite" into tubing, Autoclave Engineers specifies and controls the strength levels of both the tube and sleeve materials.

### Inspection and Testing

Autoclave Engineers low pressure tubing is inspected for compliance with specified defect restrictions as well as carburization or intergranular carbide precipitation. The tubing outside diameter and wall thickness is controlled within close tolerance to assure proper fit. Sample pieces of tube (for each lot) are tested to confirm mechanical properties for proper compression sleeve "bite" and pressure capability. Furthermore, the sample tubes are pressure tested as a final check.

### Special Materials

In addition to the type 316 and 304 stainless steel tubing listed in this section, Autoclave has a limited stock of hard-to-obtain shorter lengths of the following tubing materials:
*Monel 400*, Inconel 600*, Titanium Grade 2*, Nickel 200*, Hastelloy C276** - (* Trademark names)
Please consult factory for stock availabilty.

### Tubing Tolerance

| Nominal Tubing Size inches (mm) | Tolerance/Outside Diameter inches (mm) |
|---|---|
| 1/16 (1.59) | .064/.062 (1.62/1.57) |
| 1/8 (3.18) | .128/.125 (3.25/3.18) |
| 1/4 (6.35) | .254/.250 (6.45/6.35) |
| 3/8 (9.53) | .379/.375 (9.74/9.53) |
| 1/2 (12.70) | .505/.500 (12.83/12.70) |

| Catalog Number | Tube Materials | Fits Connection Type | Tube Size Inches (mm) Outside Diameter | Inside Diameter | Wall Thickness | Flow Area in.² (mm²) | Working Pressure psi (bar)* 0 - 100°F -17.8 to - 37.8°C | 200°F 93°C | 400°F 204°C | 600°F 316°C | 650°F 343°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MS15-070 | 316SS | W125 | 1/16 **(1.59)** | 0.026 **(0.66)** | 0.018 **(0.46)** | 0.0005 **(0.32)** | 15,000 **(1034.20)** | 15,000 **(1034.20)** | 14,400 **(992.83)** | 13,600 **(937.67)** | 12,600 **(868.73)** |
| MS15-200 | 316SS | W125 | 1/8 **(3.18)** | 0.052 **(1.32)** | 0.050 **(1.27)** | 0.002 **(1.29)** | 15,000 **(1034.20)** | 15,000 **(1034.20)** | 14,400 **(992.83)** | 13,600 **(937.67)** | 12,600 **(868.73)** |
| MS15-151 | 304SS | | | 0.062 **(1.57)** | 0.032 **(0.81)** | 0.003 **(1.94)** | 11,650 **(803.23)** | 11,050 **(751.85)** | 10,050 **(692.91)** | 9,900 **(682.57)** | 9,850 **(679.12)** |
| MS15-051 | 316SS | | | 0.062 **(1.57)** | 0.032 **(0.81)** | 0.003 **(1.94)** | 11,650 **(803.23)** | 11,650 **(803.23)** | 11,250 **(775.65)** | 10,600 **(730.83)** | 9,850 **(679.12)** |
| MS15-166 | 304SS | | | 0.069 **(1.75)** | 0.028 **(0.71)** | 0.004 **(2.58)** | 9,950 **(686.02)** | 9,400 **(648.10)** | 8,550 **(589.49)** | 8,450 **(582.60)** | 8,000 **(551.57)** |
| MS15-150 | 304SS | | | 0.085 **(2.16)** | 0.020 **(0.51)** | 0.006 **(3.87)** | 6,850 **(472.28)** | 6,500 **(448.15)** | 5,900 **(406.78)** | 5,800 **(399.89)** | 5,500 **(379.21)** |
| MS15-154 | 304SS | W250 or SW250 | 1/4 **(6.35)** | 0.125 **(3.18)** | 0.062 **(1.57)** | 0.012 **(7.74)** | 11,650 **(803.23)** | 11,650 **(761.86)** | 10,050 **(692.91)** | 9,900 **(682.57)** | 9,850 **(679.12)** |
| MS15-055 | 316SS | | | 0.125 **(3.18)** | 0.062 **(1.57)** | 0.012 **(7.74)** | 11,650 **(803.23)** | 11,650 **(761.86)** | 11,250 **(775.65)** | 10,600 **(730.83)** | 9,850 **(679.12)** |
| MS15-161 | 304SS | | | 0.180 **(4.57)** | 0.035 **(0.89)** | 0.026 **(16.77)** | 5,450 **(375.76)** | 5,150 **(355.07)** | 4,700 **(324.05)** | 4,600 **(317.15)** | 4,400 **(303.36)** |
| MS15-069 | 316SS | | | 0.180 **(4.57)** | 0.035 **(0.89)** | 0.026 **(16.77)** | 5,450 **(375.76)** | 5,450 **(375.76)** | 5,250 **(361.97)** | 4,950 **(341.29)** | 4,600 **(317.15)** |
| MS15-158 | 304SS | | | 0.194 **(4.93)** | 0.028 **(0.71)** | 0.029 **(18.71)** | 4,600 **(317.15)** | 4,350 **(299.92)** | 3,950 **(272.34)** | 3,900 **(272.34)** | 3,700 **(255.10)** |
| MS15-203 | 316SS | | | 0.084 **(2.13)** | 0.083 **(2.11)** | 0.029 **(18.71)** | 15,000 **(1034.16)** | 15,000 **(1034.16)** | 14,400 **(992.83)** | 13,600 **(937.67)** | 12,600 **(868.73)** |
| MS15-206 | 304SS | | | 0.084 **(2.13)** | 0.083 **(2.11)** | 0.029 **(18.71)** | 15,000 **(1034.16)** | 14,225 **(980.76)** | 12,940 **(892.17)** | 12,745 **(8778.72)** | 12,680 **(874.24)** |
| MS15-084 | 316SS | W375 or SW375 | 3/8 **(9.53)** | 0.195 **(4.95)** | 0.090 **(2.29)** | 0.030 **(19.35)** | 10,000 **(689.46)** | 10,000 **(689.46)** | 9,650 **(665.33)** | 9,000 **(620.52)** | 8,400 **(579.15)** |
| MS15-184 | 304SS | | | 0.195 **(4.95)** | 0.090 **(2.29)** | 0.030 **(19.35)** | 10,000 **(689.46)** | 9,400 **(648.10)** | 8,600 **(592.94)** | 8,500 **(586.05)** | 8,450 **(582.60)** |
| MS15-155 | 304SS | | | 0.250 **(6.35)** | 0.062 **(1.57)** | 0.049 **(31.61)** | 7,500 **(517.10)** | 7,100 **(489.52)** | 6,450 **(444.70)** | 6,350 **(437.81)** | 6,050 **(417.13)** |
| MS15-062 | 316SS | | | 0.250 **(6.35)** | 0.062 **(1.57)** | 0.049 **(31.61)** | 7,500 **(517.10)** | 7,500 **(517.10)** | 7,200 **(496.41)** | 6,800 **(468.84)** | 6,300 **(434.36)** |

| Catalog Number | Tube Materials | Fits Connection Type | Tube Size Inches (mm) Outside Diameter | Inside Diameter | Wall Thickness | Flow Area in.² (mm²) | Working Pressure psi (bar)* 0 - 100°F -17.8 to - 37.8°C | 200°F 93°C | 400°F 204°C | 600°F 316°C | 650°F 343°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MS15-164 | 304SS | W375 or SW500 | 3/8 **(9.53)** | 0.277 **(7.04)** | 0.049 **(1.24)** | 0.060 **(38.71)** | 5,450 **(375.76)** | 5,150 **(355.07)** | 4,700 **(324.05)** | 4,600 **(317.15)** | 4,400 **(303.36)** |
| MS15-162 | 304SS | | | 0.305 **(7.75)** | 0.035 **(0.89)** | 0.073 **(47.10)** | 3,800 **(262.00)** | 3,550 **(244.76)** | 3,250 **(224.08)** | 3,200 **(220.63)** | 3,050 **(210.29)** |
| MS15-204 | 316SS | | | 0.139 **(3.53)** | 0.118 **(3.00)** | 0.073 **(47.10)** | 15,000 **(1034.16)** | 15,000 **(1034.16)** | 14,400 **(992.83)** | 13,600 **(937.67)** | 12,600 **(868.73)** |
| MS15-207 | 304SS | | | 0.139 **(3.53)** | 0.118 **(3.00)** | 0.073 **(47.10)** | 15,000 **(1034.16)** | 14,225 **(980.76)** | 12,940 **(892.17)** | 12,745 **(878.72)** | 12,680 **(874.24)** |
| MS15-157 | 304SS | W500 or SW500 | 1/2 **(12.70)** | 0.375 **(9.53)** | 0.062 **(1.57)** | 0.110 **(70.97)** | 5,500 **(379.21)** | 5,150 **(355.07)** | 4,700 **(324.05)** | 4,600 **(317.15)** | 4,400 **(303.36)** |
| MS15-065 | 316SS | | | 0.375 **(9.53)** | 0.062 **(1.57)** | 0.110 **(70.97)** | 5,500 **(379.21)** | 5,500 **(379.21)** | 5,250 **(361.97)** | 4,950 **(341.29)** | 4,600 **(317.15)** |
| MS15-165 | 304SS | | | 0.402 **(10.21)** | 0.048 **(1.22)** | 0.127 **(81.94)** | 4,000 **(275.79)** | 3,750 **(258.55)** | 3,400 **(234.42)** | 3,400 **(234.42)** | 3,200 **(220.63)** |
| MS15-208 | 316SS | | | 0.264 **(6.71)** | 0.118 **(3.00)** | 0.127 **(8194)** | 10,000 **(689.46)** | 10,000 **(689.46)** | 9,650 **(665.33)** | 9,000 **(620.52)** | 8,400 **(579.15)** |
| MS15-208 | 304SS | | | 0.264 **(6.71)** | 0.118 **(3.00)** | 0.127 **(8194)** | 10,000 **(689.46)** | 9,400 **(648.10)** | 8,600 **(592.94)** | 8,500 **(586.05)** | 8,450 **(582.60)** |

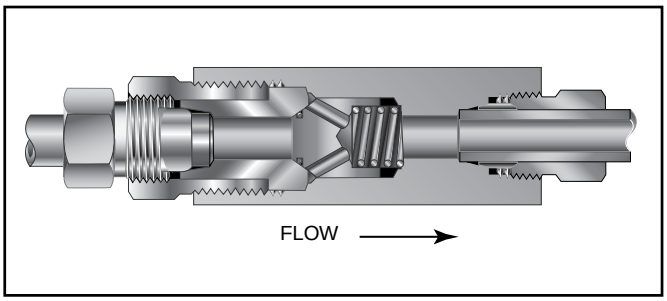
*Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

# Fittings and Tubing - Low Pressure Check Valves

## Pressures to 15,000 psi (1034 bar)

### O-Ring Check Valves

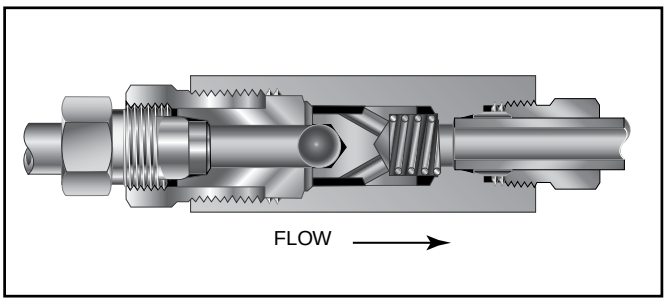



Provide unidirectional flow and tight shut-off for liquids and gases with high reliability. When differential drops below cracking pressure*, valve shuts off. **(Not for use as relief valve.)**

**Materials:** Body, cover, poppet: 316 Stainless Steel, Cover gland: Stainless Steel, Spring: 300 Series Stainless Steel, Standard O-ring: Viton, for operation to 500° F (260°C). Buna-N or Teflon available for 250°F (121°C) or 400°F (204°C) respectively; specify when ordering.

***Cracking Pressure:** 20 psi (1.38 bar) ±30%. Springs for higher cracking pressures (up to 100 psi (6.89bar)) available on special order for O-ring style check valves only.

### Ball Check Valves




Prevent reverse flow where leak-tight shut-off is not mandatory. When differential drops below cracking pressure, valve closes. With all-metal components, valve can be used up to 650°F (343°C). See Technical Information section for connection temperature limitations. **(Not for use as a relief valve.)**

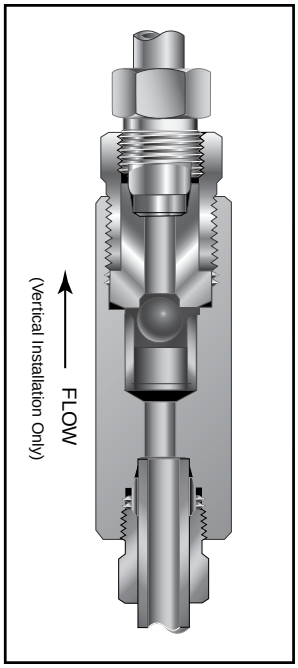
**Ball is cradled in floating poppet** to assure positive, in-line seating without "chatter". Poppet is designed essentially for axial flow with minimum pressure drop.

**Materials:** Body, cover, poppet: 316 Stainless Steel, Cover gland: Stainless Steel, Ball, Spring: 300 Series Stainless Steel.

***CAUTION:** While testing has shown O-Rings to provide satisfactory service life, both cyclic and shelf life may vary widely with differing service conditions, properties of reactants, pressure and temperature cycling and age of the O-ring. FREQUENT INSPECTIONS SHOULD BE MADE to detect any deterioration, and O-rings replaced as required.*

***CAUTION:** See Tubing section for proper selection of tubing.*
***NOTE:** For optional material see Needle Valve Options section.*
*NOTE: Special material check valves may be supplied with four flats in place of standard hex.*

## Ball Type Excess Flow Valves



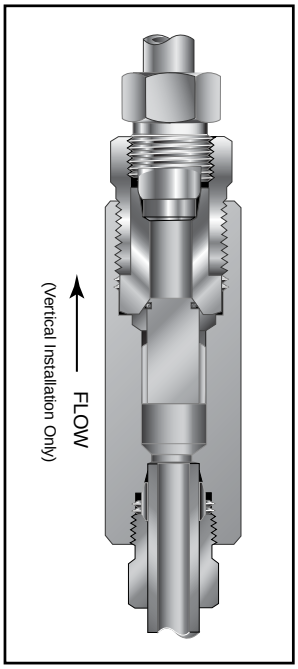

Protect pressure gauges and pressure instrumentation from sudden surges in flow or venting in the event of line failure.

**Materials:** Body, cover, sleeve: Type 316 Stainless Steel, Ball: 300 Series Stainless Steel, Cover gland: Stainless Steel.

**Vertical Installation:** Since this type of check valve employs a non-spring loaded ball, valve MUST be installed in VERTICAL position with arrow on valve body pointing UP. (cover gland up).

**Resetting Valve:** Equalize the pressure across the ball. The ball will drop and reset automatically.

## O-Ring Type Excess Flow Valves




Protects pressure gauges and other pressure instrumentation from sudden surges in flow due to operator error or line failure. This valve provides dependable, tight shut-off.

**Materials:** Body, cover, sleeve: Type 316 Stainless Steel, O-Ring: Viton for operation to 500°F (260°C). Buna-N or Teflon available for 250°F (121°C) or 400°F ( 204°C) respectively; specify when ordering.

**Vertical Installation:** Since this type of check valve employs a non-spring loaded poppet, valve MUST be installed in VERTICAL position with arrow on valve body pointing UP. (cover gland up).

**Resetting Valve:** Equalize the pressure across the poppet. The poppet will drop and reset automatically.

***CAUTION:*** *While testing has shown O-Rings to provide satisfactory service life, both cyclic and shelf life may vary widely with differing service conditions, properties of reactants, pressure and temperature cycling and age of the O-ring. FREQUENT INSPECTIONS SHOULD BE MADE to detect any deterioration, and O-rings replaced as required.*

***CAUTION:*** *See Tubing section for proper selection of tubing.*
***NOTE:*** *For optional material see Needle Valve Options section.*

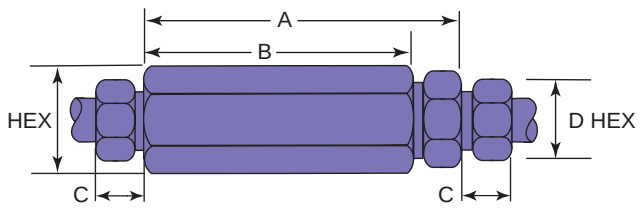
| Catalog Number | Fits Connection Type | Pressure Rating psi (bar)* | Orifice inches (mm) | Rated $C_V$ | Dimensions - inches (mm) A | B | C | D Typical | Hex | |
|---|---|---|---|---|---|---|---|---|---|---|
| **O-Ring Check Valves** | | | | | | | | | | |
| SW02200 | W125 | 15,000 **(1034.19)** | 0.094 **(2.39)** | 0.15 | 2.25 **(57.15)** | 1.88 **(47.75)** | 0.31 **(7.87)** | 0.50 **(12.70)** | 0.63 **(15.88)** | |
| SW04400 | SW250 | 15,000 **(1034.19)** | 0.188 **(4.78)** | 0.63 | 3.18 **(80.77)** | 2.56 **(65.02)** | 0.44 **(11.18)** | 0.63 **(16.00)** | 0.81 **(20.57)** | **See Figure 1** |
| SW06600 | SW375 | 15,000 **(1034.19)** | 0.250 **(6.35)** | 1.70 | 3.56 **(90.42)** | 3.00 **(76.20)** | 0.53 **(13.46)** | 0.75 **(19.05)** | 1.00 **(25.40)** | |
| SW08800 | SW500 | 10,000 **(689.46)** | 0.375 **(9.53)** | 3.40 | 4.18 **(106.17)** | 3.50 **(88.90)** | 0.53 **(13.46)** | 0.93 **(23.62)** | 1.38 **(35.05)** | |
| **Ball Check Valves** | | | | | | | | | | |
| SWB2200 | W125 | 15,000 **(1034.19)** | 0.094 **(2.39)** | 0.15 | 2.25 **(57.15)** | 1.88 **(47.75)** | 0.31 **(7.87)** | 0.50 **(12.70)** | 0.63 **(15.88)** | |
| SWB4400 | SW250 | 15,000 **(1034.19)** | 0.188 **(4.78)** | 0.63 | 3.18 **(80.77)** | 2.56 **(65.02)** | 0.44 **(11.18)** | 0.63 **(16.00)** | 0.81 **(20.57)** | **See Figure 1** |
| SWB6600 | SW375 | 15,000 **(1034.19)** | 0.250 **(6.35)** | 1.70 | 3.56 **(90.42)** | 3.00 **(76.20)** | 0.53 **(13.46)** | 0.75 **(19.05)** | 1.00 **(25.40)** | |
| SWB8800 | SW500 | 10,000 **(689.46)** | 0.375 **(9.53)** | 3.40 | 4.18 **(106.17)** | 3.50 **(88.90)** | 0.53 **(13.46)** | 0.93 **(23.62)** | 1.38 **(35.05)** | |
| **Ball Type Excess Flow Valves** | | | | | | | | | | |
| SWK2202 | W125 | 15,000 **(1034.19)** | 0.094 **(2.39)** | 0.12† | 2.25 **(57.15)** | 1.88 **(47.75)** | 0.31 **(7.87)** | 0.50 **(12.70)** | 0.63 **(15.88)** | |
| SWK4402 | SW250 | 15,000 **(1034.19)** | 0.188 **(4.78)** | 0.37† | 3.18 **(80.77)** | 2.56 **(65.02)** | 0.44 **(11.18)** | 0.63 **(16.00)** | 0.81 **(20.57)** | **See Figure 1** |
| SWK6602 | SW375 | 15,000 **(1034.19)** | 0.250 **(6.35)** | 0.104† | 3.56 **(90.42)** | 3.00 **(76.20)** | 0.53 **(13.46)** | 0.75 **(19.05)** | 1.00 **(25.40)** | |
| SWK8802 | SW500 | 10,000 **(689.46)** | 0.375 **(9.53)** | 0.212† | 4.18 **(106.17)** | 3.50 **(88.90)** | 0.53 **(13.46)** | 0.93 **(23.62)** | 1.38 **(35.05)** | |
| **O-Ring Type Excess Flow Valves** | | | | | | | | | | |
| SWK04400 | SW-250 | 15,000 **(1034.19)** | 0.188 **(4.78)** | 3†† | 3.12 **(79.25)** | 2.56 **(65.02)** | 0.44 **(11.18)** | 0.63 **(16.00)** | 0.81 **(20.57)** | |
| SWK06600 | SW-375 | 15,000 **(1034.19)** | 0.250 **(6.35)** | 5†† | 3.50 **(88.90)** | 3.00 **(76.20)** | 0.53 **(13.46)** | 0.75 **(19.05)** | 1.00 **(25.40)** | **See Figure 1** |
| SWK08800 | SW-500 | 10,000 **(689.46)** | 0.375 **(9.53)** | 10†† | 4.31 **(109.47)** | 3.50 **(88.90)** | 0.53 **(13.46)** | 0.93 **(23.62)** | 1.38 **(35.05)** | |

Note:
All check valves are furnished complete with connection components unless otherwise specified.
The 1/16" Tubing System is a complete system for use with all 1/8" components for pressure to 15,000 psi (1034 bar). Consult factory.
† - Check Flow* - water, GPM
†† - Check Flow* - CFM, nitrogen @ 500 psi (34.47 bar), RT
* - For flow using alternate fluids, consult Autoclave Engineers.

*Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

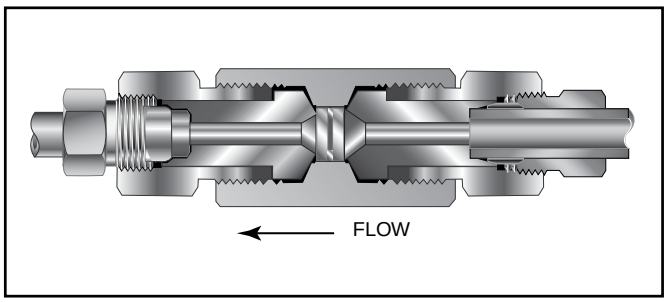
*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

**Figure 1**



## Pressures to 15,000 psi (1034 bar)

### Dual-Disc Line Filters

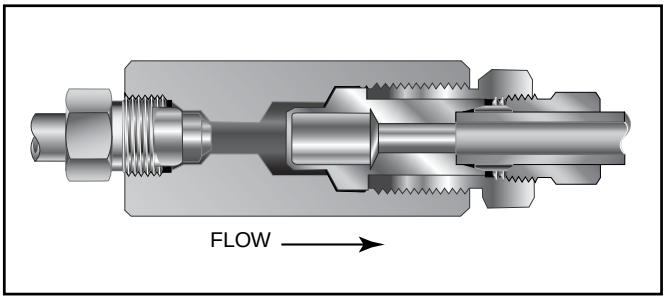



Dual-Disc Line Filters are utilized in numerous industrial, chemical processing, aerospace, nuclear and other applications. With the dual-disc design, large contaminant particles are trapped by the upstream filter element before they can reach and clog the smaller micron-size downstream element. Filter elements can be easily replaced.

**Materials:** Body: cold-worked Type 316 Stainless Steel, Filter Elements: 300 Series Stainless Steel.

**Filter Elements:** Downstream/upstream micron size 35/65 is standard. 5/10 or 10/35 also available when specified. Other element combinations available on special order.

### Cup-Type Line Filters




High Flow Cup-Type Line Filters are recommended in low pressure systems requiring both high flow rates and maximum filter surface area. Widely used in the industrial and chemical processing fields, the cup design offers as much as six times the effective filter area as compared to disc-type units. In addition, the filter elements can be quickly and easily replaced.

**Materials:** Body and Cover: cold-worked Type 316 Stainless Steel. Filter Element: 300 Series Stainless Steel.

**Filter Elements:** 300 Series Stainless Steel sintered cup. Standard elements available in choice of 5, 35 or 65 micron sizes. ***Note:*** *Filter ratings are nominal.*

***NOTE 1:*** *All filters furnished complete with connection components unless otherwise specified. All dimensions for reference only and subject to change. For optional materials, see Needle Valve Options section*

***NOTE 2:*** *Autoclave Engineers disc and cup type filters are designed to filter small amounts of process particles. It is recommended that all fluids are thoroughly cleaned prior to entering the higher pressure system.*

***NOTE 3:*** *Special material filters may be supplied with four flats in place of standard hex.*

***NOTE 4:*** *Pressure differential not to exceed 1,000 psi (69 bar) in a flowing condition.*

## Dual-Disc Line Filters

| Catalog Number | Pressure Rating psi (bar)* | Orifice inches (mm) | Micron Size** | Connection Size and Type | Effective Filter Element Area in.$^2$ (mm$^2$) | Dimensions - inches (mm) A | B | C | D Typical | Hex |
|---|---|---|---|---|---|---|---|---|---|---|
| SLF2200 | 15,000 (1034.19) | .094 **(2.39)** | 35/65 | W125 | .06 **(38.70)** | 2.31 **(58.67)** | 1.25 **(31.75)** | 0.31 **(7.87)** | .50 **(12.70)** | 0.62 **(15.74)** |
| SLF2200-5/10 | | | 5/10 | | | | | | | |
| SLF2200-10/35 | | | 10/35 | | | | | | | |
| SLF4400 | 15,000 (1034.19) | .125 **(3.18)** | 35/65 | SW250 | .15 **(96.77)** | 2.94 **(75.56)** | 1.68 **(42.67)** | 0.44 **(11.17)** | .63 **(15.88)** | 0.81 **(20.57)** |
| SLF4400-5/10 | | | 5/10 | | | | | | | |
| SLF4400-10/35 | | | 10/35 | | | | | | | |
| SLF6600 | 15,000 (1034.19) | .125 **(3.18)** | 35/65 | SW375 | .15 **(96.77)** | 2.94 **(75.56)** | 1.68 **(42.67)** | 0.53 **(13.46)** | .75 **(19.05)** | 1.00 **(25.40)** |
| SLF6600-5/10 | | | 5/10 | | | | | | | |
| SLF6600-10/35 | | | 10/35 | | | | | | | |
| SLF8800 | 10,000 (689.46) | .188 **(4.78)** | 35/65 | SW500 | .25 **(161.29)** | 3.56 **(90.42)** | 1.94 **(49.27)** | 0.53 **(13.46)** | .93 **(23.62)** | 1.18 **(29.97)** |
| SLF8800-5/10 | | | 5/10 | | | | | | | |
| SLF8800-10/35 | | | 10/35 | | | | | | | |

## Cup-Type Line Filters

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SWF4-5 | 15,000 (1034.19) | .188 **(4.78)** | 5 | SW250 | 0.81 **(522.57)** | 3.18 **(80.77)** | 2.56 **(65.02)** | 0.44 **(11.17)** | 0.63 **(15.88)** | 0.81 **(20.57)** |
| SWF4-35 | | | 35 | | | | | | | |
| SWF4-65 | | | 65 | | | | | | | |
| SWF6-5 | 15,000 (1034.19) | .312 **(7.92)** | 5 | SW375 | 0.81 **(522.57)** | 3.56 **(90.42)** | 3.00 **(76.20)** | 0.53 **(13.46)** | 0.75 **(19.05)** | 1.00 **(25.40)** |
| SWF6-35 | | | 35 | | | | | | | |
| SWF6-65 | | | 65 | | | | | | | |
| SWF8-5 | 10,000 (689.46) | .438 **(11.13)** | 5 | SW500 | 1.53 **(987.09)** | 4.18 **(106.17)** | 3.50 **(88.90)** | 0.53 **(13.46)** | .93 **(23.62)** | 1.38 **(35.05)** |
| SWF8-35 | | | 35 | | | | | | | |
| SWF8-65 | | | 65 | | | | | | | |

** Larger micron size filter element is installed on upstream (inlet) side. All filters furnished complete with connection components unless otherwise specified.

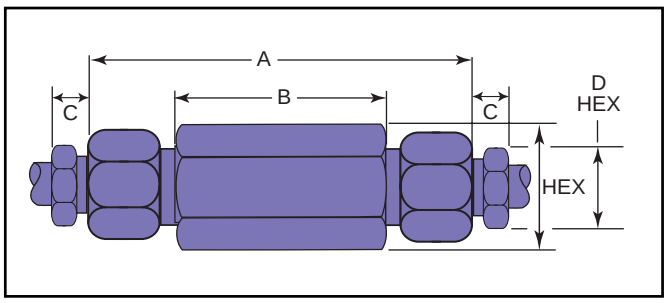
*Other micron sizes available on special order. Change last digits of the catalog number accordingly. For optional materials, see Needle Valve Options section.*

*The 1/16" Tubing System is a complete system for use with all 1/8" components for pressure to 15,000 psi (1034 bar). Consult factory.*

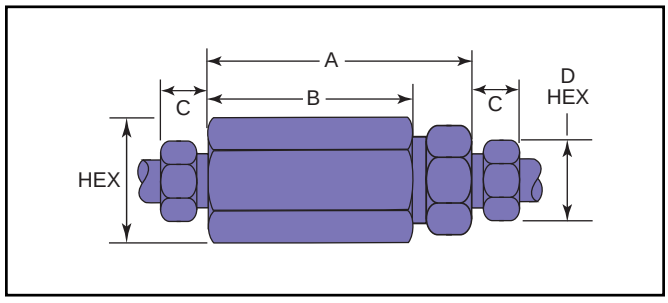
*Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

## Dual-Disc Line Filters




## Cup-Type Line Filters



# Medium Pressure

*Pressures to 20,000 psi (1379 bar)*

Since 1945 Autoclave Engineers has designed and built premium quality valves, fittings and tubing. This commitment to engineering and manufacturing excellence has earned Autoclave a reputation for reliable, efficient product performance. Autoclave Engineers has long been established as the world leader in high pressure fluid handling components for the chemical/petrochemical, research, and oil and gas industries.

## *Medium Pressure Fittings, Tubing and Nipples Features:*

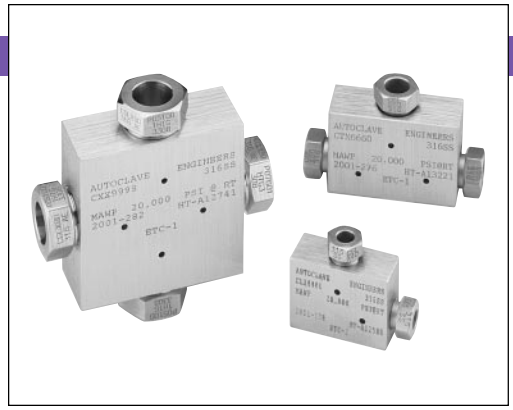
- Coned-and-Threaded Connection.
- Available sizes are 1/4, 3/8, 9/16, 3/4", and 1".
- Fittings and tubing manufactured from cold worked 316 stainless steel.
- Operating Temperatures from -423°F (-252°C) to 1200°F (649°C).
- Anti-vibration connection components available.
- All items available in special material.

The medium pressure series uses Autoclave's medium pressure connection. This coned-and-threaded connection features orifice sizes to match the high flow characteristics of this series.

Autoclave Engineers
Fluid Components
Division of Snap-tite, Inc.
*www.autoclaveengineers.com*

# Medium Pressure Fittings

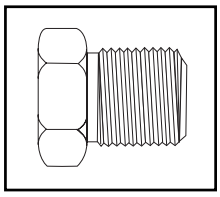
## Pressures to 20,000 psi (1379 bar)



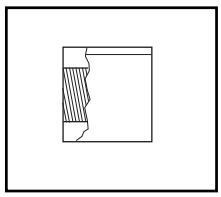
Autoclave Engineers medium pressure fittings, Series SF, are designed for use with Series 20SM medium pressure valves and Autoclave medium pressure tubing. They incorporate medium pressure coned-and-threaded connections with orifices sized to match the high-flow Series 20SC valves.

## Connection Components

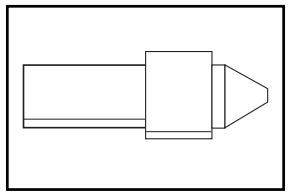
All Autoclave valves and fittings are supplied complete with appropriate glands and collars. To order these components separately, use order numbers listed. When using plug, collar is not required.



**Gland**
CGLX ( )



**Collar**
CCLX ( )



**Plug**
CPX ( )

Add tube size ( )
1/4" - 40
3/8" - 60
9/16" - 90
3/4" - 120
1" - 160

Example:
1/4" Gland - CGLX 40

To ensure proper fit use Autoclave Engineers tubing.

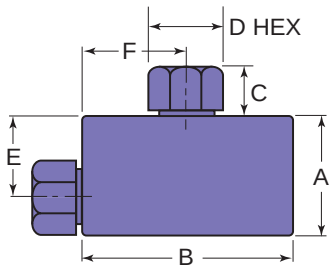
Note: Special material glands may be supplied with four flats in place of standard hex.

| Catalog Number | Connection Type | Outside Diameter Tube | Pressure Rating psi (bar)* | Minimum Opening | Dimensions - inches (mm) | | | | | | | Block Thickness | Fitting Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | A | B | C | D Typical | E | F | G Thickness | | |
| **Elbow** | | | | | | | | | | | | | |
| CLX4400 | SF250CX | 1/4 | 20,000 | 0.125 | 1.12 | 1.50 | 0.38 | 0.50 | 0.75 | 0.75 | | 0.62 | See Figure 1 |
| | | **(6.35)** | **(1378.93)** | **(3.18)** | **(28.45)** | **(38.10)** | **(9.65)** | **(12.70)** | **(19.05)** | **(19.05)** | | **(15.75)** | |
| CLX6600 | SF375CX | 3/8 | 20,000 | 0.219 | 1.38 | 2.00 | 0.44 | 0.62 | 1.00 | 1.00 | | 0.75 | |
| | | **(9.53)** | **(1378.93)** | **(5.56)** | **(35.05)** | **(50.80)** | **(11.10)** | **(15.75)** | **(25.40)** | **(25.40)** | | **(19.05)** | |
| CLX9900 | SF562CX | 9/16 | 20,000 | 0.359 | 1.75 | 2.50 | 0.53 | 0.94 | 1.25 | 1.25 | | 1.00 | |
| | | **(14.29)** | **(1378.93)** | **(9.12)** | **(44.45)** | **(63.50)** | **(13.46)** | **(23.88)** | **(31.75)** | **(31.75)** | | **(25.40)** | |
| CLX12 | SF750CX | 3/4 | 20,000 | 0.516 | 2.25 | 3.00 | 0.62 | 1.19 | 1.50 | 1.50 | | 1.38 | |
| | | **(19.05)** | **(1378.93)** | **(13.11)** | **(57.15)** | **(76.20)** | **(15.75)** | **(30.23)** | **(38.10)** | **(38.10)** | | **(34.93)** | |
| CLX16 | SF1000CX | 1 | 20,000 | 0.688 | 3.00 | 4.12 | 0.72 | 1.38 | 2.06 | 2.06 | | 1.75 | |
| | | **(25.40)** | **(1378.93)** | **(17.48)** | **(76.20)** | **(104.65)** | **(18.29)** | **(35.05)** | **(52.32)** | **(52.32)** | | **(44.45)** | |

*Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

**Figure 1**




**Elbow**

For mounting hole option add suffix PM to catalog number. Consult factory for mounting hole dimensions.

## Tee

| Catalog Number | Connection Type | Outside Diameter Tube | Pressure Rating psi (bar)* | Minimum Opening | Dimensions - inches (mm) A | B | C | D Typical | E | F | G Thickness | Block Thickness | Fitting Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CTX4440 | SF250CX | 1/4 | 20,000 | 0.125 | 1.12 | 1.50 | 0.38 | 0.50 | 0.75 | 0.75 | | 0.62 | |
| | | **(6.35)** | **(1378.93)** | **(3.18)** | **(28.45)** | **(38.10)** | **(9.65)** | **(12.70)** | **(19.05)** | **(19.05)** | | **(15.75)** | |
| CTX6660 | SF375CX | 3/8 | 20,000 | 0.219 | 1.38 | 2.00 | 0.44 | 0.62 | 1.00 | 1.00 | | 0.75 | |
| | | **(9.53)** | **(1378.93)** | **(5.56)** | **(35.05)** | **(50.80)** | **(11.10)** | **(15.75)** | **(25.40)** | **(25.40)** | | **(19.05)** | |
| CTX9990 | SF562CX | 9/16 | 20,000 | 0.359 | 1.75 | 2.50 | 0.53 | 0.94 | 1.25 | 1.25 | | 1.00 | **See Figure 2** |
| | | **(14.29)** | **(1378.93)** | **(9.12)** | **(44.45)** | **(63.50)** | **(13.46)** | **(23.88)** | **(31.75)** | **(31.75)** | | **(25.40)** | |
| CTX12 | SF750CX | 3/4 | 20,000 | 0.516 | 2.25 | 3.00 | 0.62 | 1.19 | 1.50 | 1.50 | | 1.38 | |
| | | **(19.05)** | **(1378.93)** | **(13.11)** | **(57.15)** | **(76.20)** | **(15.75)** | **(30.23)** | **(38.10)** | **(38.10)** | | **(34.93)** | |
| CTX16 | SF1000CX | 1 | 20,000 | 0.688 | 3.00 | 4.12 | 0.72 | 1.38 | 2.06 | 2.06 | | 1.75 | |
| | | **(25.40)** | **(1378.93)** | **(17.48)** | **(76.20)** | **(104.65)** | **(18.29)** | **(35.05)** | **(52.32)** | **(52.32)** | | **(44.45)** | |

## Cross

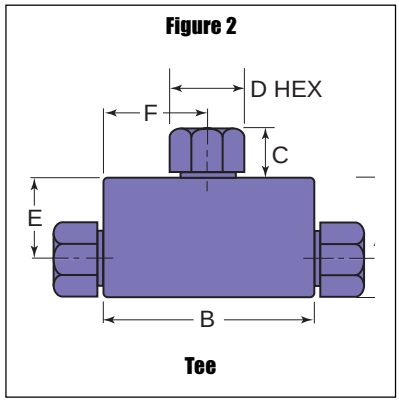
| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CXX4444 | SF250CX | 1/4 | 20,000 | 0.125 | 1.50 | 1.50 | 0.38 | 0.50 | 0.75 | 0.75 | | 0.62 | |
| | | **(6.35)** | **(1378.93)** | **(3.18)** | **(38.10)** | **(38.10)** | **(9.65)** | **(12.70)** | **(19.05)** | **(19.05)** | | **(15.75)** | |
| CXX6666 | SF375CX | 3/8 | 20,000 | 0.219 | 2.00 | 2.00 | 0.44 | 0.62 | 1.00 | 1.00 | | 0.75 | |
| | | **(9.53)** | **(1378.93)** | **(5.56)** | **(50.80)** | **(50.80)** | **(11.10)** | **(15.75)** | **(25.40)** | **(25.40)** | | **(19.05)** | |
| CXX9999 | SF562CX | 9/16 | 20,000 | 0.359 | 2.50 | 2.50 | 0.53 | 0.94 | 1.25 | 1.25 | | 1.00 | **See Figure 3** |
| | | **(14.29)** | **(1378.93)** | **(9.12)** | **(63.50)** | **(63.50)** | **(13.46)** | **(23.88)** | **(31.75)** | **(31.75)** | | **(25.40)** | |
| CXX12 | SF750CX | 3/4 | 20,000 | 0.516 | 3.00 | 3.00 | 0.62 | 1.19 | 1.50 | 1.50 | | 1.38 | |
| | | **(19.05)** | **(1378.93)** | **(13.11)** | **(76.20)** | **(76.20)** | **(15.75)** | **(30.23)** | **(38.10)** | **(38.10)** | | **(34.93)** | |
| CXX16 | SF1000CX | 1 | 20,000 | 0.688 | 4.12 | 4.12 | 0.72 | 1.38 | 2.06 | 2.06 | | 1.75 | |
| | | **(25.40)** | **(1378.93)** | **(17.48)** | **(104.65)** | **(104.65)** | **(18.29)** | **(35.05)** | **(52.32)** | **(52.32)** | | **(44.45)** | |

*Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products.
Consult your local representative.

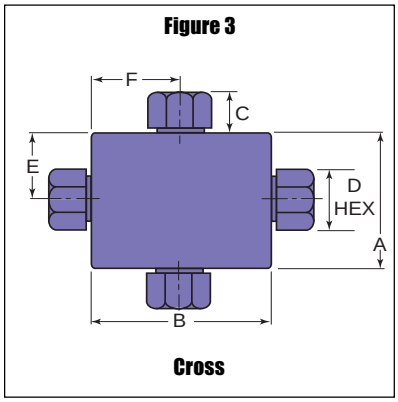
For mounting hole option add suffix PM to catalog number.
Consult factory for mounting hole dimensions.

**Figure 2**




**Tee**

**Figure 3**




**Cross**

| Catalog Number | Connection Type | Outside Diameter Tube | Pressure Rating psi (bar)* | Minimum Opening | Dimensions - inches (mm) | | | | | | | Block Thickness | Fitting Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | A | B | C | D Typical | E | F | G Thickness | | |

## Straight Coupling / Union Coupling

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 20FX4466 | SF250CX | 1/4 | 20,000 | 0.125 | 0.62 | 1.62 | 0.38 | 0.50 | Straight | | See Figure 4 |
| 20UFX4466 | | **(6.35)** | **(1378.93)** | **(3.18)** | **(15.75)** | **(41.15)** | **(9.65)** | **(12.70)** | Union | | |
| 20FX6666 | SF375CX | 3/8 | 20,000 | 0.219 | 0.75 | 1.75 | 0.44 | 0.62 | Straight | | |
| 20UFX6666 | | **(9.53)** | **(1378.93)** | **(5.56)** | **(19.05)** | **(44.45)** | **(11.10)** | **(15.75)** | Union | | |
| 20FX9966 | SF562CX | 9/16 | 20,000 | 0.359 | 1.00 | 2.12 | 0.53 | 0.94 | Straight | | |
| 20UFX9966 | | **(14.29)** | **(1378.93)** | **(9.12)** | **(25.40)** | **(53.85)** | **(13.46)** | **(23.88)** | Union | | |
| 20FX12 | SF750CX | 3/4 | 20,000 | 0.516 | 1.38 | 2.50 | 0.62 | 1.19 | Straight | | |
| 20UFX12 | | **(19.05)** | **(1378.93)** | **(13.11)** | **(35.05)** | **(63.50)** | **(15.75)** | **(30.23)** | Union | | |
| 20FX16 | SF1000CX | 1 | 20,000 | 0.688 | 1.75 | 3.50 | 0.72 | 1.38 | Straight | | |
| 20UFX16 | | **(25.40)** | **(1378.93)** | **(17.48)** | **(44.45)** | **(88.90)** | **(18.29)** | **(35.05)** | Union | | |

## Bulkhead Coupling

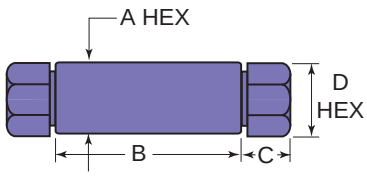
| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20BFX4466 | SF250CX | 1/4 | 20,000 | 0.125 | 0.81 | 1.88 | 0.38 | 0.50 | 0.53 | 1.00 | 0.38 | | See Figure 5 |
| | | **(6.35)** | **(1378.93)** | **(3.18)** | **(20.57)** | **(47.75)** | **(9.65)** | **(12.70)** | **(13.46)** | **(25.40)** | **(9.65)** | | |
| 20BFX6666 | SF375CX | 3/8 | 20,000 | 0.219 | 0.94 | 2.00 | 0.44 | 0.62 | 0.62 | 1.00 | 0.38 | | |
| | | **(9.53)** | **(1378.93)** | **(5.56)** | **(23.88)** | **(50.80)** | **(11.10)** | **(15.75)** | **(15.75)** | **(25.40)** | **(9.65)** | | |
| 20BFX9966 | SF562CX | 9/16 | 20,000 | 0.359 | 1.12 | 2.38 | 0.53 | 0.94 | 0.78 | 1.38 | 0.38 | | |
| | | **(14.29)** | **(1378.93)** | **(9.12)** | **(28.45)** | **(60.45)** | **(13.46)** | **(23.88)** | **(19.81)** | **(35.05)** | **(9.65)** | | |
| 20BFX12 | SF750CX | 3/4 | 20,000 | 0.516 | 1.69 | 2.62 | 0.62 | 1.19 | 0.91 | 1.88 | 0.38 | | |
| | | **(19.05)** | **(1378.93)** | **(13.11)** | **(42.93)** | **(66.55)** | **(15.75)** | **(30.23)** | **(23.11)** | **(47.75)** | **(9.65)** | | |
| 20BFX16 | SF1000CX | 1 | 20,000 | 0.688 | 1.94 | 3.50 | 0.72 | 1.38 | 1.50 | 2.21 | 0.38 | | |
| | | **(25.40)** | **(1378.93)** | **(17.48)** | **(49.28)** | **(88.90)** | **(18.29)** | **(35.05)** | **(38.10)** | **(56.13)** | **(9.65)** | | |

*Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products.
Consult your local representative.

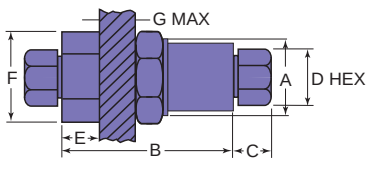
Union Couplings are designed with a removable seat insert allowing disassembly and tubing removal without the necessity of loosening other items in a line.

**Figure 4**




**Straight Coupling / Union Coupling**

**Figure 5**




**Bulkhead Coupling**

# Medium Pressure Tubing

## Pressures to 20,000 psi (1379 bar)

Autoclave Engineers offers a complete selection of austenetic, cold drawn stainless steel tubing designed to match the performance standards of Autoclave valves and fittings. Autoclave medium pressure tubing is manufactured specifically for high pressure applications requiring both strength and corrosion resistance. The tubing is furnished in random lengths between 20 feet (6 meters) and 27 feet (8.2 meters). The average is 24 feet (7.3 meters). Medium Pressure Tubing is available in five sizes and a variety of materials.

### Inspection and Testing

Autoclave Engineer's medium pressure tubing is inspected to assure freedom from seams, laps, fissures or other flaws, as well as carburization or intergranular carbide precipitation. The outside and inside diameters of the tubing are subject to special inspection and are controlled within close tolerences to assure proper fit. Sample pieces of tube for each lot are tested to confirm mechanical properties. Hydrostatic testing is also performed on a statistical basis and is conducted at the working pressure of the tube. Autoclave will perform 100% hydrostatic testing at additional cost if desired.

### Special Materials

In addition to the type 316 and 304 stainless steel tubing listed in this section, Autoclave has limited stock of hard-to-obtain shorter lengths of the following tubing materials:

*Monel 400*, Inconel 600*, Titanium Grade 2*, Nickel 200*, Hastelloy C276** - (* Trademark names)

Please consult factory for stock availabilty.

### Tubing Tolerance

| Nominal Tubing Size inches (mm) | Tolerance/Outside Diameter inches (mm) |
|---|---|
| 1/4 (6.35) | .248/.243 (6.30/6.17) |
| 3/8 (9.53) | .370/.365 (9.40/9.27) |
| 9/16 (14.27) | .557/.552 (14.15/14.02) |
| 3/4 (19.05) | .745/.740 (18.92/18.80) |
| 1 (25.40) | .995/.990 (25.27/25.14) |

| Catalog Number | Tube Material | Fits Connection Type | Tube Size Inches (mm) | | | Flow Area in.² (mm²) | Working Pressure psi (bar)* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Outside Diameter | Inside Diameter | Wall Thickness | | -325 to 100°F -198 to - 37.8°C | 200°F 93°C | 400°F 204°C | 600°F 316°C | 800°F 427°C |
| MS15-092 | 316SS | SF250CX | 1/4 **(6.35)** | 0.109 **(2.77)** | 0.070 **(1.78)** | 0.009 **(5.81)** | 20,000 **(1378.93)** | 20,000 **(1378.93)** | 19,250 **(1327.22)** | 18,050 **(1244.48)** | 16,800 **(1158.30)** |
| MS15-192 | 304SS | | | | | | 20,000 **(1378.93)** | 18,950 **(1306.54)** | 17,200 **(1185.88)** | 17,000 **(1172.09)** | 16,150 **(1113.49)** |
| MS15-093 | 316SS | SF375CX | 3/8 **(9.53)** | 0.203 **(5.16)** | 0.086 **(2.18)** | 0.032 **(20.65)** | 20,000 **(1378.93)** | 20,000 **(1378.93)** | 19,250 **(1327.22)** | 18,050 **(1244.48)** | 16,800 **(1158.30)** |
| MS15-193 | 304SS | | | | | | 20,000 **(1378.93)** | 20,000 **(1378.93)** | 19,250 **(1327.22)** | 18,050 **(1244.48)** | 16,800 **(1158.30)** |
| MS15-085 | 316SS | SF562CX | 9/16 **(14.29)** | 0.312 **(7.92)** | 0.125 **(3.18)** | 0.076 **(49.03)** | 20,000 **(1378.93)** | 20,000 **(1378.93)** | 19,250 **(1327.22)** | 18,050 **(1244.48)** | 16,800 **(1158.30)** |
| MS15-187 | 304SS | | | | | | 20,000 **(1378.93)** | 20,000 **(1378.93)** | 19,250 **(1327.22)** | 18,050 **(1244.48)** | 16,800 **(1158.30)** |
| MS15-097 | 316SS | SF562CX | 9/16 **(14.29)** | 0.359 **(9.12)** | 0.101 **(2.57)** | 0.101 **(65.16)** | 10,000 **(689.46)** | 10,000 **(689.46)** | 9,600 **(661.89)** | 9,100 **(627.41)** | 8,450 **(582.60)** |
| MS15-194 | 304SS | | | | | | 10,000 **(689.46)** | 9,450 **(651.54)** | 8,600 **(592.94)** | 8,500 **(586.05)** | 8,050 **(555.02)** |
| MS15-095 | 316SS | SF750CX | 3/4 **(19.05)** | 0.438 **(11.13)** | 0.156 **(3.96)** | 0.151 **(97.42)** | 20,000 **(1378.93)** | 20,000 **(1378.93)** | 19,250 **(1327.22)** | 18,050 **(1244.48)** | 16,800 **(1158.30)** |
| MS15-098 | 316SS | | | 0.516 **(13.11)** | 0.117 **(2.97)** | 0.209 **(134.84)** | 10,000 **(689.46)** | 10,000 **(689.46)** | 9,600 **(661.89)** | 9,100 **(627.41)** | 8,450 **(582.60)** |
| MS15-096 | 316SS | SF1000CX | 1 **(25.40)** | 0.562 **(14.27)** | 0.219 **(5.56)** | 0.248 **(160.00)** | 20,000 **(1378.93)** | 20,000 **(1378.93)** | 19,250 **(1327.22)** | 18,050 **(1244.48)** | 16,800 **(1158.30)** |
| MS15-099 | 316SS | | | 0.688 **(17.48)** | 0.156 **(3.96)** | 0.371 **(239.35)** | 10,000 **(689.46)** | 10,000 **(689.46)** | 9,600 **(661.89)** | 9,100 **(627.41)** | 8,450 **(582.60)** |

Note: Caution should be exercised in proper selection of Medium Pressure Tubing based on actual operating conditions. Two series available: 10,000 psi (690 bar) and 20,000 psi (1379 bar).
*Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

# Medium Pressure Coned-and-Threaded Nipples

## Pressures to 20,000 psi (1379 bar)

For rapid system make-up, Autoclave Engineers supplies pre-cut, coned-and-threaded nipples in various sizes and lengths for Autoclave medium pressure valves and fittings.

### Special lengths

In addition to the standard lengths listed in the table below, nipples are available in any custom length. Consult factory.

### Materials

Catalog numbers in table refer to Type 316 Stainless steel. Optional materials available. Consult factory.

| Catalog Number Nipple Length In (mm) | | | | | | | Fits Connection Type | Tube Size inches (mm) | | Working Pressure at 100°F psi (bar)* |
|---|---|---|---|---|---|---|---|---|---|---|
| 2.75" **(69.85)** | 3.00" **(76.20)** | 4.00" **(101.60)** | 6.00" **(152.40)** | 8.00" **(203.20)** | 10.00" **(254.00)** | 12.00" **(304.80)** | | O.D. | I.D. | |
| CNX4402-316 | CNX4403-316 | CNX4404-316 | CNX4406-316 | CNX4408-316 | CNX44010-316 | CNX44012-316 | SF250CX | 1/4 **(6.35)** | 0.109 **(2.77)** | 20,000 **(1378.93)** |
| | CNX6603-316 | CNX6604-316 | CNX6606-316 | CNX6608-316 | CNX66010-316 | CNX66012-316 | SF375CX | 3/8 **(9.53)** | 0.203 **(5.16)** | 20,000 **(1378.93)** |
| | | CNX9904-316 | CNX9906-316 | CNX9908-316 | CNX99010-316 | CNX99012-316 | SF562CX | 9/16 **(14.29)** | 0.312 **(7.92)** | 20,000 **(1378.93)** |
| | | CNLX9904-316 | CNLX9906-316 | CNLX9908-316 | CNLX99010-316 | CNLX99012-316 | SF562CX | 9/16 **(14.29)** | 0.359 **(9.12)** | 10,000 **(689.46)** |
| | | | CNX1206-316 | CNX1208-316 | CNX12010-316 | CNX12012-316 | SF750CX | 3/4 **(19.05)** | 0.438 **(11.13)** | 20,000 **(1378.93)** |
| | | | CNLX1206-316 | CNLX1208-316 | CNLX12010-316 | CNLX12012-316 | SF750CX | 3/4 **(19.05)** | 0.516 **(13.11)** | 10,000 **(689.46)** |
| | | | CNX1606-316 | CNX1608-316 | CNX16010-316 | CNX16012-316 | SF1000CX | 1 **(25.40)** | 0.562 **(14.27)** | 20,000 **(1378.93)** |
| | | | CNLX1606-316 | CNLX1608-316 | CNLX16010-316 | CNLX16012-316 | SF1000CX | 1 **(25.40)** | 0.688 **(17.48)** | 10,000 **(689.46)** |

Note: Caution should be exercised when selecting medium pressure nipples since two series are available: 10,000 psi (690 bar) and 20,000 psi (1379 bar)

See medium pressure tubing section for pressures at various temperatures.

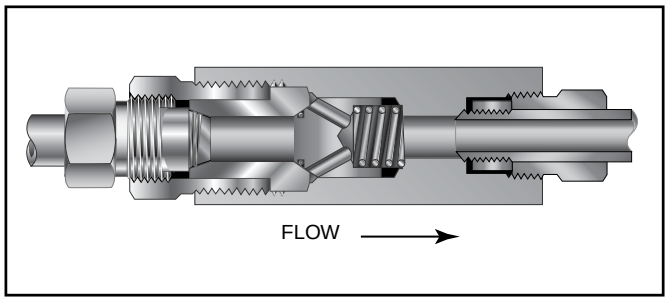
*Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

# Medium Pressure Check Valves

## Pressures to 20,000 (1379 bar)

### O-Ring Check Valves

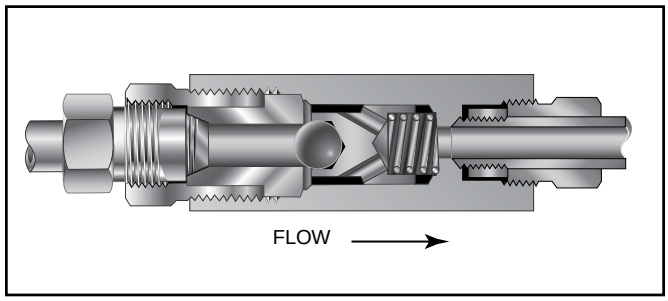



Provides unidirectional flow and tight shut-off for liquids and gas with high reliability. When differential drops below cracking pressure*, valve shuts off. **(Not for use as relief valve.)**

**Materials:** Body, cover, poppet: 316 Stainless Steel, Cover gland: Stainless Steel, Spring: 300 Series Stainless Steel, Standard O-ring: Viton, for operation to 500° F (260°C). Buna-N or Teflon available for 250°F (121°C) or 400°F (204°C) respectively; specify when ordering.

***Cracking Pressure:** 20 psi (1.38 bar) ±30%. Springs for higher cracking pressures (up to 100 psi (6.89 bar)) available on special order for O-ring style check valves only.

### Ball Check Valves

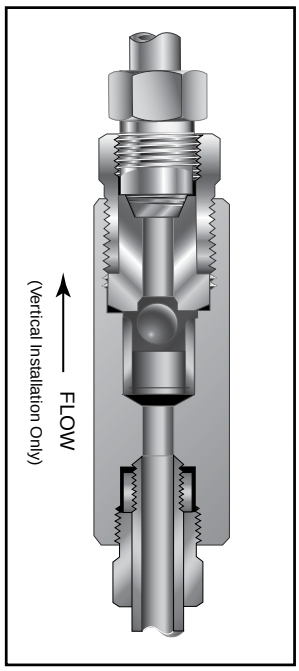



Prevents reverse flow where **leak-tight shut-off is not mandatory**. When differential drops below cracking pressure, valve closes. With all-metal components, valve can be used up to 1200°F (649°C). See Technical Information section for connection temperature limitations. (Not for use as a relief valve.)

**Ball is cradled in floating poppet** to assure positive, in-line seating without "chatter". Poppet is designed essentially for axial flow with minimum pressure drop.

**Materials:** Body, cover, poppet: 316 Stainless Steel, Cover gland: Stainless Steel, Ball, Spring: 300 Series Stainless Steel

### Ball Type Excess Flow Valves




Protects pressure gauges and pressure instrumentation from surges in flow or sudden venting in the event of line failure.

**Materials:** Body, cover, sleeve: Type 316 Stainless Steel, Ball: 300 Series Stainless Steel, Cover gland: Stainless Steel.

**Vertical Installation:** Since this type of check valve employs a non-spring loaded ball, valve MUST be installed in VERTICAL position with arrow on valve body pointing UP. (cover gland up).

**Resetting Valve:** Equalize the pressure across the ball. The ball will drop and reset automatically.

***CAUTION:*** *While testing has shown O-Rings to provide satisfactory service life, both cyclic and shelf life may vary widely with differing service conditions, properties of reactants, pressure and temperature cycling and age of the O-ring. FREQUENT INSPECTIONS SHOULD BE MADE to detect any deterioration, and O-rings replaced as required.*

***CAUTION:*** *See Tubing section for proper selection of tubing.*
***NOTE:*** *For optional material see Needle Valve Options section.*

***NOTE:*** *Special material check valves may be supplied with four flats in place of standard hex.*

# Medium Pressure Check Valves

| Catalog Number | Fits Connection Type | Pressure Rating psi (bar)* | Orifice inches (mm) | Rated $C_V$ | Dimensions - inches (mm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | A | B | C | D Typical | Hex | |

## O-Ring Check Valves

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CXO4400 | SF250CX | 20,000 (1378.93) | 0.125 (3.18) | 0.28 | 2.94 (74.68) | 2.50 (63.50) | 0.38 (9.65) | 0.50 (12.70) | 0.81 (20.57) | |
| CXO6600 | SF375CX | 20,000 (1378.93) | 0.218 (5.54) | 0.84 | 3.12 (79.25) | 2.62 (66.55) | 0.47 (11.94) | 0.62 (15.75) | 1.00 (25.40) | |
| CXO9900 | SF562CX | 20,000 (1378.93) | 0.359 (9.12) | 2.30 | 4.18 (106.17) | 3.50 (88.90) | 0.53 (13.46) | 0.94 (23.88) | 1.38 (35.05) | **See Figure 1** |
| CXO12 | SF750CX | 20,000 (1378.93) | 0.516 (13.11) | 4.70 | 5.50 (139.70) | 4.75 (120.65) | 0.62 (15.75) | 1.19 (30.23) | 1.75 (44.45) | |
| CXO16 | SF1000CX | 20,000 (1378.93) | 0.688 (17.48) | 7.40 | 6.63 (168.40) | 5.75 (146.05) | 0.72 (18.29) | 1.38 (35.05) | 2.12 (53.85) | |

## Ball Check Valves

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CXB4400 | SF250CX | 20,000 (1378.93) | 0.125 (3.18) | 0.28 | 2.94 (74.68) | 2.50 (63.50) | 0.38 (9.65) | 0.50 (12.70) | 0.81 (20.57) | |
| CXB6600 | SF375CX | 20,000 (1378.93) | 0.218 (5.54) | 0.84 | 3.12 (79.25) | 2.62 (66.55) | 0.47 (11.94) | 0.62 (15.75) | 1.00 (25.40) | |
| CXB9900 | SF562CX | 20,000 (1378.93) | 0.359 (9.12) | 2.30 | 4.18 (106.17) | 3.50 (88.90) | 0.53 (13.46) | 0.94 (23.88) | 1.38 (35.05) | **See Figure 1** |
| CXB12 | SF750CX | 20,000 (1378.93) | 0.516 (13.11) | 4.70 | 5.50 (139.70) | 4.75 (120.65) | 0.62 (15.75) | 1.19 (30.23) | 1.75 (44.45) | |
| CXB16 | SF1000CX | 20,000 (1378.93) | 0.688 (17.48) | 7.40 | 6.63 (168.40) | 5.75 (146.05) | 0.72 (18.29) | 1.38 (35.05) | 2.12 (53.85) | |

## Ball Type Excess Flow Valves

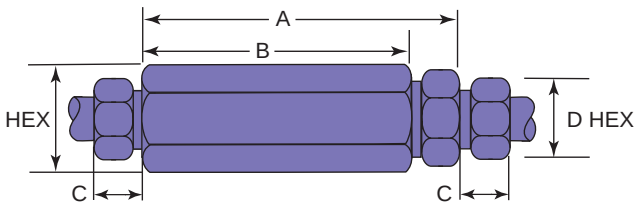
| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CXK4402 | SF250CX | 20,000 (1378.93) | 0.125 (3.18) | 0.37† | 2.94 (74.68) | 2.50 (63.50) | 0.38 (9.65) | 0.50 (12.70) | 0.81 (20.57) | |
| CXK6602 | SF375CX | 20,000 (1378.93) | 0.218 (5.54) | 0.66† | 3.12 (79.25) | 2.62 (66.55) | 0.47 (11.94) | 0.62 (15.75) | 1.00 (25.40) | |
| CXK9902 | SF562CX | 20,000 (1378.93) | 0.359 (9.12) | .212† | 4.18 (106.17) | 3.50 (88.90) | 0.53 (13.46) | 0.94 (23.88) | 1.38 (35.05) | **See Figure 1** |
| CXK12 | SF750CX | 20,000 (1378.93) | 0.516 (13.11) | .368† | 5.12 (130.05) | 4.38 (111.25) | 0.62 (15.75) | 1.19 (30.23) | 1.75 (44.45) | |
| CXK16 | SF1000CX | 20,000 (1378.93) | 0.688 (17.48) | .864† | 6.50 (165.10) | 5.62 (142.75) | 0.72 (18.29) | 1.38 (35.05) | 2.12 (53.85) | |

Note:
†-Check Flow - water, GPM
For flow rates using alternate fluids, consult Autoclave Engineers.

*Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

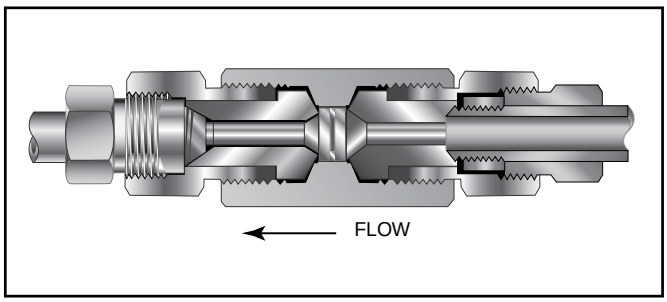
**Figure 1**



# Medium Pressure Line Filters

## Pressures to 20,000 psi (1379 bar)

### Dual-Disc Line Filters

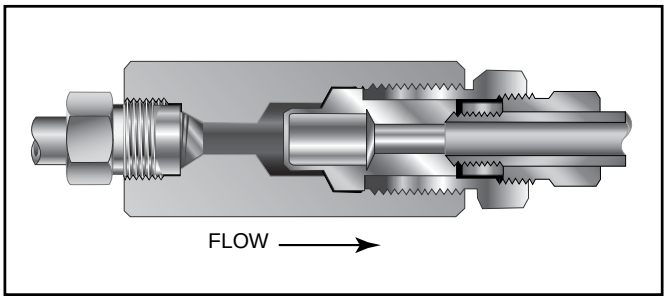



Autoclave Engineers Dual-Disc Line Filters are utilized in numerous industrial, chemical processing, aerospace, nuclear and other applications. With the dual-disc design, large contaminant particles are trapped by the upstream filter element before they can reach and clog the smaller micron-size downstream element. Filter elements can be easily replaced.

**Materials:** Body: cold-worked Type 316 Stainless Steel, Filter Elements: 300 Series Stainless Steel.

**Filter Elements:** Downstream/upstream micron size 35/65 is standard. 5/10 or 10/35 also available when specified. Other element combinations available on special order.

### Cup-Type Line Filters




Autoclave Engineers High Flow Cup-Type Line Filters are recommended in high pressure systems requiring both high flow rates and maximum filter surface area. Widely used in the industrial and chemical processing fields, the cup design offers as much as six times the effective filter area as compared to disc-type units. In addition, the filter elements can be quickly and easily replaced.

**Materials:** Body and Cover: cold-worked Type 316 Stainless Steel. Filter Element: 300 Series Stainless Steel.

**Filter Elements:** 300 Series Stainless Steel sintered cup. Standard elements available in choice of 5, 35 or 65 micron sizes. ***Note:*** *Filter ratings are nominal.*

***NOTE 1:*** *All filters furnished complete with connection components unless otherwise specified. All dimensions for reference only and subject to change.*

*For optional materials, see Needle Valve Options section*

***NOTE 2:*** *Autoclave Engineers disc and cup type filters are designed to filter small amounts of process particles. It is recommended that all fluids are thoroughly cleaned prior to entering the higher pressure system.*

***NOTE 3:*** *Special material filters may be supplied with four flats in place of standard hex.*

***NOTE 4:*** *Pressure differential not to exceed 1,000 psi (69 bar) in a flowing condition.*

| Catalog Number | Pressure Rating psi (bar)* | Orifice inches (mm) | Micron Size** | Connection Size and Type | Effective Filter Element Area in.$^2$ (mm$^2$) | Dimensions - inches (mm) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | A | B | C | D Typical | Hex |

## Dual-Disc Line Filters

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **CLFX9900** | 20,000 **(1378.93)** | 0.312 (7.92) | 35/65 | SF562CX | 0.25 **(161.29)** | 4.94 **(125.48)** | 2.68 **(68.07)** | 0.53 **(13.46)** | .94 **(23.88)** | 1.38 **(35.05)** |
| **CLFX9900-5/10** | 20,000 **(1378.93)** | 0.312 **(7.92)** | 5/10 | | | | | | | |
| **CLFX9900-10/35** | 20,000 **(1378.93)** | 0.312 **(7.92)** | 10/35 | | | | | | | |

## Cup-Type Line Filters

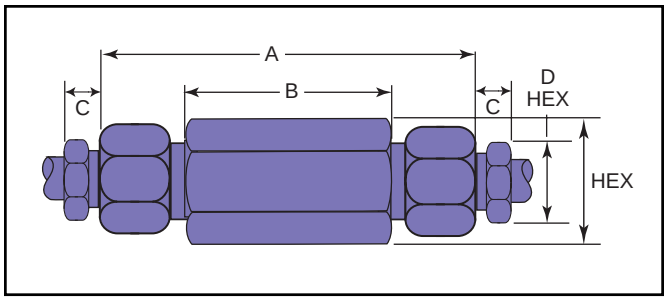
| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **CXF4-5** | 20,000 **(1378.93)** | 0.125 **(3.18)** | 5 | SF250CX | 0.81 **(522.57)** | 2.94 **(74.68)** | 2.50 **(63.50)** | 0.38 **(9.65)** | .50 **(12.70)** | 0.81 **(20.57)** |
| **CXF4-35** | | | 35 | | | | | | | |
| **CXF4-65** | | | 65 | | | | | | | |
| **CXF6-5** | 20,000 **(1378.93)** | 0.218 **(5.54)** | 5 | SF375CX | 0.81 **(522.57)** | 3.12 **(79.25)** | 2.62 **(66.55)** | 0.47 **(11.99)** | .62 **(15.75)** | 1.00 **(25.40)** |
| **CXF6-35** | | | 35 | | | | | | | |
| **CXF6-65** | | | 65 | | | | | | | |
| **CXF9-5** | 20,000 **(1378.93)** | 0.359 **(9.12)** | 5 | SF562CX | 1.53 **(987.09)** | 4.18 **(106.17)** | 3.50 **(88.90)** | 0.53 **(13.46)** | .94 **(23.88)** | 1.38 **(35.05)** |
| **CXF9-35** | | | 35 | | | | | | | |
| **CXF9-65** | | | 65 | | | | | | | |
| **CXF16-5** | 20,000 **(1378.93)** | 0.688 **(17.48)** | 5 | SF1000CX | 5.00 **(3225.80)** | 6.62 **(168.15)** | 5.75 **(146.05)** | 0.72 **(18.29)** | 1.38 **(35.05)** | 2.12 **(53.05)** |
| **CXF16-10** | | | 10 | | | | | | | |
| **CXF16-35** | | | 35 | | | | | | | |
| **CXF16-65** | | | 65 | | | | | | | |

*Note:*
*** Other micron sizes available on special order. Change last digits of the catalog number accordingly.*
*For optional materials, see Needle Valve Options section.*

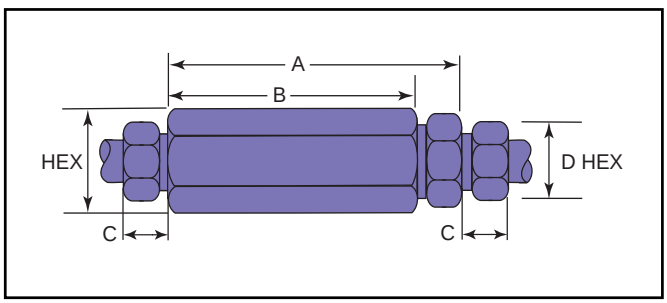
*Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

### Dual-Disc Line Filters




### Cup-Type Line Filters



# Anti-Vibration Collet Gland Assembly

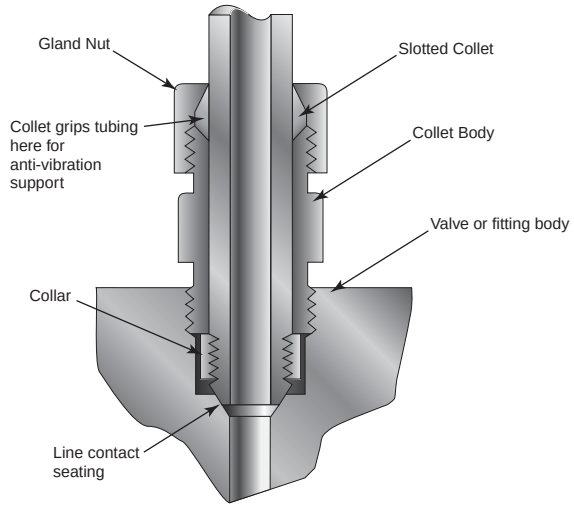
## Pressures to 20,000 psi (1379 bar)

### Series KCBGLX Sizes to 1" (25.40 mm)

For extreme conditions of vibration and/or shock in tubing systems, such as an unsupported line near a compressor, coned-and-threaded connections are offered with the Autoclave anti-vibration collet gland assembly. Completely interchangeable with standard Autoclave Engineers medium pressure connections, the collet gland assembly provides equally effective pressure handling capability.

In standard connection systems, the bending stresses on the threaded area of the tubing imposed by excessive vibration or movement may cause premature fatigue failure of the tubing at the back of the thread. By moving the stress concentration back to the unthreaded part of the tubing and providing a wedge-type gripping action, the Autocalve Engineers anti-vibration collet gland assembly strengthens the entire structure. With stress concentration reduced and overall stress level maintained well below the endurance limit of the material, the result is virtually unlimited vibrational fatigue life.

A less complex and more economical design than other vibration-resistant connections, the collet gland assembly utilizes the same coned-and-threaded features of Autoclave medium pressure connections. Series KCBGLX extends the gland nut to provide room for the tapered slotted collet. The design provides a slight difference in angles between the collet and the corresponding taper of the gland nut. As the nut is tightened, it acts to wedge the tapered end of the collet into a gripping engagement with the tubing.



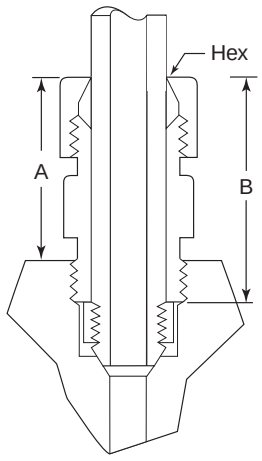

**Series KCBGLX**
Pressures to 20,000 (1379 bar)

### Materials

Type 316 stainless steel with bonded dry film (316 MC) moly lubricant.

***NOTE:*** *Special material assemblies may be supplied with four flats in place of standard hex.*

| Catalog Number | Part | Outside Diameter Tubing Size in. (mm) | Dimensions - inches (mm) | | |
|---|---|---|---|---|---|
| | | | A | B | Hex |
| KCBGLX40-316MC | Complete assembly | 1/4 (6.35) | 0.94 (23.88) | 1.19 (30.23) | 0.62 (15.75) |
| KCBLX40-316MC | Collet body | | | | |
| KCCLX40-316MC | Slotted collet | | | | |
| KGLX40-316MC | Gland nut | | | | |
| KCBGLX60-316MC | Complete assembly | 3/8 (9.53) | 1.19 (30.23) | 1.50 (38.10) | 0.81 (20.63) |
| KCBLX60-316MC | Collet body | | | | |
| KCCLX60-316MC | Slotted collet | | | | |
| KGLX60-316MC | Gland nut | | | | |
| KCBGLX90-316MC | Complete assembly | 9/16 (14.29) | 1.41 (35.81) | 1.78 (45.21) | 0.94 (23.88) |
| KCBLX90-316MC | Collet body | | | | |
| KCCLX90-316MC | Slotted collet | | | | |
| KGLX90-316MC | Gland nut | | | | |
| KCBGLX120-316MC | Complete assembly | 3/4 (19.05) | 1.59 (40.37) | 2.00 (50.80) | 1.25 (31.75) |
| KCBLX120-316MC | Collet body | | | | |
| KCCLX120-316MC | Slotted collet | | | | |
| KGLX120-316MC | Gland nut | | | | |
| KCBGLX160-316MC | Complete assembly | 1 (25.40) | 1.69 (42.93) | 2.38 (60.45) | 1.50 (38.10) |
| KCBLX160-316MC | Collet body | | | | |
| KCCLX160-316MC | Slotted collet | | | | |
| KGLX160-316MC | Gland nut | | | | |




**Series KCBGLX**
20,000 psi ( 1379 bar)

Standard Autoclave Engineers collar not included in complete assembly

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

# Fittings, Tubing & Nipples

## High Pressure

*Pressures to 150,000 psi (10342 bar)*

Since 1945 Autoclave Engineers has designed and built premium quality valves, fittings and tubing. This commitment to engineering and manufacturing excellence has earned Autoclave a reputation for reliable, efficient product performance. Autoclave Engineers has long been established as the world leader in high pressure fluid handling components for the chemical/petrochemical, research, and oil and gas, waterjet, and waterblast industries.

### *High Pressure Fittings, Tubing and Nipples Features:*

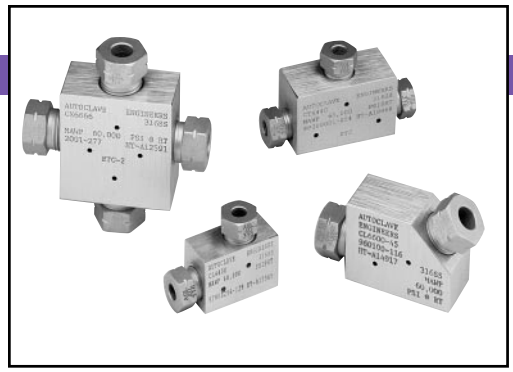
- Coned-and-Threaded Connection.
- Available sizes are 1/4, 5/16, 3/8, 9/16, and 1".
- Fittings and tubing manufactured from 316 cold worked stainless steel.
- Operating Temperatures from -423°F (-252°C) to 1200°F (649°C).
- Anti-vibration connection components available.
- Ultra-high pressure components.
- Autofrettaged tubing.
- High pressure high cycle tubing.

The high and ulta-high pressure series uses Autoclave's high pressure connector. This coned-and-threaded connection provides dependable performance in gas or liquid service.

Autoclave Engineers
Fluid Components
Division of Snap-tite, Inc.
*www.autoclaveengineers.com*

# High Pressure Fittings

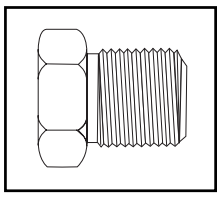
## Pressures to 150,000 psi (10342 bar)



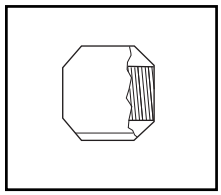
Autoclave Engineers high pressure fittings Series F and SF are the industry standard for pressures to 150,000 psi (10342 bar). Utilizing Autoclave Engineers high pressure coned-and-threaded connections, these fittings are correlated with Series 30VM, 30SC, 40VM, 60VM, 100V, and 150V valves and Autoclave Engineers high pressure tubing.

## Connection Components

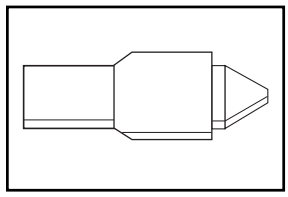
All Autoclave Engineers valves and fittings are supplied complete with appropriate glands and collars. To order these components separately, use order numbers listed. When using plug, collar is not required.



**Gland**
AGL ( )



**Collar**
ACL ( )



**Plug**
AP ( )

Add tube size ( )
1/4" - 40
5/16" - 50
3/8" - 60
9/16" - 90
1" - 160

Example:
1/4" Gland - AGL (40)

To ensure proper fit use Autoclave Engineers tubing.

Note: Special material glands maybe supplied with four flats in place of standard hex.

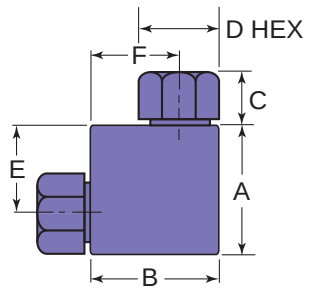
| Connection Type | Gland | Collar | Plug | Connection Components (Industry Standard) |
|---|---|---|---|---|
| F250C<br>F375C<br>F562C | AGL( ) | ACL( ) | AP( ) | Autoclave Engineer's high pressure fittings 1/4, 3/8 and 9/16 connection components to 60,000 psi (4137 bar).<br>For use with 30VM, 40VM, 60VM valves and fittings. |
| F1000C43 | CGLX160 | CCLX160 | 43CP160 | Autoclave Engineer's high pressure 1" connection components to 43,000 psi (2965 bar) for use with 30SC, 43Y valves, and fittings. |
| F312C150 | CGL50 | CCL50 | CP50 | Autoclave Engineer's ultra high pressure 5/16 connection components to 150,000 psi ( 10342 bar) for use with 100V and 150V valve and fittings. |

| Catalog Number | Connection Type | Outside Diameter Tube | Pressure Rating psi (bar)* | Minimum Opening | Dimensions - inches (mm) | | | | | | | Block Thickness | Fitting Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | A | B | C | D Typical | E | F | G Thickness | | |
| **Elbow** | | | | | | | | | | | | | |
| CL4400 | F250C | 1/4 **(6.35)** | 60,000 **(4136.79)** | 0.094 **(2.39)** | 1.00 **(25.40)** | 1.50 **(38.10)** | 0.50 **(12.70)** | 0.63 **(15.88)** | 0.62 **(15.75)** | 0.88 **(22.35)** | | 0.75 **(19.05)** | **See Figure 1** |
| CL5500 | F312C150 | 5/16 **(7.94)** | 150,000 **(10341.97)** | 0.062 **(1.57)** | 2.12 **(53.85)** | 3.00 **(76.20)** | 0.52 **(13.21)** | 0.75 **(19.05)** | 1.50 **(38.10)** | 1.50 **(38.10)** | | 1.38 **(35.05)** | |
| CL6600 | F375C | 3/8 **(9.53)** | 60,000 **(4136.79)** | 0.125 **(3.18)** | 1.50 **(38.10)** | 2.00 **(50.80)** | 0.53 **(13.46)** | 0.81 **(20.62)** | 1.00 **(25.40)** | 1.25 **(31.75)** | | 1.00 **(25.40)** | |
| CL9900 | F562C | 9/16 **(14.29)** | 60,000 **(4136.79)** | 0.188 **(4.78)** | 1.88 **(47.75)** | 2.62 **(66.55)** | 0.81 **(20.57)** | 1.19 **(30.23)** | 1.12 **(28.45)** | 1.88 **(47.75)** | | 1.50 **(38.10)** | |
| 40CL9900 | F562C40 | 9/16 **(14.29)** | 40,000 **(2757.86)** | 0.250 **(6.35)** | 1.88 **(47.775)** | 2.62 **(66.55)** | 0.81 **(20.57)** | 1.19 **(30.23)** | 1.12 **(28.45)** | 1.88 **(47.75)** | | 1.50 **(38.10)** | |
| 43CL16 | F1000C43 | 1 **(25.40)** | 43,000 **(2964.70)** | 0.438 **(11.13)** | 3.00 **(76.20)** | 4.12 **(104.65)** | 0.72 **(18.29)** | 1.38 **(35.05)** | 2.06 **(52.32)** | 2.06 **(52.32)** | | 1.75 **(44.45)** | |
| **Tee** | | | | | | | | | | | | | |
| CT4440 | F250C | 1/4 **(6.35)** | 60,000 **(4136.79)** | 0.094 **(2.39)** | 1.25 **(31.75)** | 2.00 **(50.80)** | 0.50 **(12.70)** | 0.63 **(15.88)** | 0.88 **(22.35)** | 1.00 **(25.40)** | | 1.00 **(25.40)** | **See Figure 2** |
| CT5550 | F312C150 | 5/16 **(7.94)** | 150,000 **(10341.97)** | 0.062 **(1.57)** | 2.12 **(53.85)** | 3.00 **(76.20)** | 0.52 **(13.21)** | 0.75 **(19.05)** | 1.50 **(38.10)** | 1.50 **(38.10)** | | 1.38 **(35.05)** | |
| CT6660 | F375C | 3/8 **(9.53)** | 60,000 **(4136.79)** | 0.125 **(3.18)** | 1.56 **(39.62)** | 2.00 **(50.80)** | 0.53 **(13.46)** | 0.81 **(20.62)** | 1.06 **(26.92)** | 1.00 **(25.40)** | | 1.00 **(25.40)** | |
| CT9990 | F562C | 9/16 **(14.29)** | 60,000 **(4136.79)** | 0.188 **(4.78)** | 2.12 **(53.85)** | 2.62 **(66.55)** | 0.81 **(20.57)** | 1.19 **(30.23)** | 1.38 **(35.05)** | 1.31 **(33.27)** | | 1.50 **(38.10)** | |
| 40CT9990 | F562C40 | 9/16 **(14.29)** | 40,000 **(2757.86)** | 0.250 **(6.35)** | 2.12 **(53.85)** | 2.62 **(66.55)** | 0.81 **(20.57)** | 1.19 **(30.23)** | 1.38 **(35.05)** | 1.31 **(33.27)** | | 1.50 **(38.10)** | |
| 43CT16 | F1000C43 | 1 **(25.40)** | 43,000 **(2964.70)** | 0.438 **(11.13)** | 3.00 **(76.20)** | 4.12 **(104.65)** | 0.72 **(18.29)** | 1.38 **(35.05)** | 2.06 **(52.32)** | 2.06 **(52.32)** | | 1.75 **(44.45)** | |
| **Cross** | | | | | | | | | | | | | |
| CX4444 | F250C | 1/4 **(6.35)** | 60,000 **(4136.79)** | 0.094 **(2.39)** | 1.25 **(31.75)** | 2.00 **(50.80)** | 0.50 **(12.70)** | 0.63 **(15.88)** | 0.62 **(15.75)** | 1.00 **(25.40)** | | 1.00 **(25.40)** | **See Figure 3** |
| CX5555 | F312C150 | 5/16 **(7.94)** | 150,000 **(10341.97)** | 0.062 **(1.57)** | 3.00 **(76.20)** | 3.00 **(76.20)** | 0.52 **(13.21)** | 0.75 **(19.05)** | 1.50 **(38.10)** | 1.50 **(38.10)** | | 1.38 **(35.05)** | |
| CX6666 | F375C | 3/8 **(9.53)** | 60,000 **(4136.79)** | 0.125 **(3.18)** | 2.12 **(53.85)** | 2.00 **(50.80)** | 0.53 **(13.46)** | 0.81 **(20.62)** | 1.06 **(26.92)** | 1.00 **(25.40)** | | 1.00 **(25.40)** | |
| CX9999 | F562C | 9/16 **(14.29)** | 60,000 **(4136.79)** | 0.188 **(4.78)** | 2.75 **(69.85)** | 2.62 **(66.55)** | 0.81 **(20.57)** | 1.19 **(30.23)** | 1.38 **(35.05)** | 1.31 **(33.27)** | | 1.50 **(38.10)** | |
| 40CX9999 | F562C40 | 9/16 **(14.29)** | 40,000 **(2757.86)** | 0.250 **(6.35)** | 2.75 **(69.85)** | 2.62 **(66.55)** | 0.81 **(20.57)** | 1.19 **(30.23)** | 1.38 **(35.05)** | 1.31 **(33.27)** | | 1.50 **(38.10)** | |
| 43CX16 | F1000C43 | 1 **(25.40)** | 43,000 **(2964.70)** | 0.438 **(11.13)** | 4.12 **(104.65)** | 4.12 **(104.65)** | 0.72 **(18.29)** | 1.38 **(35.05)** | 2.06 **(52.32)** | 2.06 **(52.32)** | | 1.75 **(44.45)** | |

*Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

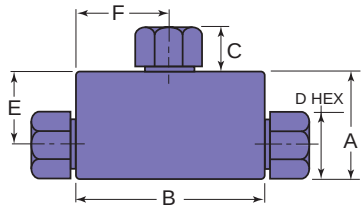
*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

**Figure 1**



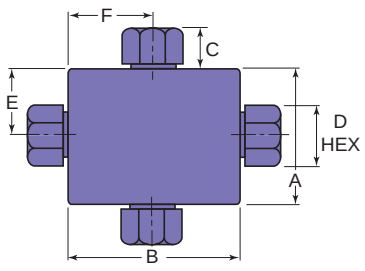

**Elbow**

**Figure 2**




**Tee**

**Figure 3**




**Cross**

Note: Fittings such as 45° elbows, reducer elbows, and reducer 45° elbows are available upon request.
For mounting hole option add suffix PM to catalog number, consult factory for mounting hole dimensions.
Contact your local sales representative for additional information.

| Catalog Number | Connection Type | Outside Diameter Tube | Pressure Rating psi (bar)* | Minimum Opening | Dimensions - inches (mm) | | | | | | | Block Thickness | Fitting Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | A | B | C | D Typical | E | F | G Thickness | | |

## Straight Coupling/Union Coupling

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 60F4433 | F250C | 1/4 | 60,000 | 0.094 | 0.75 | 1.38 | 0.50 | 0.63 | Straight | See Figure 4 |
| 60UF4433 | | **(6.35)** | **(4136.79)** | **(2.39)** | **(19.05)** | **(35.05)** | **(12.70)** | **(15.88)** | Union | |
| 150F5533 | F312C150 | 5/16 | 150,000 | 0.062 | 1.12 | 2.62 | 0.52 | 0.75 | Straight | |
| 150UF5533 | | **(7.94)** | **(10341.97)** | **(1.57)** | **(28.52)** | **(66.55)** | **(13.21)** | **(19.05)** | Union | |
| 60F6633 | F375C | 3/8 | 60,000 | 0.125 | 1.00 | 1.75 | 0.53 | 0.81 | Straight | |
| 60UF6633 | | **(9.53)** | **(4136.79)** | **(3.18)** | **(25.40)** | **(44.45)** | **(13.46)** | **(20.62)** | Union | |
| 60F9933 | F562C | 9/16 | 60,000 | 0.188 | 1.38 | 2.19 | 0.81 | 1.19 | Straight | |
| 60UF9933 | | **(14.29)** | **(4136.79)** | **(4.78)** | **(35.05)** | **(55.63)** | **(20.57)** | **(30.15)** | Union | |
| 40F9933 | F562C40 | 9/16 | 40,000 | 0.250 | 1.38 | 2.19 | 0.81 | 1.19 | Straight | |
| 40UF9933 | | **(14.29)** | **(2757.86)** | **(6.35)** | **(35.05)** | **(55.63)** | **(20.57)** | **(30.15)** | Union | |
| 43F16 | F1000C43 | 1 | 43,000 | 0.438 | 1.75 | 3.50 | 0.72 | 1.38 | Straight | |
| 43UF16 | | **(25.40)** | **(2964.70)** | **(11.13)** | **(44.45)** | **(88.90)** | **(18.29)** | **(35.05)** | Union | |

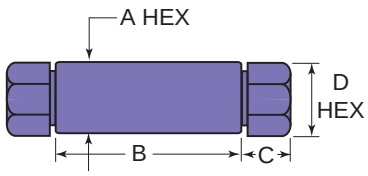
## Bulkhead Coupling

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 60BF4433 | F250C | 1/4 | 60,000 | 0.094 | 0.094 | 1.88 | 0.50 | 0.63 | 0.50 | 1.00 | 0.38 | | See Figure 5 |
| | | **(6.35)** | **(4136.79)** | **(2.39)** | **(23.88)** | **(47.75)** | **(12.70)** | **(15.88)** | **(12.70)** | **(25.40)** | **(9.65)** | | |
| 150BF5533 | F312C150 | 5/16 | 150,000 | 0.062 | 2.12 | 3.25 | 0.52 | 0.75 | 1.38 | 2.00 | 0.38 | | |
| | | **(7.94)** | **(10341.97)** | **(1.57)** | **(53.85)** | **(82.55)** | **(13.21)** | **(19.05)** | **(35.05)** | **(50.80)** | **(9.65)** | | |
| 60BF6633 | F375C | 3/8 | 60,000 | 0.125 | 1.12 | 2.38 | 0.53 | 0.81 | 0.78 | 1.38 | 0.38 | | |
| | | **(9.53)** | **(4136.79)** | **(3.18)** | **(28.45)** | **(60.45)** | **(13.46)** | **(20.62)** | **(19.81)** | **(35.05)** | **(9.65)** | | |
| 60BF9933 | F562C | 9/16 | 60,000 | 0.188 | 1.69 | 2.75 | 0.81 | 1.19 | 1.00 | 1.88 | 0.38 | | |
| | | **(14.29)** | **(4136.79)** | **(4.78)** | **(42.93)** | **(69.85)** | **(20.57)** | **(30.23)** | **(25.40)** | **(47.75)** | **(9.65)** | | |
| 40BF9933 | F562C40 | 9/16 | 40,000 | 0.250 | 1.69 | 2.75 | 0.81 | 1.19 | 1.00 | 1.88 | 0.38 | | |
| | | **(14.29)** | **(2757.86)** | **(6.35)** | **(42.93)** | **(69.85)** | **(20.57)** | **(30.23)** | **(25.40)** | **(47.75)** | **(9.65)** | | |
| 43BF16 | F1000C43 | 1" | 43,000 | 0.438 | 1.75 | 3.50 | 0.72 | 1.38 | 1.50 | 2.13 | 0.50 | | |
| | | **(25.40)** | **(2964.70)** | **(11.13)** | **(44.45)** | **(88.90)** | **(18.29)** | **(35.05)** | **(38.10)** | **(54.10)** | **(12.70)** | | |

*Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

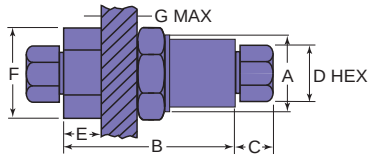
*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

**Figure 4**




**Straight Coupling / Union Coupling**

**Figure 5**

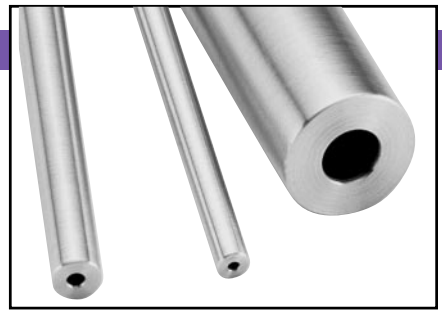



**Bulkhead Coupling**

Union Couplings are designed with a removable seat insert allowing disassembly and tubing removal without the necessity of loosening other items in a line.

# High Pressure Tubing

## Pressures to 150,000 psi (10342 bar)



Autoclave Engineers offers a complete selection of austenetic, cold drawn stainless steel tubing designed to match the performance standards of Autoclave valves and fittings. Autoclave high pressure tubing is manufactured specifically for high pressure applications requiring both strength and corrosion resistance. The tubing is furnished in random lengths between 20 feet (6 meters) and 27 feet (8.2 meters). The average is 24 feet (7.3 meters). High pressure tubing is available in five sizes and a variety of materials. Special longer lengths are available. Consult factory.

### Inspection and Testing

Autoclave Engineer's high pressure tubing is inspected to assure freedom from seams, laps, fissures or other flaws, as well as carburization or intergranular carbide precipitation. The outside and inside diameters of the tubing are controlled within close tolerences. Sample pieces of tubing for each lot are tested to confirm mechanical properties. Hydrostatic testing is also performed on a statistical basis and is conducted at the working pressure of the tube. Autoclave will perform 100% hydrostatic testing at additional cost if desired.

### Special Materials

In addition to the type 316 and 304 stainless steel tubing listed in this section, Autoclave has limited stock of hard-to-obtain shorter lengths of the following tubing materials in some sizes:

*Monel 400*, Inconel 600*, Titanium Grade 2*, Nickel 200*, Hastelloy C276** - (* Trademark names)

Please consult factory for stock availabilty.

### Tubing Tolerance

| Nominal Tubing Size inches (mm) | Tolerance/Outside Diameter inches (mm) |
|---|---|
| 1/4 (6.35) | .248/.243 (6.30/6.17) |
| 5/16 (7.94) | .310/.306 (7.87/7.77) |
| 3/8 (9.53) | .370/.365 (9.40/9.27) |
| 9/16 (14.29) | .557/.552 (14.15/14.02) |
| 1 (25.40) | .995/.990 (25.27/25.14) |

| Catalog Number | Tube Material | Fits Connection Type | Tube Size Inches (mm) | | | Flow Area in.² (mm²) | Working Pressure psi (bar)* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Outside Diameter | Inside Diameter | Wall Thickness | | -325 to 100°F -198 to - 37.8°C | 200°F 93°C | 400°F 204°C | 600°F 316°C | 800°F 427°C |
| MS15-081 | 316SS | F250C | 1/4 **(6.35)** | 0.083 **(2.11)** | 0.083 **(2.11)** | 0005 **(3.23)** | 60,000 **(4136.79)** | 60,000 **(4136.79)** | 57,750 **(3981.66)** | 54,250 **(3740.35)** | 50,700 **(3495.59)** |
| MS15-182 | 304SS | | | | | | 60,000 **(4136.79)** | 56,800 **(3916.16)** | 51,650 **(3561.09)** | 50,700 **(3495.59)** | 48,450 **(3340.46)** |
| MS15-202 | Stainless | | | | | | 95,000 **(6549.92)** | 95,000 **(6549.92)** | 91,400 **(6301.71)** | 85,850 **(5919.06)** | 80,200 **(5529.51)** |
| MS15-082 | 316SS | F312C150 | 5/16 **(7.94)** | 0.062 **(1.57)** | 0.125 **(3.18)** | 0.033 **(1.94)** | 150,000 **(10341.97)** | 150,000 **(10341.97)** | 144,400 **(9955.87)** | 136,350 **(9400.85)** | 126,750 **(8738.97)** |
| MS15-087 | 316SS | F375C | 3/8 **(9.53)** | 0.125 **(3.18)** | 0.125 **(3.18)** | 0.012 **(7.74)** | 60,000 **(4136.79)** | 60,000 **(4136.79)** | 57,750 **(3981.66)** | 54,250 **(3740.35)** | 50,700 **(3495.59)** |
| MS15-183 | 304SS | | | | | | 60,000 **(4136.79)** | 56,800 **(3916.16)** | 51,650 **(3561.09)** | 50,700 **(3495.59)** | 48,450 **(3340.46)** |
| MS15-201 | Stainless | | | | | | 95,000 **(6549.92)** | 95,000 **(6549.92)** | 91,400 **(6301.71)** | 85,850 **(5919.06)** | 80,200 **(5529.51)** |
| MS15-083 | 316SS | F562C | 9/16 **(14.29)** | 0.188 **(4.78)** | 0.187 **(4.75)** | 0.028 **(18.06)** | 60,000 **(4136.79)** | 60,000 **(4136.79)** | 57,750 **(3981.66)** | 54,250 **(3740.35)** | 50,700 **(3495.59)** |
| MS15-185 | 304SS | | | | | | 60,000 **(4136.79)** | 56,800 **(3916.16)** | 51,650 **(3561.09)** | 50,700 **(3495.59)** | 48,450 **(3340.46)** |
| MS15-210 | Stainles | | | | | | 95,000 **(6549.92)** | 95,000 **(6549.92)** | 91,000 **(6301.71)** | 85,850 **(5919.06)** | 80,200 **(5529.51)** |
| MS15-090 | 316SS | F562C40 | 9/16 **(14.29)** | 0.250 **(6.35)** | 0.156 **(3.96)** | 0.048 **(30.97)** | 40,000 **(2757.86)** | 40,000 **(2757.86)** | 38,500 **(2654.44)** | 36,100 **(2488.96)** | 33,800 **(2330.39)** |
| MS15-189 | 304SS | | | | | | 40,000 **(2757.86)** | 36,800 **(2537.23)** | 31,650 **(2182.16)** | 30,700 **(2116.66)** | 28,450 **(1961.53)** |
| MS15-209 | Stainless | F562C40-312 | 9/16 **(14.29)** | 0.312 **(7.92)** | 0.125 **(3.18)** | 0.076 **(49.03)** | 40,000 **(2757.86)** | 40,000 **(2757.86)** | 38,500 **(2654.44)** | 36,100 **(2488.97)** | 33,800 **(2330.39)** |
| MS15-199 | 304SS | F1000C43 | 1 **(25.40)** | 0.438 **(11.13)** | 0.281 **(7.14)** | 0.151 **(97.42)** | 43,000 **(2964.70)** | 40,600 **(2799.23)** | 36,900 **(2544.13)** | 36,300 **(2502.76)** | 34,700 **(2392.44)** |

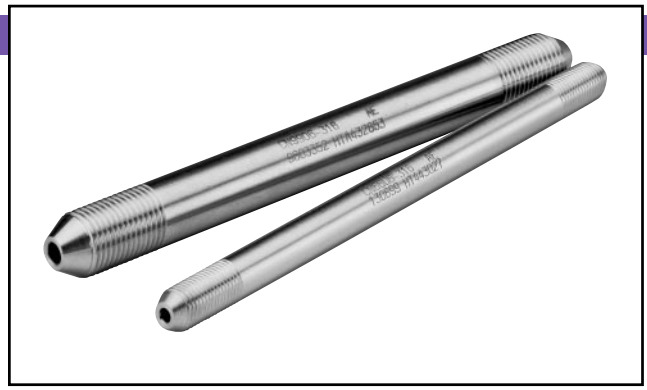
Note:
1. Autofrettaged tubing available (see technical Information section: Pressure Cycling for Autofrettage information)
2. For HighPressure, High Cycle (HPHC) tubing, MS15-201, MS15-202, MS15-203, and MS15-204 are available. (See Technical Information section: Pressure Cycling for additional information)

*Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

# High Pressure Coned-and-Threaded Nipples

## Pressures to 150,000 psi (10342 bar)



For rapid system make-up, Autoclave Engineers supplies pre-cut, coned-and-threaded nipples in various sizes and lengths for Autoclave high pressure valves and fittings.

### Special lengths

In addition to the standard lengths listed in the table below, nipples are available in any custom length. Consult factory.

### Materials**

Catalog numbers in table refer to Type 316 Stainless steel.

*Material in table is 316 Stainless steel*

| Catalog Number Nipple Length In (mm) | | | | | | | Fits Connection Type | Tube Size inches (mm) | | Working* Pressure at 100°F (37.8°C) psi (bar) |
|---|---|---|---|---|---|---|---|---|---|---|
| 2.75" **(69.85)** | 3.00" **(76.20)** | 4.00" **(101.60)** | 6.00" **(152.40)** | 8.00" **(203.20)** | 10.00" **(254.00)** | 12.00" **(304.80)** | | O.D. | I.D. | |
| CN4402-316 | CN4403-316 | CN4404-316 | CN4406-316 | CN4408-316 | CN44010-316 | CN44012-316 | F250C | 1/4 **(6.35)** | 0.083 **(2.11)** | 60,000 **(4136.79)** |
| | CN6603-316 | CN6604-316 | CN6606-316 | CN6608-316 | CN66010-316 | CN66012-316 | F375C | 3/8 **(9.53)** | 0.125 **(3.18)** | 60,000 **(4136.79)** |
| | | CN9904-316 | CN9906-316 | CN9908-316 | CN99010-316 | CN99012-316 | F562C | 9/16 **(14.29)** | 0.188 **(4.78)** | 60,000 **(4136.79)** |
| | | CN5504-316 | CN5506-316 | CN5508-316 | CN55010-316 | CN55012-316 | F312C150 | 5/16 **(7.94)** | 0.062 **(1.57)** | 150,000 **(10341.97)** |
| *Material in table is 304 Stainless steel* | | | | | | | | | | |
| | | 40CN9904-304 | 40CN9906-304 | 40CN9908-304 | 40CN99010-304 | 40CN99012-304 | F562C40 | 9/16 **(14.29)** | 0.250 **(6.35)** | 40,000 **(2757.86)** |
| | | | 43CN1606-304 | 43CN1608-304 | 43CN16010-304 | 43CN16012-304 | F1000C43 | 1 **(25.40)** | 0.438 **(12.40)** | 43,000 **(2964.70)** |

*Note:*
*See High pressure tubing section for pressure ratings at various temperatures.*
***Type 304 stainless steel nipples available.*

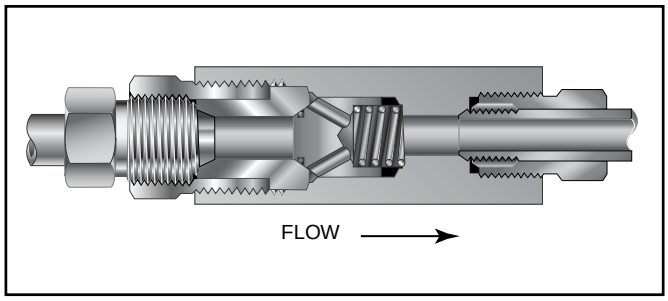
*Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

# High Pressure Check Valves

## Pressures to 60,000 psi (4137 bar)

### O-Ring Check Valves

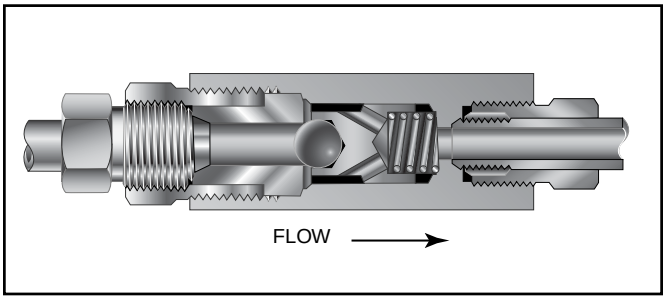



Provides unidirectional flow and tight shut-off for liquids and gas with high reliability. When differential drops below cracking pressure*, valve shuts off. **(Not for use as relief valve.)**

**Materials:** Body, cover, poppet: 316 Stainless Steel, Cover gland: Stainless Steel, Spring: 300 Series Stainless Steel, Standard O-ring: Viton, for operation to 500° F (260°C). Buna-N or Teflon available for 250°F (121°C) or 400°F (204°C) respectively; specify when ordering.

***Cracking Pressure:** 20 psi (1.38 bar) ±30%. Springs for higher cracking pressures (up to 100 psi (6.89 bar)) available on special order for O-ring style check valves only.

### Ball Check Valves

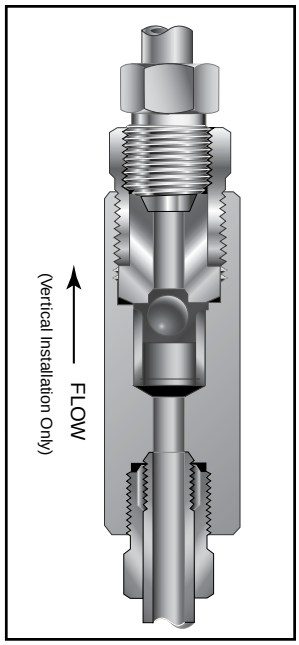



Prevents reverse flow where **leak-tight shut-off is not mandatory**. When differential drops below cracking pressure, valve closes. With all-metal components, valve can be used up to 1200°F (649°C). See Technical Information section for connection temperature limitations. **(Not for use as a relief valve.)**

**Ball is cradled in floating poppet** to assure positive, in-line seating without "chatter". Poppet is designed essentially for axial flow with minimum pressure drop.

**Materials:** Body, cover, poppet: 316 Stainless Steel, Cover gland: Stainless Steel, Ball, Spring: 300 Series Stainless Steel

### Ball Type Excess Flow Valves




Protects pressure gauges and pressure instrumentation from surges in flow or sudden venting in the event of line failure.

**Materials:** Body, cover, sleeve: Type 316 Stainless Steel, Ball: 300 Series Stainless Steel, Cover gland: stainless steel.

**Vertical Installation:** Since this type of check valve employs a non-spring loaded ball, valve MUST be installed in VERTICAL position with arrow on valve body pointing UP. (cover gland up).

**Resetting Valve:** Equalize the pressure across the ball. The ball will drop and reset automatically.

***CAUTION:*** *While testing has shown O-Rings to provide satisfactory service life, both cyclic and shelf life may vary widely with differing service conditions, properties of reactants, pressure and temperature cycling and age of the O-ring. FREQUENT INSPECTIONS SHOULD BE MADE to detect any deterioration, and O-rings replaced as required.*

***NOTE:*** *For optional material see Needle Valve Options section.*

# High Pressure Check Valves

| Catalog Number | Fits Connection Type | Pressure Rating psi (bar)* | Orifice inches (mm) | Rated $C_V$ | Dimensions - inches (mm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | A | B | C | D Typical | Hex | |

## O-Ring Check Valves

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CKO4400 | F250C | 60,000 **(4136.79)** | 0.094 **(2.39)** | 0.15 | 3.38 **(85.85)** | 2.50 **(63.50)** | 0.50 **(12.70)** | 0.63 **(16.00)** | 1.18 **(29.97)** | **See Figure 1** |
| CKO6600 | F375C | 60,000 **(4136.79)** | 0.125 **(3.18)** | 0.28 | 3.75 **(95.25)** | 2.62 **(66.55)** | 0.53 **(13.46)** | 0.75 **(19.05)** | 1.18 **(29.97)** | |
| CKO9900 | F562C | 60,000 **(4136.79)** | 0.187 **(4.75)** | 0.63 | 4.62 **(117.35)** | 3.38 **(85.85)** | 0.81 **(20.57)** | 1.12 **(28.45)** | 1.50 **(38.10)** | |
| 40CKO9900 | F562C40 | 40,000 **(2757.85)** | 0.250 **(6.35)** | 0.78 | 4.64 **(117.86)** | 3.38 **(85.73)** | 0.72 **(18.29)** | 1.19 **(30.23)** | 1.50 **(38.10)** | |
| 43CK016 | F1000C43 | 43,000 **(2964.70)** | 0.438 **(11.13)** | 4.3 | 6.54 **(166.11)** | 5.63 **(143.00)** | .72 **(18.29)** | 1.38 **(35.05)** | 1.88 **(47.76)** | |

## Ball Check Valves

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CB4400 | F250C | 60,000 **(4136.79)** | 0.094 **(2.39)** | 0.15 | 3.38 **(85.85)** | 2.50 **(63.50)** | 0.50 **(12.70)** | 0.63 **(16.00)** | 1.18 **(29.97)** | **See Figure 1** |
| CB6600 | F375C | 60,000 **(4136.79)** | 0.125 **(3.18)** | 0.28 | 3.75 **(95.25)** | 2.62 **(66.55)** | 0.53 **(13.46)** | 0.75 **(19.05)** | 1.18 **(29.97)** | |
| CB9900 | F562C | 60,000 **(4136.79)** | 0.187 **(4.75)** | 0.63 | 4.62 **(117.35)** | 3.38 **(85.85)** | 0.81 **(20.57)** | 1.12 **(28.45)** | 1.50 **(38.10)** | |
| 43CB16 | F1000C43 | 43,000 **(2964.70)** | 0.438 **(11.13)** | 4.3 | 6.54 **(166.11)** | 5.63 **(143.00)** | .72 **(18.29)** | 1.38 **(35.05)** | 1.88 **(47.76)** | |

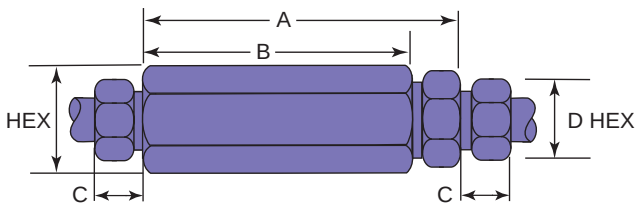
## Ball Type Excess Flow Valves

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CK4402 | F250C | 60,000 **(4136.79)** | 0.094 **(2.39)** | | 3.38 **(85.85)** | 2.50 **(63.50)** | 0.50 **(12.70)** | 0.63 **(16.00)** | 1.18 **(29.97)** | **See Figure 1** |
| CK6602 | F375C | 60,000 **(4136.79)** | 0.125 **(3.18)** | | 3.75 **(95.25)** | 2.62 **(66.55)** | 0.53 **(13.46)** | 0.75 **(19.05)** | 1.18 **(29.97)** | |
| CK9902 | F562C | 60,000 **(4136.79)** | 0.187 **(4.75)** | | 4.62 **(117.35)** | 3.38 **(85.85)** | 0.81 **(20.57)** | 1.12 **(28.45)** | 1.50 **(38.10)** | |

*Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

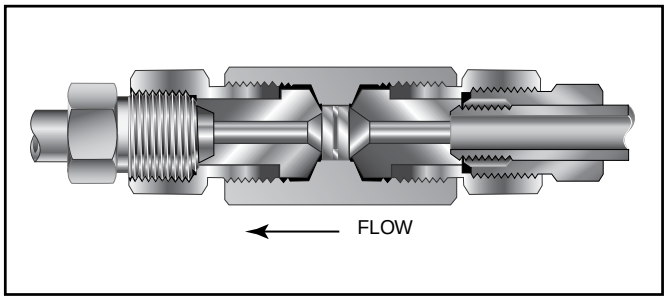
**Figure 1**



# High Pressure Line Filters

## Pressures to 60,000 psi (4137 bar)

### Dual-Disc Line Filters

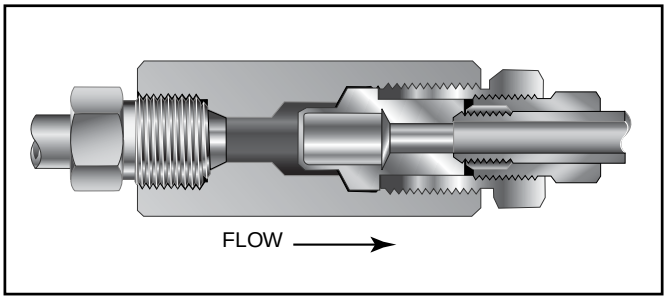



Autoclave Engineers Dual-Disc Line Filters are utilized in numerous industrial, chemical processing, aerospace, nuclear and other applications. With the dual-disc design, large contaminant particles are trapped by the upstream filter element before they can reach and clog the smaller micron-size downstream element. Filter elements can be easily replaced.

**Materials:** Body: cold-worked Type 316 Stainless Steel, Filter Elements: 300 Series Stainless Steel.

**Filter Elements:** Downstream/upstream micron size 35/65 is standard. 5/10 or 10/35 also available when specified. Other element combinations available on special order.

### Cup-Type Line Filters




Autoclave Engineers High Flow Cup-Type Line Filters are recommended in high pressure systems requiring both high flow rates and maximum filter surface area. Widely used in the industrial and chemical processing fields, the cup design offers as much as six times the effective filter area as compared to disc-type units. In addition, the filter elements can be quickly and easily replaced.

**Materials:** Body and Cover: cold-worked Type 316 Stainless Steel. Filter Element: 300 Series Stainless Steel.

**Filter Elements:** 300 Series Stainless Steel sintered cup. Standard elements available in choice of 5, 35 or 65 micron sizes. ***NOTE:*** *Filter ratings are nominal.*

***NOTE 1:*** *All filters furnished complete with connection components unless specified without. All dimensions for reference only and subject to change.*

***NOTE 2:*** *Autoclave Engineers disc and cup type filters are designed to filter small amounts of process particles. It is recommended that all fluids are thoroughly cleaned prior to entering the higher pressure system.*

*For optional materials, see Needle Valve Options section*

***NOTE 3:*** *Special material filters may be supplied with four flats in place of standard hex.*

***NOTE 4:*** *Pressure differential not to exceed 1,000 psi (69 bar) in a flowing condition.*

| Catalog Number | Pressure Rating psi (bar)* | Orifice inches (mm) | Micron Size** | Connection Size and Type | Effective Filter Element Area in.$^2$ (mm$^2$) | Dimensions - inches (mm) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | A | B | C | D Typical | Hex |

## Dual-Disc Line Filters

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **CLF4400** | 60,000 | 0.094 | 35/65 | | 0.07 | 4.75 | 3.00 | 0.50 | .63 | 1.12 |
| **CLF4400-5/10** | **(4136.79)** | **(2.39)** | 5/10 | F250C | **(45.16)** | **(20.65)** | **(76.20)** | **(12.70)** | **(16.00)** | **(28.45)** |
| **CLF4400-10/35** | | | 10/35 | | | | | | | |
| **CLF6600** | 60,000 | 0.125 | 35/65 | | 0.07 | 5.12 | 3.00 | 0.53 | .75 | 1.12 |
| **CLF6600-5/10** | **(4136.79)** | **(3.18)** | 5/10 | F375C | **(45.16)** | **(130.16)** | **(76.20)** | **(13.46)** | **(19.05)** | **(28.45)** |
| **CLF6600-10/35** | | | 10/35 | | | | | | | |
| **CLF9900** | 60,000 | 0.187 | 35/65 | | 0.15 | 5.81 | 3.38 | 0.81 | 1.12 | 1.38 |
| **CLF9900-5/10** | **(4136.79)** | **(4.75)** | 5/10 | F562C | **(96.77)** | **(147.57)** | **(85.85)** | **(20.58)** | **(28.45)** | **(35.05)** |
| **CLF9900-10/35** | | | 10/35 | | | | | | | |

## Cup-Type Line Filters

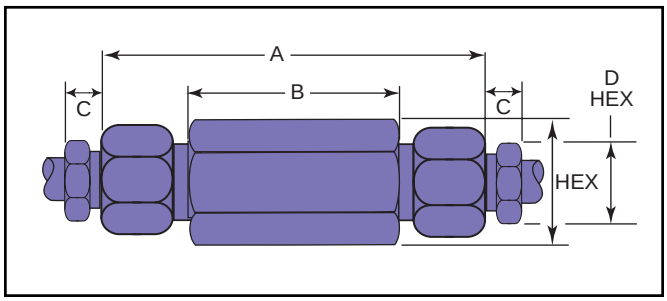
| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **CF4-5** | 60,000 | 0.094 | 5 | | 1.29 | 4.19 | 3.38 | 0.50 | .63 | 1.38 |
| **CF4-35** | **(4136.79)** | **(2.39)** | 35 | F250C | **(832.26)** | **(106.42)** | **(85.85)** | **(12.70)** | **(16.00)** | **(35.05)** |
| **CF4-65** | | | 65 | | | | | | | |
| **CF6-5** | 60,000 | 0.125 | 5 | | 1.29 | 4.62 | 3.62 | 0.53 | .75 | 1.38 |
| **CF6-35** | **(4136.79)** | **(3.18)** | 35 | F375C | **(832.26)** | **(117.35)** | **(91.94)** | **(13.46)** | **(19.05)** | **(35.05** |
| **CF6-65** | | | 65 | | | | | | | |
| **CF9-5** | 60,000 | 0.187 | 5 | | 1.29 | 5.25 | 4.06 | 0.81 | 1.12 | 1.50 |
| **CF9-35** | **(4136.79)** | **(4.75)** | 35 | F562C | **(832.26)** | **(133.35)** | **(103.12)** | **(20.58)** | **(28.45)** | **(38.10)** |
| **CF9-65** | | | 65 | | | | | | | |

*Note:*
** *Other micron sizes available on special order. Change last digits of the catalog number accordingly.*
*For optional materials, see Needle Valve Options section.*

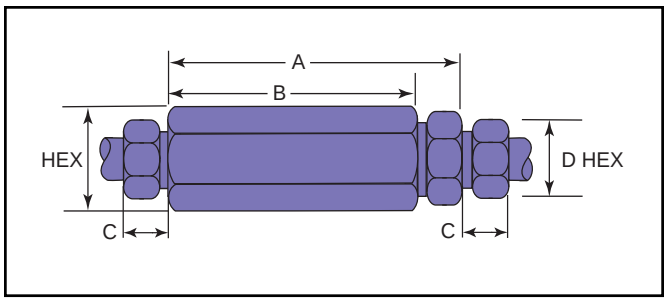
*Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

## Dual-Disc Line Filters




## Cup-Type Line Filters



# High Anti-Vibration Collet Gland Assembly

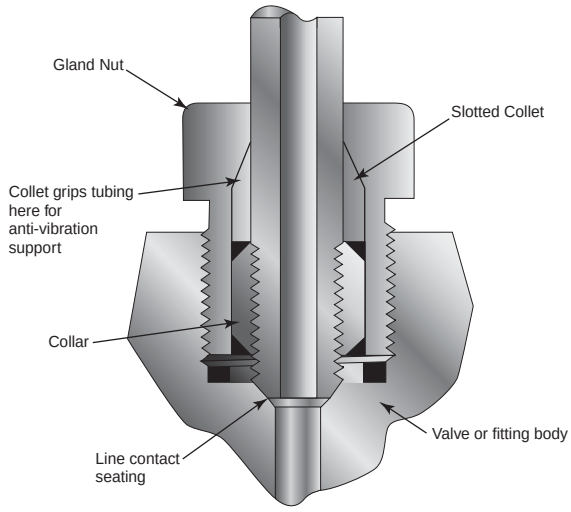
## Pressures to 150,000 psi (10342 bar)

### Series KCGL Sizes to 9/16" (14.29 mm)

For extreme conditions of vibration and/or shock in tubing systems, such as locating valve or fitting on an unsupported line near a compressor, Autoclave coned-and-threaded connections are offered with the Anti-Vibration Collet Gland Assemblies. Completely interchangeable with standard Autoclave high pressure connections, the Collet Gland Assemblies provide equally effective pressure handling capability.

In standard connection systems, the bending stresses on the threaded area of the tubing imposed by excessive vibration or movement may cause premature fatigue failure of the tubing at the back of the thread. By moving the stress concentration back to the unthreaded part of the tubing and providing a wedge-type gripping action, the Autocalve Engineers anti-vibration collet gland assembly strengthens the entire structure. With stress concentration reduced and overall stress level maintained well below the endurance limit of the material, the result is virtually unlimited vibrational fatigue life.

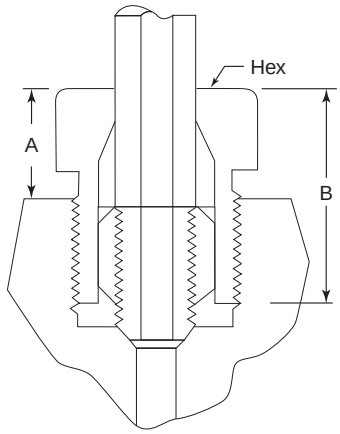
A less complex and more economical design than other vibration-resistant connections, the Collet Gland Assembly utilizes the same coned-and-threaded features of Autoclave high pressure connections. In Series KCGL the gland nut is recessed to accommodate a tapered, slotted collet that grips the tubing at a point behind the threaded area of the tubing.The design provides a slight difference in angles between the collet and the corresponding taper of the gland nut. As the nut is tightened, it acts to wedge the tapered end of the collet into a gripping engagement with the tubing and, at the same time, forces the collar and tubing assembly into line contact with the connection seat.




**Series KCGL**
Pressures to 60,000 psi (4137 bar)

Note: Special material assemblies may be supplied with four flats in place of standard hex.

| Catalog Number | Part | Outside Diameter Tubing Size in. (mm) | Dimensions - inches (mm) | | |
|---|---|---|---|---|---|
| | | | A | B | Hex |
| **KCGL40-316** | Complete assembly | 1/4 (6.35) | 0.50 (12.70) | 0.81 (20.58) | 0.62 (15.75) |
| **KCL40-316** | Slotted collet | | | | |
| **KGL40-316** | Gland nut | | | | |
| | | | | | |
| **KCGL60-316** | Complete assembly | 3/8 (9.53) | 0.62 (15.75) | 1.12 (28.45) | 0.81 (20.58) |
| **KCL60-316** | Slotted collet | | | | |
| **KGL60-316** | Gland nut | | | | |
| | | | | | |
| **KCGL90-316** | Complete assembly | 9/16 (14.29) | 1.00 (25.40) | 1.50 (38.10) | 1.19 (30.23) |
| **KCL90-316** | Slotted collet | | | | |
| **KGL90-316** | Gland nut | | | | |
| | | | | | |




**Series KCGL**
60,000 psi (4137 bar)

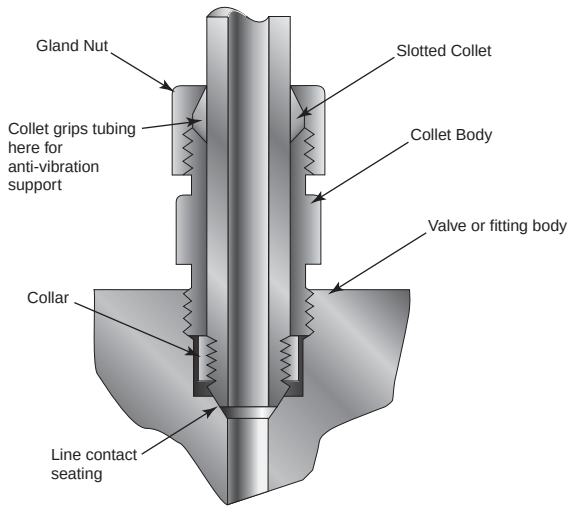
Standard Autoclave Engineers collar not included in complete assembly

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

## Series KCBGLX - Sizes to 1" (25.40 mm)
## Series KCBGL - Sizes to 5/16" (7.94 mm)

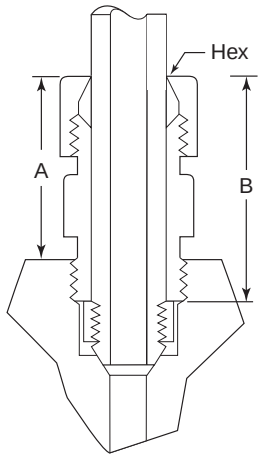
For extreme conditions of vibration and/or shock in tubing systems, such as locating a valve or fitting on an unsupported line near a compressor, Autoclave coned-and-threaded connections are offered with the Anti-Vibration Collet Gland Assemblies. A less complex and more economical design than other vibration-resistant connections, the collet gland assembly utilizes the same coned-and -threaded features of Autoclave high pressure connections.

Series KCBGLX and KCBGL extends the gland nut to provide room for the tapered, slotted collet and collet nut. The design provides a slight difference in angles between the collet and the corresponding taper of the gland nut. As the nut is tightned, it acts to wedge the tapered end of the collet into a gripping engagement with the tubing.




**Series KCBGLX** - Pressures to 43,000 psi (2965 bar)
**Series KCBGL** - Pressures to 150,000 psi (10342 bar)

| Catalog Number | Part | Outside Diameter Tubing Size in. (mm) | Dimensions - inches (mm) | | |
|---|---|---|---|---|---|
| | | | A | B | Hex |
| **KCBGLX160-316MC** | Complete assembly | 1.0 (25.40) | 1.69 (42.92) | 2.38 (60.45) | 1.50 (38.10) |
| **KCBLX160-316MC** | Collet body | | | | |
| **KCCLX160-316MC** | Slotted collet | | | | |
| **KGLX160-316MC** | Gland nut | | | | |
| | | | | | |
| **KCBGL50-316MC** | Complete assembly | .312 (7.94) | 1.38 (34.92) | 1.88 (47.62) | .75 (19.05) |
| **KCBL50-316MC** | Collet body | | | | |
| **KCCL50-316MC** | Slotted collet | | | | |
| **KGL50-316MC** | Gland nut | | | | |




**Series KCBGLX** - 43,000 psi (2965 bar)
**Series KCBGL** - 150,000 psi (10342 bar)

Standard Autoclave Engineers collar not included in complete assembly

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.



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*02-0125SE-0203*


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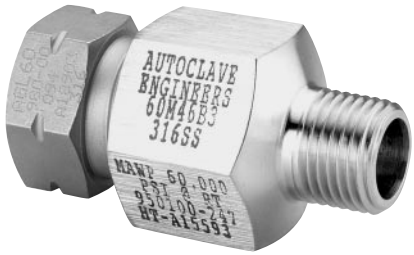
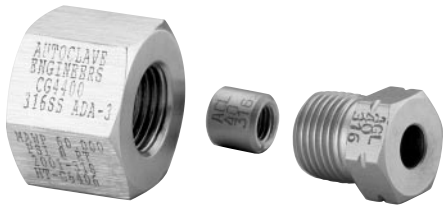
# Adapters/Couplings

## Index







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*02-0126CE-0302*

Autoclave Engineers
Fluid Components
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*www.autoclaveengineers.com*

# Adapters/Couplings

Autoclave Engineers offers a complete line of standard adapters and couplings as well as special designs and materials.


### *Adapters:*
Male/female adapters are designed to join a female connection directly to another size and/or type of connection without the need for an additional coupling.

### *Couplings:*
Couplings and reducer/adapter couplings accommodate female-to-female joining of any combination of standard size tubing listed.

### *Male-to-Male Adapters:*
Male-to-male adapters are designed to join two female connections of any combination listed.

### *JIC Adapters:*
Male-to-male adapters have one end machined with a 37° flare design.

### *BSPP Adapters:*
Male-to-male adapters have one end machined with a British Standard Pipe Parallel thread and an 80° included angle cone seat.

### *Easy-Union Adapters:*
O-ring face seal adapter.
Flat face style o-ring seal permits easy installation or removal of components.

### *Butt-Weld/Header Coupling Adapters:*
Female to male adapters have one end machined for butt-welding to pipe, tubes, and headers.

### *Bulkhead Adapters:*
Male to female adapters designed for panel mounting.

### *SAE O-Ring Adapters:*
Female to male SAE/MS straight thread o-ring seal adapter.

For specials or other adapters not listed contact your local Sales Representative.

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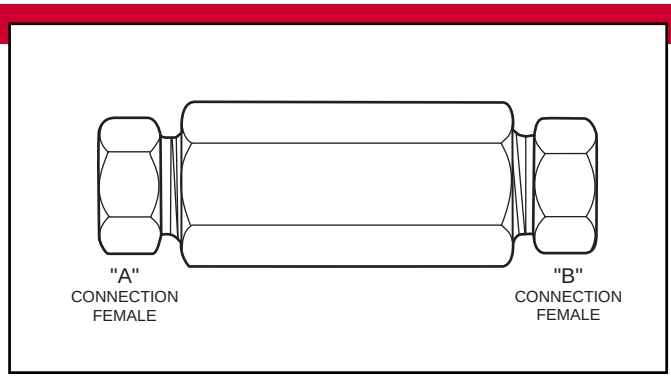
The couplings shown here permit the joining of any combination of standard size tubing or tubing and standard pipe with female-to-female couplings. Other couplings available on special order.

**Pressure Rating** - The pressure rating of Autoclave couplings is based on the lower rated connection used.




Note: Special material couplings may be supplied with four flats in place of standard hex.

**How to use the Ordering Chart below:**

1. Locate "A" connection in the vertical column.
2. Locate the desired "B" connection across the top of the chart.
3. The catalog number of the required coupling is located at the intersection of the two columns.

| "A" Connection | | | | "B" Connection | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | SpeedBite | | | | Medium Pressure | | | | | High Pressure | | | | |
| | Tube Outside in (mm) | Connector Type | Pressure psi (bar)* | 1/8 **W 125** | 1/4 **SW 250** | 3/8 **SW 375** | 1/2** **SW 500** | 1/4 **SF 250 CX** | 3/8 **SF 375 CX** | 9/16 **SF 562 CX** | 3/4 **SF 750 CX** | 1 **SF 1000 CX** | 1 **F 1000 C43** | 1/4 **F 250 C** | 3/8 **F 375 C** | 9/16 **F 562 C** | 9/16 **F 562 C40** | 5/16 **F 312 C150** |
| SpeedBite | 1/8 (3.18) | **W125** | 15,000 **(1034)** | 15F 2211 | 6F 2412 | 6F 2612 | 4F 2812 | 15F 2416 | 15F 2616 | 15F 2916 | | | | 15F 2413 | 15F 2613 | 15F 2913 | | |
| | 1/4 (6.35) | **SW250** | 15,000 **(1034)** | | 6F 4422 | 6F 4622 | 4F 4822 | 6F 4426 | 6F 4626 | 6F 4926 | | | | 6F 4423 | 6F 4623 | 6F 4923 | | |
| | 3/8 (9.52) | **SW375** | 15,000 **(1034)** | | | 6F 6622 | 4F 6822 | 6F 6426 | 6F 6626 | 6F 6926 | 6F 61226 | 6F 61626 | | 6F 6423 | 6F 6623 | 6F 6923 | | |
| | 1/2 (12.70) | **SW500** | 10,000 **(690)** | | | | 4F 8822 | 4F 8426 | 4F 8626 | 4F 8926 | 4F 81226 | 4F 81626 | | 4F 8423 | 4F 8623 | 4F 8923 | | |
| Medium Pressure | 1/4 (6.35) | **SF250 CX** | 20,000 **(1379)** | | | | | 20FX 4466 | 20F 4666 | 20F 4966 | 20F 41266 | 20F 41666 | 43F 41663 | 20F 4463 | 20F 4663 | 20F 4963 | | 20F 4563 |
| | 3/8 (9.52) | **SF375 CX** | 20,000 **(1379)** | | | | | | 20FX 6666 | 20F 6966 | 20F 61266 | 20F 61666 | 43F 61663 | 20F 6463 | 20F 6663 | 20F 6963 | | 20F 6563 |
| | 9/16 (14.27) | **SF562 CX** | 20,000 **(1379)** | | | | | | | 20FX 9966 | 20F 91266 | 20F 91666 | | 20F 9463 | 20F 9663 | 20F 9963 | | 20F 9563 |
| | 3/4 (19.05) | **SF750 CX** | 20,000 **(1379)** | | | | | | | | 20FX 12 | 20F 121666 | | 20F 12463 | 20F 12663 | 20F 12963 | | 20F 12563 |
| | 1 (25.40) | **SF1000 CX** | 20,000 **(1379)** | | | | | | | | | 20FX 16 | | 20F 16463 | 20F 16663 | 20F 16963 | | 20F 16563 |
| High Pressure | 1 (25.40) | **F1000 C43** | 43,000 **(2965)** | | | | | | | | | | 43F 16 | | | | | |
| | 1/4 (6.35) | **F250 C** | 60,000 **(4137)** | | | | | | | | | | 43F 41633 | 60F 4433 | 60F 4633 | 60F 4933 | | 60F 4533 |
| | 3/8 (9.52) | **F375 C** | 60,000 **(4137)** | | | | | | | | | | 43F 61633 | | 60F 6633 | 60F 6933 | | 60F 6533 |
| | 9/16 (14.27) | **F562 C** | 60,000 **(4137)** | | | | | | | | | | 43F 91633 | | | 60F 9933 | | 60F 9533 |
| | 9/16 (14.27) | **F562 C40** | 40,000 **(2760)** | | | | | | | | | | | | | | 40F 9933 | |
| | 5/16 (7.92) | **F312 C150** | 150,000 **(10342)** | | | | | | | | | | | | | | | 150F 5533 |
| National Pipe Thread (NPT) | 1/8 (3.18) | **NPT** | 10,000 **(690)** | 6F 2281 | 6F 2482 | 6F 2682 | 4F 2882 | 6F 2486 | 6F 2686 | 6F 2986 | 6F 21286 | | | 6F 2483 | 6F 2683 | 6F 2983 | | 6F 2583 |
| | 1/4 (6.35) | **NPT** | 10,000 **(690)** | 6F 4281 | 6F 4482 | 6F 4682 | 4F 4882 | 6F 4486 | 6F 4686 | 6F 4986 | 6F 41286 | 6F 41686 | | 6F 4483 | 6F 4683 | 6F 4983 | | 6F 4583 |
| | 3/8 (9.52) | **NPT** | 10,000 **(690)** | 6F 6281 | 6F 6482 | 6F 6682 | 4F 6882 | 6F 6486 | 6F 6686 | 6F 6986 | 6F 61286 | 6F 61686 | | 6F 6483 | 6F 6683 | 6F 6983 | | 6F 6583 |
| | 1/2 (12.70) | **NPT** | 10,000 **(690)** | 6F 8281 | 6F 8482 | 6F 8682 | 4F 8882 | 6F 8486 | 6F 8686 | 6F 8986 | 6F 81286 | 6F 81686 | | 6F 8483 | 6F 8683 | 6F 8983 | | 6F 8583 |
| | 3/4 (19.05) | **NPT** | 10,000 **(690)** | | | | 4F 12882 | | 6F 12686 | 6F 12986 | 6F 121286 | 6F 121686 | | | | 6F 12983 | | |
| | 1 (25.40) | **NPT** | 10,000 **(690)** | | | | | | | 6F 16986 | | 6F 161686 | | 6F 16483 | | 6F 16983 | | |

*Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.
**1/2 low pressure rated to 10,000 psi.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.
CAUTION: See appropriate pressure section in reference to proper selection of tubing.

## Coupling Dimensions - Speedbite

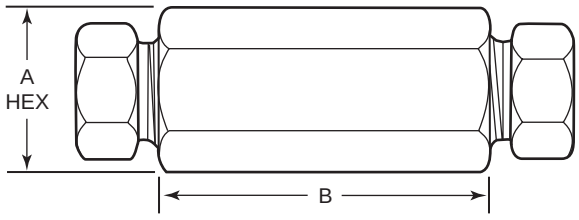
| Connection "A" | Connection "B" | Catalog Number | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| W125 | W125 | 15F221 | 0.50 (12.7) | 1.25 (31.7) |
| W125 | SW250 | 6F2412 | 0.63 (15.9) | 1.44 (36.6) |
| W125 | SW375 | 6F2612 | 0.75 (19.1) | 1.50 (38.1) |
| W125 | SW500 | 4F2812 | 1.00 (25.4) | 1.63 (41.4) |
| W125 | SF250CX | 15F2416 | 0.63 (15.9) | 1.38 (35.1) |
| W125 | SF375CX | 15F2616 | 0.75 (19.1) | 1.50 (38.1) |
| W125 | SF562CX | 15F2916 | 1.00 (25.4) | 1.75 (44.5) |
| W125 | F250C | 15F2413 | 0.75 (19.1) | 1.25 (31.7) |
| W125 | F375C | 15F2613 | 1.00 (25.4) | 1.50 (38.1) |
| W125 | F562C | 15F2913 | 1.38 (35.1) | 1.75 (44.5) |
| | | | | |
| SW250 | SW250 | 6F4422 | 0.63 (15.9) | 1.63 (41.4) |
| SW250 | SW375 | 6F4622 | 0.75 (19.1) | 1.69 (42.9) |
| SW250 | SW500 | 4F4822 | 1.00 (25.4) | 1.88 (47.8) |
| SW250 | SF250CX | 6F4426 | 0.63 (15.9) | 1.63 (41.4) |
| SW250 | SF375CX | 6F4626 | 0.75 (19.1) | 1.75 (44.5) |
| SW250 | SF562CX | 6F4926 | 1.00 (25.4) | 2.00 (50.8) |
| SW250 | F250C | 6F4423 | 0.75 (19.1) | 1.50 (38.1) |
| SW250 | F375C | 6F4623 | 1.00 (25.4) | 1.69 (42.9) |
| SW250 | F562C | 6F4923 | 1.38 (35.1) | 2.06 (52.3) |

| Connection "A" | Connection "B" | Catalog Number | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| SW375 | SW375 | 6F6622 | 0.75 (19.1) | 1.75 (44.5) |
| SW375 | SW500 | 4F6822 | 1.00 (25.4) | 1.88 (47.8) |
| SW375 | SF250CX | 6F6426 | 0.75 (19.1) | 0.88 (22.2) |
| SW375 | SF375CX | 6F6626 | 0.75 (19.1) | 1.75 (44.5) |
| SW375 | SF562CX | 6F6926 | 1.00 (25.4) | 2.00 (50.8) |
| SW375 | SF750CX | 6F61226 | 1.38 (35.1) | 2.25 (57.2) |
| SW375 | SF1000CX | 6F61626 | 1.75 (44.5) | 3.00 (76.2) |
| SW375 | F250C | 6F6423 | 0.75 (19.1) | 1.63 (41.4) |
| SW375 | F375C | 6F6623 | 1.00 (25.4) | 1.81 (46.0) |
| SW375 | F562C | 6F6923 | 1.38 (35.1) | 2.00 (50.8) |
| | | | | |
| SW500 | SW500 | 4F8822 | 1.00 (25.4) | 2.00 (50.8) |
| SW500 | SF250CX | 4F8426 | 1.00 (25.4) | 1.63 (41.4) |
| SW500 | SF375CX | 4F8626 | 1.00 (25.4) | 1.88 (47.8) |
| SW500 | SF562CX | 4F8926 | 1.00 (25.4) | 2.00 (50.8) |
| SW500 | SF750CX | 4F81226 | 1.38 (35.1) | 2.25 (57.2) |
| SW500 | SF1000CX | 4F81626 | 1.75 (44.5) | 3.00 (76.2) |
| SW500 | F250C | 4F8423 | 1.00 (25.4) | 1.69 (42.9) |
| SW500 | F375C | 4F8623 | 1.00 (25.4) | 1.88 (47.8) |
| SW500 | F562C | 4F8923 | 1.38 (35.1) | 2.06 (52.3) |

## Coupling Dimensions - Medium Pressure

| Connection "A" | Connection "B" | Catalog Number | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| SF250CX | SF250CX | 20FX4466 | 0.63 (15.9) | 1.63 (41.4) |
| SF250CX | SF375CX | 20F4666 | 0.75 (19.1) | 1.75 (44.5) |
| SF250CX | SF562CX | 20F4966 | 1.00 (25.4) | 2.00 (50.8) |
| SF250CX | SF750CX | 20F41266 | 1.38 (35.1) | 2.25 (57.2) |
| SF250CX | SF1000CX | 20F41666 | 1.75 (44.5) | 2.75 (69.9) |
| SF250CX | F250C | 20F4463 | 0.75 (19.1) | 1.38 (35.1) |
| SF250CX | F375C | 20F4663 | 1.00 (25.4) | 1.63 (41.4) |
| SF250CX | F562C | 20F4963 | 1.38 (35.1) | 1.88 (47.8) |
| SF250CX | F312C150 | 20F4563 | 1.00 (25.4) | 2.13 (54.1) |
| SF250CX | F1000C43 | 43F41663 | 1.75 (44.5) | 2.75 (69.9) |
| | | | | |
| SF375CX | SF375CX | 20FX6666 | 0.75 (19.1) | 1.75 (44.5) |
| SF375CX | SF562CX | 20F6966 | 1.00 (25.4) | 2.00 (50.8) |
| SF375CX | SF750CX | 20F61266 | 1.38 (35.1) | 2.25 (57.2) |
| SF375CX | SF1000CX | 20F61666 | 1.75 (44.5) | 2.88 (73.0) |
| SF375CX | F250C | 20F6463 | 0.75 (19.1) | 1.63 (41.4) |
| SF375CX | F375C | 20F6663 | 1.00 (25.4) | 2.00 (50.8) |
| SF375CX | F562C | 20F6963 | 1.38 (35.1) | 2.00 (50.8) |
| SF375CX | F312C150C | 20F6563 | 1.00 (25.4) | 2.25 (57.2) |
| SF375CX | F1000C43 | 43F61663 | 1.75 (44.5) | 2.88 (73.0) |
| | | | | |
| SF562CX | SF562CX | 20FX9966 | 1.00 (25.4) | 2.13 (54.1) |
| SF562CX | SF750CX | 20F91266 | 1.38 (35.1) | 2.50 (63.5) |
| SF562CX | SF1000CX | 20F91666 | 1.75 (44.5) | 3.00 (76.2) |
| SF562CX | F250C | 20F9463 | 1.00 (25.4) | 2.00 (50.8) |
| SF562CX | F375C | 20F9663 | 1.00 (25.4) | 2.00 (50.8) |
| SF562CX | F562C | 20F9963 | 1.38 (35.1) | 2.25 (57.2) |
| SF562CX | F312C150C | 20F9563 | 1.00 (25.4) | 2.50 (63.5) |

| Connection "A" | Connection "B" | Catalog Number | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| SF750CX | SF750CX | 20FX12 | 1.38 (35.1) | 2.50 (63.5) |
| SF750CX | SF1000CX | 20F121666 | 1.75 (44.5) | 3.00 (76.2) |
| SF750CX | F250C | 20F12463 | 1.38 (35.1) | 2.50 (63.5) |
| SF750CX | F375C | 20F12663 | 1.38 (35.1) | 2.38 (60.33) |
| SF750CX | F562C | 20F12963 | 1.38 (35.1) | 2.75 (69.9) |
| SF750CX | F312C150 | 20F12563 | 1.38 (35.1) | 2.75 (69.9) |
| | | | | |
| SF1000CX | SF1000CX | 20FX16 | 1.75 (44.5) | 3.50 (88.9) |
| SF1000CX | F250C | 20F16463 | 1.75 (44.5) | 2.75 (69.9) |
| SF1000CX | F375C | 20F16663 | 1.75 (44.5) | 2.88 (73.0) |
| SF1000CX | F562C | 20F16963 | 1.75 (44.5) | 3.25 (82.6) |
| SF1000CX | F312C150 | 20F16563 | 1.75 (44.5) | 3.25 (82.6) |

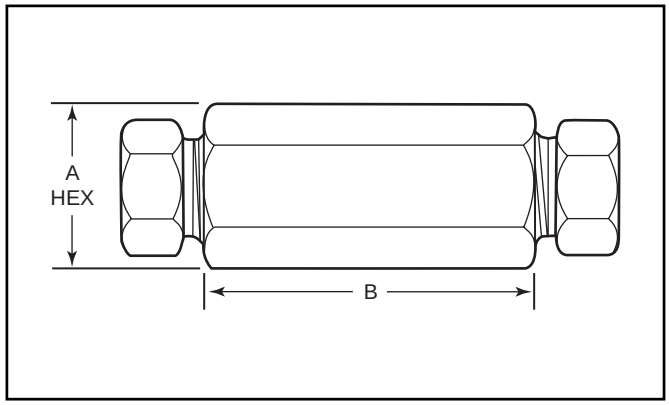



Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.
*Note: For pressure rating see selection chart.*

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

## Coupling Dimensions - High Pressure

| Connection "A" | Connection "B" | Catalog Number | A Hex | B |
|---|---|---|---|---|
| F250C | F250C | 60F4433 | 0.75 (19.1) | 1.38 (35.1) |
| F250C | F375C | 60F4633 | 1.00 (25.4) | 1.63 (41.4) |
| F250C | F562C | 60F4933 | 1.38 (35.1) | 1.75 (44.5) |
| F250C | F312C150 | 60F4533 | 1.00 (25.4) | 2.00 (50.8) |
| F250C | F1000C43 | 43F41633 | 1.75 (44.5) | 2.75 (69.9) |
| | | | | |
| F375C | F375C | 60F6633 | 1.00 (25.4) | 1.75 (44.5) |
| F375C | F562C | 60F6933 | 1.38 (35.1) | 2.00 (50.8) |
| F375C | F312C150 | 60F6533 | 1.00 (25.4) | 2.25 (57.2) |
| F375C | F1000C43 | 43F61633 | 1.75 (44.5) | 2.88 (73.0) |
| | | | | |
| F562C | F562C | 60F9933 | 1.38 (35.1) | 2.19 (55.6) |
| F562C40 | F562C40 | 40F9933 | 1.38 (35.1) | 2.19 (55.6) |
| F562C | F312C150 | 60F9533 | 1.19 (30.1) | 2.63 (66.7) |
| F562C | SF1000C43 | 43F91633 | 1.75 (44.5) | 3.75 (82.6) |
| | | | | |
| F312C150 | F312C150 | 150F5533 | 1.38 (35.1) | 2.50 (63.5) |
| | | | | |
| F1000C43 | F1000C43 | 43F16 | 1.75 (44.5) | 3.50 (88.9) |



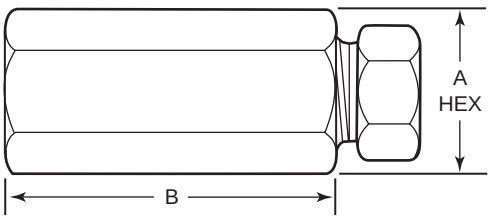

## Coupling Dimensions - National Pipe Thread (NPT)

| Connection "A" | Connection "B" | Catalog Number | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 1/8 NPT | W125 | 6F2281 | 0.63 (15.9) | 1.38 (35.1) |
| 1/8 NPT | SW250 | 6F2482 | 0.63 (15.9) | 1.50 (38.1) |
| 1/8 NPT | SW375 | 6F2682 | 0.75 (19.1) | 1.63 (41.4) |
| 1/8 NPT | SW500 | 4F2882 | 1.00 (25.4) | 1.50 (38.1) |
| 1/8 NPT | SF250CX | 6F2486 | 0.63 (15.9) | 1.38 (35.1) |
| 1/8 NPT | SF375CX | 6F2686 | 0.75 (19.1) | 1.50 (38.1) |
| 1/8 NPT | SF562CX | 6F2986 | 1.00 (25.4) | 1.63 (41.4) |
| 1/8 NPT | SF750CX | 6F21286 | 1.38 (35.1) | 1.75 (44.5) |
| 1/8 NPT | F250C | 6F2483 | 0.75 (19.1) | 1.38 (35.1) |
| 1/8 NPT | F375C | 6F2683 | 1.00 (25.4) | 1.63 (41.4) |
| 1/8 NPT | F562C | 6F2983 | 1.38 (35.1) | 1.82 (46.2) |
| 1/8 NPT | F312C150 | 6F2583 | 1.00 (25.4) | 2.13 (54.1) |

Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.
*Note: For pressure rating see selection chart.*

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

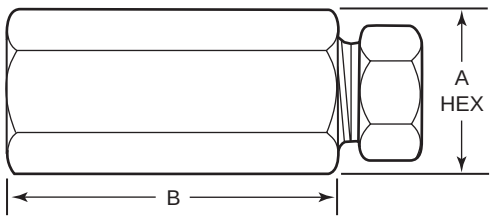
| Connection "A" | Connection "B" | Catalog Number | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 1/4 NPT | W125 | 6F4281 | 0.75 (19.1) | 1.50 (38.1) |
| 1/4 NPT | SW250 | 6F4482 | 0.75 (19.1) | 1.63 (41.4) |
| 1/4 NPT | SW375 | 6F4682 | 0.75 (19.1) | 1.75 (44.5) |
| 1/4 NPT | SW500 | 4F4882 | 0.75 (19.1) | 1.63 (41.4) |
| 1/4 NPT | SF250CX | 6F4486 | 0.75 (19.1) | 1.63 (41.4) |
| 1/4 NPT | SF375CX | 6F4686 | 0.75 (19.1) | 1.75 (44.5) |
| 1/4 NPT | SF562CX | 6F4986 | 1.00 (25.4) | 2.00 (50.8) |
| 1/4 NPT | SF750CX | 6F41286 | 1.38 (35.1) | 1.75 (44.5) |
| 1/4 NPT | SF1000CX | 6F41686 | 1.38 (35.1) | 2.38 (60.33) |
| 1/4 NPT | F250C | 6F4483 | 0.75 (19.1) | 1.63 (41.4) |
| 1/4 NPT | F375C | 6F4683 | 1.00 (25.4) | 1.88 (47.8) |
| 1/4 NPT | F562C | 6F4983 | 1.38 (35.1) | 2.00 (50.8) |
| 1/4 NPT | F312C150 | 6F4583 | 1.00 (25.4) | 2.50 (63.5) |



## Coupling Dimensions - National Pipe Thread (NPT) - con't

| Connection "A" | Connection "B" | Catalog Number | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 3/8 NPT | W125 | 6F6281 | 1.00 (25.4) | 1.63 (41.1) |
| 3/8 NPT | SW250 | 6F6482 | 1.00 (25.4) | 1.75 (44.5) |
| 3/8 NPT | SW375 | 6F6682 | 1.00 (25.4) | 1.88 (47.8) |
| 3/8 NPT | SW500 | 4F6882 | 1.00 (25.4) | 1.75 (44.5) |
| 3/8 NPT | SF250CX | 6F6486 | 0.94 (23.9) | 1.63 (41.4) |
| 3/8 NPT | SF375CX | 6F6686 | 0.94 (23.9) | 1.82 (46.2) |
| 3/8 NPT | SF562CX | 6F6986 | 1.00 (25.4) | 2.00 (50.8) |
| 3/8 NPT | SF750CX | 6F61286 | 1.38 (35.1) | 2.38 (60.33) |
| 3/8 NPT | SF1000CX | 6F61686 | 1.75 (44.5) | 2.50 (63.5) |
| 3/8 NPT | F250C | 6F6483 | 1.00 (25.4) | 1.63 (41.4) |
| 3/8 NPT | F375C | 6F6683 | 1.00 (25.4) | 1.88 (47.8) |
| 3/8 NPT | F562C | 6F6983 | 1.38 (35.1) | 2.00 (50.8) |
| 3/8 NPT | F312C150 | 6F6583 | 1.00 (25.4) | 2.25 (57.2 |
| | | | | |
| 1/2 NPT | W125 | 6F8281 | 1.19 (30.1) | 2.00 (50.8) |
| 1/2 NPT | SW250 | 6F8482 | 1.88 (47.8) | 2.13 (54.1) |
| 1/2 NPT | SW375 | 6F8682 | 1.88 (47.8) | 2.13 (54.1) |
| 1/2 NPT | SW500 | 4F8882 | 1.19 (30.1) | 2.25 (57.2) |
| 1/2 NPT | SF250CX | 6F8486 | 1.19 (30.1) | 2.00 (50.8) |
| 1/2 NPT | SF375CX | 6F8686 | 1.19 (30.1) | 2.13 (54.1) |
| 1/2 NPT | SF562CX | 6F8986 | 1.19 (30.1) | 2.25 (57.2) |
| 1/2 NPT | SF750CX | 6F81286 | 1.38 (35.1) | 2.63 (66.7) |
| 1/2 NPT | SF1000CX | 6F81686 | 1.75 (44.5) | 3.00 (76.2) |
| 1/2 NPT | F250C | 6F8483 | 1.19 (30.1) | 2.00 (50.8) |
| 1/2 NPT | F375C | 6F8683 | 1.19 (30.1) | 2.13 (54.1) |
| 1/2 NPT | F562C | 6F8983 | 1.38 (35.1) | 2.50 (63.5) |
| 1/2 NPT | F312C150 | 6F8583 | 1.19 (30.1) | 2.50 (63.5) |

| Connection "A" | Connection "B" | Catalog Number | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 3/4 NPT | SW500 | 4F12882 | 1.38 (35.1) | 2.50 (63.5) |
| 3/4 NPT | SF375CX | 6F12686 | 1.38 (35.1) | 2.25 (57.2) |
| 3/4 NPT | SF562CX | 6F12986 | 1.38 (35.1) | 2.25 (57.2) |
| 3/4 NPT | SF750CX | 6F121286 | 1.50 (38.1) | 2.63 (66.7) |
| 3/4 NPT | SF1000CX | 6F121686 | 1.75 (44.5) | 3.00 (76.2) |
| 3/4 NPT | F562C | 6F12983 | 1.38 (35.1) | 2.38 (60.33) |
| | | | | |
| 1 NPT | SF562CX | 6F16986 | 1.75 (44.5) | 2.63 (66.7) |
| 1 NPT | SF1000CX | 6F161686 | 1.75 (44.5) | 2.88 (73.0) |
| 1 NPT | F250C | 6F16483 | 1.88 (47.8) | 2.38 (60.33) |
| 1 NPT | F250C | 6F16983 | 1.75 (44.5) | 2.50 (63.5) |




Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.
*Note: For pressure rating see selection chart.*

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

# Adapters/Couplings - Male/Female Adapters

Male /female adapters are designed to adapt a female connection to another size and/or type of connection without the need for additional couplings. In selecting an adapter involving two different sized connections, the larger connection should be on the male end where it is possible to maximize the mechanical strength of the adapter.

### To use this chart:

1. Locate MALE end in vertical column.
2. Locate desired FEMALE end of adapter across top of chart.
3. Catalog number of required adapter is located at intersection of columns.
4. For one piece adapter add-OP to suffix of part number

### Other Adapters

Autoclave supplies many other types of adapters on special order. These include Autoclave UniVersa-Lok swaged-type connections, socketweld to O.D. tube or nominal pipe size, male or female AN connections and others.

### Materials

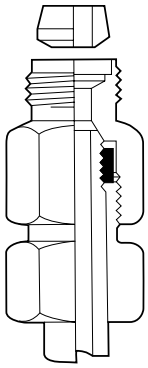
All Autoclave adapters are precision machined from cold-worked Type 316 stainless steel. Other materials available on special order.

Note: Special material couplings may be supplied with four flats in place of standard hex.

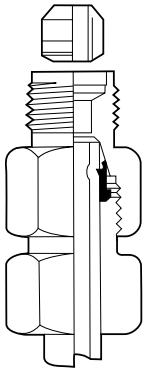
| MALE END | | | | FEMALE END | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | SpeedBite | | | | Medium Pressure | | | | |
| Connection Size and Type | | | | 1/8" W125 | 1/4" SW250 | 3/8" SW375 | 1/2" SW500 | 1/4" SF250CX | 3/8" SF375CX | 9/16" SF562CX | 3/4" SF750CX | 1" SF1000CX |
| | Fits this Female Connection | | Pressure Rating PSI (bar)* | 15,000 (1034.20) | 15,000 (1034.20) | 15,000 (1034.20) | 10,000 (689.45) | 20,000 (1378.93) | 20,000 (1378.93) | 20,000 (1378.93) | 20,000 (1378.93) | 20,000 (1378.93) |
| SpeedBite | 1/8" | W125 | 15,000 (1034.20) | | 6M24C2 | 6M26C2 | 4M28C2 | 6M24C6 | 6M26C6 | 6M29C6 | | |
| | 1/4" | SW250 | 15,000 (1034.20) | 6M42D1 | | 6M46D2 | 4M48D2 | 6M44D6 | 6M46D6 | 6M49D6 | 6M412D6 | |
| | 3/8" | SW375 | 15,000 (1034.20) | 6M62D1 | 6M64D2 | | 4M68D2 | 6M64D6 | 6M66D6 | 6M69D6 | 6M612D6 | 6M616D6 |
| | 1/2" | SW500 | 10,000 (689.46) | 4M82D1 | 4M84D2 | 4M86D2 | | 4M84D6 | 4M86D6 | 4M89D6 | 4M812D6 | 4M816D6 |
| Medium Pressure | 1/4" | SF250CX | 20,000 (1378.93) | 15MX42K1 | 6MX44K2 | 6MX46K2 | 4MX48K2 | | 20M46K6 | 20M49K6 | 20M412K6 | 20M416K6 |
| | 3/8" | SF375CX | 20,000 (1378.93) | 15MX62K1 | 6MX64K2 | 6MX66K2 | 4MX68K2 | 20M64K6 | | 20M69K6 | 20M612K6 | 20M616K6 |
| | 9/16" | SF562CX | 20,000 (1378.93) | 15MX92K1 | 6MX94K2 | 6MX96K2 | 4MX98K2 | 20M94K6 | 20M96K6 | | 20M912K6 | 20M916K6 |
| | 3/4" | SF750CX | 20,000 (1378.93) | 15MX122K1 | 6MX124K2 | 4MX126K2 | 4MX128K2 | 20M124K6 | 20M126K6 | 20M129K6 | | 20M1216K6 |
| | 1" | SF1000CX | 20,000 (1378.93) | 15MX162K1 | 6MX164K2 | 6MX166K2 | 4MX168K2 | 20M164K6 | 20M166K6 | 20M169K6 | 20M1612K6 | 20M1616K6 |
| High Pressure | 1" | F1000C43 | 43,000 (2964.69) | | | | | | | | | |
| | 1/4" | F250C | 60,000 (4136.85) | 15M42B1 | 6M44B2 | 6M46B2 | 4M48B2 | 20M44B6 | 20M46B6 | 20M49B6 | 20M412B6 | |
| | 5/16" | F321C150 | 150,000 (10342.14) | | 6M54B2 | 6M56B2 | 4M58B2 | 20M54B6 | 20M56B6 | 20M59B6 | 20M512B6 | |
| | 3/8" | F375C | 60,000 (4136.85) | 15M62B1 | 6M64B2 | 6M66B2 | 4M68B2 | 20M64B6 | 20M66B6 | 20M69B6 | 20M612B6 | 20M616B6 |
| | 9/16" | F562C | 60,000 (4136.85) | 15M92B1 | 6M94B2 | 6M96B2 | 4M98B2 | 20M94B6 | 20M96B6 | 20M99B6 | 20M912B6 | 20M916B6 |
| | 9/16" | F562C40 | 40,000 (2757.90) | | | | | | | | 20M912G6 | |
| Flat Top Flat Bottom | 7/16" | F437FB | 10,000 (689.45) | 15M72E1 | 6M74E2 | 6M76E2 | 4M78E2 | 15M74E6 | 15M76E6 | 15M79E6 | | |
| | 9/16" | F562FB | 10,000 (689.45) | 15M92E1 | 6M94E2 | 6M96E2 | 4M98E2 | 15M94E6 | 15M96E6 | 15M99E6 | 15M912E6 | 15M916E6 |
| | 9/16" | F562FT | 10,000 (689.45) | 15M92R1 | 6M94R2 | 6M96R2 | 4M98R2 | 15M94R6 | 15M96R6 | 15M99R6 | 15M912R6 | 15M916R6 |
| | 3/4" | F750FB | 10,000 (689.45) | 15M122E1 | 6M124E2 | 6M126E2 | 4M128E2 | 15M124E6 | 15M126E6 | 15M129E6 | 15M1212E6 | 15M1216E6 |
| National Pipe Thread (NPT) | 1/8" | NPT | 10,000 (689.45) | 6M22N1 | 6M24N2 | 6M26N2 | 4M28N2 | 6M24N6 | 6M26N6 | 6M29N6 | | |
| | 1/4" | NPT | 10,000 (689.45) | 6M42N1 | 6M44N2 | 6M46N2 | 4M48N2 | 6M44N6 | 6M46N6 | 6M49N6 | 6M412N6 | 6M416N6 |
| | 3/8" | NPT | 10,000 (689.45) | 6M62N1 | 6M64N2 | 6M66N2 | 4M68N2 | 6M64N6 | 6M66N6 | 6M69N6 | 6M612N6 | 6M616N6 |
| | 1/2" | NPT | 10,000 (689.45) | 6M82N1 | 6M84N2 | 6M86N2 | 4M88N2 | 6M84N6 | 6M86N6 | 6M89N6 | 6M812N6 | 6M816N6 |
| | 3/4" | NPT | 10,000 (689.45) | | 6M124N2 | 6M126N2 | 4M128N2 | 6M124N6 | 6M126N6 | 6M129N6 | 6M1212N6 | 6M1216N6 |
| | 1" | NPT | 10,000 (689.45) | | | 6M166N2 | 4M168N2 | | 6M166N6 | 6M169N6 | 6M1612N6 | 6M1616N6 |

*Note:*
*All AE adapters are supplied complete with appropriate glands, collars, tube nuts and sleeves unless specified without.*

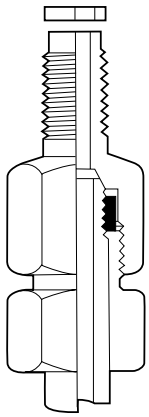
** The maximum pressure rating for an adapter is determined by the connection component with the LOWEST pressure rating; that is, the two end connections and the tubing or pipe used, whichever is LOWER.*
CAUTION: See appropriate pressure section in reference to proper selection of tubing.



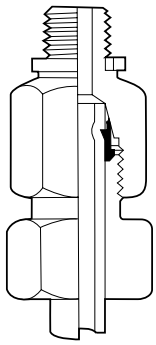
**Double Cone Plug**
(Medium Pressure shown)



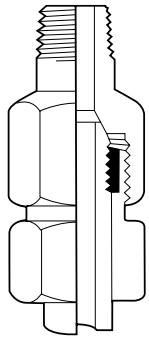
**Double Cone Plug**
(SpeedBite shown)



**Flat Bottom Gasket**
(Medium Pressure shown)



**Flat Top Gasket**
(SpeedBite shown)



**Male NPT**
(High Pressure shown)

## FEMALE END

| High Pressure | | | | | | National Pipe Thread (NPT) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1" F1000C43 | 1/4" F250C | 5/16" F312C150 | 3/8" F375C | 9/16" F562C | 9/16" F562C40 | 1/8" NPT | 1/4" NPT | 3/8" NPT | 1/2" NPT | 3/4" NPT | 1" NPT |
| 43,000 (2964.69) | 60,000 (4136.85) | 150,000 (10342.14) | 60,000 (4136.85) | 60,000 (4136.85) | 40,000 (2757.90) | 10,000 (689.45) | 10,000 (689.45) | 10,000 (689.45) | 10,000 (689.45) | 10,000 (689.45) | 10,000 (689.45) |
| | 6M24C3 | | 6M26C3 | 6M29C3 | | 6M22C8 | 6M24C8 | 6M26C8 | 6M28C8 | | |
| | 6M44D3 | | 6M46D3 | 6M49D3 | | 6M42D8 | 6M44D8 | 6M46D8 | 6M48D8 | 6M412D8 | |
| | 6M64D3 | | 6M66D3 | 6M69D3 | | 6M62D8 | 6M64D8 | 6M66D8 | 6M68D8 | 6M612D8 | 6M616D8 |
| | 4M84D3 | | 4M86D3 | 4M89D3 | | 4M82D8 | 4M84D8 | 4M86D8 | 4M88D8 | 4M812D8 | 4M816D8 |
| | 20M44K3 | 20M45K3 | 20M46K3 | 20M49K3 | | 6MX42K8 | 6MX44K8 | 6MX46K8 | 6MX48K8 | 6MX412K8 | |
| | 20M64K3 | 20M65K3 | 20M66K3 | 20M69K3 | | 6MX62K8 | 6MX64K8 | 6MX66K8 | 6MX68K8 | 6MX612K8 | 6MX616K8 |
| | 20M94K3 | 20M95K3 | 20M96K3 | 20M99K3 | | 6MX92K8 | 6MX94K8 | 6MX96K8 | 6MX98K8 | 6MX912K8 | 6MX916K8 |
| | 20M124K3 | 20M125K3 | 20M126K3 | 20M129K3 | 20M129K40 | | 6MX124K8 | 6MX126K8 | 6MX128K8 | 6MX1212K8 | 6MX1216K8 |
| | 20M164K3 | | 20M166K3 | 20M169K3 | | | 6MX164K8 | 6MX166K8 | 6MX168K8 | 6MX1612K8 | 6MX1616K8 |
| | 43M164B3 | | 43M166B3 | 43M169B3 | 43M169B40 | | | | | | |
| 43M416B6 | | 60M45B3 | 60M46B3 | 60M49B3 | | 6M42B8 | 6M44B8 | 6M46B8 | 6M48B8 | 6M412B8 | |
| | 60M54B3 | | 60M56B3 | 60M59B3 | | | | | 6M58B8 | 6M512B8 | |
| 43M616B6 | 60M64B3 | 60M65B3 | | 60M69B3 | | 6M62B8 | 6M64B8 | 6M66B8 | 6M68B8 | 6M612B8 | 6M616B8 |
| 43M916B6 | 60M94B3 | 60M95B3 | 60M96B3 | | | 6M92B8 | 6M94B8 | 6M96B8 | 6M98B8 | 6M912B8 | 6M916B8 |
| | | | | | | | | | 6M98G8 | | |
| | 15M74E3 | | 15M76E3 | 15M79E3 | | 6M72E8 | 6M74E8 | 6M76E8 | 6M78E8 | 6M712E8 | |
| | 15M94E3 | | 15M96E3 | | | 6M92E8 | 6M94E8 | 6M96E8 | 6M98E8 | 6M912E8 | 6M916E8 |
| | 15M94R3 | | 15M96R3 | 15M99R3 | | 6M92R8 | 6M94R8 | 6M96R8 | 6M98R8 | 6M912R8 | 6M916R8 |
| | 15M124E3 | | 15M126E3 | 15M129E3 | | 6M122E8 | 6M124E8 | 6M126E8 | 6M128E8 | 6M1212E8 | 6M1216E8 |
| | 6M24N3 | | 6M26N3 | 6M29N3 | | | | | | | |
| | 6M44N3 | 6M45N3 | 6M46N3 | 6M49N3 | | | | | 6M48N8 | | |
| | 6M64N3 | | 6M66N3 | 6M69N3 | 6M69N40 | | | | 6M68N8 | | |
| | 6M84N3 | | 6M86N3 | 6M89N3 | 6M89N40 | | | | | 6M812N8 | |
| | 6M124N3 | | 6M126N3 | 6M129N3 | | 6M122N8 | | | | | |
| | | | 6M166N3 | 6M169N3 | | | | | | | |

*AE Male/Female Adapters are available in a "one-piece" design. They are identical to the two piece designs in length and can be ordered by adding the suffix - OP to the two piece adapter part numbers listed.*

*For prompt service, Autoclave stocks select products. Consult factory.*

## Speed Bite

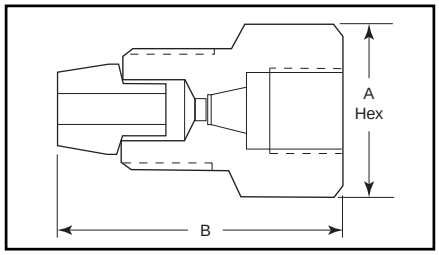
| Male End Fits this Connection | Female End | Catalog Number | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| W125 | W125 | | | |
| W125 | SW250 | 6M24C2 | 0.63 (15.9) | 1.29 (32.1) |
| W125 | SW375 | 6M26C2 | 0.75 (19.1) | 1.41 (35.8) |
| W125 | SW500 | 4M28C2 | 1.00 (25.4) | 1.53 (38.8) |
| W125 | SF250CX | 6M24C6 | 0.63 (15.9) | 1.41 (35.8) |
| W125 | SF375CX | 6M26C6 | 0.75 (19.1) | 1.41 (35.8) |
| W125 | SF562CX | 6M29C6 | 1.00 (25.4) | 1.66 (42.1) |
| W125 | SF750CX | | | |
| W125 | SF1000CX | | | |
| W125 | F1000C43 | | | |
| W125 | F250C | 6M24C3 | .75 (19.1) | 1.16 (29.5) |
| W125 | F312C150 | | | |
| W125 | F375C | 6M26C3 | 1.00 (25.4) | 1.34 (34.1) |
| W125 | F562C | 6M29C3 | 1.38 (35.1) | 1.59 (40.5) |
| W125 | F562C40 | | | |
| W125 | 1/8 NPT | 6M22C8 | 0.63 (15.9) | 1.25 (31.8) |
| W125 | 1/4 NPT | 6M24C8 | 0.75 (19.1) | 1.47 (37.3) |
| W125 | 3/8 NPT | 6M26C8 | 1.00 (25.4) | 1.53 (38.8) |
| W125 | 1/2 NPT | 6M28C8 | 1.18 (30.1) | 1.81 (46.0) |
| W125 | 3/4 NPT | | | |
| W125 | 1 NPT | | | |
| | | | | |
| SW250 | W125 | 6M42D1 | 0.63 (15.9) | 1.08 (27.4) |
| SW250 | SW250 | | | |
| SW250 | SW375 | 6M46D2 | 0.75 (19.1) | 1.64 (41.7) |
| SW250 | SW500 | 4M48D2 | 1.00 (25.4) | 1.77 (44.9) |
| SW250 | SF250CX | 6M44D6 | 0.63 (15.9) | 1.52 (38.5) |
| SW250 | SF375CX | 6M46D6 | 0.75 (19.1) | 1.77 (44.9) |
| SW250 | SF562CX | 6M49D6 | 1.00 (25.4) | 1.89 (48.0) |
| SW250 | SF750CX | 6M412D6 | 1.38 (35.1) | 2.27 (57.7) |
| SW250 | SF1000CX | | | |
| SW250 | F1000C43 | | | |
| SW250 | F250C | 6M44D3 | .75 (19.1) | 1.27 (32.2) |
| SW250 | F312C150 | | | |
| SW250 | F375C | 6M46D3 | 1.00 (25.4) | 1.70 (43.3) |
| SW250 | F562C | 6M49D3 | 1.38 (35.1) | 1.77 (44.9) |
| SW250 | F562C40 | | | |
| SW250 | 1/8 NPT | 6M42D8 | 0.63 (15.9) | 1.39 (35.3) |
| SW250 | 1/4 NPT | 6M44D8 | 0.75 (19.1) | 1.64 (41.7) |
| SW250 | 3/8 NPT | 6M46D8 | 1.00 (25.4) | 1.70 (43.3) |
| SW250 | 1/2 NPT | 6M48D8 | 1.18 (30.1) | 1.95 (49.6) |
| SW250 | 3/4 NPT | 6M412D8 | 1.38 (35.1) | 2.21 (56.0) |
| SW250 | 1 NPT | | | |

| Male End Fits this Connection | Female End | Catalog Number | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| SW375 | W125 | 6M62D1 | 0.75 (19.1) | 1.16 (29.4) |
| SW375 | SW250 | 6M64D2 | 0.75 (19.1) | 1.41 (35.7) |
| SW375 | SW375 | | | |
| SW375 | SW500 | 4M68D2 | 1.00 (25.4) | 1.78 (45.3) |
| SW375 | SF250CX | 6M64D6 | 0.75 (19.1) | 1.41 (35.9) |
| SW375 | SF375CX | 6M66D6 | 0.75 (19.1) | 1.59 (40.4) |
| SW375 | SF562CX | 6M69D6 | 1.00 (25.4) | 1.72 (43.7) |
| SW375 | SF750CX | 6M612D6 | 1.38 (35.1) | 2.28 (57.9) |
| SW375 | SF1000CX | 6M616D6 | 1.75 (44.5) | 2.78 (70.7) |
| SW375 | F1000C43 | | | |
| SW375 | F250C | 6M64D3 | .75 (19.1) | 1.41 (35.7) |
| SW375 | F312C150 | | | |
| SW375 | F375C | 6M66D3 | 1.00 (25.4) | 1.66 (42.2) |
| SW375 | F562C | 6M69D3 | 1.38 (35.1) | 1.78 (45.3) |
| SW375 | F562C40 | | | |
| SW375 | 1/8 NPT | 6M62D8 | 0.75 (19.1) | 1.41 (35.7) |
| SW375 | 1/4 NPT | 6M64D8 | 0.75 (19.1) | 1.66 (42.2) |
| SW375 | 3/8 NPT | 6M66D8 | 1.00 (25.4) | 1.78 (45.3) |
| SW375 | 1/2 NPT | 6M68D8 | 1.18 (30.1) | 1.97 (50.0) |
| SW375 | 3/4 NPT | 6M612D8 | 1.38 (35.1) | 2.28 (57.9) |
| SW375 | 1 NPT | 6M616D8 | 1.75 (44.5) | 2.78 (70.7) |
| | | | | |
| SW500 | W125 | 4M82D1 | 0.94 (23.8) | 1.22 (31.0) |
| SW500 | SW250 | 4M84D2 | 0.94 (23.8) | 1.34 (34.1) |
| SW500 | SW375 | 4M86D2 | 0.94 (23.8) | 1.47 (37.3) |
| SW500 | SW500 | | | |
| SW500 | SF250CX | 4M84D6 | 1.00 (25.4) | 1.59 (40.5) |
| SW500 | SF375CX | 4M86D6 | 1.00 (25.4) | 1.59 (40.5) |
| SW500 | SF562CX | 4M89D6 | 1.00 (25.4) | 1.66 (42.2) |
| SW500 | SF750CX | 4M812D6 | 1.38 (35.1) | 2.09 (53.2) |
| SW500 | SF1000CX | 4M816D6 | 1.75 (44.5) | 2.72 (69.0) |
| SW500 | F1000C43 | | | |
| SW500 | F250C | 4M84D3 | 0.94 (23.8) | 1.41 (35.7) |
| SW500 | F312C150 | | | |
| SW500 | F375C | 4M86D3 | 1.00 (25.4) | 1.59 (40.5) |
| SW500 | F562C | 4M89D3 | 1.38 (35.1) | 1.72 (43.7) |
| SW500 | F562C40 | | | |
| SW500 | 1/8 NPT | 4M82D8 | 1.00 (25.4) | 1.34 (34.1) |
| SW500 | 1/4 NPT | 4M84D8 | 1.00 (25.4) | 1.47 (37.3) |
| SW500 | 3/8 NPT | 4M86D8 | 1.00 (25.4) | 1.72 (43.7) |
| SW500 | 1/2 NPT | 4M88D8 | 1.18 (30.1) | 2.16 (54.7) |
| SW500 | 3/4 NPT | 4M812D8 | 1.38 (35.1) | 2.22 (56.3) |
| SW500 | 1 NPT | 4M816D8 | 1.75 (44.5) | 2.47 (62.7) |

Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

Note: For pressure rating see selection chart.

*All Dimensions for reference only and subject to change.*




*For prompt service, Autoclave stocks select products. Consult factory.*

| Male End Fits this Connection | Female End | Catalog Number | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| SF250CX | W125 | 15MX42K1 | 0.63 (15.9) | 1.34 (34.1) |
| SF250CX | SW250 | 6MX44K2 | 0.63 (15.9) | 1.59 (40.5) |
| SF250CX | SW375 | 6MX46K2 | 0.75 (19.1) | 1.59 (40.5) |
| SF250CX | SW500 | 4MX48K2 | 1.00 (25.4) | 1.00 (25.4) |
| SF250CX | SF250CX | | | |
| SF250CX | SF375CX | 20M46K6 | 0.75 (19.1) | 1.59 (40.5) |
| SF250CX | SF562CX | 20M49K6 | 1.00 (25.4) | 1.97 (50.0) |
| SF250CX | SF750CX | 20M412K6 | 1.38 (35.1) | 2.34 (59.5) |
| SF250CX | SF1000CX | 20M416K6 | 1.75 (44.5) | 2.84 (72.2) |
| SF250CX | F1000C43 | | | |
| SF250CX | F250C | 20M44K3 | .75 (19.1) | 1.28 (32.5) |
| SF250CX | F312C150 | 20M45K3 | 1.00 (25.4) | 2.09 (53.2) |
| SF250CX | F375C | 20M46K3 | 1.00 (25.4) | 1.59 (40.5) |
| SF250CX | F562C | 20M49K3 | 1.38 (35.1) | 1.97 (50.0) |
| SF250CX | F562C40 | | | |
| SF250CX | 1/8 NPT | 6MX42K8 | 0.63 (15.9) | 1.47(37.3) |
| SF250CX | 1/4 NPT | 6MX44K8 | 0.75 (19.1) | 1.59 (40.5) |
| SF250CX | 3/8 NPT | 6MX46K8 | 1.00 (25.4) | 1.66 (42.2) |
| SF250CX | 1/2 NPT | 6MX48K8 | 1.18 (30.1) | 1.97 (50.0) |
| SF250CX | 3/4 NPT | 6MX412K8 | 1.38 (35.1) | 2.09 (53.2) |
| SF250CX | 1 NPT | | | |
| | | | | |
| SF375CX | W125 | 15MX62K1 | 0.63 (15.9) | 1.50 (38.1) |
| SF375CX | SW250 | 6MX64K2 | 0.63 (15.9) | 1.63 (41.3) |
| SF375CX | SW375 | 6MX66K2 | 1.00 (25.4) | 1.82 (46.0) |
| SF375CX | SW500 | 4MX68K2 | 1.00 (25.4) | 2.00 (50.8) |
| SF375CX | SF250CX | 20M64K6 | 0.63 (15.9) | 1.39 (35.2) |
| SF375CX | SF375CX | | | |
| SF375CX | SF562CX | 20M69K6 | 1.00 (25.4) | 2.06 (52.4) |
| SF375CX | SF750CX | 20M612K6 | 1.38 (35.1) | 2.50 (63.5) |
| SF375CX | SF1000CX | 20M616K6 | 1.75 (44.5) | 3.06 (77.8) |
| SF375CX | F1000C43 | | | |
| SF375CX | F250C | 20M64K3 | .75 (19.1) | 1.44 (36.5) |
| SF375CX | F312C150 | 20M65K3 | 1.00 (25.4) | 2.25 (57.2) |
| SF375CX | F375C | 20M66K3 | 1.00 (25.4) | 1.63 (41.3) |
| SF375CX | F562C | 20M69K3 | 1.38 (35.1) | 1.88 (47.6) |
| SF375CX | F562C40 | | | |
| SF375CX | 1/8 NPT | 6MX62K8 | 0.63 (15.9) | 1.75 (44.5) |
| SF375CX | 1/4 NPT | 6MX64K8 | 0.75 (19.1) | 1.81 (46.0) |
| SF375CX | 3/8 NPT | 6MX66K8 | 1.00 (25.4) | 1.88 (47.6) |
| SF375CX | 1/2 NPT | 6MX68K8 | 1.18 (30.1) | 2.12 (54.0) |
| SF375CX | 3/4 NPT | 6MX612K8 | 1.38 (35.1) | 2.38 (60.3) |
| SF375CX | 1 NPT | 6MX616K8 | 1.75 (44.5) | 2.63 (66.7) |

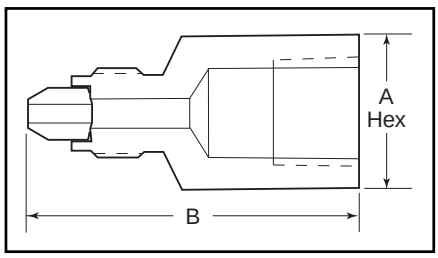
| Male End Fits this Connection | Female End | Catalog Number | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| SW562CX | W125 | 15MX92K1 | 0.81 (20.6) | 1.75 (44.5) |
| SW562CX | SW250 | 6MX94K2 | 0.94 (23.8) | 1.75 (44.5) |
| SW562CX | SW375 | 6MX96K2 | 0.94 (23.8) | 1.75 (44.5) |
| SW562CX | SW500 | 4MX98K2 | 1.00 (25.4) | 1.94 (49.2) |
| SW562CX | SF250CX | 20M94K6 | 0.94 (23.8) | 1.34 (34.1) |
| SW562CX | SF375CX | 20M96K6 | 0.94 (23.8) | 1.34 (59.5) |
| SW562CX | SF562CX | | | |
| SW562CX | SF750CX | 20M912K6 | 1.38 (35.1) | 3.12 (79.3) |
| SW562CX | SF1000CX | 20M916K6 | 1.75 (44.5) | 3.75 (95.3) |
| SW562CX | F1000C43 | | | |
| SW562CX | F250C | 20M94K3 | .81 (20.6) | 1.81 (46.0) |
| SW562CX | F312C150 | 20M95K3 | 1.00 (25.4) | 2.50 (63.5) |
| SW562CX | F375C | 20M96K3 | 1.00 (25.4) | 2.00 (50.8) |
| SW562CX | F562C | 20M99K3 | 1.38 (35.1) | 2.12 (54.0) |
| SW562CX | F562C40 | | | |
| SW562CX | 1/8 NPT | 6MX92K8 | 0.94 (23.8) | 1.75 (44.5) |
| SW562CX | 1/4 NPT | 6MX94K8 | 0.94 (23.8) | 2.18 (55.5) |
| SW562CX | 3/8 NPT | 6MX96K8 | 0.94 (23.8) | 2.18 (55.5) |
| SW562CX | 1/2 NPT | 6MX98K8 | 1.18 (30.1) | 2.44 (61.9) |
| SW562CX | 3/4 NPT | 6MX912K8 | 1.50 (38.1) | 2.50 (63.5) |
| SW562CX | 1 NPT | 6MX916K8 | 1.75 (44.5) | 3.00 (76.2) |
| | | | | |
| SF750CX | W125 | | | |
| SF750CX | SW250 | 6MX124K2 | 1.18 (30.1) | 2.06 (52.4) |
| SF750CX | SW375 | 6MX126K2 | 1.18 (30.1) | 1.97 (50.0) |
| SF750CX | SW500 | 4MX128K2 | 1.00 (25.4) | 2.75 (69.9) |
| SF750CX | SF250CX | 20M124K6 | 1.18 (30.1) | 2.06 (52.4) |
| SF750CX | SF375CX | 20M126K6 | 1.18 (30.1) | 2.06 (52.4) |
| SF750CX | SF562CX | 20M129K6 | 1.18 (30.1) | 1.69 (61.9) |
| SF750CX | SF750CX | | | |
| SF750CX | SF1000CX | 20M1216K6 | 1.75 (44.5) | 3.50 (88.9) |
| SF750CX | F1000C43 | | | |
| SF750CX | F250C | 20M124K3 | 1.18 (30.1) | 1.88 (47.6) |
| SF750CX | F312C150 | 20M125K3 | 1.00 (25.4) | 3.12 (79.3) |
| SF750CX | F375C | 20M126K3 | 1.18 (30.1) | 2.06 (52.4) |
| SF750CX | F562C | 20M129K3 | 1.31 (58.6) | 2.12 (54.0) |
| SF750CX | F562C40 | 20M129K40 | 1.38 (35.1) | 2.38 (60.4) |
| SF750CX | 1/8 NPT | | | |
| SF750CX | 1/4 NPT | 6MX124K8 | 0.81 (20.6) | 2.50 (63.5) |
| SF750CX | 3/8 NPT | 6MX126K8 | 1.00 (25.4) | 2.88 (73.0) |
| SF750CX | 1/2 NPT | 6MX128K8 | 1.18 (30.1) | 2.88 (73.0) |
| SF750CX | 3/4 NPT | 6MX1212K8 | 1.38 (35.1) | 3.12 (79.3) |
| SF750CX | 1 NPT | 6MX1216K8 | 1.75 (44.5) | 3.50 (88.9) |

Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

Note: For pressure rating see selection chart.

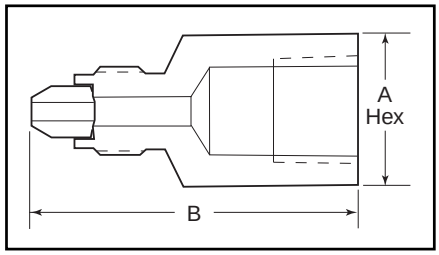
*All Dimensions for reference only and subject to change.*

*For prompt service, Autoclave stocks select products. Consult factory.*




Adapter configurations may vary from outline shown

| Male End Fits this Connection | Female End | Catalog Number | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| SF1000CX | W125 | 6MX162K2 | 1.38 (35.1) | 2.69 (68.3) |
| SF1000CX | SW250 | 6MX164K2 | 1.38 (35.1) | 2.63 (66.7) |
| SF1000CX | SW375 | 6MX166K2 | 1.38 (35.1) | 2.63 (66.7) |
| SF1000CX | SW500 | 4MX168K2 | 1.18 (30.1) | 4.25 (108.0) |
| SF1000CX | SF250CX | 20M164K6 | 1.38 (35.1) | 2.63 (66.7) |
| SF1000CX | SF375CX | 20M166K6 | 1.38 (35.1) | 2.63 (66.7) |
| SF1000CX | SF562CX | 20M169K6 | 1.38 (35.1) | 2.63 (66.7) |
| SF1000CX | SF750CX | 20M1612K6 | 1.50 (38.1) | 2.12 (54.0) |
| SF1000CX | SF1000CX | | | |
| SF1000CX | F1000C43 | | | |
| SF1000CX | F250C | 20M164K3 | 1.38 (35.1) | 2.18 (55.6) |
| SF1000CX | F312C150 | | | |
| SF1000CX | F375C | 20M166K3 | 1.38 (35.1) | 2.18 (55.6) |
| SF1000CX | F562C | 20M169K3 | 1.50 (38.1) | 2.44 (61.9) |
| SF1000CX | F562C40 | | | |
| SF1000CX | 1/8 NPT | | | |
| SF1000CX | 1/4 NPT | 6MX164K8 | 1.50 (38.1) | 3.18 (81.0) |
| SF1000CX | 3/8 NPT | 6MX166K8 | 1.75 (44.5) | 3.18 (81.0) |
| SF1000CX | 1/2 NPT | 6MX168K8 | 1.75 (44.5) | 3.18 (81.0) |
| SF1000CX | 3/4 NPT | 6MX1612K8 | 1.75 (44.5) | 3.18 (81.0) |
| SF1000CX | 1 NPT | 6MX1616K8 | 1.75 (44.5) | 3.18 (81.0) |




Adapter configurations may vary from outline shown

## High Pressure

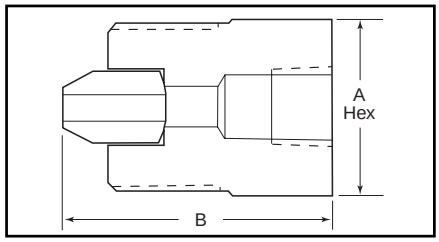
| Male End Fits this Connection | Female End | Catalog Number | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| F1000C43 | W125 | | | |
| F1000C43 | SW250 | | | |
| F1000C43 | SW375 | | | |
| F1000C43 | SW500 | | | |
| F1000C43 | SF250CX | | | |
| F1000C43 | SF375CX | | | |
| F1000C43 | SF562CX | | | |
| F1000C43 | SF750CX | | | |
| F1000C43 | SF1000CX | | | |
| F1000C43 | F1000C43 | | | |
| F1000C43 | F250C | 43M164B3 | 1.38 (35.1) | 2.31 (58.7) |
| F1000C43 | F312C150 | | | |
| F1000C43 | F375C | 43M166B3 | 1.38 (35.1) | 2.31 (58.7) |
| F1000C43 | F562C | 43M169B3 | 1.50 (38.1) | 2.56 (65.1) |
| F1000C43 | F562C40 | 43M169B40 | 1.50 (38.1) | 2.56 (65.1) |
| F1000C43 | 1/8 NPT | | | |
| F1000C43 | 1/4 NPT | | | |
| F1000C43 | 3/8 NPT | | | |
| F1000C43 | 1/2 NPT | | | |
| F1000C43 | 3/4 NPT | | | |
| F1000C43 | 1 NPT | | | |

| Male End Fits this Connection | Female End | Catalog Number | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| F250C | W125 | 15M42B1 | 0.63 (15.9) | 1.25 (31.7) |
| F250C | SW250 | 6M44B2 | 0.63 (15.9) | 1.44 (36.5) |
| F250C | SW375 | 6M46B2 | 0.75 (19.1) | 1.56 (39.7) |
| F250C | SW500 | 4M48B2 | 1.00 (25.4) | 1.69 (42.8) |
| F250C | SF250CX | 20M44B6 | 0.63 (15.9) | 1.31 (33.3) |
| F250C | SF375CX | 20M46B6 | 0.75 (19.1) | 1.69 (42.8) |
| F250C | SF562CX | 20M49B6 | 1.00 (25.4) | 1.81 (46.0) |
| F250C | SF750CX | 20M412B6 | 1.38 (35.1) | 2.18 (55.5) |
| F250C | SF1000CX | | | |
| F250C | F1000C43 | 43M416B3 | 1.75 (44.5) | 3.00 (76.2) |
| F250C | F250C | | | |
| F250C | F312C150 | 60M45B3 | 1.00 (25.4) | 2.06 (52.4) |
| F250C | F375C | 60M46B3 | 1.00 (25.4) | 1.56 (39.7) |
| F250C | F562C | 60M49B3 | 1.38 (35.1) | 1.81 (46.0) |
| F250C | F562C40 | | | |
| F250C | 1/8 NPT | 6M42B8 | 0.63 (15.9) | 1.38 (34.9) |
| F250C | 1/4 NPT | 6M44B8 | 0.75 (19.1) | 1.69 (42.8) |
| F250C | 3/8 NPT | 6M46B8 | 1.00 (25.4) | 1.69 (42.8) |
| F250C | 1/2 NPT | 6M48B8 | 1.18 (30.1) | 2.00 (50.8) |
| F250C | 3/4 NPT | 6M412B8 | 1.38 (35.1) | 2.18 (55.5) |
| F250C | 1 NPT | | | |

Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

Note: For pressure rating see selection chart.

*All Dimensions for reference only and subject to change.*




*Note: Adapter configurations may vary from outline shown*

*For prompt service, Autoclave stocks select products. Consult factory.*

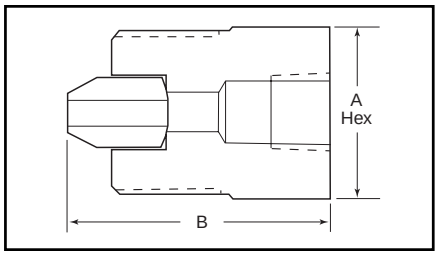
| Male End Fits this Connection | Female End | Catalog Number | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| F312C150 | W125 | | | |
| F312C150 | SW250 | 6M54B2 | 0.75 (19.1) | 2.13 (54.0) |
| F312C150 | SW375 | 6M56B2 | 0.75 (19.1) | 2.25 (57.2) |
| F312C150 | SW500 | 4M58B2 | 1.00 (25.4) | |
| F312C150 | SF250CX | 20M54B6 | 0.75 (19.1) | 2.00 (50.8) |
| F312C150 | SF375CX | 20M56B6 | 0.75 (19.1) | 2.25 (57.2) |
| F312C150 | SF562CX | 20M59B6 | 1.00 (25.4) | 2.38 (60.4) |
| F312C150 | SF750CX | 20M512B6 | 1.38 (35.1) | 3.00 (76.2) |
| F312C150 | SF1000CX | | | |
| F312C150 | F1000C43 | | | |
| F312C150 | F250C | 60M54B3 | 1.00 (25.4) | 2.06 (52.4) |
| F312C150 | F312C150 | | | |
| F312C150 | F375C | 60M56B3 | 1.00 (25.4) | 2.25 (57.2) |
| F312C150 | F562C | 60M59B3 | 1.38 (35.1) | 2.56 (65.1) |
| F312C150 | F562C40 | | | |
| F312C150 | 1/8 NPT | | | |
| F312C150 | 1/4 NPT | | | |
| F312C150 | 3/8 NPT | | | |
| F312C150 | 1/2 NPT | 6M58B8 | 1.18 (30.1) | 2.69 (68.3) |
| F312C150 | 3/4 NPT | 6M512B8 | 1.38 (35.1) | 2.88 (73.0) |
| F312C150 | 1 NPT | | | |
| | | | | |
| F375C | W125 | 15M62B1 | 0.81 (20.6) | 1.44 (36.5) |
| F375C | SW250 | 6M64B2 | 0.81 (20.6) | 1.69 (42.8) |
| F375C | SW375 | 6M66B2 | 0.81 (20.6) | 1.69 (42.8) |
| F375C | SW500 | 4M68B2 | 1.00 (25.4) | 1.75 (44.5) |
| F375C | SF250CX | 20M64B6 | 0.81 (20.6) | 1.75 (44.5) |
| F375C | SF375CX | 20M66B6 | 0.81 (20.6) | 1.88 (47.6) |
| F375C | SF562CX | 20M69B6 | 1.00 (25.4) | 2.00 (50.8) |
| F375C | SF750CX | 20M612B6 | 1.38 (35.1) | 2.25 (57.2) |
| F375C | SF1000CX | 20M616B6 | 1.75 (44.5) | 3.25 (82.6) |
| F375C | F1000C43 | 43M616B6 | 1.75 (44.5) | 3.25 (82.6) |
| F375C | F250C | 60M64B3 | .81 (20.6) | 1.63 (41.3) |
| F375C | F312C150 | 60M65B3 | 1.00 (25.4) | 2.25 (57.2) |
| F375C | F375C | | | |
| F375C | F562C | 60M69B3 | 1.38 (35.1) | 1.63 (41.3) |
| F375C | F562C40 | | | |
| F375C | 1/8 NPT | 6M62B8 | 0.81 (20.6) | 1.50 (38.1) |
| F375C | 1/4 NPT | 6M64B8 | 0.81 (20.6) | 1.75 (44.5) |
| F375C | 3/8 NPT | 6M66B8 | 1.00 (25.4) | 2.00 (50.8) |
| F375C | 1/2 NPT | 6M68B8 | 1.18 (30.1) | 2.25 (57.2) |
| F375C | 3/4 NPT | 6M612B8 | 1.38 (35.1) | 2.50 (63.5) |
| F375C | 1 NPT | 6M616B8 | 1.75 (44.5) | 2.75 (69.9) |

| Male End Fits this Connection | Female End | Catalog Number | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| F562C | W125 | 15M92B1 | 1.18 (30.1) | 1.50 (38.1) |
| F562C | SW250 | 6M94B2 | 1.18 (30.1) | 1.69 (42.8) |
| F562C | SW375 | 6M96B2 | 1.18 (30.1) | 1.69 (42.8) |
| F562C | SW500 | 4M98B2 | 1.18 (30.1) | 1.75 (44.5) |
| F562C | SF250CX | 20M94B6 | 1.18 (30.1) | 1.69 (42.8) |
| F562C | SF375CX | 20M96B6 | 1.18 (30.1) | 1.81 (46.0) |
| F562C | SF562CX | 20M99B6 | 1.18 (30.1) | 1.94 (49.2) |
| F562C | SF750CX | 20M912B6 | 1.38 (35.1) | 2.31 (58.7) |
| F562C | SF1000CX | 20M916B6 | 1.75 (44.5) | 3.31 (84.1) |
| F562C | F1000C43 | 43M916B6 | 1.75 (44.5) | 3.31 (84.1) |
| F562C | F250C | 60M94B3 | 1.18 (30.1) | 1.69 (42.8) |
| F562C | F312C150 | 60M95B3 | 1.18 (30.1) | 2.31 (58.7) |
| F562C | F375C | 60M96B3 | 1.18 (30.1) | 1.88 (47.6) |
| F562C | F562C | | | |
| F562C | F562C40 | | | |
| F562C | 1/8 NPT | 6M92B8 | 0.94 (23.8) | 1.81 (46.0) |
| F562C | 1/4 NPT | 6M94B8 | 0.94 (23.8) | 1.81 (46.0) |
| F562C | 3/8 NPT | 6M96B8 | 0.94 (23.8) | 1.81 (46.0) |
| F562C | 1/2 NPT | 6M98B8 | 1.18 (30.1) | 2.13 (54.0) |
| F562C | 3/4 NPT | 6M912B8 | 1.50 (38.1) | 2.31 (58.7) |
| F562C | 1 NPT | 6M916B8 | 1.75 (44.5) | 1.69 (42.8) |
| | | | | |
| F562C40 | W125 | | | |
| F562C40 | SW250 | | | |
| F562C40 | SW375 | | | |
| F562C40 | SW500 | | | |
| F562C40 | SF250CX | | | |
| F562C40 | SF375CX | | | |
| F562C40 | SF562CX | | | |
| F562C40 | SF750CX | 20M912G6 | 1.38 (35.1) | 2.50 (63.5) |
| F562C40 | SF1000CX | | | |
| F562C40 | F1000C43 | | | |
| F562C40 | F250C | | | |
| F562C40 | F312C150 | | | |
| F562C40 | F375C | | | |
| F562C40 | F562C | | | |
| F562C40 | F562C40 | | | |
| F562C40 | 1/8 NPT | | | |
| F562C40 | 1/4 NPT | | | |
| F562C40 | 3/8 NPT | | | |
| F562C40 | 1/2 NPT | 6M98G8 | 1.18 (30.1) | 2.13 (54.0) |
| F562C40 | 3/4 NPT | | | |
| F562C40 | 1 NPT | | | |

Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

Note: For pressure rating see selection chart.

*All Dimensions for reference only and subject to change.*




Adapter configurations may vary from outline shown

*For prompt service, Autoclave stocks select products. Consult factory.*

## Flat Bottom

| Male End Fits this Connection | Female End | Catalog Number | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| F437FB | W125 | 15M72E1 | 0.50 (12.7) | 1.41 (35.8) |
| F437FB | SW250 | 6M74E2 | 0.63 (15.9) | 1.53 (38.9) |
| F437FB | SW375 | 6M76E2 | 0.75 (19.1) | 1.91 (48.4) |
| F437FB | SW500 | 4M78E2 | 1.00 (25.4) | 2.16 (54.8) |
| F437FB | SF250CX | 15M74E6 | 0.63 (15.9) | 1.53 (38.9) |
| F437FB | SF375CX | 15M76E6 | 0.75 (19.1) | 1.78 (45.2) |
| F437FB | SF562CX | 15M79E6 | 1.00 (25.4) | 1.91 (48.4) |
| F437FB | SF750CX | | | |
| F437FB | SF1000CX | | | |
| F437FB | F1000C43 | | | |
| F437FB | F250C | 15M74E3 | .75 (19.1) | 1.53 (38.9) |
| F437FB | F312C150 | | | |
| F437FB | F375C | 15M76E3 | 1.00 (25.4) | 1.78 (45.2) |
| F437FB | F562C | 15M79E3 | 1.38 (35.1) | 2.03 (51.6) |
| F437FB | F562C40 | | | |
| F437FB | 1/8 NPT | 6M72E8 | .63 (15.9) | 1.59 (40.4) |
| F437FB | 1/4 NPT | 6M74E8 | .75 (19.1) | 1.78 (45.2) |
| F437FB | 3/8 NPT | 6M76E8 | 1.00 (25.4) | 1.91 (48.4) |
| F437FB | 1/2 NPT | 6M78E8 | 1.18 (30.1) | 2.16 (54.8) |
| F437FB | 3/4 NPT | 6M712E8 | n/a | n/a |
| F437FB | 1 NPT | | | |
| | | | | |
| F562FB | W125 | 15M92E1 | 0.63 (15.9) | 1.44 (36.5) |
| F562FB | SW250 | 6M94E2 | 0.75 (19.1) | 2.06 (52.4) |
| F562FB | SW375 | 6M96E2 | 0.75 (19.1) | 2.25 (57.2) |
| F562FB | SW500 | 4M98E2 | 1.00 (25.4) | 2.18 (55.5) |
| F562FB | SF250CX | 15M94E6 | 0.63 (15.9) | 1.81 (46.0) |
| F562FB | SF375CX | 15M96E6 | 0.75 (19.1) | 2.06 (52.4) |
| F562FB | SF562CX | 15M99E6 | 1.00 (25.4) | 1.18 (30.1) |
| F562FB | SF750CX | 15M912E6 | 1.38 (35.1) | 2.81 (71.4) |
| F562FB | SF1000CX | 15M916E6 | n/a | n/a |
| F562FB | F1000C43 | | | |
| F562FB | F250C | 15M94E3 | .81 (20.6) | 1.94 (49.2) |
| F562FB | F312C150 | | | |
| F562FB | F375C | 15M96E3 | 1.00 (25.4) | 2.44 (61.9) |
| F562FB | F562C | | | |
| F562FB | F562C40 | | | |
| F562FB | 1/8 NPT | 6M92E8 | 0.63 (15.9) | 1.94 (49.2) |
| F562FB | 1/4 NPT | 6M94E8 | 0.75 (19.1) | 2.18 (55.5) |
| F562FB | 3/8 NPT | 6M96E8 | 1.00 (25.4) | 2.31 (58.7) |
| F562FB | 1/2 NPT | 6M98E8 | 1.18 (30.1) | 1.63 (41.3) |
| F562FB | 3/4 NPT | 6M912E8 | 1.38 (35.1) | 2.06 (52.4) |
| F562FB | 1 NPT | 6M916E8 | 1.88 (47.6) | 2.25 (57.2) |

| Male End Fits this Connection | Female End | Catalog Number | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| F750FB | W125 | 15M122E1 | 0.75 (19.1) | 1.69 (42.8) |
| F750FB | SW250 | 6M124E2 | 0.81 (20.6) | 2.06 (52.4) |
| F750FB | SW375 | 6M126E2 | 0.75 (19.1) | 1.94 (49.2) |
| F750FB | SW500 | 4M128E2 | 1.00 (25.4) | 2.18 (55.5) |
| F750FB | SF250CX | 15M124E6 | 0.81 (20.6) | 1.94 (49.2) |
| F750FB | SF375CX | 15M126E6 | 0.81 (20.6) | 2.06 (52.4) |
| F750FB | SF562CX | 15M129E6 | 1.00 (25.4) | 1.31 (33.3) |
| F750FB | SF750CX | 15M1212E6 | 1.38 (35.1) | 1.69 (42.8) |
| F750FB | SF1000CX | 15M1216E6 | 1.75 (44.5) | 3.31 (84.1) |
| F750FB | F1000C43 | | | |
| F750FB | F250C | 15M124E3 | 1.00 (25.4) | 1.94 (49.2) |
| F750FB | F312C150 | | | |
| F750FB | F375C | 15M126E3 | 1.00 (25.4) | 2.18 (55.5) |
| F750FB | F562C | 15M129E3 | 1.38 (35.1) | 2.31 (58.7) |
| F750FB | F562C40 | | | |
| F750FB | 1/8 NPT | 6M122E8 | 0.94 (23.8) | 1.81 (46.0) |
| F750FB | 1/4 NPT | 6M124E8 | 1.00 (25.4) | 2.31 (58.7) |
| F750FB | 3/8 NPT | 6M126E8 | 1.00 (25.4) | 2.18 (55.5) |
| F750FB | 1/2 NPT | 6M128E8 | 1.18 (30.1) | 2.69 (68.3) |
| F750FB | 3/4 NPT | 6M1212E8 | 1.38 (35.1) | 2.69 (68.3) |
| F750FB | 1 NPT | 6M1216E8 | 1.88 (47.6) | 3.18 (81.0) |

## Flat Top

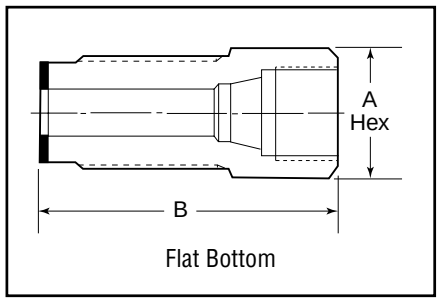
| | | | | |
|---|---|---|---|---|
| F562FT | W125 | 15M92R1 | 0.75 (19.1) | 0.94 (23.9) |
| F562FT | SW250 | 6M94R2 | 0.75 (19.1) | 1.50 (38.1) |
| F562FT | SW375 | 6M96R2 | 0.75 (19.1) | 1.50 (38.1) |
| F562FT | SW500 | 4M98R2 | 1.00 (25.4) | 1.63 (41.3) |
| F562FT | SF250CX | 15M94R6 | 0.75 (19.1) | 1.25 (31.8) |
| F562FT | SF375CX | 15M96R6 | 0.75 (19.1) | 1.50 (38.1) |
| F562FT | SF562CX | 15M99R6 | 1.00 (25.4) | 1.63 (41.3) |
| F562FT | SF750CX | 15M912R6 | n/a | n/a |
| F562FT | SF1000CX | 15M916R6 | n/a | n/a |
| F562FT | F1000C43 | | | |
| F562FT | F250C | 15M94R3 | 0.75 (19.1) | 1.25 (31.8) |
| F562FT | F312C150 | | | |
| F562FT | F375C | 15M96R3 | 1.00 (25.4) | 1.50 (38.1) |
| F562FT | F562C | 15M99R3 | 1.38 (35.1) | 1.75 (44.5) |
| F562FT | F562C40 | | | |
| F562FT | 1/8 NPT | 6M92R8 | 0.75 (19.1) | 1.25 (31.8) |
| F562FT | 1/4 NPT | 6M94R8 | 0.75 (19.1) | 1.44 (36.5) |
| F562FT | 3/8 NPT | 6M96R8 | 0.94 (23.8) | 1.56 (39.7) |
| F562FT | 1/2 NPT | 6M98R8 | 1.18 (30.1) | 2.00 (50.8) |
| F562FT | 3/4 NPT | 6M912R8 | n/a | n/a |
| F562FT | 1 NPT | 6M916R8 | n/a | n/a |

Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

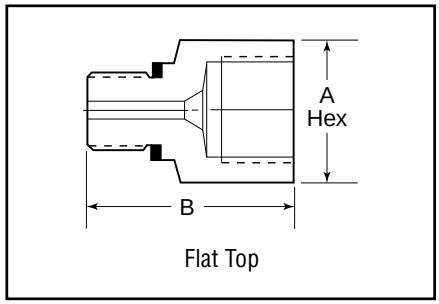
Note: For pressure rating see selection chart.

*All Dimensions for reference only and subject to change.*

*For prompt service, Autoclave stocks select products. Consult factory.*



Flat Bottom



Flat Top

# National Pipe Thread (NPT)

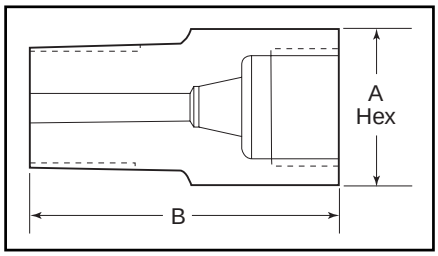
| Male End Fits this Connection | Female End | Catalog Number | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 1/8 NPT | W125 | 6M22N1 | 0.50 (12.7) | 1.00 (25.4) |
| 1/8 NPT | SW250 | 6M24N2 | 0.63 (15.9) | 1.25 (31.8) |
| 1/8 NPT | SW375 | 6M26N2 | 0.75 (19.1) | 1.44 (36.5) |
| 1/8 NPT | SW500 | 4M28N2 | 1.00 (25.4) | 1.50 (38.1) |
| 1/8 NPT | SF250CX | 6M24N6 | 0.63 (15.9) | 1.81 (46.0) |
| 1/8 NPT | SF375CX | 6M26N6 | 0.75 (19.1) | 1.38 (35.1) |
| 1/8 NPT | SF562CX | 6M29N6 | 1.00 (25.4) | 1.75 (44.5) |
| 1/8 NPT | SF750CX | | | |
| 1/8 NPT | SF1000CX | | | |
| 1/8 NPT | F1000C43 | | | |
| 1/8 NPT | F250C | 6M24N3 | 0.75 (19.1) | 1.25 (31.8) |
| 1/8 NPT | F312C150 | | | |
| 1/8 NPT | F375C | 6M26N3 | 1.00 (25.4) | 1.50 (38.1) |
| 1/8 NPT | F562C | 6M29N3 | 1.38 (35.1) | 1.63 (41.3) |
| 1/8 NPT | F562C40 | | | |
| 1/8 NPT | 1/8 NPT | | | |
| 1/8 NPT | 1/4 NPT | | | |
| 1/8 NPT | 3/8 NPT | | | |
| 1/8 NPT | 1/2 NPT | | | |
| 1/8 NPT | 3/4 NPT | | | |
| 1/8 NPT | 1 NPT | | | |
| | | | | |
| 1/4 NPT | W125 | 6M42N1 | 0.63 (15.9) | 1.13 (28.6) |
| 1/4 NPT | SW250 | 6M44N2 | 0.63 (15.9) | 1.38 (35.1) |
| 1/4 NPT | SW375 | 6M46N2 | 0.75 (19.1) | 1.50 (38.1) |
| 1/4 NPT | SW500 | 4M48N2 | 1.00 (25.4) | 1.75 (44.5) |
| 1/4 NPT | SF250CX | 6M44N6 | 0.63 (15.9) | 1.38 (35.1) |
| 1/4 NPT | SF375CX | 6M46N6 | 0.75 (19.1) | 1.56 (39.7) |
| 1/4 NPT | SF562CX | 6M49N6 | 1.00 (25.4) | 1.75 (44.5) |
| 1/4 NPT | SF750CX | 6M412N6 | 1.38 (35.1) | 2.25 (57.2) |
| 1/4 NPT | SF1000CX | 6M416N6 | 1.75 (44.5) | 2.88 (73.0) |
| 1/4 NPT | F1000C43 | | | |
| 1/4 NPT | F250C | 6M44N3 | 0.75 (19.1) | 1.38 (35.1) |
| 1/4 NPT | F312C150 | 6M45N3 | 1.00 (25.4) | 2.50 (63.5) |
| 1/4 NPT | F375C | 6M46N3 | 1.00 (25.4) | 1.63 (41.3) |
| 1/4 NPT | F562C | 6M49N3 | 1.38 (35.1) | 1.75 (44.5) |
| 1/4 NPT | F562C40 | | | |
| 1/4 NPT | 1/8 NPT | | | |
| 1/4 NPT | 1/4 NPT | | | |
| 1/4 NPT | 3/8 NPT | | | |
| 1/4 NPT | 1/2 NPT | 6M48N8 | 1.18 (30.1) | 2.25 (57.2) |
| 1/4 NPT | 3/4 NPT | | | |
| 1/4 NPT | 1 NPT | | | |

| Male End Fits this Connection | Female End | Catalog Number | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 3/8 NPT | W125 | 6M62N1 | 0.75 (19.1) | 1.13 (28.6) |
| 3/8 NPT | SW250 | 6M64N2 | 0.75 (19.1) | 1.38 (35.1) |
| 3/8 NPT | SW375 | 6M66N2 | 0.75 (19.1) | 1.50 (38.1) |
| 3/8 NPT | SW500 | 4M68N2 | 1.00 (25.4) | 1.75 (44.5) |
| 3/8 NPT | SF250CX | 6M64N6 | 0.75 (19.1) | 1.38 (35.1) |
| 3/8 NPT | SF375CX | 6M66N6 | 0.75 (19.1) | 1.50 (38.1) |
| 3/8 NPT | SF562CX | 6M69N6 | 1.00 (25.4) | 1.75 (44.5) |
| 3/8 NPT | SF750CX | 6M612N6 | 1.38 (35.1) | 2.00 (50.8) |
| 3/8 NPT | SF1000CX | 6M616N6 | 1.75 (44.5) | 2.88 (73.0) |
| 3/8 NPT | F1000C43 | | | |
| 3/8 NPT | F250C | 6M64N3 | 0.75 (19.1) | 1.38 (35.1) |
| 3/8 NPT | F312C150 | | | |
| 3/8 NPT | F375C | 6M66N3 | 1.00 (25.4) | 1.63 (41.3) |
| 3/8 NPT | F562C | 6M69N3 | 1.38 (35.1) | 1.75 (44.5) |
| 3/8 NPT | F562C40 | 6M69N40 | 1.38 (35.1) | 1.75 (44.5) |
| 3/8 NPT | 1/8 NPT | | | |
| 3/8 NPT | 1/4 NPT | | | |
| 3/8 NPT | 3/8 NPT | | | |
| 3/8 NPT | 1/2 NPT | 6M68N8 | 1.18 (30.1) | 2.25 (57.2) |
| 3/8 NPT | 3/4 NPT | | | |
| 3/8 NPT | 1 NPT | | | |
| | | | | |
| 1/2 NPT | W125 | 6M82N1 | 1.00 (25.4) | 2.50 (63.5) |
| 1/2 NPT | SW250 | 6M84N2 | 1.00 (25.4) | 1.63 (41.3) |
| 1/2 NPT | SW375 | 6M86N2 | 1.00 (25.4) | 1.63 (41.3) |
| 1/2 NPT | SW500 | 4M88N2 | 1.00 (25.4) | 1.88 (47.6) |
| 1/2 NPT | SF250CX | 6M84N6 | 1.00 (25.4) | 1.38 (35.1) |
| 1/2 NPT | SF375CX | 6M86N6 | 1.00 (25.4) | 1.63 (41.3) |
| 1/2 NPT | SF562CX | 6M89N6 | 1.00 (25.4) | 1.94 (49.2) |
| 1/2 NPT | SF750CX | 6M812N6 | 1.38 (35.1) | 2.18 (55.5) |
| 1/2 NPT | SF1000CX | 6M816N6 | 1.75 (44.5) | 2.81 (71.4) |
| 1/2 NPT | F1000C43 | | | |
| 1/2 NPT | F250C | 6M84N3 | 1.00 (25.4) | 1.50 (38.1) |
| 1/2 NPT | F312C150 | | | |
| 1/2 NPT | F375C | 6M86N3 | 1.00 (25.4) | 1.75 (44.5) |
| 1/2 NPT | F562C | 6M89N3 | 1.38 (35.1) | 1.88 (47.6) |
| 1/2 NPT | F562C40 | 6M89N40 | 1.38 (35.1) | 1.75 (44.5) |
| 1/2 NPT | 1/8 NPT | | | |
| 1/2 NPT | 1/4 NPT | | | |
| 1/2 NPT | 3/8 NPT | | | |
| 1/2 NPT | 1/2 NPT | | | |
| 1/2 NPT | 3/4 NPT | 6M812N8 | 1.38 (35.1) | 2.25 (57.2) |
| 1/2 NPT | 1 NPT | | | |

*Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

Note: For pressure rating see selection chart.

*All Dimensions for reference only and subject to change.*




*For prompt service, Autoclave stocks select products. Consult factory.*

# National Pipe Thread (NPT)

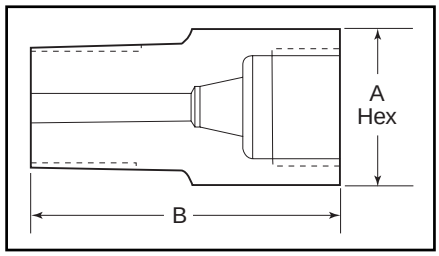
| Male End Fits this Connection | Female End | Catalog Number | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 3/4 NPT | W125 | | | |
| 3/4 NPT | SW250 | 6M124N2 | 1.18 (30.1) | 1.75 (44.5) |
| 3/4 NPT | SW375 | 6M126N2 | 1.18 (30.1) | 1.75 (44.5) |
| 3/4 NPT | SW500 | 4M128N2 | 1.18 (30.1) | 1.75 (44.5) |
| 3/4 NPT | SF250CX | 6M124N6 | 1.18 (30.1) | 1.75 (44.5) |
| 3/4 NPT | SF375CX | 6M126N6 | 1.18 (30.1) | 1.75 (44.5) |
| 3/4 NPT | SF562CX | 6M129N6 | 1.38 (35.1) | 2.00 (50.8) |
| 3/4 NPT | SF750CX | 6M1212N6 | 1.38 (35.1) | 2.25 (57.2) |
| 3/4 NPT | SF1000CX | 6M1216N6 | 1.75 (44.5) | 2.88 (73.0) |
| 3/4 NPT | F1000C43 | | | |
| 3/4 NPT | F250C | 6M124N3 | 1.18 (30.1) | 1.75 (44.5) |
| 3/4 NPT | F312C150 | | | |
| 3/4 NPT | F375C | 6M126N3 | 1.18 (30.1) | 2.00 (50.8) |
| 3/4 NPT | F562C | 6M129N3 | 1.38 (35.1) | 2.13 (54.0) |
| 3/4 NPT | F562C40 | | | |
| 3/4 NPT | 1/8 NPT | 6M122N8 | 1.18 (30.1) | 1.63 (41.3) |
| 3/4 NPT | 1/4 NPT | | | |
| 3/4 NPT | 3/8 NPT | | | |
| 3/4 NPT | 1/2 NPT | | | |
| 3/4 NPT | 3/4 NPT | | | |
| 3/4 NPT | 1 NPT | | | |

| Male End Fits this Connection | Female End | Catalog Number | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 1 NPT | W125 | | | |
| 1 NPT | SW250 | | | |
| 1 NPT | SW375 | 6M166N2 | 1.38 (35.1) | 1.75 (44.5) |
| 1 NPT | SW500 | 4M168N2 | 1.38 (35.1) | 1.75 (44.5) |
| 1 NPT | SF250CX | | | |
| 1 NPT | SF375CX | 6M166N6 | 1.38 (35.1) | 2.00 (50.8) |
| 1 NPT | SF562CX | 6M169N6 | 1.38 (35.1) | 2.25 (57.2) |
| 1 NPT | SF750CX | 6M1612N6 | 1.38 (35.1) | 2.63 (66.7) |
| 1 NPT | SF1000CX | 6M1616N6 | 1.75 (44.5) | 3.06 (77.8) |
| 1 NPT | F1000C43 | | | |
| 1 NPT | F250C | | | |
| 1 NPT | F312C150 | | | |
| 1 NPT | F375C | 6M166N3 | 1.38 (35.1) | 2.00 (50.8) |
| 1 NPT | F562C | 6M169N3 | 1.38 (35.1) | 2.25 (57.2) |
| 1 NPT | F562C40 | | | |
| 1 NPT | 1/8 NPT | | | |
| 1 NPT | 1/4 NPT | | | |
| 1 NPT | 3/8 NPT | | | |
| 1 NPT | 1/2 NPT | | | |
| 1 NPT | 3/4 NPT | | | |
| 1 NPT | 1 NPT | | | |

Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

Note: For pressure rating see selection chart.

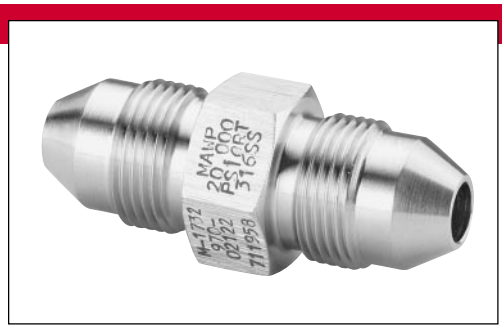
*All Dimensions for reference only and subject to change.*



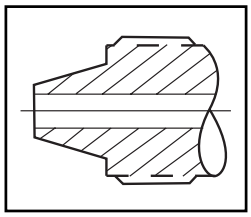

*For prompt service, Autoclave stocks select products. Consult factory.*

# Adapters/Couplings - Male-to-Male One Piece Adapters

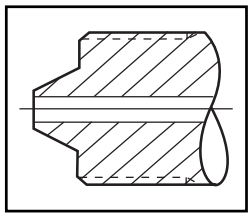
Autoclave Engineer's standard male-to-male one piece adapters are available in low, medium, and high pressure configurations. Standard male-to-male adapters are machined from cold worked stainless steel. Other materials are available upon request. Contact your local Sales Representative for optional information. The following tables list our standard adapters with dimensions.



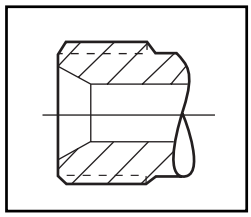
## Adapter End Configuration



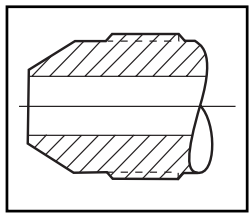
'L' Low Pressure



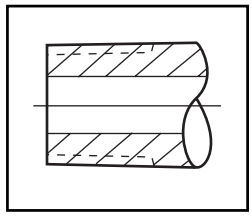
'H' High Pressure



'RH' Reverse High Pressure



'M' Medium Pressure



'P' National Pipe Tapered

## Ordering Procedure

Typical catalog number: 20 MA M6 H9

| 20 | MA | M6 | H9 |
|---|---|---|---|
| Pressure (X 1000 psi) | Male Adapter | Available End Connections | |

**L2** - 1/8" Low Pressure
**L4** - 1/4" Low Pressure
**L6** - 3/8" Low Pressure
**L8** - 1/2" Low Pressure

**M4** - 1/4" Medium Pressure
**M6** - 3/8" Medium Pressure
**M9** - 9/16" Medium Pressure
**M12** - 3/4" Medium Pressure
**M16** - 1" Medium Pressure

**H4** - 1/4" High Pressure
**H5** - 5/16" High Pressure
**H6** - 3/8" High Pressure
**H9** - 9/16" High Pressure

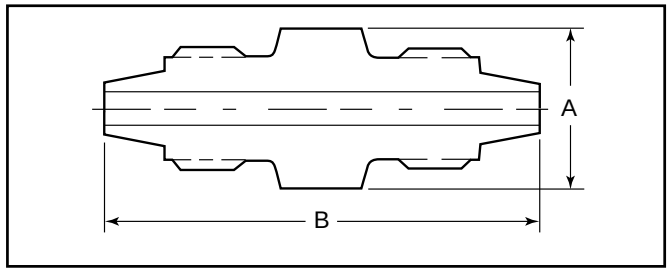
**P4** - 1/4" NPT
**P6** - 3/8" NPT
**P8** - 1/2" NPT

**RH9** - 9/16" -18 Reverse High
**RH12** - 3/4" -16 Reverse High
**RH14** - 7/8" -14 Reverse High
**RH16** - 1" -12 Reverse High
**RH21** - 1-5/16" -12 Reverse High

Note: Special material one piece adapters may be supplied with four flats in place of standard hex.

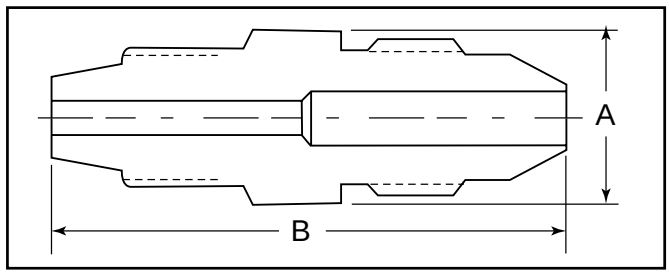
## Low-Pressure to Low-Pressure Adapters

| Catalog Number | Connection L/P | Connection L/P | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 15MAL2L2 | W125 | W125 | 0.50 (12.7) | 1.38 (34.9) |
| 15MAL2L4 | W125 | SW250 | 0.63 (15.9) | 1.63 (41.3) |
| 15MAL4L4 | SW250 | SW250 | 0.63 (15.9) | 1.88 (47.6) |
| 10MAL8L8 | SW500 | SW500 | 1.00 (25.4) | 2.13 (54.0) |



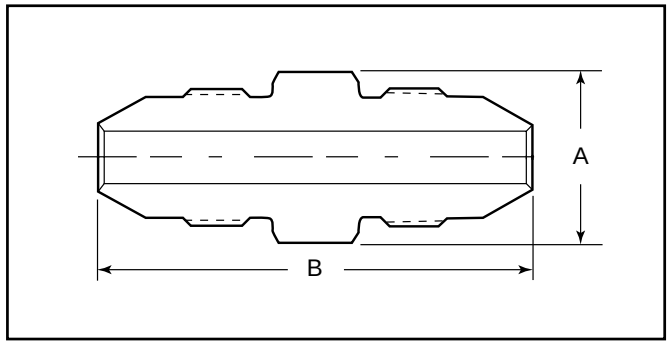

## Low-Pressure to Medium-Pressure Adapters

| Catalog Number | Connection L/P | Connection M/P | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 15MAL4M4 | SW250 | SF375CX | 0.63 (15.9) | 1.86 (47.3) |



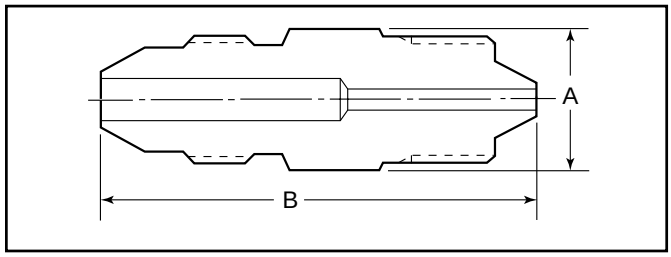

## Medium-Pressure to Medium-Pressure Adapters

| Catalog Number | Connection M/P | Connection M/P | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 20MAM4M4 | SF250CX | SF250CX | 0.50 (12.7) | 1.69 (42.9) |
| 20MAM4M6 | SF250CX | SF375CX | 0.63 (15.9) | 1.88 (47.6) |
| 20MAM4M9 | SF250CX | SF562CX | 0.94 (23.8) | 2.38 (60.3) |
| 20MAM4M12 | SF250CX | SF750CX | 1.19 (30.1) | 2.69 (68.2) |
| 20MAM4M16 | SF250CX | SF1000CX | 1.38 (34.9) | 3.38 (85.7) |
| 20MAM6M6 | SF375CX | SF375CX | 0.63 (15.9) | 2.25 (57.1) |
| 20MAM6M9 | SF375CX | SF562CX | 0.94 (23.8) | 2.38 (60.3) |
| 20MAM6M12 | SF375CX | SF750CX | 1.19 (30.1) | 2.81 (71.4) |
| 20MAM6M16 | SF375CX | SF1000CX | 1.38 (34.9) | 3.38 (85.7) |
| 20MAM9M9 | SF562CX | SF562CX | 0.94 (23.8) | 2.50 (63.5) |
| 20MAM9M12 | SF562CX | SF750CX | 1.19 (30.1) | 3.00 (76.2) |
| 20MAM9M16 | SF562CX | SF1000CX | 1.38 (34.9) | 2.69 (68.2) |
| 20MAM12M12 | SF750CX | SF750CX | 1.19 (30.1) | 3.13 (79.3) |
| 20MAM12M16 | SF750CX | SF1000CX | 1.38 (34.9) | 3.81 (96.8) |
| 20MAM16M4 | SF1000CX | SF250CX | 1.38 (34.9) | 3.25 (82.6) |
| 20MAM16M16 | SF1000CX | SF1000CX | 1.38 (34.9) | 4.38 (111.1) |




## Medium-Pressure to High-Pressure Adapters

| Catalog Number | Connection M/P | Connection H/P | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 20MAM4H4 | SF250CX | F250C | 0.63 (15.9) | 1.75 (44.5) |
| 20MAM4H6 | SF250CX | F375C | 0.81 (20.6) | 2.13 (54.0) |
| 20MAM4H9 | SF250CX | F562C | 1.19 (30.1) | 2.63 (66.7) |
| 20MAM6H4 | SF375CX | F250C | 0.63 (15.9) | 1.94 (49.2) |
| 20MAM6H6 | SF375CX | F375C | 0.81 (20.6) | 2.38 (60.3) |
| 20MAM6H9 | SF375CX | F562C | 1.19 (30.1) | 2.69 (68.2) |
| 20MAM9H4 | SF562CX | F250C | 0.81 (20.6) | 2.25 (57.1) |
| 20MAM9H6 | SF562CX | F375C | 0.81 (20.6) | 2.56 (65.0) |
| 20MAM9H9 | SF562CX | F562C | 1.19 (30.1) | 2.94 (74.6) |
| 20MAM12H4 | SF750CX | F250C | 1.19 (30.1) | 2.63 (66.7) |
| 20MAM12H6 | SF750CX | F375C | 1.19 (30.1) | 2.88 (73.0) |
| 20MAM12H9 | SF750CX | F562C | 1.19 (30.1) | 3.00 (76.2) |
| 20MAM16H4 | SF1000CX | F250C | 1.38 (34.9) | 3.25 (82.6) |
| 20MAM16H6 | SF1000CX | F375C | 1.38 (34.9) | 3.50 (89.0) |
| 20MAM16H9 | SF1000CX | F562C | 1.38 (34.9) | 3.69 (93.6) |



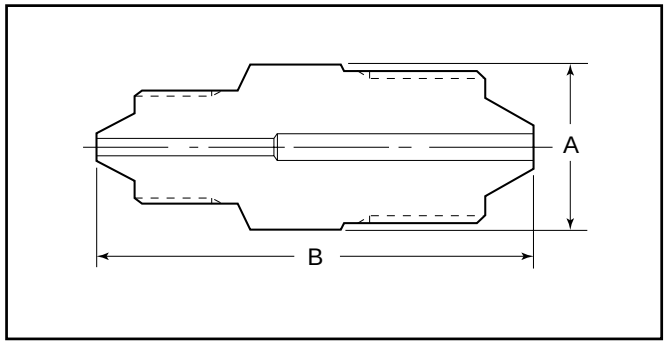

Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

Note: For pressure rating see ordering procedure.
*All Dimensions for reference only and subject to change.*

*For prompt service, Autoclave stocks select products. Consult factory.*

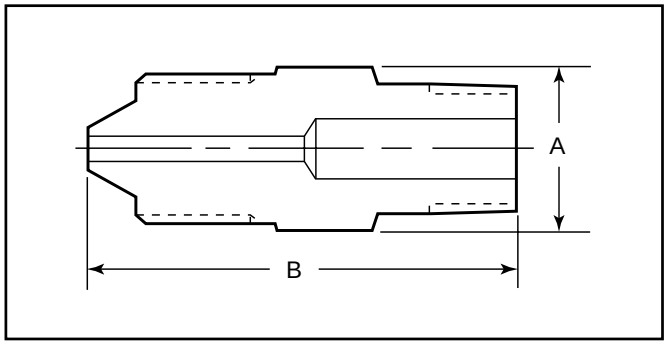
## High-Pressure to High-Pressure Adapters

| Catalog Number | Connection H/P | Connection H/P | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 40MAH9H9 | F562C40 | F562C40 | 1.19 (30.1) | 2.94 (74.6) |
| 60MAH4H4 | F250C | F250C | 0.63 (15.9) | 1.69 (42.8) |
| 60MAH4H5 | F250C | F312C150 | 0.75 (19.1) | 2.63 (66.7) |
| 60MAH4H6 | F250C | F375C | 0.81 (20.6) | 2.13 (54.0) |
| 60MAH4H9 | F250C | F562C | 1.19 (30.1) | 2.56 (65.0) |
| 60MAH5H6 | F312C150 | F375C | 0.81 (20.6) | 2.81 (71.4) |
| 60MAH6H6 | F375C | F375C | 0.81 (20.6) | 2.25 (57.1) |
| 60MAH6H9 | F375C | F562C | 1.19 (30.1) | 2.88 (73.0) |
| 60MAH9H9 | F562C | F562C | 1.19 (30.1) | 3.00 (76.2) |
| 150MAH5H5 | F312C150 | F312C150 | 0.75 (19.1) | 3.38 (85.7) |



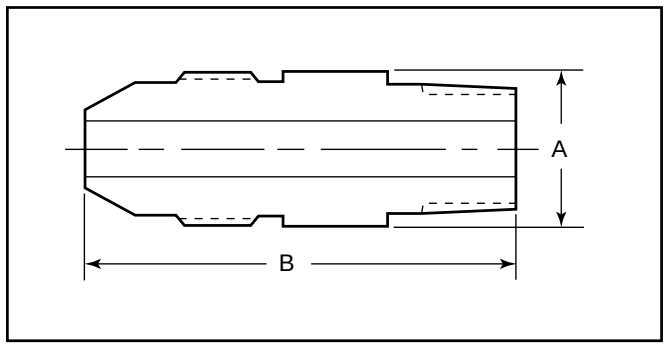

## Low-Pressure to NPT Adapters

| Catalog Number | Connection L/P | Connection NPT | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 10MAL2P2 | W125 | 1/8” | 0.50 (12.7) | 1.38 (34.9) |
| 10MAL2P4 | W125 | 1/4” | 0.63 (15.9) | 1.63 (41.2) |
| 10MAL4P2 | SW250 | 1/8” | 0.63 (15.9) | 1.63 (41.2) |
| 10MAL4P4 | SW250 | 1/4” | 0.63 (15.9) | 1.75 (44.5) |
| 10MAL8P6 | SW500 | 3/8” | 1.00 (25.4) | 2.00 (50.0) |




## Medium-Pressure to NPT Adapters

| Catalog Number | Connection M/P | Connection NPT | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 10MAM4P4 | SF250CX | 1/4” | 0.63 (15.9) | 1.75 (44.5) |
| 10MAM4P6 | SF250CX | 3/8” | 0.75 (19.1) | 1.81 (46.2) |
| 10MAM4P8 | SF250CX | 1/2” | 0.94 (23.8) | 2.19 (55.5) |
| 10MAM6P4 | SF375CX | 1/4” | 0.63 (15.9) | 1.94 (49.1) |
| 10MAM6P6 | SF375CX | 3/8” | 0.75 (19.1) | 2.00 (50.8) |
| 10MAM6P8 | SF375CX | 1/2” | 0.94 (23.8) | 2.38 (60.3) |
| 10MAM9P4 | SF562CX | 1/4” | 0.81 (20.6) | 2.25 (57.1) |
| 10MAM9P6 | SF562CX | 3/8” | 0.81 (20.6) | 2.13 (54.0) |
| 10MAM9P8 | SF562CX | 1/2” | 0.94 (23.8) | 2.56 (65.0) |
| 10MAM12P4 | SF750CX | 1/4” | 1.19 (30.1) | 2.63 (66.7) |
| 10MAM12P6 | SF750CX | 3/8” | 1.19 (30.1) | 2.63 (66.7) |
| 10MAM12P8 | SF750CX | 1/2” | 1.19 (30.1) | 2.81 (71.4) |
| 10MAM16P4 | SF1000CX | 1/4” | 1.38 (34.9) | 3.38 (85.7) |
| 10MAM16P6 | SF1000CX | 3/8” | 1.38 (34.9) | 3.31 (84.1) |
| 10MAM16P8 | SF1000CX | 1/2” | 1.38 (34.9) | 3.44 (87.3) |




Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

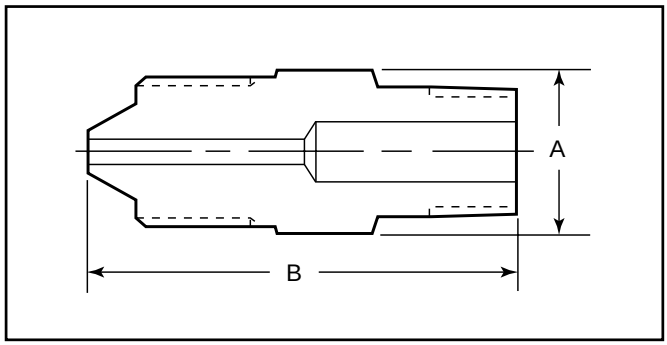
Note: For pressure rating see ordering procedure.

*All Dimensions for reference only and subject to change.*

*For prompt service, Autoclave stocks select products. Consult factory.*

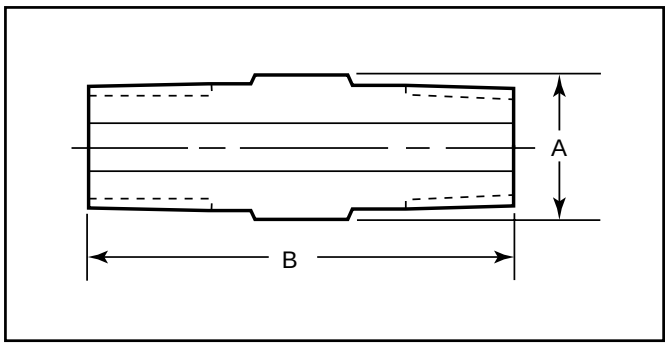
## High-Pressure to NPT Adapters

| Catalog Number | Connection H/P | Connection NPT | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 10MAH4P4 | F250C | 1/4” | 0.63 (15.9) | 1.81 (46.2) |
| 10MAH4P6 | F250C | 3/8” | 0.75 (19.1) | 1.88 (47.6) |
| 10MAH4P8 | F250C | 1/2” | 0.94 (23.8) | 2.25 (57.1) |
| 10MAH6P4 | F375C | 1/4” | 0.81 (20.6) | 2.13 (54.0) |
| 10MAH6P6 | F375C | 3/8” | 0.81 (20.6) | 2.13 (54.0) |
| 10MAH6P8 | F375C | 1/2” | 0.94 (23.8) | 2.50 (63.5) |
| 10MAH9P4 | F562C | 1/4” | 1.19 (30.1) | 2.63 (66.7) |
| 10MAH9P6 | F562C | 3/8” | 1.19 (30.1) | 2.56 (65.0) |
| 10MAH9P8 | F562C | 1/2” | 1.19 (30.1) | 2.75 (69.9) |



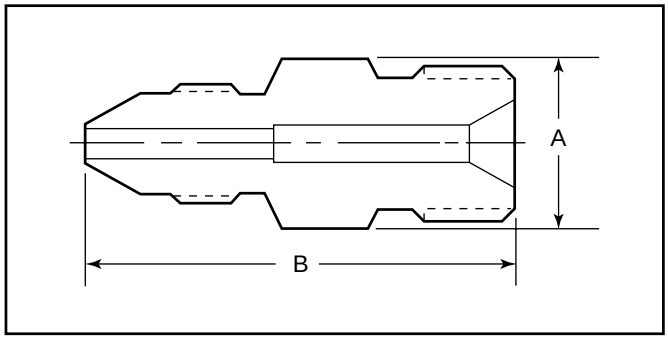

## NPT to NPT Adapters

| Catalog Number | Connection NPT | Connection NPT | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 10MAP4P4 | 1/4 | 1/4” | 0.63 (15.9) | 1.81 (46.2) |
| 10MAP4P6 | 1/4 | 3/8” | 0.75 (19.1) | 1.88 (47.6) |
| 10MAP4P8 | 1/4 | 1/2” | 0.94 (23.8) | 2.31 (58.7) |
| 10MAP6P6 | 3/8 | 3/8” | 0.75 (19.1) | 1.88 (47.6) |
| 10MAP6P8 | 3/8 | 1/2” | 0.94 (23.8) | 2.31 (58.7) |
| 10MAP8P8 | 1/2 | 1/2” | 0.94 (23.8) | 2.50 (63.5) |




## Medium-Pressure to Reverse High-Pressure Adapters

| Catalog Number | Connection M/P | Connection RH | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 20MAM4RH9 | SF250CX | 9/16” | 0.63 (15.9) | 1.56 (39.7) |
| 20MAM4RH12 | SF250CX | 3/4” | 0.81 (20.6) | 1.88 (47.6) |
| 20MAM4RH16 | SF250CX | 1” | 1.00 (25.4) | 2.13 (54.0) |
| 20MAM6RH9 | SF375CX | 9/16” | 0.63 (15.9) | 1.69 (42.8) |
| 20MAM6RH12 | SF375CX | 3/4” | 0.81 (20.6) | 1.81 (46.2) |
| 20MAM6RH16 | SF375CX | 1” | 1.00 (25.4) | 2.25 (57.1) |
| 20MAM9RH9 | SF562CX | 9/16” | 0.94 (23.8) | 2.00 (50.8) |
| 20MAM9RH12 | SF562CX | 3/4” | 0.94 (23.8) | 2.13 (54.0) |
| 20MAM9RH14 | SF562CX | 7/8” | 0.94 (23.8) | 2.44 (61.9) |
| 20MAM9RH16 | SF562CX | 1” | 1.00 (25.4) | 2.25 (57.1) |
| 20MAM12RH9 | SF750CX | 9/16” | 1.19 (30.1) | 2.38 (60.3) |
| 20MAM12RH12 | SF750CX | 3/4” | 1.19 (30.1) | 2.44 (61.9) |
| 20MAM12RH16 | SF750CX | 1” | 1.19 (30.1) | 2.50 (63.5) |
| 20MAM12RH21 | SF750CX | 1-5/16” | 1.50 (38.1) | 2.75 (69.9) |
| 20MAM16RH9 | SF1000CX | 9/16” | 1.38 (34.9) | 3.13 (79.3) |
| 20MAM16RH12 | SF1000CX | 3/4” | 1.38 (34.9) | 3.19 (80.9) |
| 20MAM16RH14 | SF1000CX | 7/8” | 1.38 (34.9) | 3.34 (84.9) |
| 20MAM16RH16 | SF1000CX | 1” | 1.38 (34.9) | 3.38 (85.7) |
| 20MAM16RH21 | SF1000CX | 1-5/16” | 1.50 (38.1) | 3.25 (82.6) |




Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

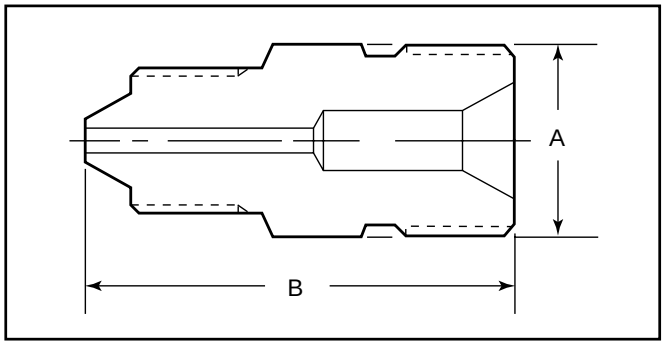
Note: For pressure rating see ordering procedure.

*All Dimensions for reference only and are subject to change.*

*For prompt service, Autoclave stocks select products.*
*Consult factory.*

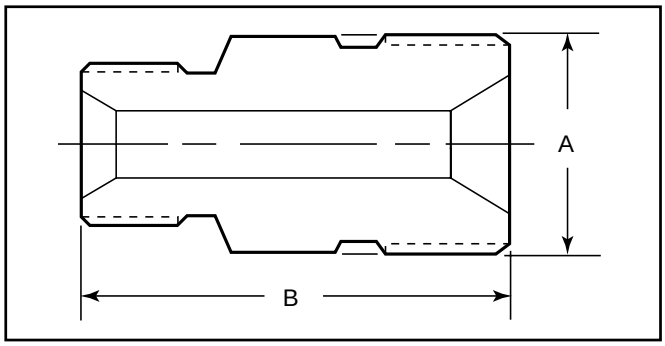
## High-Pressure to Reverse High-Pressure Adapters

| Catalog Number | Connection H/P | Connection RH | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 26MAH4RH16 | F250C | 1” | 1.00 (25.4) | 2.13 (54.0) |
| 26MAH6RH16 | F375C | 1” | 1.00 (25.4) | 2.25 (57.1) |
| 26MAH9RH16 | F562C | 1” | 1.19 (30.1) | 2.69 (68.2) |
| 30MAH4RH12 | F250C | 3/4” | 0.81 (20.6) | 1.88 (47.6) |
| 30MAH6RH12 | F375C | 3/4” | 0.81 (20.6) | 2.06 (54.0) |
| 30MAH9RH12 | F562C | 3/4” | 1.19 (30.1) | 2.50 (63.5) |
| 40MAH4RH9 | F250C | 9/16” | 0.63 (15.9) | 1.56 (39.7) |
| 40MAH6RH9 | F375C | 9/16” | 0.81 (20.6) | 1.94 (49.1) |
| 40MAH9RH9 | F562C | 9/16” | 1.19 (30.1) | 2.38 (60.3) |



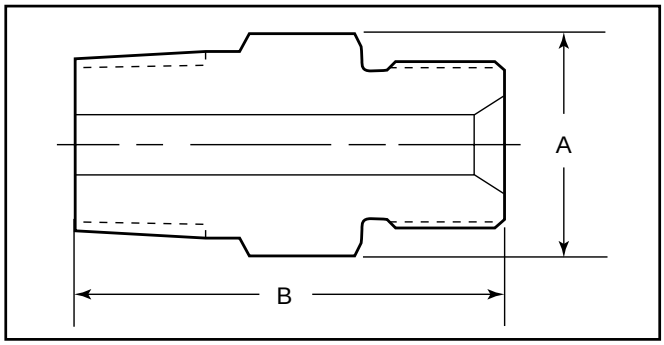

## Reverse High-Pressure to Reverse High-Pressure Adapters

| Catalog Number | Connection RH | Connection RH | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 26MARH9RH16 | 9/16 | 1” | 1.00 (25.4) | 1.88 (47.6) |
| 26MARH12RH12 | 3/4 | 3/4” | 0.81 (20.6) | 1.75 (44.5) |
| 26MARH12RH16 | 3/4 | 1” | 1.00 (25.4) | 2.00 (50.8) |
| 26MARH16RH16 | 1 | 1” | 1.00 (25.4) | 2.00 (50.8) |
| 30MARH9RH12 | 9/16 | 3/4” | 0.81 (20.6) | 1.63 (41.2) |
| 30MARH12RH12 | 3/4 | 3/4” | 0.81 (20.6) | 1.75 (44.5) |
| 40MARH9RH9 | 9/16 | 9/16” | 0.63 (15.9) | 1.50 (38.1) |




## NPT to Reverse High-Pressure Adapters

| Catalog Number | Connection NPT | Connection RH | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 10MAP4RH9 | 1/4 | 9/16” | 0.63 (15.9) | 1.63 (41.2) |
| 10MAP4RH12 | 1/4 | 3/4” | 0.81 (20.6) | 1.88 (47.6) |
| 10MAP4RH16 | 1/4 | 1” | 1.00 (25.4) | 2.25 (57.1) |
| 10MAP6RH9 | 3/8 | 9/16” | 0.75 (19.1) | 1.81 (46.2) |
| 10MAP6RH12 | 3/8 | 3/4” | 0.81 (20.6) | 1.94 (49.1) |
| 10MAP6RH16 | 3/8 | 1” | 1.00 (25.4) | 2.13 (54.0) |
| 10MAP8RH9 | 1/2 | 9/16” | 0.94 (23.8) | 2.00 (50.8) |
| 10MAP8RH12 | 1/2 | 3/4” | 0.94 (23.8) | 2.13 (54.0) |
| 10MAP8RH14 | 1/2 | 7/8” | 1.00 (25.4) | 2.25 (57.1) |
| 10MAP8RH16 | 1/2 | 1” | 1.00 (25.4) | 2.31 (58.7) |
| 10MAP12RH12 | 3/4 | 3/4” | 1.19 (30.1) | 2.31 (58.7) |
| 10MAP12RH16 | 3/4 | 1” | 1.38 (34.9) | 2.63 (66.7) |
| 10MAP16RH16 | 1 | 1” | 1.38 (34.9) | 2.81 (71.4) |




Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

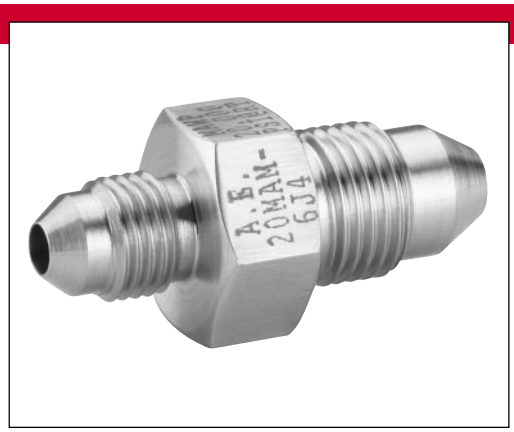
Note: For pressure rating see ordering procedure.

*All Dimensions for reference only and are subject to change.*

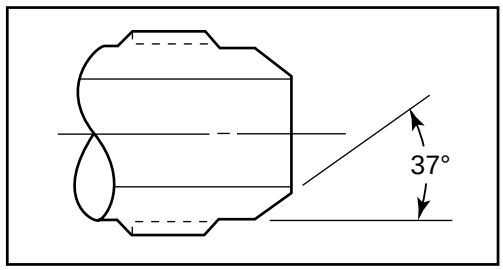
*For prompt service, Autoclave stocks select products. Consult factory.*

# Male-to-Male JIC One Piece Adapters

Autoclave Engineer's male-to-male JIC one-piece adapters are available in low, medium, and high pressure configurations. JIC adapters are machined from cold worked stainless steel. Other materials are available upon request. Contact your local Sales Representative for optional information. The following tables list our standard adapters with dimensions.




## Adapter End Configuration




JIC connections consist of a 37° angle.

## Ordering Procedure

Typical catalog number: 20 MA M4 J4

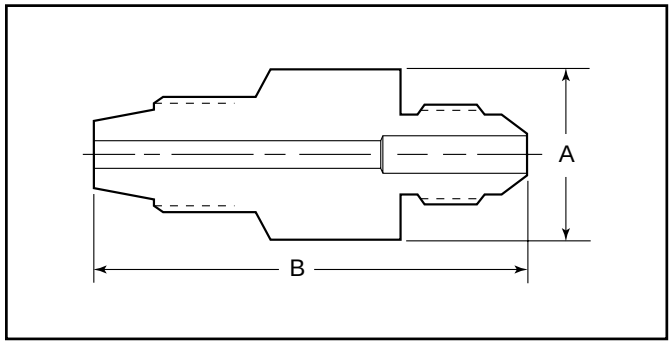
| 20 | MA | M4 | J4 |
|---|---|---|---|
| Pressure (X 1000 psi) | Male Adapter | Available End Connections | |

| | | | | |
|---|---|---|---|---|
| **J4** - 1/4" JIC | **L4** - 1/4" Low Pressure | **M4** - 1/4" Medium Pressure | **H4** - 1/4" High Pressure | **P4** - 1/4" NPT |
| **J6** - 3/8" JIC | **L6** - 3/8" Low Pressure | **M6** - 3/8" Medium Pressure | **H6** - 3/8" High Pressure | **P6** - 3/8" NPT |
| **J8** - 1/2" JIC | **L8** - 1/2" Low Pressure | **M9** - 9/16" Medium Pressure | **H9** - 9/16" High Pressure | **P8** - 1/2" NPT |
| **J10** - 5/8" JIC | | **M12** - 3/4" Medium Pressure | | |
| **J12** - 3/4" JIC | | **M16** - 1" Medium Pressure | | |
| **J16** - 1" JIC | | | | |

Note: Special material one piece adapters may be supplied with four flats in place of standard hex.

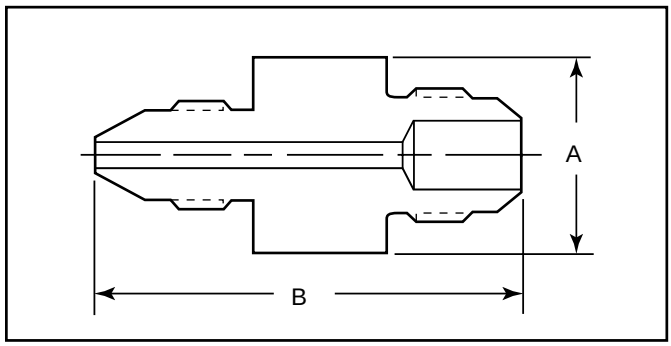
## Low-Pressure to JIC Adapters

| Catalog Number | Connection L/P | Connection JIC | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 15MAL4J4 | SW250 | 1/4” | 0.75 (19.1) | 1.88 (47.6) |



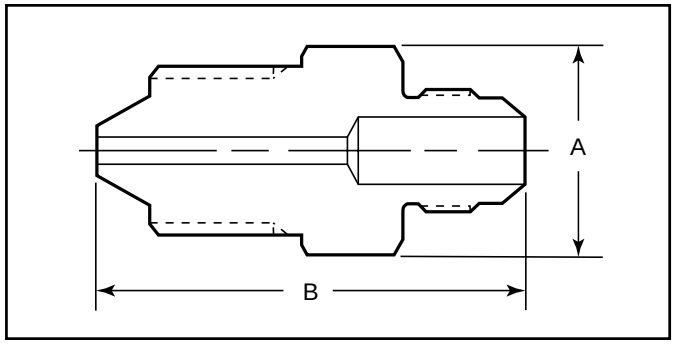

## Medium-Pressure to JIC Adapters

| Catalog Number | Connection M/P | Connection JIC | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 15MAM4J12 | SF250CX | 3/4” | 1.38 (34.9) | 2.25 (57.1) |
| 15MAM6J12 | SF375CX | 3/4” | 1.38 (34.9) | 2.44 (61.9) |
| 15MAM9J12 | SF562CX | 3/4” | 1.38 (34.9) | 2.69 (68.2) |
| 15MAM12J12 | SF750CX | 3/4” | 1.38 (34.9) | 2.88 (73.0) |
| 15MAM12J16 | SF750CX | 1” | 1.50 (34.9) | 2.88 (73.0) |
| 15MAM16J12 | SF1000CX | 3/4” | 1.38 (34.9) | 3.38 (85.7) |
| 15MAM16J16 | SF1000CX | 1” | 1.50 (38.1) | 3.50 (89.0) |
| 20MAM4J4 | SF250CX | 1/4” | 0.75 (19.1) | 1.63 (41.3) |
| 20MAM4J6 | SF250CX | 3/8” | 0.81 (20.6) | 1.75 (44.5) |
| 20MAM4J8 | SF250CX | 1/2” | 1.00 (25.4) | 2.00 (50.8) |
| 20MAM6J4 | SF375CX | 1/4” | 0.75 (19.1) | 1.75 (44.5) |
| 20MAM6J6 | SF375CX | 3/8” | 0.81 (20.6) | 1.81 (46.0) |
| 20MAM6J8 | SF375CX | 1/2” | 1.00 (25.4) | 2.00 (50.8) |
| 20MAM9J4 | SF562CX | 1/4” | 0.94 (23.8) | 2.13 (54.0) |
| 20MAM9J6 | SF562CX | 3/8” | 0.94 (23.8) | 2.13 (54.0) |
| 20MAM9J8 | SF562CX | 1/2” | 1.00 (25.4) | 2.25 (57.1) |
| 20MAM9J10 | SF562CX | 5/8” | 1.19 (30.1) | 2.25 (57.1) |
| 20MAM12J4 | SF750CX | 1/4” | 1.19 (30.1) | 2.38 (60.3) |
| 20MAM12J6 | SF750CX | 3/8” | 1.19 (30.1) | 2.38 (60.3) |
| 20MAM12J8 | SF750CX | 1/2” | 1.19 (30.1) | 2.50 (63.5) |
| 20MAM16J4 | SF1000CX | 1/4” | 1.38 (34.9) | 3.13 (79.3) |
| 20MAM16J6 | SF1000CX | 3/8” | 1.38 (34.9) | 3.13 (79.3) |
| 20MAM16J8 | SF1000CX | 1/2” | 1.38 (34.9) | 3.13 (79.3) |




## High-Pressure to JIC Adapters

| Catalog Number | Connection H/P | Connection JIC | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 20MAH4J4 | F250C | 1/4” | 0.75 (19.1) | 1.63 (41.3) |
| 20MAH4J6 | F250C | 3/8” | 0.81 (20.6) | 1.63 (41.3) |
| 20MAH4J8 | F250C | 1/2” | 1.00 (25.4) | 1.88 (47.6) |
| 20MAH6J4 | F375C | 1/4” | 0.81 (20.6) | 1.94 (49.1) |
| 20MAH6J6 | F375C | 3/8” | 0.81 (20.6) | 1.94 (49.1) |
| 20MAH6J8 | F375C | 1/2” | 1.00 (25.4) | 2.19 (55.5) |
| 20MAH9J4 | F562C | 1/4” | 1.19 (30.1) | 2.31 (58.7) |
| 20MAH9J6 | F562C | 3/8” | 1.19 (30.1) | 2.31 (58.7) |
| 20MAH9J8 | F562C | 1/2” | 1.19 (30.1) | 2.38 (60.3) |
| 20MAH4J10 | F250C | 5/8” | 1.19 (30.1) | 2.13 (54.0) |

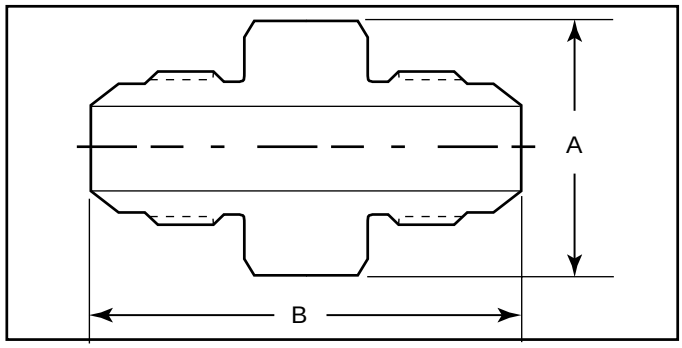



Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

Note: For pressure rating see ordering procedure.
*All Dimensions for reference only and are subject to change.*
*For prompt service, Autoclave stocks select products. Consult factory.*

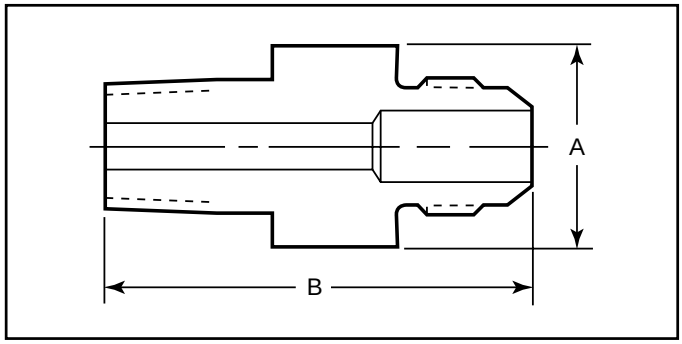
## JIC to JIC Adapters

| Catalog Number | Connection JIC | Connection JIC | A Hex | B |
|---|---|---|---|---|
| 20MAJ6J6 | 3/8 | 3/8” | 0.81 (20.6) | 1.56 (39.7) |




## NPT to JIC Adapters

| Catalog Number | Connection NPT | Connection JIC | Dimension inches (mm) A Hex | B |
|---|---|---|---|---|
| 10MAP4J4 | 1/4 | 1/4” | 0.75 (19.1) | 1.69 (42.8) |
| 10MAP4J6 | 1/4 | 3/8” | 0.81 (20.6) | 1.75 (44.5) |
| 10MAP4J8 | 1/4 | 1/2” | 1.00 (25.4) | 1.94 (49.1) |
| 10MAP4J12 | 1/4 | 3/4” | 1.38 (34.9) | 2.25 (57.1) |
| 10MAP6J4 | 3/8 | 1/4” | 0.75 (19.1) | 1.69 (42.8) |
| 10MAP6J6 | 3/8 | 3/8” | 0.81 (20.6) | 1.75 (44.5) |
| 10MAP6J8 | 3/8 | 1/2” | 1.00 (25.4) | 1.81 (46.0) |
| 10MAP6J12 | 3/8 | 3/4” | 1.38 (34.9) | 2.25 (57.1) |
| 10MAP8J4 | 1/2 | 1/4” | 0.94 (23.8) | 2.00 (50.8) |
| 10MAP8J8 | 1/2 | 1/2” | 1.00 (25.4) | 2.13 (54.0) |
| 10MAP8J12 | 1/2 | 3/4” | 1.38 (34.9) | 2.44 (61.9) |




Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

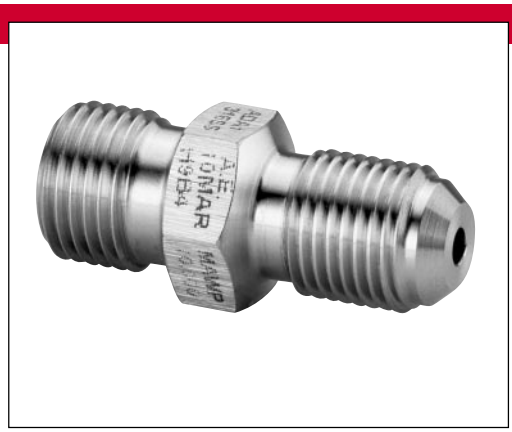
Note: For pressure rating see ordering procedure.

*All Dimensions for reference only and are subject to change.*

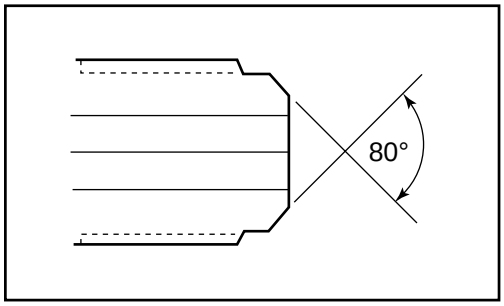
*For prompt service, Autoclave stocks select products.*
*Consult factory.*

# Male-to-Male BSPP One Piece Adapters

Autoclave Engineer's male-to-male one piece BSPP (British Standard Parallel Pipe Thread) adapters are available in a number of configurations. BSPP adapters are machined from cold worked stainless steel. Other materials available upon request. Contact your local Sales Representative for optional information. The following tables list our standard adapters with dimensions.



## Adapter End Configuration




BSPP connections consist of an 80° included angle

## Ordering Procedure

Typical catalog number: 20 MA M4 B4

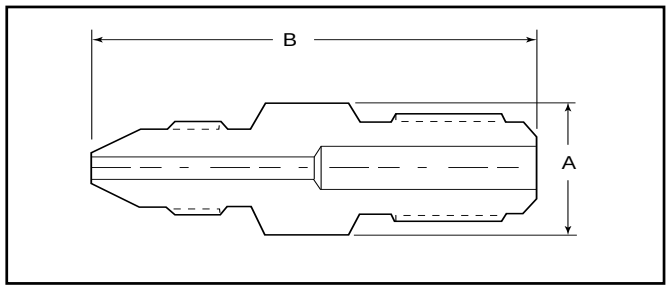
| 10 | MA | M4 | B4 |
|---|---|---|---|
| Pressure (X 1000 psi) | Male Adapter | Available End Connections | |

| | | | |
|---|---|---|---|
| **B4** - 1/4" BSPP | **M4** - 1/4" Medium Pressure | **H4** - 1/4" High Pressure | **P4** - 1/4" NPT |
| **B6** - 3/8" BSPP | **M6** - 3/8" Medium Pressure | **H6** - 3/8" High Pressure | **P6** - 3/8" NPT |
| **B8** - 1/2" BSPP | **M9** - 9/16" Medium Pressure | **H9** - 9/16" High Pressure | **P8** - 1/2" NPT |
| | **M12** - 3/4" Medium Pressure | **RH9** - 9/16" Reverse High Pressure | |
| | **M16** - 1" Medium Pressure | **RH12** - 3/4" Reverse High Pressure | |
| | | **RH16** - 1" Reverse High Pressure | |

Note: Special material one piece adapters may be supplied with four flats in place of standard hex.

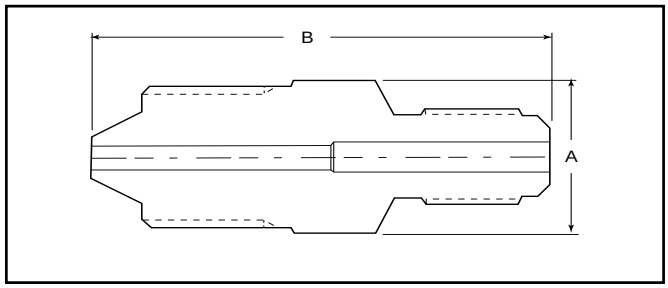
## Medium-Pressure to BSPP Adapters

| Catalog Number | Connection M/P | Connection BSPP | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 10MAM4B4 | SF250CX | 1/4” | 0.63 (15.9) | 1.81 (46.0) |
| 10MAM6B4 | SF375CX | 1/4” | 0.63 (15.9) | 1.94 (49.3) |
| 10MAM9B4 | SF562CX | 1/4” | 0.81 (20.6) | 2.25 (57.2) |
| 10MAM12B4 | SF750CX | 1/4” | 1.88 (30.2) | 2.63 (66.8) |
| 10MAM16B4 | SF750CX | 1/4” | 1.38 (34.9) | 3.25 (82.6) |



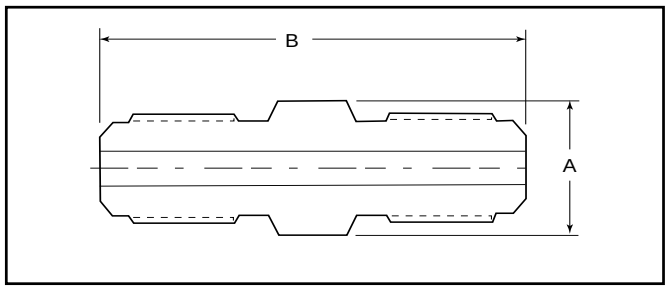

## High-Pressure to BSPP Adapters

| Catalog Number | Connection H/P | Connection BSPP | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 10MAH4B4 | F250C | 1/4” | 0.63 (15.9) | 1.75 (44.5) |
| 10MAH6B4 | F375C | 1/4” | 0.81 (20.6) | 2.13 (54.1) |
| 10MAH9B4 | F562C | 1/4” | 1.88 (30.2) | 2.56 (65.0) |



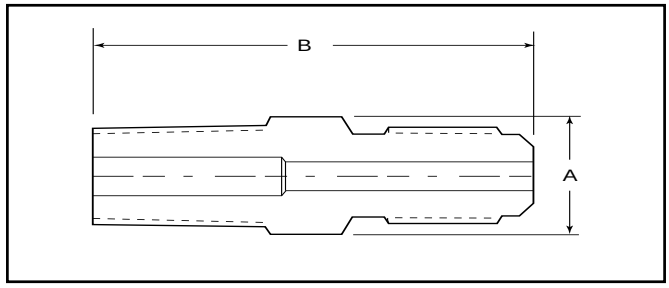

## BSPP to BSPP Adapters

| Catalog Number | Connection BSPP | Connection BSPP | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 10MAB4B4 | 1/4” | 1/4” | 0.63 (15.9) | 1.81 (46.0) |



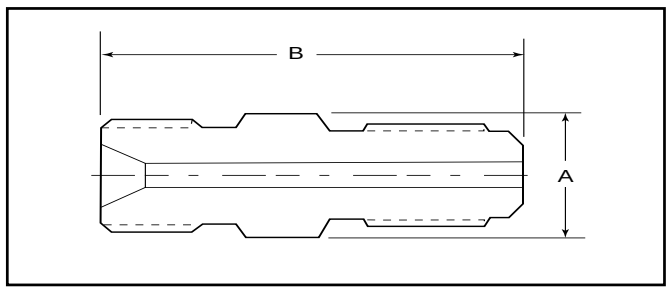

## NPT to BSPP Adapters

| Catalog Number | Connection NPT | Connection BSPP | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 10MAP4B4 | 1/4” | 1/4” | 0.63 (15.9) | 1.75 (44.5) |
| 10MAP6B4 | 3/8” | 1/4” | 0.75 (19.1) | 1.88 (30.2) |
| 10MAP8B4 | 1/2” | 1/4” | 0.94 (23.8) | 2.13 (54.1) |




## Reverse High Pressure to BSPP Adapters

| Catalog Number | Connection R/H | Connection BSPP | Dimension inches (mm) | |
|---|---|---|---|---|
| | | | A Hex | B |
| 10MARH9B2 | 9/16” | 1/8” | 0.63 (15.9) | 1.56 (39.6) |
| 10MARH9B4 | 9/16” | 1/4” | 0.63 (15.9) | 1.56 (39.6) |
| 10MARH12B4 | 3/4” | 1/4” | 0.81 (20.6) | 1.81 (46.0) |
| 10MARH16B4 | 1” | 1/4” | 1.00 (25.4) | 2.00 (50.8) |




Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

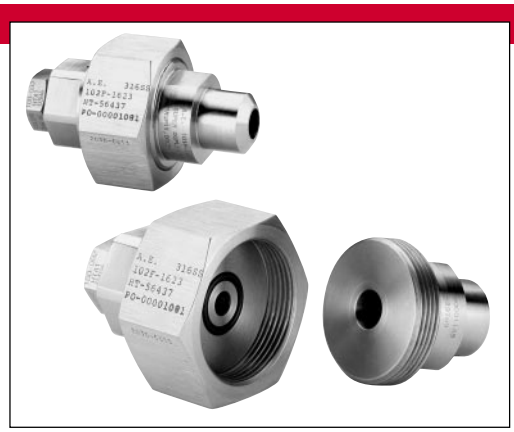
Note: For pressure rating see selection chart.

*All Dimensions for reference only and are subject to change.*

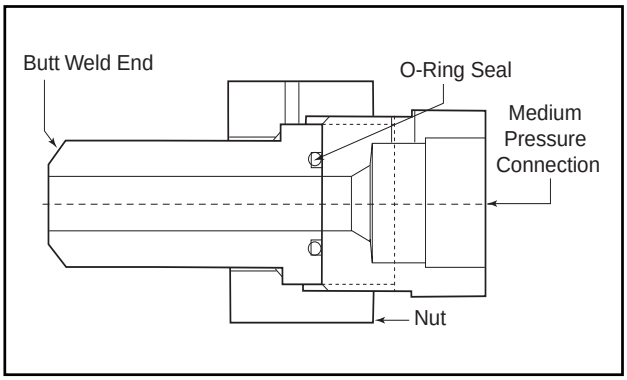
*For prompt service, Autoclave stocks select products. Consult factory.*

# Adapters/Couplings - EZ-Union Adapters

Autoclave Engineers offers an EZ-Union adapter providing a fast and simple way to install or remove components from a pressure system. The face seal o-ring design provides a positive seal with easy and reliable operation. EZ-Union adapters can be provided with any standard or special connection combination. Optional materials available upon request. Contact your local Sales Representative for optional information and sizes not shown. The following tables show the standard adapters with dimensions.



## EZ-Union Adapter




## Ordering Procedure

Typical catalog number: 15 EZ BW16 M12

**15** — **Pressure (X 1000 psi)**

**EZ** — **EZ- Male to Female**
**EZMA- Male to Male**

**BW16** — **Available End Connections**

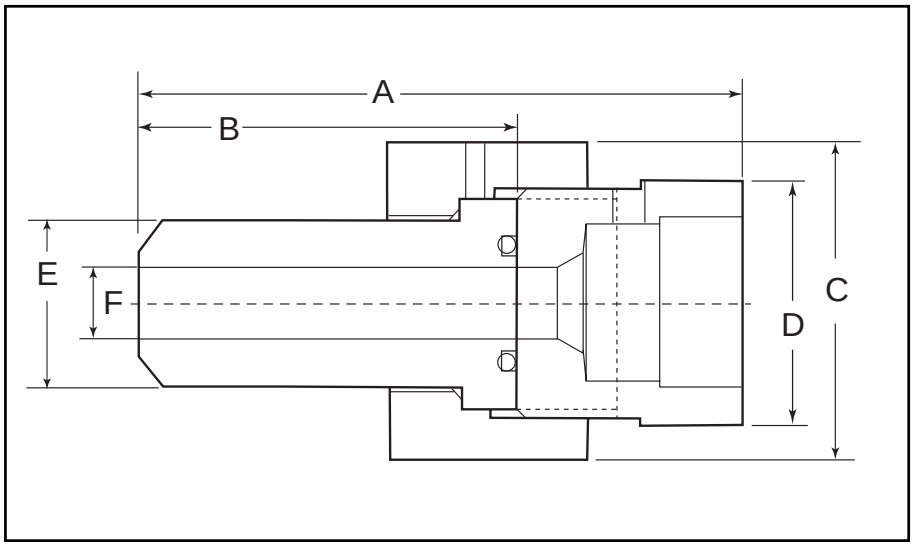
**M12** — **Available End Connections**

| | | | |
|---|---|---|---|
| **BW4** - 1/4” Butt-Weld | **M4** - 1/4” Medium Pressure | **H4** - 1/4” High Pressure | **P4** - 1/4” NPT |
| **BW6** - 3/8” Butt-Weld | **M6** - 3/8” Medium Pressure | **H6** - 3/8” High Pressure | **P6** - 3/8” NPT |
| **BW9** - 9/16” Butt-Weld | **M9** - 9/16” Medium Pressure | **H9** - 9/16” High Pressure | **P8** - 1/2” NPT |
| **BW12** - 3/4” Butt-Weld | **M12** - 3/4” Medium Pressure | | |
| **BW16** - 1” Butt-Weld | **M16** - 1” Medium Pressure | | |

Note: Special material ez unions may be supplied with four flats in place of standard hex.

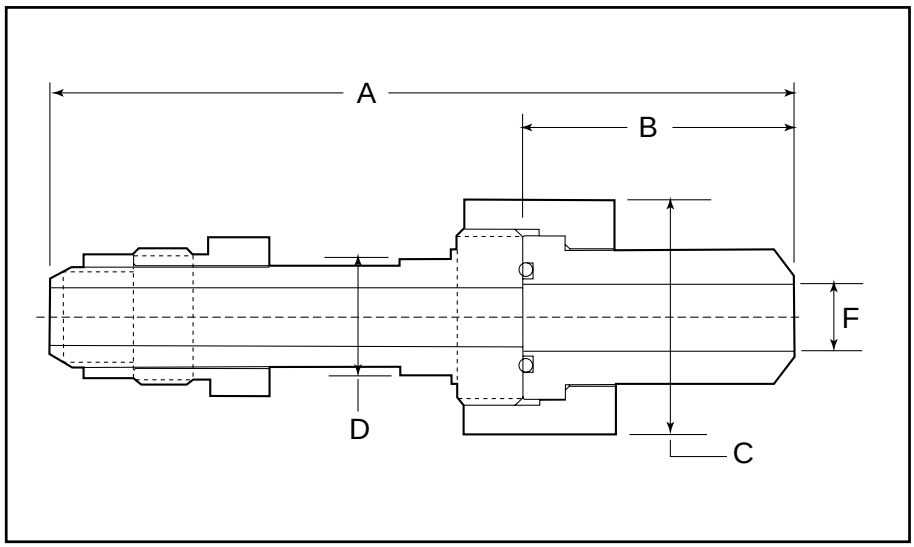
## EZ-Union Female to Male Adapter - Medium Pressure to Butt-Weld Adapters

| Catalog Number | Female M/P | Male BW | Dimension inches (mm) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | A | B | C Hex | D Across Flats | E Across Flats | F Diameter |
| 15EZBW16M6 | SF375CX | 1”Tube | 3.63 (92.20) | 2.00 (50.80) | 2.25 (57.15) | 1.38 (35.05) | 1.38 (35.05) | 0.50 (12.70) |
| 15EZBW16M9 | SF562CX | 1”Tube | 3.63 (92.20) | 2.00 (50.80) | 2.25 (57.15) | 1.38 (35.05) | 1.38 (35.05) | |
| 15EZBW16M12 | SF750CX | 1”Tube | 3.63 (92.20) | 2.00 (50.80) | 2.25 (57.15) | 1.38 (35.05) | 1.38 (35.05) | |




## EZ-Union Male to Male Adapter - Medium Pressure to Butt-Weld Adapters

| Catalog Number | Male M/P | Male BW | Dimension inches (mm) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | A | B | C Hex | D Across Flats | E Across Flats | F Diameter |
| 15EZMABW16M12 | SF750CX | 1” Tube | 5.50 (137.70) | 2.00 (50.80) | 1.75 (44.45) | 0.87 (22.09) | - | 0.50 (12.70) |




Note1: EZ-Unions are constructed from 316 SS and are supplied with a Viton o-ring as standard. Weld ends are made from super Duplex F255.

Note 2: Gland and collar supplied with high pressure connections.

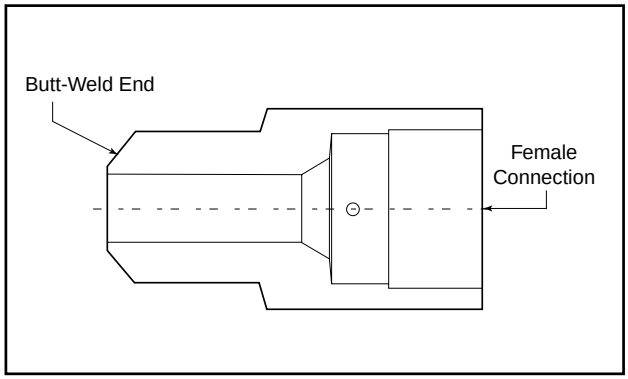
Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

Note: For pressure rating see ordering procedure.
*All Dimensions for reference only and subject to change.*

*For prompt service, Autoclave stocks select products. Consult factory.*

Autoclave Engineer's Butt-Weld adapters are available in a number of configurations. The following tables show models for all three pressure ranges. Models not shown and special material adapters are available upon request. Contact your local Sales Representative for more information.


## Butt-Weld Adapter




Note: Standard Butt-weld adapters made from 316 SS.

## Butt-Weld Adapters

| Weld Connection Type | Size/Schedule | AE Low Pressure - Female Connection | | | | |
|---|---|---|---|---|---|---|
| | | SW250 | SW375 | SW500 | | |
| Pipe Butt-Weld | 3/4" / XXS | | | M128W2B-XXS | | |

| Weld Connection Type | Size/Schedule | AE Medium Pressure - Female Connection | | | | |
|---|---|---|---|---|---|---|
| | | SF250CX | SF375CX | SF562CX | SF750CX | SF1000CX |
| Pipe Butt-Weld | 1/8" / 80 | M24W6B-XS | M26W6B-XS | | | |
| Pipe Butt-Weld | 1/4" / 80 | M44W6B-XS | M46W6B-XS | M49W6B-XS | | |
| Pipe Butt-Weld | 3/8" / 80 | M64W6B-XS | M66W6B-XS | M69W6B-XS | M612W6B-XS | |
| Pipe Butt-Weld | 1/2" / 80 | M84W6B-XS | | M89W6B-XS | | |
| Pipe Butt-Weld | 1/2" / XXS | | | M89W6B-XXS | M812W6B-XXS | M816W6B-XXS |
| Pipe Butt-Weld | 3/4" / 80 | | | M129W6B-XS | | |
| Pipe Butt-Weld | 3/4" / 160 | | | M129W6B-160 | | |
| Pipe Butt-Weld | 3/4" / XXS | | | M129W6B-XXS | M1212W6B-XXS | M1216W6B-XXS |
| Pipe Butt-Weld | 1" / XXS | | | | | M1616W6B-XXS |

| Weld Connection Type | Size/Schedule | AE High Pressure - Female Connection | | | | |
|---|---|---|---|---|---|---|
| | | F250C | F375C | F562C | F562C40 | SF1000CX43 |
| Pipe Butt-Weld | 1" / XXS | | | M169W8B-XXS | | |

## Butt-Weld to Low-Pressure

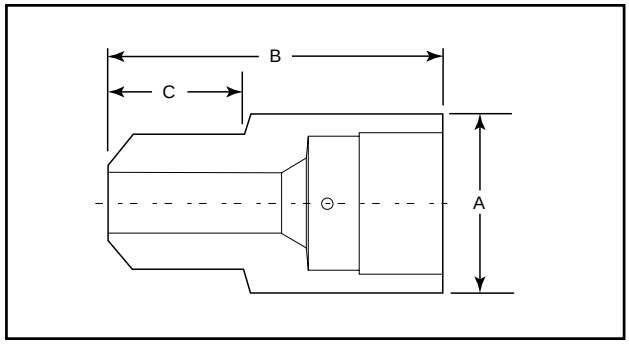
| Catalog Number | Male BW | Female LP | Dimension inches (mm) | | |
|---|---|---|---|---|---|
| | | | A Hex | B | C |
| M128W2B-XXS | 3/4” | SW500 | 1.19 (30.23) | 2.00 (50.80) | 0.81 (20.57) |

## Butt-Weld to Medium-Pressure

| Catalog Number | Male BW | Female LP | Dimension inches (mm) | | |
|---|---|---|---|---|---|
| | | | A Hex | B | C |
| M24W6B-XS | 1/8” | SF250CX | 0.63 (15.88) | 1.00 (25.40) | 0.38 (9.53) |
| M26W6B-XS | 1/8” | SF375CX | 0.75 (19.05) | 1.31 (33.32) | 0.38 (9.53) |
| M44W6B-XS | 1/4” | SF250CX | 0.63 (15.88) | 1.18 (29.97) | 0.56 (14.27) |
| M46W6B-XS | 1/4” | SF375CX | 0.75 (19.05) | 1.50 (38.10) | 0.56 (14.27) |
| M49W6B-XS | 1/4” | SF562CX | 1.00 (25.40) | 1.56 (39.67) | 0.56 (14.27) |
| M64W6B-XS | 3/8” | SF250CX | 0.75 (19.05) | 1.25 (31.75) | 0.63 (15.88) |
| M66W6B-XS | 3/8” | SF375CX | 0.75 (19.05) | 1.56 (39.67) | 0.63 (15.88) |
| M69W6B-XS | 3/8” | SF562CX | 1.00 (25.40) | 1.63 (41.28) | 0.63 (15.88) |
| M612W6B-XS | 3/8” | SF750CX | 1.38 (34.93) | 1.94 (49.20) | 0.63 (15.88) |
| M84W6B-XS | 1/2” | SF250CX | 1.00 (25.40) | 1.38 (34.93) | 0.81 (20.57) |
| M89W6B-XS | 1/2” | SF562CX | 1.00 (25.40) | 1.81 (45.97) | 0.81 (20.57) |
| M89W6B-XXS | 1/2” | SF562CX | 1.00 (25.40) | 1.81 (45.97) | 0.81 (20.57) |
| M812W6B-XXS | 1/2” | SF750CX | 1.38 (34.93) | 2.13 (53.98) | 0.81 (20.57) |
| M816W6B-XXS | 1/2” | SF1000CX | 1.75 (44.45) | 2.81 (71.37) | 0.81 (20.57) |
| M129W6B-XS | 3/4” | SF562CX | 1.19 (30.23) | 1.81 (45.97) | 0.81 (20.57) |
| M129W6B-160 | 3/4” | SF562CX | 1.19 (30.23) | 2.00 (50.80) | 0.81 (20.57) |
| M129W6B-XXS | 3/4” | SF562CX | 1.19 (30.23) | 2.00 (50.80) | 0.81 (20.57) |
| M1212W6B-XXS | 3/4” | SF750CX | 1.38 (34.93) | 2.06 (52.32) | 0.81 (20.57) |
| M1216W6B-XXS | 3/4” | SF1000CX | 1.75 (44.45) | 2.69 (68.25) | 0.81 (20.57) |
| M1616W6B-XXS | 1” | SF1000CX | 1.75 (44.45) | 3.25 (82.55) | 1.31 (33.32) |

## Butt-Weld to High-Pressure

| Catalog Number | Male BW | Female LP | Dimension inches (mm) | | |
|---|---|---|---|---|---|
| | | | A Hex | B | C |
| M169W8B-XXS | 1” | F562C | 1.38 (34.93) | 2.44 (61.90) | 1.22 (30.99) |




Gland and collar supplied with high pressure connections.

Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by piping pressure rating, contact factory.

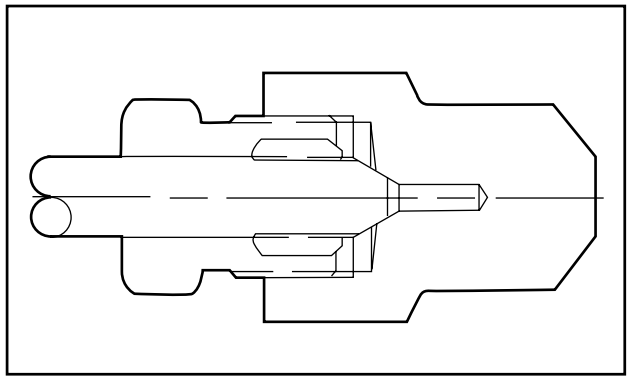
Note: For pressure rating see ordering procedure.
*All Dimensions for reference only and are subject to change.*

*For prompt service, Autoclave stocks select products. Consult factory.*

# Adapters/Couplings - Header Couplings

Autoclave Engineer's offers weld style Header Couplings in a number of designs and materials. The standard materials are SAE-4130 and Inconel 625. Other materials are listed in the tables. Header couplings are available drilled through or blind drilled, allowing final drill through after welding. The couplings can be supplied with any style of Autoclave connection or special connections if required. Header couplings come standard with 316 SS glands and collars for our medium and high-pressure connections. Models not shown are available upon request. Contact your local sales representative.

## Header Coupling



## Ordering Procedure

Typical catalog number: HC F M16 W 625 DT

| HC | F | M16 | W | 625 | Option DT |
|---|---|---|---|---|---|
| Header Coupling | Female Connection | Available End Connections | Welded | | Drilled Through |

**625**

**SAE 4130** - 4130
**Inconel 625** - 625
**2205 Duplex** - 2205
**316 SS** - 316
**A105** - 105
**A105N** - 105 Normalized

**M16**

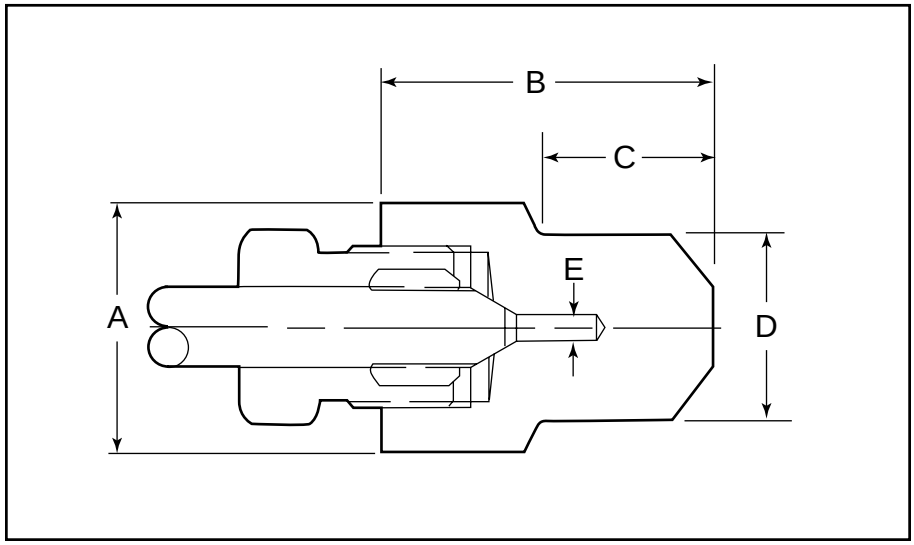
**M4** - 1/4" Medium Pressure
**M6** - 3/8" Medium Pressure
**M9** - 9/16" Medium Pressure
**M12** - 3/4" Medium Pressure
**M16** - 1" Medium Pressure
**H4** - 1/4" High Pressure
**H6** - 3/8" High Pressure
**H9** - 9/16" High Pressure

## Female Medium-Pressure Header Coupling Blind End

| Catalog Number | Material | Pressure psi (bar) | Female M/P | Dimension inches (mm) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | A Flats | B | C | D | E |
| HCFM16W316 | 316 SS | 10,000 (690) | SF1000CX20 | 1.75** (44.45) | 2.62 (66.55) | 1.00 (25.40) | 1.38 (34.93) | 0.56 (14.27) |
| HCFM16W2205 | 2205 Duplex | 15,000 (1034) | SF1000CX10 | 1.75 (44.45) | 3.00 (76.20) | 1.05 (26.59) | 1.31 (33.27) | 0.69 (17.48) |

## Female High-Pressure Header Coupling Blind End

| Catalog Number | Material | Pressure psi (bar) | Female H/P | Dimension inches (mm) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | A Flats | B | C | D | E |
| HCFH9W4130 | SAE-4130 | 15,000 (1034) | F562C | 1.50 (38.10) | 2.31 (58.67) | 1.19 (30.18) | 1.31 (33.27) | 0.19 (4.75) |
| HCFH9W625 | Inconel 625 | 30,000 (2068) | F562C | 1.50 (38.10) | 2.31 (58.67) | 1.19 (30.18) | 1.31 (33.27) | 0.19 (4.75) |
| HCFH16W4130 | SAE-4130 | 20,000 (1379) | SF1000CX43 | 1.75 (44.45) | 3.00 (76.20) | 1.05 (26.59) | 1.32 (33.53) | 0.44 (11.10) |
| HCFH16W625 | Inconel 625 | 22,000 (1551) | SF1000CX43 | 1.75 (44.45) | 3.00 (76.20) | 1.05 (26.59) | 1.32 (33.53) | 0.44 (11.10) |




Gland and collar supplied with high pressure connections.

Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

*All Dimensions for reference only and are subject to change.*

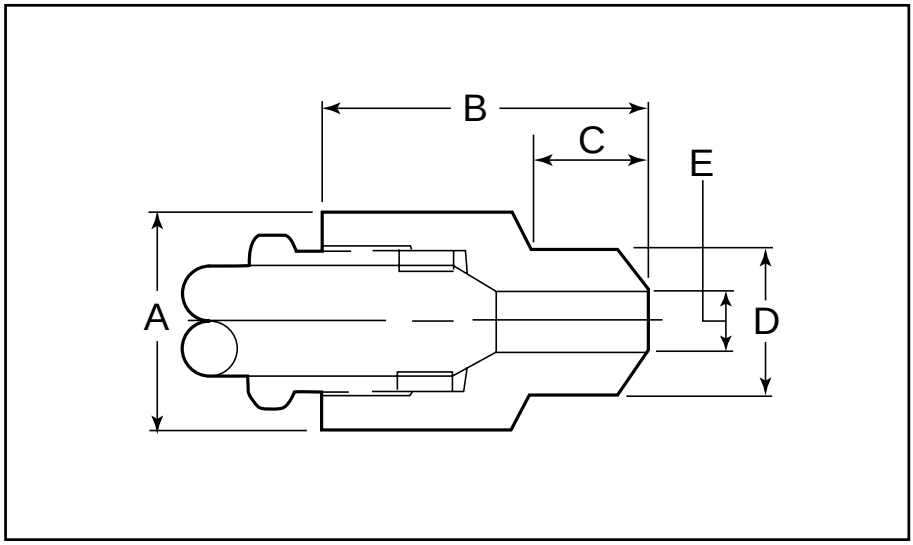
*For prompt service, Autoclave stocks select products. Consult factory.*

## Female Medium-Pressure Header Coupling Drill Through

| Catalog Number | Material | Pressure psi (bar) | Female M/P | Dimension inches (mm) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | A Flats | B | C | D | E |
| HCFM12W4130DT | SAE-4130 | 20,000 (1379) | SF750CX | 1.375 (34.93) | 2.63 (66.68) | 1.05 (26.59) | 1.32 (33.53) | 0.44 (11.10) |
| HCFM16W4130DT | SAE-4130 | 20,000 (1379) | SF1000CX | 1.75 (44.45) | 3.00 (76.20) | 1.05 (26.59) | 1.32 (33.53) | 0.56 (14.27) |
| HCFM16W105DT | SA-105 | 12,000 (827) | SF1000CX | 1.75 (44.45) | 3.00 (76.20) | 1.05 (26.59) | 1.32 (33.53) | 0.56 (14.27) |

## Female High-Pressure Header Coupling Drill Through

| Catalog Number | Material | Pressure psi (bar) | Female H/P | Dimension inches (mm) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | A Flats | B | C | D | E |
| HCFH9W4130DT | SAE-4130 | 20,000 (1379) | F562C | 1.13 (28.58) | 2.44 (61.98) | 1.13 (28.70) | 1.31 (33.27) | 0.36 (9.12) |
| HCFH9W105DT | SA-105 | 20,000 (1379) | F562C | 2.00 (50.80) | 2.00 (50.80) | 0.00 (0.00) | 0.00 (0.00) | 0.19 (4.78) |




Gland and collar supplied with high pressure adapters.

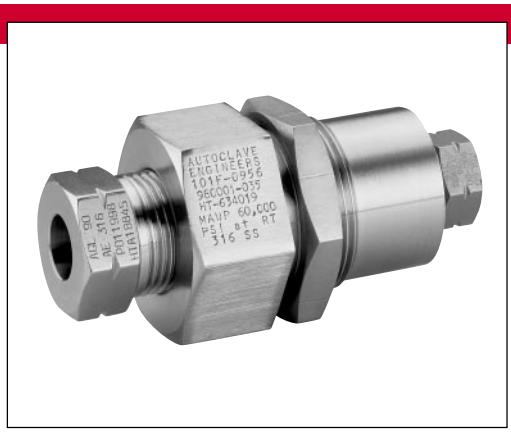
Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

*Note: For pressure rating see ordering procedure.*

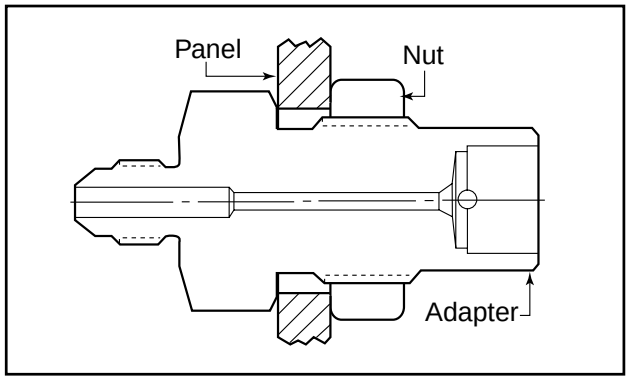
*All Dimensions for reference only and are subject to change.*

*For prompt service, Autoclave stocks select products. Consult factory.*

Autoclave Engineers bulkhead adapters are used to connect tubing or piping of different sizes and configurations through the panel. Bulkhead adapters are machined from cold worked stainless steel. Other material and connections are available. Contact your local Sales Repersentative for optional information.



## Bulkhead Adapter




## Ordering Procedure

Typical catalog number: 20 BA M J16 F H4

| 20 | BA | M | J16 | F | H4 |
|---|---|---|---|---|---|
| Pressure (X 1000 psi) | Bulkhead Adapter | Male Female | Connection | Female Male | Connection |

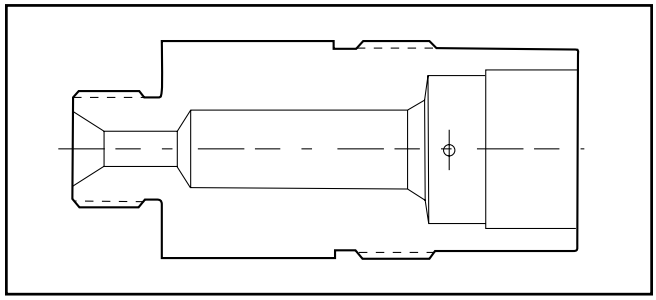
**Available End Connections**

| | | | | |
|---|---|---|---|---|
| **J4** - 1/4" JIC | **L4** - 1/4" Low Pressure | **M4** - 1/4" Medium Pressure | **H4** - 1/4" High Pressure | **P4** - 1/4" NPT |
| **J6** - 3/8" JIC | **L6** - 3/8" Low Pressure | **M6** - 3/8" Medium Pressure | **H6** - 3/8" High Pressure | **P6** - 3/8" NPT |
| **J8** - 1/2" JIC | **L8** - 1/2" Low Pressure | **M9** - 9/16" Medium Pressure | **H9** - 9/16" High Pressure | **P8** - 1/2" NPT |
| **J10** - 5/8" JIC | | **M12** - 3/4" Medium Pressure | **RH9** - 9/16" Reverse High Pressure | |
| **J12** - 3/4" JIC | | **M16** - 1" Medium Pressure | **RH12** - 3/4" Reverse High Pressure | |
| **J16** - 1" JIC | | | **RH16** - 1" Reverse High Pressure | |

Note: Special material adapters may be supplied with four flats in place of standard hex.

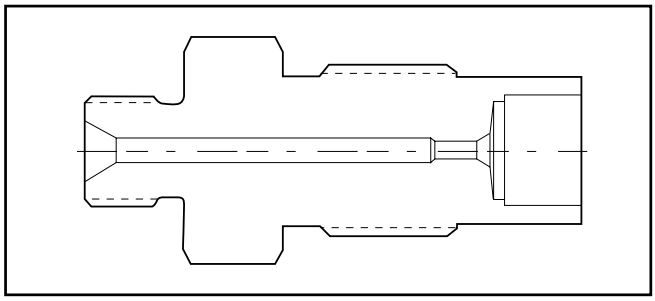
## Reverse High to Medium-Pressure

| Male Connection R/H | AE Medium Pressure - Female Connection | | | | |
|---|---|---|---|---|---|
| | SF250CX | SF375CX | SF562CX | SF750CX | SF1000CX |
| 9/16” | | 20BAMRH9FM6 | 20BAMRH9FM9 | | |
| 3/4” | | | 20BAMRH12FM9 | | 20BAMRH12FM16 |
| 1” | | | | | 20BAMRH16FM16 |



## Reverse High to High Pressure

| Male Connection R/H | AE High Pressure - Female Connection | | | | |
|---|---|---|---|---|---|
| | F250C | F375C | F562C | | |
| 9/16” | 40BAMRH9FH4 | | 40BAMRH9FH9 | | |
| 3/4” | | | 30BAMRH12FH9 | | |
| 1” | | | | | |

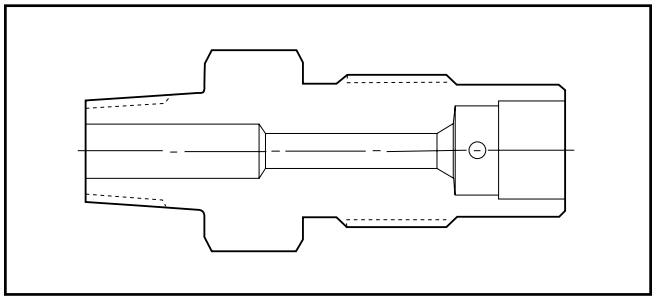


## NPT to Medium Pressure

| Male Connection NPT | AE Medium Pressure - Female Connection | | | | |
|---|---|---|---|---|---|
| | SF250CX | SF375CX | SF562CX | SF750CX | SF1000CX |
| 1/4” | | | | | |
| 3/8” | | 10BAMP6FM6 | | | |
| 1” | | | | | |

Gland and collar supplied with adapter.

Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

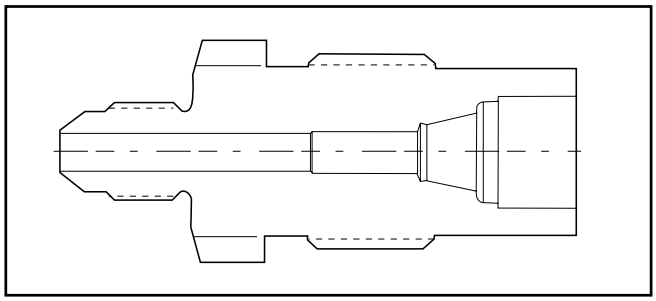


Note: For pressure rating see ordering procedure. *All Dimensions for reference only and are subject to change.*

*For prompt service, Autoclave stocks select products. Consult factory.*

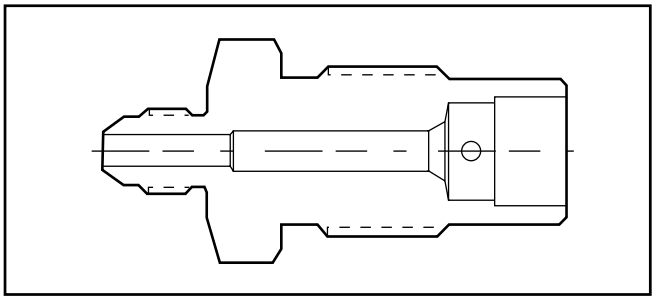
## JIC to Low Pressure

| Male Connection JIC | AE Low Pressure - Female Connection | | | | |
|---|---|---|---|---|---|
| | SW250 | SW375 | SW500 | | |
| 1/4” | 15BAMJ4FL4 | | | | |
| 3/8” | | | | | |
| 1/2” | | | | | |



## JIC to Medium Pressure

| Male Connection JIC | AE Medium Pressure - Female Connection | | | | |
|---|---|---|---|---|---|
| | SF250CX | SF375CX | SF562CX | SF750CX | SF1000CX |
| 1/4” | 20BAMJ4FM4 | 20BAMJ4FM6 | | | |
| 3/8” | 20BAMJ6FM4 | 20BAMJ6FM6 | 20BAMJ6FM9 | | |
| 1/2” | | 20BAMJ8FM6 | 20BAMJ8FM9 | 20BAMJ8FM12 | |

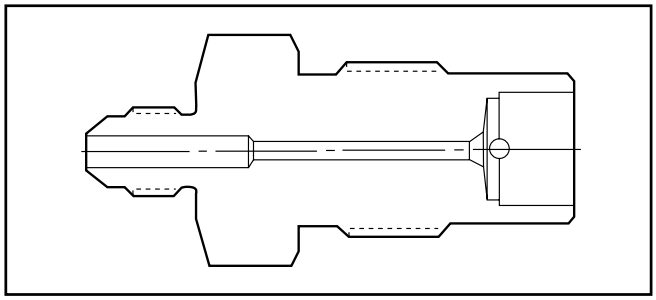


## JIC to High Pressure

| Male Connection JIC | AE High Pressure - Female Connection | | | | |
|---|---|---|---|---|---|
| | F250C | F375C | F562C | | |
| 1/4” | 20BAMJ4FH4 | | | | |
| 3/8” | | | | | |
| 1/2” | | | | | |

Gland and collar supplied with adapter.

Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.



Note: For pressure rating see ordering procedure. *All Dimensions for reference only and are subject to change.*

*For prompt service, Autoclave stocks select products. Consult factory.*

## Reverse High Pressure to Medium Pressure

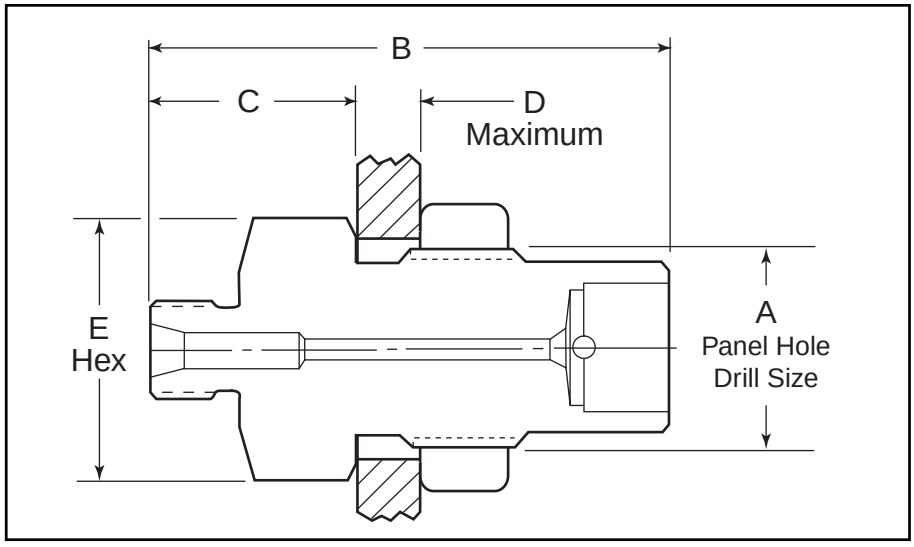
| Catalog Number | Male R/H | Female M/P | Dimension inches (mm) | | | | |
|---|---|---|---|---|---|---|---|
| | | | A Panel Hole | B | C | D Max | E Hex |
| 20BAMRH9FM6 | 9/16” | SF375CX | 0.94 (23.88) | 2.63 (66.80) | 1.13 (28.70) | 0.38 (9.65) | 1.00 (25.40) |
| 20BAMRH9FM9 | 9/16” | SF562CX | 1.13 (28.58) | 3.00 (76.20) | 1.28 (32.51) | 0.38 (9.65) | 1.38 (34.93) |
| 20BAMRH12FM9 | 3/4” | SF562CX | 1.13 (28.58) | 3.13 (79.50) | 1.41 (35.81) | 0.38 (9.65) | 1.38 (34.93) |
| 20BAMRH12FM16 | 3/4” | SF1000CX | 1.94 (49.28) | 4.26 (108.20) | 2.13 (54.10) | 0.38 (9.65) | 2.13 (54.10) |
| 20BAMRH16FM16 | 1” | SF1000CX | 1.94 (49.28) | 4.41 (112.01) | 2.28 (57.91) | 0.38 (9.65) | 2.13 (54.10) |

## Reverse High Pressure to High Pressure

| Catalog Number | Male R/H | Female H/P | Dimension inches (mm) | | | | |
|---|---|---|---|---|---|---|---|
| | | | A Panel Hole | B | C | D Max | E Hex |
| 40BAMRH9FH4 | 9/16” | F250C | 0.94 (23.88) | 2.50 (63.50) | 1.00 (25.40) | 0.38 (9.65) | 1.00 (25.40) |
| 40BAMRH9FH9 | 9/16” | F562C | 1.69 (42.85) | 3.38 (85.85) | 1.50 (38.10) | 0.38 (9.65) | 1.88 (47.75) |
| 30BAMRH12FH9 | 3/4” | F562C | 1.69 (42.85) | 3.50 (88.90) | 1.62 (41.15) | 0.38 (9.65) | 1.88 (47.75) |

## Pipe to Medium Pressure

| Catalog Number | Male NPT | Female M/P | Dimension inches (mm) | | | | |
|---|---|---|---|---|---|---|---|
| | | | A Panel Hole | B | C | D Max | E Hex |
| 10BAMP6FM6 | 3/8” | SF375CX | 0.94 (23.88) | 2.75 (69.85) | 1.25 (31.75) | 0.38 (9.53) | 1.00 (25.40) |




Gland and collar supplied with adapter.

Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

Note: For pressure rating see ordering procedure.
*All Dimensions for reference only and are subject to change.*

*For prompt service, Autoclave stocks select products. Consult factory.*

## JIC to Low Pressure

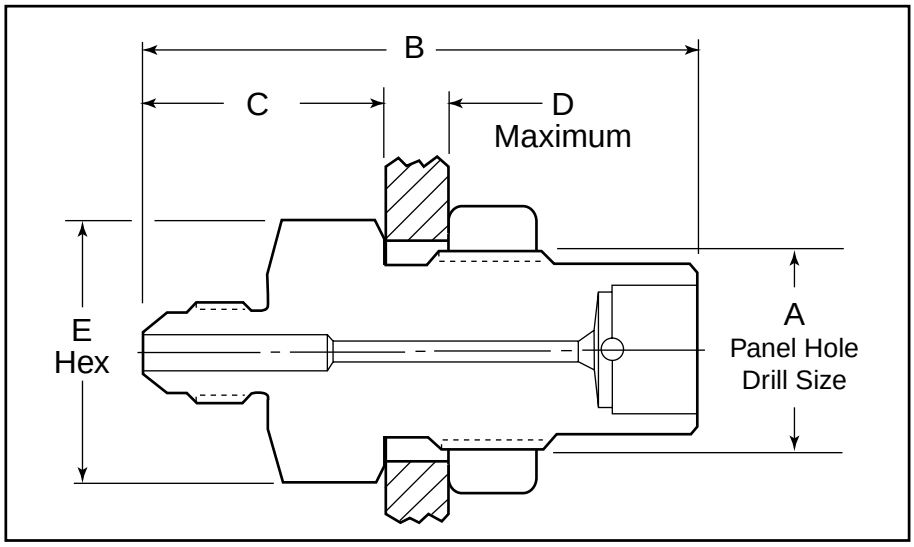
| Catalog Number | Male JIC | Female LP | Dimension inches (mm) | | | | |
|---|---|---|---|---|---|---|---|
| | | | A Panel Hole | B | C | D Max | E Hex |
| 15BAMJ4FL4 | 1/4” | SW250 | 0.94 (23.88) | 2.29 (58.04) | 0.91 (23.11) | 0.38 (9.65) | 1.00 (25.40) |

## JIC to Medium Pressure

| Catalog Number | Male JIC | Female MP | Dimension inches (mm) | | | | |
|---|---|---|---|---|---|---|---|
| | | | A Panel Hole | B | C | D Max | E Hex |
| 20BAMJ4FM4 | 1/4” | SF250CX | 0.81 (20.62) | 2.25 (57.15) | 0.91 (23.11) | 0.38 (9.53) | 1.00 (25.40) |
| 20BAMJ4FM6 | 1/4” | SF375CX | 0.81 (20.62) | 2.44 (61.93) | 0.94 (23.88) | 0.38 (9.53) | 1.00 (25.40) |
| 20BAMJ6FM4 | 3/8” | SF250CX | 0.81 (20.62) | 2.25 (57.15) | 0.91 (23.11) | 0.38 (9.53) | 1.00 (25.40) |
| 20BAMJ6FM6 | 3/8” | SF375CX | 0.94 (23.88) | 2.44 (61.98) | 0.94 (23.88) | 0.38 (9.53) | 1.00 (25.40) |
| 20BAMJ6FM9 | 3/8” | SF562CX | 1.13 (28.58) | 2.75 (69.85) | 1.16 (29.46) | 0.38 (9.53) | 1.38 (34.93) |
| 20BAMJ8FM6 | 1/2” | SF375CX | 0.81 (20.62) | 2.53 (64.26) | 1.03 (26.16) | 0.38 (9.53) | 1.00 (25.40) |
| 20BAMJ8FM9 | 1/2” | SF562CX | 1.13 (28.58) | 3.00 (76.20) | 1.41 (35.69) | 0.38 (9.53) | 1.38 (34.93) |
| 20BAMJ8FM12 | 1/2” | SF750CX | 1.69 (42.85) | 3.13 (79.38) | 1.41 (35.69) | 0.38 (9.53) | 1.88 (47.75) |

## JIC to High Pressure

| Catalog Number | Male JIC | Female HP | Dimension inches (mm) | | | | |
|---|---|---|---|---|---|---|---|
| | | | A Panel Hole | B | C | D Max | E Hex |
| 20BAMJ4FH4 | 1/4” | F250C | 0.81 (20.62) | 2.44 (61.90) | 1.06 (26.97) | 0.38 (9.53) | 1.00 (25.40) |




Gland and collar supplied with adapter.

Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

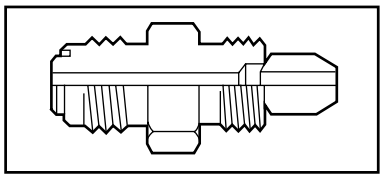
Note: For pressure rating see ordering procedure.
*All Dimensions for reference only and are subject to change.*

*For prompt service, Autoclave stocks select products. Consult factory.*

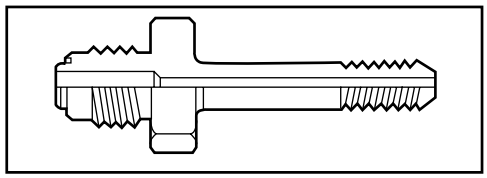
# Adapters/Couplings - Special Adapters

Autoclave Engineers also offers a line of components that assist in adapting into and out of specialized connections with Autoclave Medium Pressure products. Along with the adapters shown, Autoclave can provide other special adapters to fill your requirements. Contact your local Sales representative for information.

## AE Medium Pressure (Male)



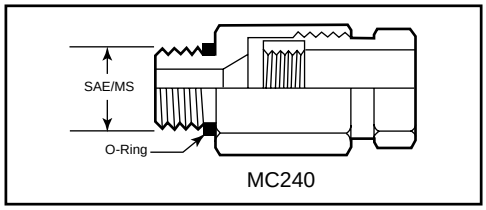
KC105 - 2 Piece



KC105 - 1 Piece

| Connection Type | Tube Size (inches) | AE Medium Pressure (Male) | | | | |
|---|---|---|---|---|---|---|
| | | SF250CX | SF375CX | SF562CX | SF750CX | SF1000CX |
| KC105 (2 piece) | 1/4 | M44KC9B | M46KC9B | M49KC9B | | |
| | 3/8 | M64KC9B | M66KC9B | M69KC9B | | |
| | 1/2 | | M86KC9B | M89KC9B | M812KC9B | M816KC9B |
| | 5/8 | | | | M1012KC9B | M1016KC9B |
| | 3/4 | | M126KC9B | | M1212KC9B | M1216KC9B |
| | 1 | | | | | M1616KC9B |
| KC105 (1 piece) | 1/4 | M44KC9B-1 | | | | |
| | 3/8 | | M66KC9B-1 | | | |
| | 1/2 | | | M89KC9B-1 | | |
| | 3/4 | | | M129KC9B-1 | | |

## AE Medium Pressure (Female) SAE/MS Male




MC240 (SAE/MS Straight thread Boss)

Note: O-rings are standard Buna-N.

| Connection Type | SAE/MS Thread Size (inches) | AE Medium Pressure (Female) | | | | |
|---|---|---|---|---|---|---|
| | | SF250CX | SF375CX | SF562CX | SF750CX | SF1000CX |
| MC240 (SAE/MS) | 5/16-24 | M24MC6B | M26MC6B | | | |
| | 7/16-20 | M44MC6B | M46MC6B | M49MC6B | | |
| | 9/16-18 | M64MC6B | M66MC6B | M69MC6B | | |
| | 3/4-16 | | M86MC6B | M89MC6B | M812MC6B | |
| | 7/8-14 | | | | M1012MC6B | M1016MC6B |
| | 1 1/16 - 12 | | | | M1212MC6B | M1216MC6B |
| | 1 5/16-12 | | | | | M1616MC6B |

Note: KC105 adapter ends are manufactured to NASA standard. For pressure ratings and additional information contact your local sales representative.

# Adapters/Couplings - Female Tube Caps / Gauge Connectors

## Tube Caps

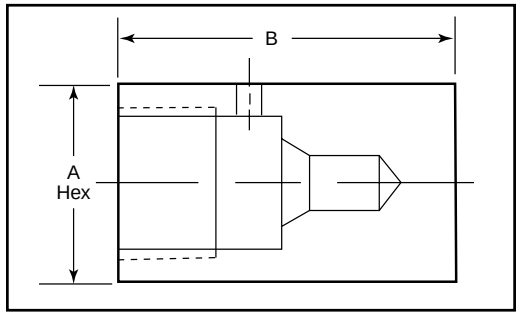
Autoclave Engineers offers a line of tube caps used to seal the ends of tubing. Caps are used when pressure testing lengths of tubes or capping off sections of systems for isolation or pressure tests.


## Female Tube Caps - Low Pressure

| Catalog Number | Connection Type | Outside Diameter Tube-Inches | Pressure Rating psi (bar)* | Dimension inches (mm) | |
|---|---|---|---|---|---|
| | | | | A Hex | B |
| SWTC2 | W125 | 1/8 | 15000 (1034.20) | 0.50 (12.7) | 0.63 (15.9) |
| SWTC4 | SW250 | 1/4 | 15000 (1034.20) | 0.63 (15.9) | 1.00 (25.4) |
| SWTC6 | SW375 | 3/8 | 15000 (1034.20) | 0.75 (19.1) | 1.09 (27.8) |
| SWTC8 | SW500 | 1/2 | 10000 (689.5) | 1.00 (25.4) | 1.25 (31.8) |

## Female Tube Caps - Medium Pressure

| Catalog Number | Connection Type | Outside Diameter Tube-Inches | Pressure Rating psi (bar)* | Dimension inches (mm) | |
|---|---|---|---|---|---|
| | | | | A Hex | B |
| 20TC4X | SF250CX | 1/4 | 20000 (1378.9) | 0.63 (15.9) | 0.81 (20.6) |
| 20TC6X | SF375CX | 3/8 | 20000 (1378.9) | 0.75 (19.1) | 1.13 (28.6) |
| 20TC9X | SF562CX | 9/16 | 20000 (1378.9) | 1.00 (25.4) | 1.38 (34.9) |
| 20TC12X | SF750CX | 3/4 | 20000 (1378.9) | 1.38 (34.9) | 1.75 (44.5) |
| 20TC16X | SF1000CX | 1 | 20000 (1378.9) | 1.75 (44.5) | 2.25 (57.1) |




Tube cap configuration may vary from outline shown.

## Female Tube Caps - High Pressure Tube Caps

| Catalog Number | Connection Type | Outside Diameter Tube-Inches | Pressure Rating psi (bar)* | Dimension inches (mm) | |
|---|---|---|---|---|---|
| | | | | A Hex | B |
| 43CT16X | SF1000CX-43 | 1 | 43000 (29647) | 1.75 (44.5) | 2.25 (57.1) |
| | | | | | |
| 60TC4C | F250C | 1/4 | 60000 (4136.7) | 0.75 (19.1) | 0.75 (19.1) |
| 60TC6C | F375C | 3/8 | 60000 (4136.7) | 1.00 (25.4) | 1.13 (28.6) |
| 60TC9C | F562C | 9/16 | 60000 (4136.7) | 2.25 (57.1) | 1.38 (34.9) |

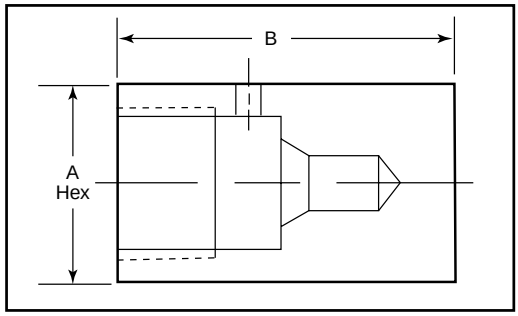
*Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.Note: All tube caps are furnished with connection components unless otherwise specified. All dimensions for reference only and subject to change.

*For prompt service, Autoclave stocks select products. Consult factory.*

## Female Tube Caps - JIC

| Catalog Number | Connection Type | Outside Diameter Tube-Inches | Pressure Rating psi (bar) | Dimension inches (mm) | |
|---|---|---|---|---|---|
| | | | | A Hex | B |
| 20JC4 | JIC | 1/4 | 20000 (1378.9) | 0.75 (19.1) | 1.00 (25.4) |
| 20JC6 | JIC | 3/8 | 20000 (1378.9) | 0.94 (23.8) | 1.13 (28.6) |
| 20JC8 | JIC | 1/2 | 20000 (1378.9) | 1.19 (30.1) | 1.31 (58.6) |

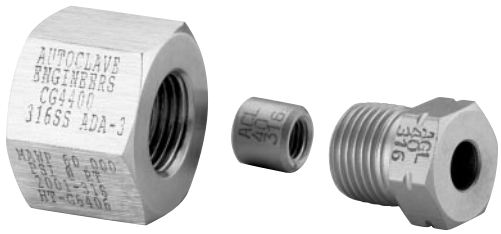
* Maximum pressure rating must not exceed rating of tubing used.
Note: All tube caps are furnished with connection components unless otherwise specified.
All dimensions for reference only and subject to change.




Tube cap configuration may vary from outline shown.

## Gauge Connectors

Autoclave Engineers offers a line of gauge connectors used to connect pressure lines to pressure gauges. Gauge connectors can be connected to gauges with tapered and straight pipe threads, or high-pressure connections.




## Gauge Connectors

| To Fit This Gauge Connection ▶ | | | 1/4" NPT | 1/2" NPT | 1/2" NPS |
|---|---|---|---|---|---|
| Seal Type | | | Tube Cone | Tube Cone | Gasket |
| With This Female Tubing Connection ▼ | | | 60,000 PSI (4136.8 bar) | 60,000 PSI (4136.8 bar) | 60,000 PSI (4136.8 bar) |
| High Pressure | 1/4" | F250C | CG4400 | CG4800 | CG8400 |
| | 9/16" | F562C | | CG9800 | CG8900 |

## Gauge Connectors

| To Fit This Gauge Connection ▶ | | | 1/4" High Pressure F250C |
|---|---|---|---|
| Seal Type | | | H.P. Cone |
| With This Male Tubing Connection ▼ | | | 20,000 PSI (1378.9 bar) |
| Medium Pressure | 9/16" | SF562CX | 101F-1707 |

NPT: National Pipe Thread
NPS: National Straight Pipe Thread

Note: For gauge connector without collars and glands, add the following suffix: **-WO**
For gauge connector for sour gas applications, add the following suffix: **-SOG or -SOGWO**

| Catalog Number | Gauge Connection Type | Outside Diameter Tube-Inches | Pressure Rating psi (bar) | Dimension inches (mm) | | |
|---|---|---|---|---|---|---|
| | | | | A Hex | B | |
| CG4400 | Tube Cone | 1/4 | 60000 (4136.7) | 1.00 (25.4) | .813 (20.6) | See Figure 1 |
| CG4800 | Tube Cone | 1/4 | 60000 (4136.7) | 1.19 (30.1) | .94 (23.8) | |
| CG9800 | Tube Cone | 9/16 | 60000 (4136.7) | 1.50 (38.1) | 1.25 (31.8) | |
| | | | | | | |
| CG8400 | Gasket | 1/4 | 60000 (4136.7) | 1.19 (30.1) | 1.19 (30.1) | See Figure 2 |
| CG8900 | Gasket | 9/16 | 60000 (4136.7) | 1.38 (34.9) | 2.25 (57.1) | |
| | | | | | | |
| 101F-1707 | 1/4" High Pressure | 9/16 | 20000 (1379) | 0.63 (15.9) | 2.75 (69.9) | See Figure 3 |

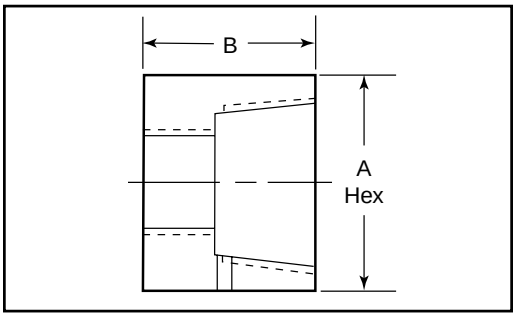



Figure 1

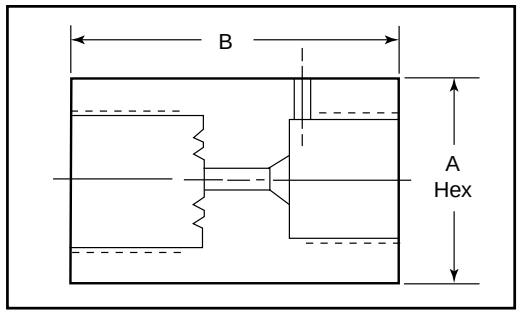



Figure 2

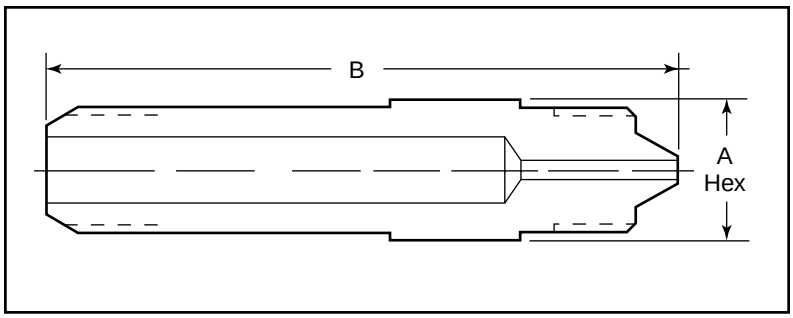



Figure 3

*Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

Note: For pressure rating see selection chart. These adapters are not intended as couplings.

*For prompt service, Autoclave stocks select products. Consult factory.*

**! WARNING !**

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# Ball Valve

# Index

### 2-Way Ball Valves:
- 1/4”, 3/8”, & 1/2” pressures to 20,000 psi. (1379 bar)

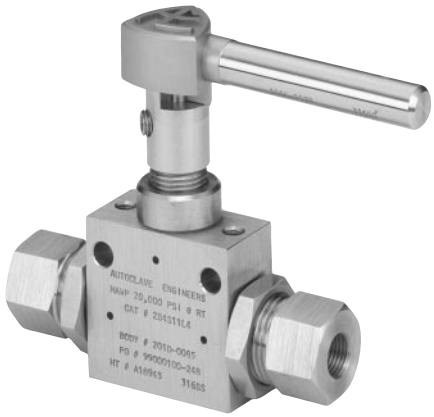
### 3-Way Ball Valves: Standard and Diverter
- 3/16”, 3/8”, & 1/2” pressures to 20,000 psi. (1379 bar)

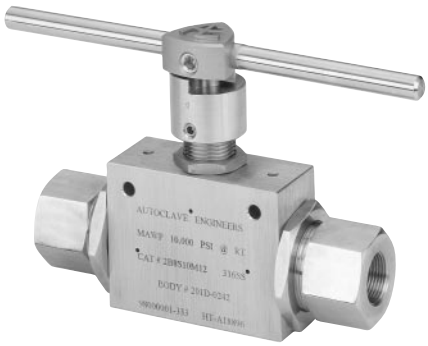
### 4-Way Ball Valves:
- 3/8” pressures to 10,000 psi. (689 bar)

### Subsea Ball Valves:
- 3/16”, 1/4”, 3/8”, & 1/2” pressures to 20,000 psi. (1379 bar)

### Ball Valve Actuators:
- Air and Electric operators

### Ball Valve Options/Details:
- High Temperature Seals, Materials, Limit Switches, Handles, Lockouts, and Connection Details.





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Ball Valve - Index

# Ball Valves

## 2-Way Series

*Pressures to 20,000 psi (1379 bar)*

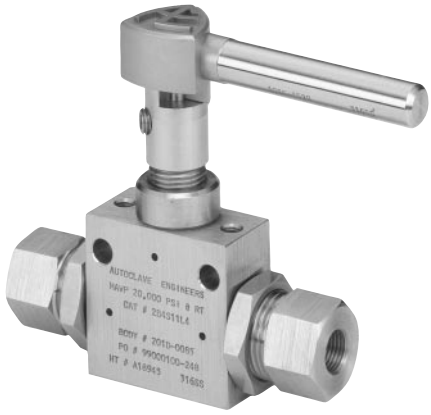
Autoclave Engineers high-pressure ball valves have been designed to provide superior quality for maximum performance within a variety of valve styles, sizes, and process connections. Some of the more unique design innovations include an integral one-piece trunnion mounted style ball and stem that eliminates the shear failure common in two piece designs, re-torqueable seat glands that result in longer seat life, and a low friction stem seal that reduces actuation torque and enhances cycle life.

These ball valves can also be modified to incorporate the use of special materials, seals for high temperature applications, subsea models, and valve actuators.

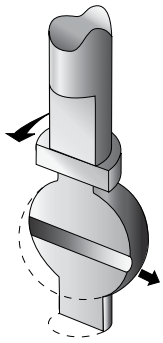
When it comes to high-pressure applications, these ball valves with the associated high-pressure components, provide the critical performance demanded by the high pressure market.

### AE Ball Valve Features:

- One-piece, trunnion mounted style, stem design eliminates shear failure and reduces the effects of side loading found in two piece designs.
- Re-torqueable seat glands for longer seat life.
- PEEK seats offer excellent resistance to chemicals, heat, and wear/abrasion.
- Full-port flow path minimizes pressure drop.
- 316 cold worked stainless steel construction.
- Low friction pressure assisted graphite filled Teflon stem seal increases cycle life and reduces operating torque.
- Quarter turn from open to close with positive stop.
- Viton o-rings for operation from 0°F (-17.8°C) to 400°F (204°C).
- Optional o-rings available for high-temperature applications.
- Optional wetted materials.
- Wide selection of tube and pipe end fittings available.
- Electric and pneumatic actuator options.



Flow Configuration



**Two-Way Shut-Off**

### Applications:

- Laboratories
- Test Stands
- Control Panels
- Chemical Research
- Pilot Plants
- Water Blast Pumping Units
- High volume chemical injection skids.

Autoclave Engineers

Fluid Components
Division of Snap-tite, Inc.

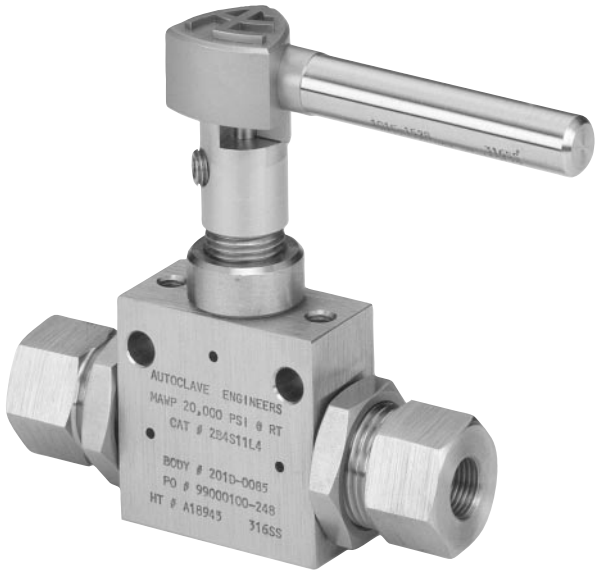
*www.autoclaveengineers.com*

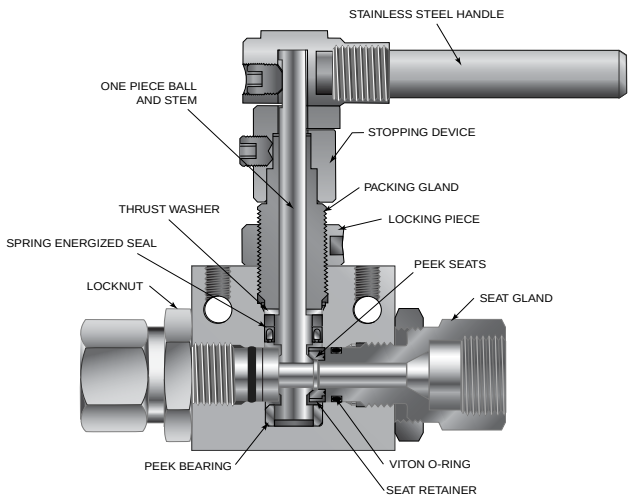
# Ball Valves - 2-Way Series (1/4" Orifice)

## Pressures to 20,000 psi (1379 bar) .250" (6.35mm) Orifice

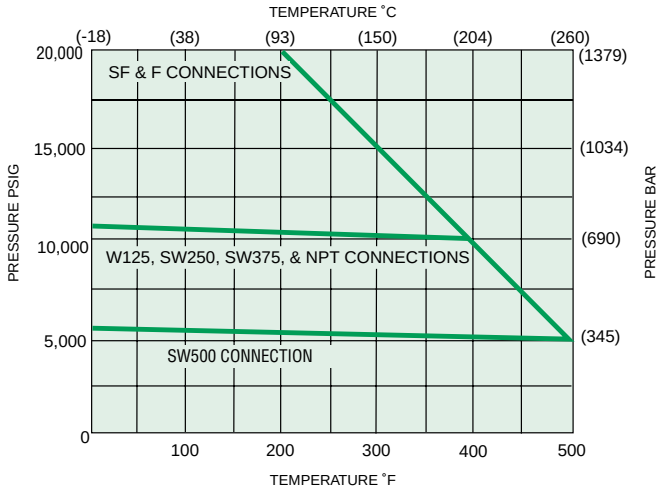
| Connection | MAWP @ Room Temperature | Minimum Orifice inches(mm) |
|---|---|---|
| W125 | 15,000 psi (1034 bar) | .094 (2.39) |
| SW250 | 15,000 psi (1034 bar) | .128 (3.25) |
| SW375 | 15,000 psi (1034 bar) | .250 (6.35) |
| SW500 | 10,000 psi (690 bar) | .250 (6.35) |
| SF250CX20 | 20,000 psi (1379 bar) | .109 (2.77) |
| SF375CX20 | 20,000 psi (1379 bar) | .203 (5.16) |
| SF562CX20 | 20,000 psi (1379 bar) | .250 (6.35) |
| F250C | 20,000 psi (1379 bar) | .094 (2.39) |
| F375C | 20,000 psi (1379 bar) | .125 (3.17) |
| F562C | 20,000 psi (1379 bar) | .188 (4.77) |
| 1/8" NPT | 10,000 psi (690 bar) | .250 (6.35) |
| 1/4" NPT | 10,000 psi (690 bar) | .250 (6.35) |
| 3/8" NPT | 10,000 psi (690 bar) | .250 (6.35) |
| 1/2" NPT | 10,000 psi (690 bar) | .250 (6.35) |
| | Valve $C_V$=1.51 | |

MAWP: Maximum Allowable Working Pressure




PRESSURE TEMPERATURE RATINGS




*pressure ratings are determined by the end connections chosen, see chart.

NOTE: Ball valves are not recommended for critical gas applications such as Hydrogen, Helium or other small molecular gases.

## Ordering Procedure

For complete information on available end connections and material options, see next page. 2-way ball valves are furnished complete with tube or pipe connections.

Typical catalog number: **2B 4 S 20 M9 — XXX**

**2B**
**Valve Series**
**2B:** 2-way

**4**
**Ball Orifice Diameter**
**4**-1/4" (6.35 mm)

**S**
**Material**
**S** -316SS
(For material options contact factory)

**20**
**Pressure (X 1000 psi)**

**M9**
**End Connection**
**M9** -SF562CX20
(See Chart on next page)

**XXX**
**Options**
**HT** - High Temperature
(Ball Valve Actuators, see next page)

## End Connection Options

| Catalog Number | End Connection Number | Connection | MAWP @ Room Temperature | Hex Inches(mm) |
|---|---|---|---|---|
| 2B4S15L2 | L2 | W125 | 15,000 psi (1034 bar) | 1 (25.40) |
| 2B4S15L4 | L4 | SW250 | 15,000 psi (1034 bar) | 1 (25.40) |
| 2B4S15L6 | L6 | SW375 | 15,000 psi (1034 bar) | 1 (25.40) |
| 2B4S10L8 | L8 | SW500 | 10,000 psi (690 bar) | 1 (25.40) |
| 2B4S20M4 | M4 | SF250CX20 | 20,000 psi (1379 bar) | 1 (25.40) |
| 2B4S20M6 | M6 | SF375CX20 | 20,000 psi (1379 bar) | 1 (25.40) |
| 2B4S20M9 | M9 | SF562CX20 | 20,000 psi (1379 bar) | 1 (25.40) |
| 2B4S20H4 | H4 | F250C | 20,000 psi (1379 bar) | 1 (25.40) |
| 2B4S20H6 | H6 | F375C | 20,000 psi (1379 bar) | 1 (25.40) |
| 2B4S20H9 | H9 | F562C | 20,000 psi (1379 bar) | 1.38 (35.05) |
| 2B4S10P2 | P2 | 1/8” NPT | 10,000 psi (690 bar) | 1 (25.40) |
| 2B4S10P4 | P4 | 1/4” NPT | 10,000 psi (690 bar) | 1 (25.40) |
| 2B4S10P6 | P6 | 3/8” NPT | 10,000 psi (690 bar) | 1 (25.40) |
| 2B4S10P8 | P8 | 1/2” NPT | 10,000 psi (690 bar) | 1.38 (35.05) |

MAWP: Maximum Allowable Working Pressure

See ball valve option/details section for end connection details, material, and high temperature options.

## Ball Valve Options

**Pneumatic Actuator**

AO - Air-to-open/Spring to close
AOC - Air-to-open-and-close (double action)

**Electric Actuator**

EO1 - 120 volt AC 50/60 Hz
EO2 - 220 volt AC 50/60 Hz

**Actuator Operating Temperature:**

Pneumatic: -20˚F to 175˚F (-29˚C to 79˚C)
Electric: -20˚F to 160˚F (-29˚C to 71˚C)

**High Temperature Option:**

HT - for media temperature up to 500˚F (260˚C)

See ball valve actuator section for full description, additional information, and options.

## Valve Maintenance

**Repair Kits:** add “**R**” to the front of valve catalog first 4 numbers for proper repair kit. (Example: **R2B4S**)

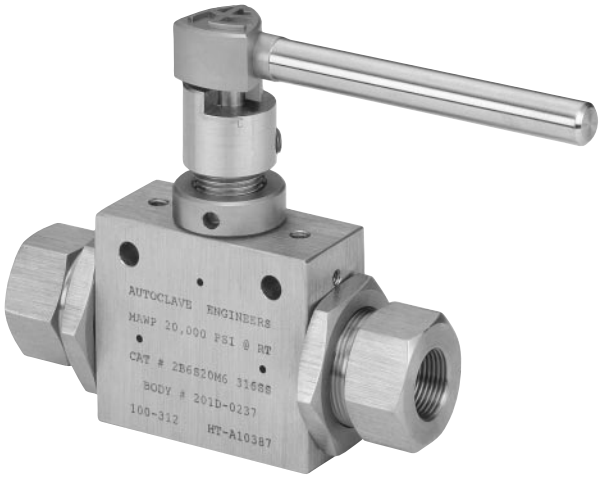
Consult your Autoclave representative for pricing on repair kits. Refer to the Operation and Maintenance manual for proper maintenance procedures.

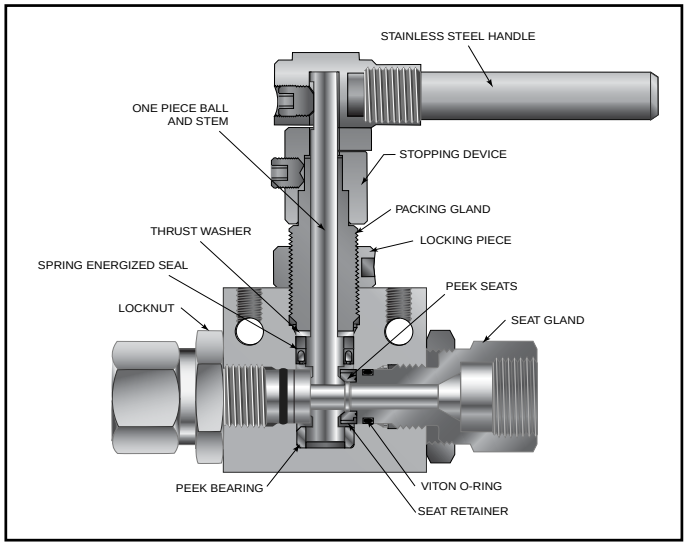
# Ball Valves - 2-Way Series (3/8" Orifice)

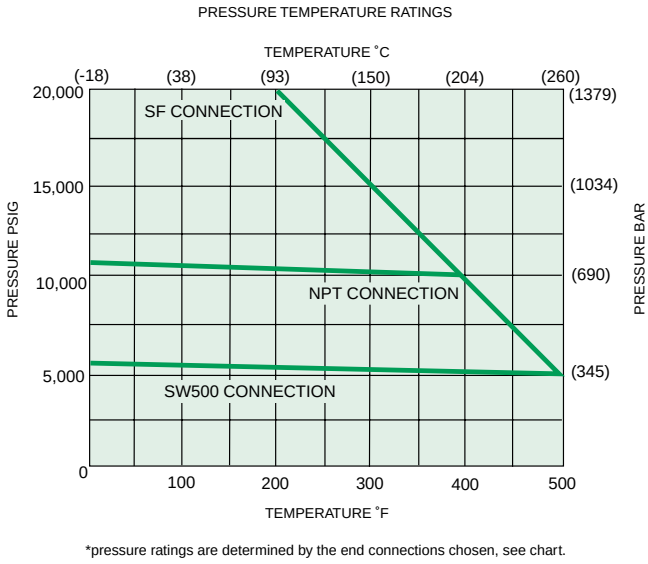
## Pressures to 20,000 psi (1379 bar) .375" (9.52mm) Orifice

| Connection | MAWP @ Room Temperature | Minimum Orifice inches(mm) |
|---|---|---|
| SW500 | 10,000 psi (690 bar) | .375 (9.52) |
| SF375CX20 | 20,000 psi (1379 bar) | .203 (5.16) |
| SF562CX20 | 20,000 psi (1379 bar) | .312 (7.92) |
| SF750CX20 | 20,000 psi (1379 bar) | .375 (9.52) |
| 1/4" NPT | 10,000 psi (690 bar) | .375 (9.52) |
| 3/8" NPT | 10,000 psi (690 bar) | .375 (9.52) |
| 1/2" NPT | 10,000 psi (690 bar) | .375 (9.52) |
| | Valve $C_V$=3.51 | |

MAWP: Maximum Allowable Working Pressure




*pressure ratings are determined by the end connections chosen, see chart.

NOTE: Ball valves are not recommended for critical gas applications such as Hydrogen, Helium or other small molecular gases.

## Ordering Procedure

For complete information on available end connections and material options, see next page. 2-way ball valves are furnished complete with tube or pipe connections.

Typical catalog number: **2B 6 S 20 M9**

**2B**
**Valve Series**
**2B:** 2-way

**6**
**Ball Orifice Diameter**
**6**-3/8" (9.52 mm)

**S**
**Material**
**S** - 316SS
(For material options contact factory)

**20**
**Pressure (X 1000 psi)**

**M9**
**End Connection**
**M9** -SF562CX20
(See Chart on next page)

—

**XXX**
**Options**
**HT** - High Temperature
(Ball Valve Acutators, see next page.)

## End Connection Options

| Catalog Number | End Connection Number | Connection | MAWP @ Room Temperature | Hex Inches(mm) |
|---|---|---|---|---|
| 2B6S10L8 | L8 | SW500 | 10,000 psi (690 bar) | 1.38 (35.05) |
| 2B6S20M6 | M6 | SF375CX20 | 20,000 psi (1379 bar) | 1.38 (35.05) |
| 2B6S20M9 | M9 | SF562CX20 | 20,000 psi (1379 bar) | 1.38 (35.05) |
| 2B6S20M12 | M12 | SF750CX20 | 20,000 psi (1379 bar) | 1.38 (35.05) |
| 2B6S10P4 | P4 | 1/4" NPT | 10,000 psi (690 bar) | 1.38 (35.05) |
| 2B6S10P6 | P6 | 3/8" NPT | 10,000 psi (690 bar) | 1.38 (35.05) |
| 2B6S10P8 | P8 | 1/2" NPT | 10,000 psi (690 bar) | 1.38 (35.05) |

MAWP: Maximum Allowable Working Pressure

See ball valve option/details section for end connection details, material, and high temperature options.

## Ball Valve Options

**Pneumatic Actuator**

AO - Air-to-open/Spring to close
AOC - Air-to-open-and-close (double action)

**Electric Actuator**

EO1 - 120 volt AC 50/60 Hz
EO2 - 220 volt AC 50/60 Hz

**Actuator Operating Temperature:**

Pneumatic: -20˚F to 175˚F (-29˚C to 79˚C)
Electric: -20˚F to 160˚F (-29˚C to 71˚C)

**High Temperature Option:**

HT - for media temperature up to 500˚F (260˚C)

See ball valve actuator section for full description, additional information, and options.

## Valve Maintenance

**Repair Kits:** add "**R**" to the front of valve catalog first 4 numbers for proper repair kit. (Example: **R2B6S**)

Consult your Autoclave representative for pricing on repair kits. Refer to the Operation and Maintenance manual for proper maintenance procedures.

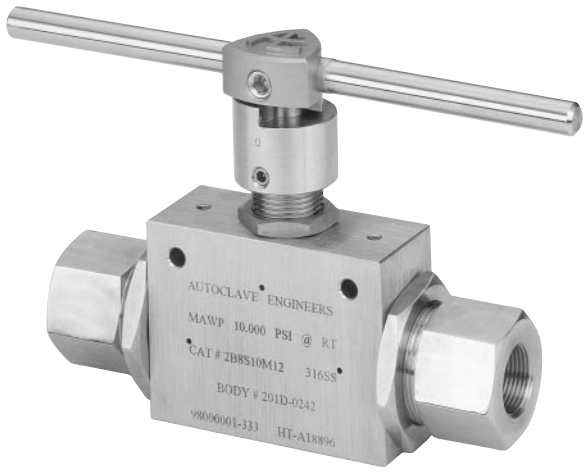
# Ball Valves - 2-Way Series (1/2" Orifice)

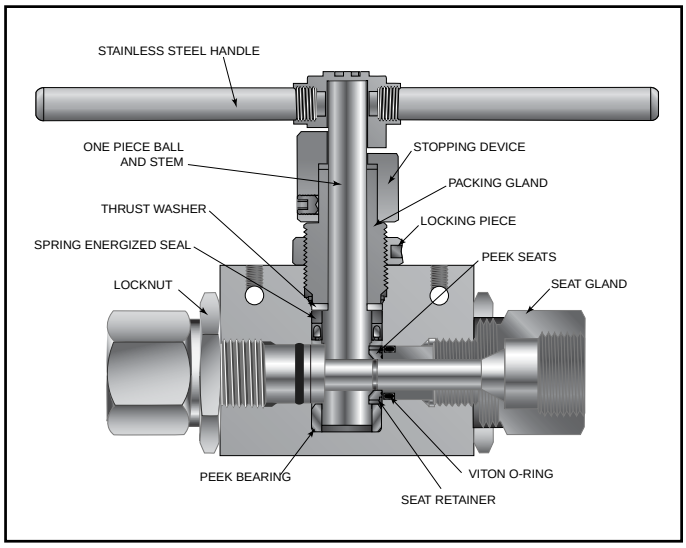
## Pressures to 10,000 psi (690 bar) .500" (12.7mm) Orifice

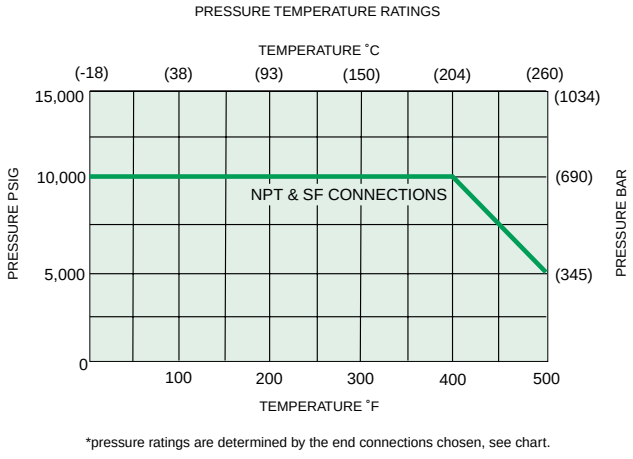
| Connection | MAWP @ Room Temperature | Minimum Orifice Inches (mm) |
|---|---|---|
| SF750CX20 | 10,000 psi (690 bar) | .500 (12.70) |
| SF1000CX20 | 10,000 psi (690 bar) | .500 (12.70) |
| 3/4" NPT | 10,000 psi (690 bar) | .500 (12.70) |
| 1" NPT | 10,000 psi (690 bar) | .500 (12.70) |

Valve $C_V$=10.20

MAWP: Maximum Allowable Working Pressure




*pressure ratings are determined by the end connections chosen, see chart.

NOTE: Ball valves are not recommended for critical gas applications such as Hydrogen, Helium or other small molecular gases.

## Ordering Procedure

For complete information on available end connections and material options, see next page. 2-way ball valves are furnished complete with tube or pipe connections.

Typical catalog number: **2B 8 S 10 M12**

**2B**
**Valve Series**
**2B:** 2-way

**8**
**Ball Orifice Diameter**
**8**-1/2" (12.7 mm)

**S**
**Material**
**S** -316SS
(For material options contact factory)

**10**
**Pressure (X 1000 psi)**

**M12**
**End Connection**
**M12** - SF750CX20
(See Chart on next page)

—

**XXX**
**Options**
**HT** - High Temperature
(Ball Valve Acutators, see next page.)

## End Connection Options

| Catalog Number | End Connection Number | Connection | MAWP @ Room Temperature | Hex Inches(mm) |
|---|---|---|---|---|
| 2B8S10M12 | M12 | SF750CX20 | 10,000 psi (690 bar) | 1.75 (44.5) |
| 2B8S10M16 | M16 | SF1000CX20 | 10,000 psi (690 bar) | 1.75 (44.5) |
| 2B8S10P12 | P12 | 3/4" NPT | 10,000 psi (690 bar) | 1.75 (44.5) |
| 2B8S10P16 | P16 | 1" NPT | 10,000 psi (690 bar) | 1.75 (44.5) |

MAWP: Maximum Allowable Working Pressure

See ball valve option/details section for end connection details, material, and high temperature options.

## Ball Valve Options

**Pneumatic Actuator**

AO - Air-to-open/Spring to close
AOC - Air-to-open-and-close (double action)

**Electric Actuator**

EO1 - 120 volt AC 50/60 Hz
EO2 - 220 volt AC 50/60 Hz

**Actuator Operating Temperature:**

Pneumatic: -20˚F to 175˚F (-29˚C to 79˚C)
Electric: -20˚F to 160˚F (-29˚C to 71˚C)

**High Temperature Option:**

HT - for media temperature up to 500˚F (260˚C)

See ball valve Actuator section for full description, additional information, and options.

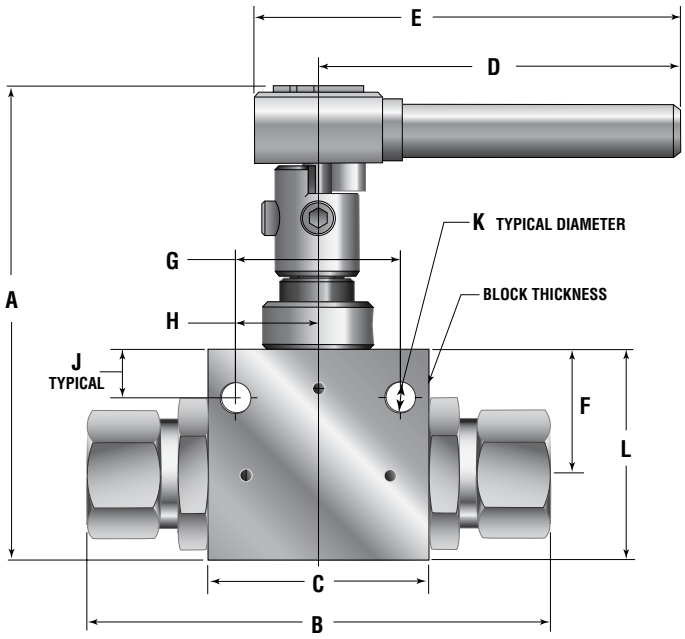
## Valve Maintenance

**Repair Kits:** add "**R**" to the front of valve catalog first 4 numbers for proper repair kit. (Example: **R2B8S**)

Consult your Autoclave representative for pricing on repair kits. Refer to the Operation and Maintenance manual for proper maintenance procedures.

## Ball Valve Dimensions - inches (mm)

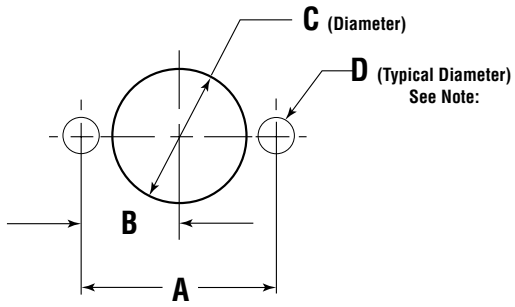
| | VALVE MODELS | | |
|---|---|---|---|
| | 2B4S | 2B6S | 2B8S |
| A | 4.33 (109.99) | 4.97 (126.30) | 5.93 (150.59) |
| B | 4.19 (106.49) | 5.53 (140.41) | 7.73 (196.46) |
| C | 2.00 (50.80) | 3.00 (76.20) | 4.13 (104.78) |
| D | 3.37 (85.55) | 4.99 (126.82) | 5.12 (130.04) |
| E | 3.90 (99.02) | 5.52 (140.32) | 10.25 (260.35) |
| F | 1.13 (28.58) | 1.38 (34.92) | 1.75 (44.56) |
| G | 1.50 (38.10) | 2.00 (50.80) | 3.00 (76.20) |
| H | 0.75 (19.05) | 1.00 (25.40) | 1.50 (38.10) |
| J | 0.43 (10.92) | 0.41 (10.31) | 0.50 (12.70) |
| K | 0.28 (7.11) | 0.28 (7.11) | 0.28 (7.11) |
| L | 1.91 (48.41) | 2.50 (63.50) | 3.09 (78.58) |
| Block Thickness | 1.00 (25.40) | 1.38 (34.92) | 1.75 (44.45) |




## Ball Valve Panel Mounting Dimensions - inches (mm)

| | VALVE MODELS | | |
|---|---|---|---|
| | 2B4S | 2B6S | 2B8S |
| A | 1.500 (38.10) | 2.000 (50.80) | 3.000 (76.20) |
| B | 0.750 (19.05) | 1.000 (25.40) | 1.500 (38.10) |
| C | 1.03 (26.01) | 1.41 (35.81) | 1.78 (45.21) |
| D | 0.28 (7.11) | 0.28 (7.11) | 0.28 (7.11) |

Note: Body mounting 1/4" - 20 thread




All dimensions are for reference only
and are subject to change without notice.

**! WARNING !**

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# Ball Valves

## 3-Way Series

*Pressures to 20,000 psi (1379 bar)*

Autoclave Engineers high-pressure ball valves have been designed to provide superior quality for maximum performance within a variety of valve styles, sizes, and process connections. Some of the more unique design innovations include an integral one-piece trunnion mounted style ball and stem that eliminates the shear failure common in two piece designs, re-torqueable seat glands that result in longer seat life, and a low friction stem seal that reduces actuation torque and enhances cycle life.

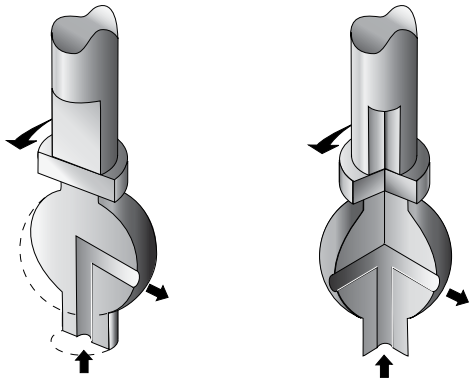
These ball valves can also be modified to incorporate the use of special materials, seals for high temperature applications, subsea models, and valve actuators.

When it comes to high-pressure applications, these ball valves with the associated high-pressure components, provide the critical performance demanded by the high pressure market.

### AE Ball Valve Features:

- One-piece, trunnion mounted style, stem design eliminates shear failure found in two piece designs and reduces effects of side loading.
- Re-torqueable seat glands for longer seat life.
- PEEK seats offer excellent resistance to chemicals, heat, and wear/abrasion.
- Full-port flow path minimizes pressure drop.
- 316 cold worked stainless steel construction.
- Low friction pressure assisted graphite filled Teflon stem seal increases cycle life and reduces operating torque.
- Available in 90° turn diverter and 180° turn switching models.
- Viton o-rings for operation from 0°F (-17.8°C) to 400°F (204°C).
- Optional o-rings available for high-temperature applications.
- Optional wetted materials.
- Wide selection of tube and pipe end fittings available.
- Electric and pneumatic actuator options.

Flow Configuration



**3-Way Switching**
**180° Turn**

**3-Way Diverting**
**90° Turn**

### Applications:

- Laboratories
- Test Stands
- Control Panels
- Chemical Research
- Pilot Plants
- Water Blast Pumping Units
- High volume chemical injection skids.

Autoclave Engineers
Fluid Components
Division of Snap-tite, Inc.
*www.autoclaveengineers.com*

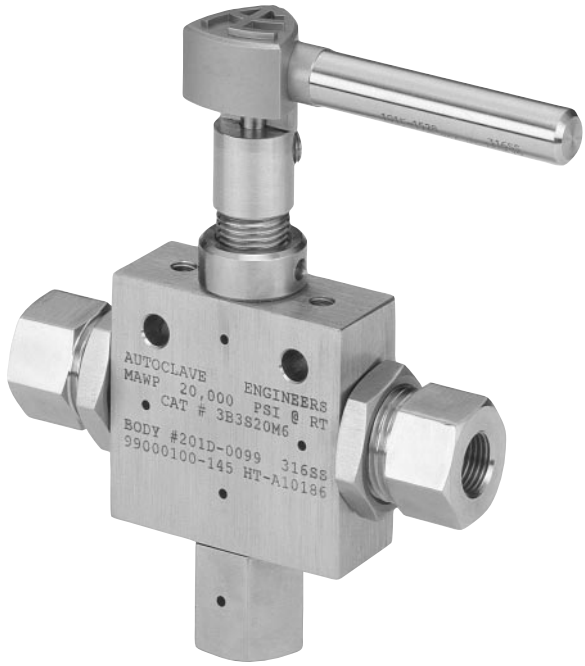
# Ball Valves - 3-Way Series (3/16" Orifice)

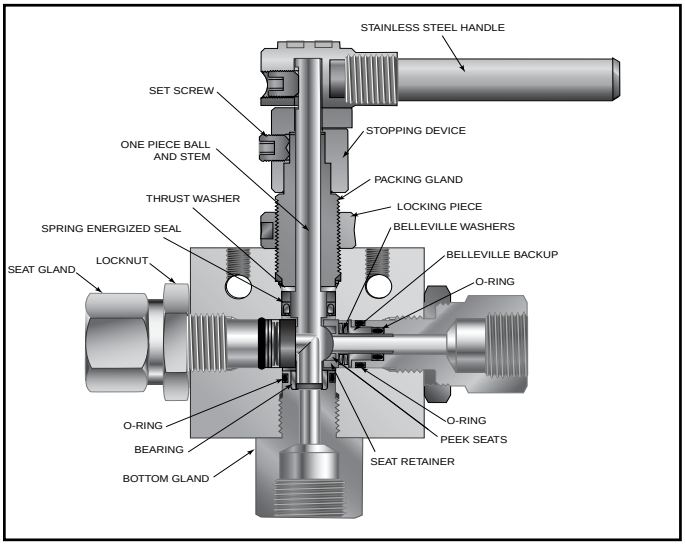
## Pressures to 20,000 psi (1379 bar) .187" (4.77mm) Orifice

| Connection | MAWP @ Room Temperature | Minimum Orifice inches(mm) |
|---|---|---|
| W125 | 15,000 psi (1034 bar) | .094 (2.39) |
| SW250 | 15,000 psi (1034 bar) | .128 (3.25) |
| SW375 | 15,000 psi (1034 bar) | .188 (4.77) |
| SW500 | 10,000 psi (690 bar) | .188 (4.77) |
| SF250CX20 | 20,000 psi (1379 bar) | .109 (2.77) |
| SF375CX20 | 20,000 psi (1379 bar) | .188 (4.77) |
| SF562CX20 | 20,000 psi (1379 bar) | .188 (4.77) |
| F250C | 20,000 psi (1379 bar) | .094 (2.39) |
| F375C | 20,000 psi (1379 bar) | .125 (3.17) |
| F562C | 20,000 psi (1379 bar) | .188 (4.77) |
| 1/8" NPT | 10,000 psi (690 bar) | .188 (4.77) |
| 1/4" NPT | 10,000 psi (690 bar) | .188 (4.77) |
| 3/8" NPT | 10,000 psi (690 bar) | .188 (4.77) |
| 1/2" NPT | 10,000 psi (690 bar) | .188 (4.77) |

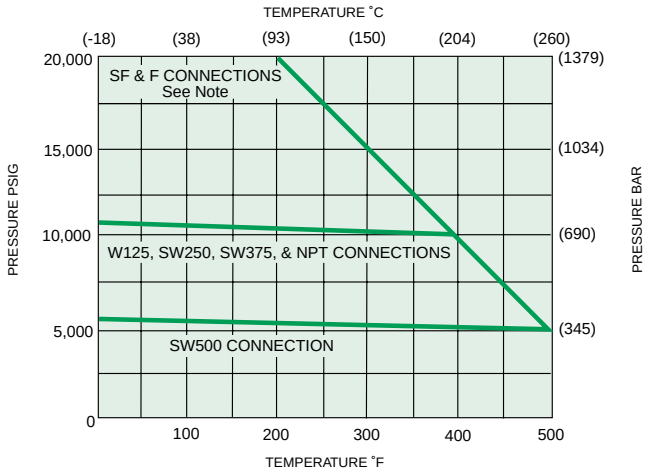
Valve $C_V$=.58

MAWP: Maximum Allowable Working Pressure




PRESSURE TEMPERATURE RATINGS




*pressure ratings are determined by the end connections chosen, see chart.
NOTE: Maximum side connection inlet pressure 15,000 psi (1034 bar).

NOTE: Ball valves are not recommended for critical gas applications such as Hydrogen, Helium or other small molecular gases.

## Ordering Procedure

For complete information on available end connections and material options, see next page. 3-way ball valves are furnished complete with tube or pipe connections.

Typical catalog number: **3B 3 S 20 M9 — XXX**

**3B**
**Valve Series**
**3B:** 3-way
**3BD:** 3-way diverter

**3**
**Ball Orifice Diameter**
**3**-3/16" (4.77 mm)

**S**
**Material**
**S** -316SS
(For material options contact factory)

**20**
**Pressure (X 1000 psi)**

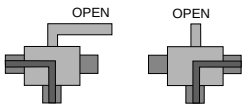
**M9**
**End Connection**
**M9** -SF562CX20
(See Chart on next page)

**XXX**
**Options**
**HT** - High Temperature (Ball Valve Actuators, see next page)

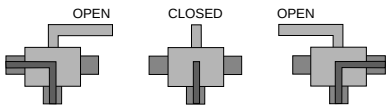
## End Connection Options

| Catalog Number | End Connection Number | Connection | MAWP @ Room Temperature | Hex Inches(mm) |
|---|---|---|---|---|
| 3B3S15L2<br>3BD3S15L2 | L2 | W125 | 15,000 psi (1034 bar) | 1 (25.40) |
| 3B3S15L4<br>3BD3S15L4 | L4 | SW250 | 15,000 psi (1034 bar) | 1 (25.40) |
| 3B3S15L6<br>3BD3S15L6 | L6 | SW375 | 15,000 psi (1034 bar) | 1 (25.40) |
| 3B3S10L8<br>3BD3S10L8 | L8 | SW500 | 10,000 psi (690 bar) | 1 (25.40) |
| 3B3S20M4<br>3BD3S20M4 | M4 | SF250CX20 | 20,000 psi (1379 bar) | 1 (25.40) |
| 3B3S20M6<br>3BD3S20M6 | M6 | SF375CX20 | 20,000 psi (1379 bar) | 1 (25.40) |
| 3B3S20M9<br>3BD3S20M9 | M9 | SF562CX20 | 20,000 psi (1379 bar) | 1 (25.40) |
| 3B3S20H4<br>3BD3S20H4 | H4 | F250C | 20,000 psi (1379 bar) | 1 (25.40) |
| 3B3S20H6<br>3BD3S20H6 | H6 | F375C | 20,000 psi (1379 bar) | 1 (25.40) |
| 3B3S20H9<br>3BD3S20H9 | H9 | F562C | 20,000 psi (1379 bar) | 1.38 (35.05) |
| 3B3S10P2<br>3BD3S10P2 | P2 | 1/8” NPT | 10,000 psi (690 bar) | 1 (25.40) |
| 3B3S10P4<br>3BD3S10P4 | P4 | 1/4” NPT | 10,000 psi (690 bar) | 1 (25.40) |
| 3B3S10P6<br>3BD3S10P6 | P6 | 3/8” NPT | 10,000 psi (690 bar) | 1 (25.40) |
| 3B3S10P8<br>3BD3S10P8 | P8 | 1/2” NPT | 10,000 psi (690 bar) | 1.38 (35.05) |

See ball valve option/detail section for end connection details, material, and high temperature options.




*3-Way Diverter Valve
90° Turn




3-Way Ball Valve
180° Turn

*The Diverter Valve design permits inlet flow through the bottom port. Outlet flow may be diverted to either valve side port.

## Ball Valve Options

**Pneumatic Actuator**

AO - Air-to-open/Spring to close
AOC - Air-to-open-and-close (double action)

**Electric Actuator**

EO1 - 120 volt AC 50/60 Hz
EO2 - 220 volt AC 50/60 Hz

**Actuator Operating Temperature:**

Pneumatic: -20˚F to 175˚F (-29˚C to 79˚C)
Electric: -20˚F to 160˚F (-29˚C to 71˚C)

**High Temperature Option:**

HT - for media temperature up to 500˚F (260˚C)

See ball valve actuator section for full description, additional information, and options.

## Valve Maintenance

**Repair Kits:** add “**R**” to the front of valve catalog numbers for proper repair kit. (Example: **R3B3S**)

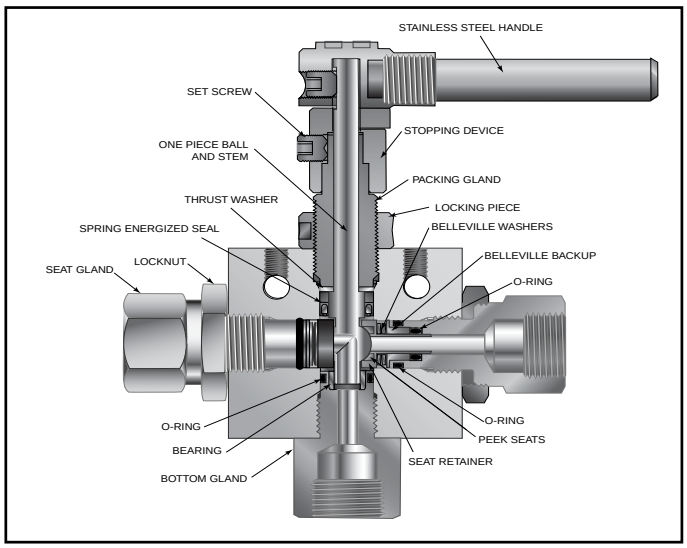
Consult your Autoclave representative for pricing on repair kits. Refer to the Operation and Maintenance manual for proper maintenance procedures.

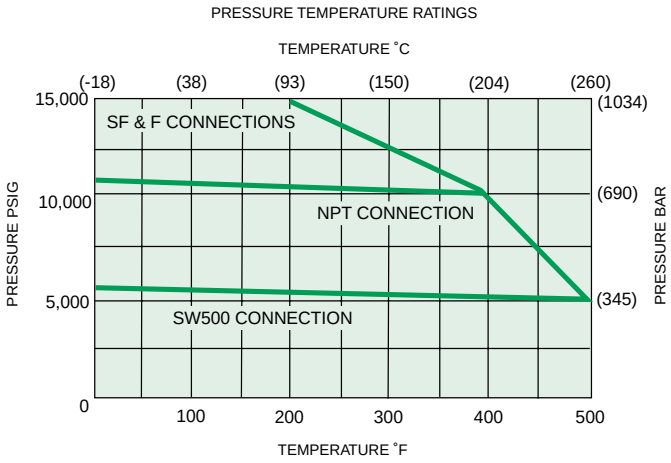
# Ball Valves - 3-Way Series (3/8" Orifice)

## Pressures to 15,000 psi (1034 bar) .375" (9.52mm) Orifice

| Connection | MAWP @ Room Temperature | Minimum Orifice inches(mm) |
|---|---|---|
| SW500 | 10,000 psi (690 bar) | .375 (9.52) |
| SF375CX20 | 15,000 psi (1034 bar) | .203 (5.16) |
| SF562CX20 | 15,000 psi (1034 bar) | .312 (7.92) |
| SF750CX20 | 15,000 psi (1034 bar) | .375 (9.52) |
| 1/4" NPT | 10,000 psi (690 bar) | .375 (9.52) |
| 3/8" NPT | 10,000 psi (690 bar) | .375 (9.52) |
| 1/2" NPT | 10,000 psi (690 bar) | .375 (9.52) |
| | Valve $C_V$=2.5 | |

MAWP: Maximum Allowable Working Pressure


*pressure ratings are determined by the end connections chosen, see chart.

NOTE: Ball valves are not recommended for critical gas applications such as Hydrogen, Helium or other small molecular gases.

## Ordering Procedure

For complete information on available end connections and material options, see next page. 3-way ball valves are furnished complete with tube or pipe connections.

Typical catalog number: **3B 6 S 15 M9**

**3B**
**Valve Series**
**3B:** 3-way
**3BD:** 3-way diverter

**6**
**Ball Orifice Diameter**
**6**-3/8" (9.52 mm)

**S**
**Material**
**S** -316SS
(For material options contact factory)

**15**
**Pressure (X 1000 psi)**

**M9**
**End Connection**
**M9** -SF562CX20
(See Chart on next page)

—

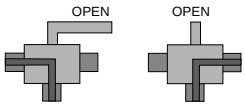
**XXX**
**Options**
**HT** - High Temperature
(Ball Valve Actuators, see next page)

## End Connection Options

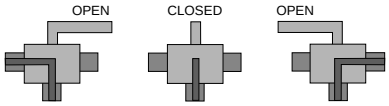
| Catalog Number | End Connection Number | Connection | MAWP @ Room Temperature | Hex Inches(mm) |
|---|---|---|---|---|
| 3B6S10L8<br>3BD6S10L8 | L8 | SW500 | 10,000 psi (690 bar) | 1.38 (35.05) |
| 3B6S15M6<br>3BD6S15M6 | M6 | SF375CX20 | 15,000 psi (1034 bar) | 1.38 (35.05) |
| 3B6S15M9<br>3BD6S15M9 | M9 | SF562CX20 | 15,000 psi (1034 bar) | 1.38 (35.05) |
| 3B6S15M12<br>3BD6S15M12 | M12 | SF750CX20 | 15,000 psi (1034 bar) | 1.38 (35.05) |
| 3B6S10P4<br>3BD6S10P4 | P4 | 1/4” NPT | 10,000 psi (690 bar) | 1.38 (35.05) |
| 3B6S10P6<br>3BD6S10P6 | P6 | 3/8” NPT | 10,000 psi (690 bar) | 1.38 (35.05) |
| 3B6S10P8<br>3BD6S10P8 | P8 | 1/2” NPT | 10,000 psi (690 bar) | 1.38 (35.05) |

MAWP: Maximum Allowable Working Pressure

See ball valve option/details section for end connection details, material, and high temperature options.




*3-Way Diverter Valve
90° Turn




3-Way Ball Valve
180° Turn

*The Diverter Valve design permits inlet flow through the bottom port. Outlet flow may be diverted to either valve side port.

## Ball Valve Options

**Pneumatic Actuator**

AO - Air-to-open/Spring to close
AOC - Air-to-open-and-close (double action)

**Electric Actuator**

EO1 - 120 volt AC 50/60 Hz
EO2 - 220 volt AC 50/60 Hz

**Actuator Operating Temperature:**

Pneumatic: -20˚F to 175˚F (-29˚C to 79˚C)
Electric: -20˚F to 160˚F (-29˚C to 71˚C)

**High Temperature Option:**

HT - for media temperature up to 500˚F (260˚C)

See ball valve actuator section for full description, additional information, and options.

## Valve Maintenance

**Repair Kits:** add “**R**” to the front of valve catalog numbers for proper repair kit. (Example: **R3B6S**)

Consult your Autoclave representative for pricing on repair kits. Refer to the Operation and Maintenance manual for proper maintenance procedures.

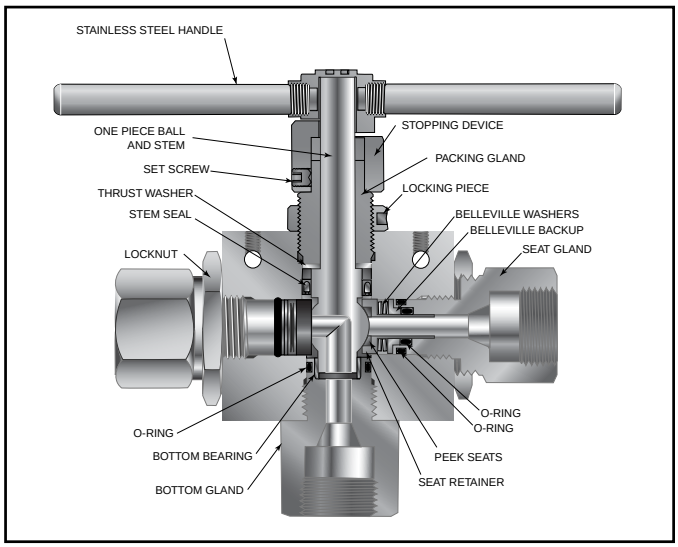
# Ball Valves - 3-Way Series (1/2" Orifice)

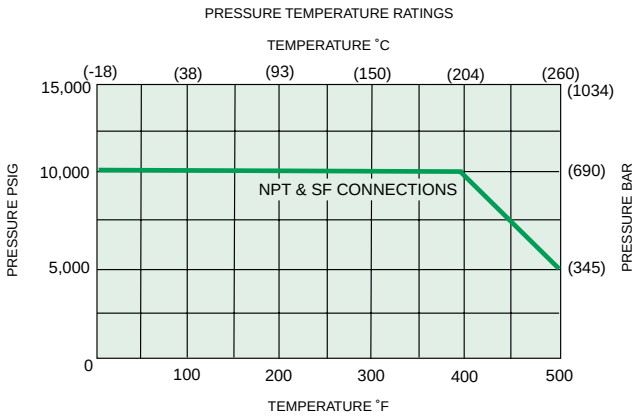
## Pressures to 10,000 psi (690 bar) .500" (12.7mm) Orifice

| Connection | MAWP @ Room Temperature | Minimum Orifice inches(mm) |
|---|---|---|
| SF750CX20 | 10,000 psi (690 bar) | .500 (12.70) |
| SF1000CX20 | 10,000 psi (690 bar) | .500 (12.70) |
| 3/4" NPT | 10,000 psi (690 bar) | .500 (12.70) |
| 1" NPT | 10,000 psi (690 bar) | .500 (12.70) |

Valve $C_V$=5.10

MAWP: Maximum Allowable Working Pressure


*pressure ratings are determined by the end connections chosen, see chart.

NOTE: Ball valves are not recommended for critical gas applications such as Hydrogen, Helium or other small molecular gases.

## Ordering Procedure

For complete information on available end connections and material options, see next page. 3-way ball valves are furnished complete with tube or pipe connections.

Typical catalog number: **3B 8 S 10 M12** — **XXX**

**3B** — **Valve Series**
**3B:** 3-way
**3BD:** 3-way diverter

**8** — **Ball Orifice Diameter**
**3**-3/16" (4.77 mm)

**S** — **Material**
**S** -316SS
(For material options contact factory)

**10** — **Pressure (X 1000 psi)**

**M12** — **End Connection**
**M12** - SF750CX20
(See Chart on next page)

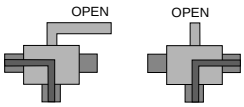
**XXX** — **Options**
**HT** - High Temperature
(Ball Valve Actuators, see next page)

## End Connection Options

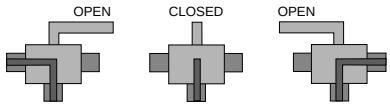
| Catalog Number | End Connection Number | Connection | MAWP @ Room Temperature | Hex Inches(mm) |
|---|---|---|---|---|
| 3B8S10M12<br>3BD8S10M12 | M12 | SF750CX20 | 10,000 psi (690 bar) | 1.75 (44.5) |
| 3B8S10M16<br>3BD8S10M16 | M16 | SF1000CX20 | 10,000 psi (690 bar) | 1.75 (44.5) |
| 3B8S10P12<br>3BD8S10P12 | P12 | 3/4" NPT | 10,000 psi (690 bar) | 1.75 (44.5) |
| 3B8S10P16<br>3BD8S10P16 | P16 | 1" NPT | 10,000 psi (690 bar) | 1.75 (44.5) |

MAWP: Maximum Allowable Working Pressure

See ball valve options for end connection details, material, and high temperature options.




*3-Way Diverter Valve
90° Turn




3-Way Ball Valve
180° Turn

*The Diverter Valve design permits inlet flow through the bottom port. Outlet flow may be diverted to either valve side port.

## Ball Valve Options

**Pneumatic Actuator**

AO - Air-to-open/Spring to close
AOC - Air-to-open-and-close (double action)

**Electric Actuator**

EO1 - 120 volt AC 50/60 Hz
EO2 - 220 volt AC 50/60 Hz

**Actuator Operating Temperature:**

Pneumatic: -20˚F to 175˚F (-29˚C to 79˚C)
Electric: -20˚F to 160˚F (-29˚C to 71˚C)

**High Temperature Option:**

HT - for media temperature up to 500˚F (260˚C)

See ball valve actuator section for full description, additional information, and options.

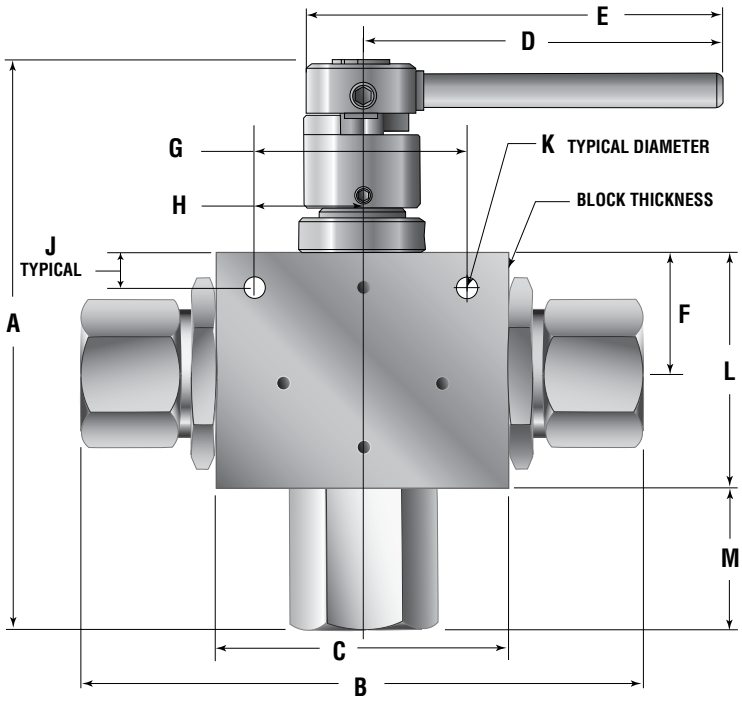
## Valve Maintenance

**Repair Kits:** add "**R**" to the front of valve catalog numbers for proper repair kit. (Example: **R3B8S**)

Consult your Autoclave representative for pricing on repair kits. Refer to the Operation and Maintenance manual for proper maintenance procedures.

## Ball Valve Dimensions - inches (mm)

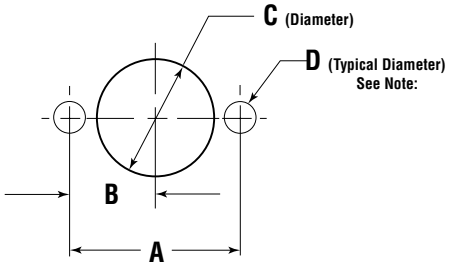
| | VALVE MODELS | | |
|---|---|---|---|
| | 3B3S/3BD3S | 3B6S/3BD6S | 3B8S/3BD8S |
| A | 5.64 (143.35) | 6.61 (167.91) | 7.83 (198.79) |
| B | 4.72 (119.94) | 5.74 (145.79) | 7.73 (196.43) |
| C | 2.50 (63.50) | 3.00 (76.20) | 4.13 (104.78) |
| D | 3.37 (85.55) | 4.99 (126.82) | 5.12 (130.04) |
| E | 3.90 (99.02) | 5.52 (140.32) | 10.25 (260.35) |
| F | 1.13 (28.58) | 1.38 (34.93) | 1.66 (42.16) |
| G | 1.50 (38.10) | 2.00 (50.80) | 3.00 (76.20) |
| H | 0.75 (19.05) | 1.00 (25.40) | 1.50 (38.10) |
| J | 0.43 (10.92) | 0.41 (10.31) | 0.50 (12.70) |
| K | 0.28 (7.11) | 0.28 (7.11) | 0.28 (7.11) |
| L | 2.25 (57.15) | 2.88 (73.03) | 3.34 (84.94) |
| M | 0.97 (24.64) | 1.19 (30.32) | 1.70 (43.18) |
| Block Thickness | 1.00 (25.40) | 1.38 (34.92) | 1.75 (44.45) |




## Ball Valve Panel Mounting Dimensions - inches (mm)

| | VALVE MODELS | | |
|---|---|---|---|
| | 3B3S/3BD3S | 3B6S/3BD6S | 3B8S/3BD8S |
| A | 1.500 (38.10 | 2.000 (50.80) | 3.000 (76.20) |
| B | 0.750 (19.05) | 1.000 (25.40) | 1.500 (38.10) |
| C | 1.03 (26.01) | 1.41 (35.81) | 1.78 (45.21) |
| D | 0.28 (7.11) | 0.28 (7.11 | 0.28 (7.11) |

Note: Body mounting 1/4" -20 threads




All dimensions are for reference only and are subject to change without notice.

**! WARNING !**

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND/OR PROPERTY DAMAGE.

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# Ball Valves

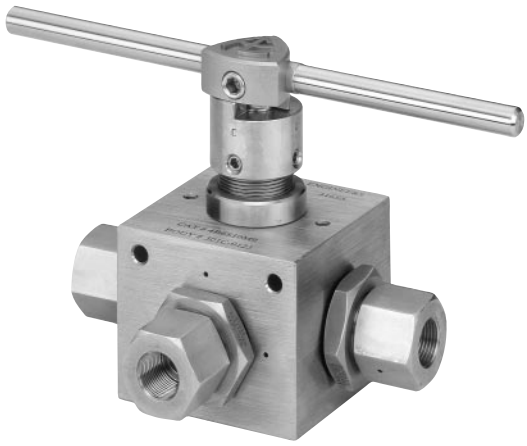
# 4-Way Series

*Pressures to 10,000 psi (690 bar)*

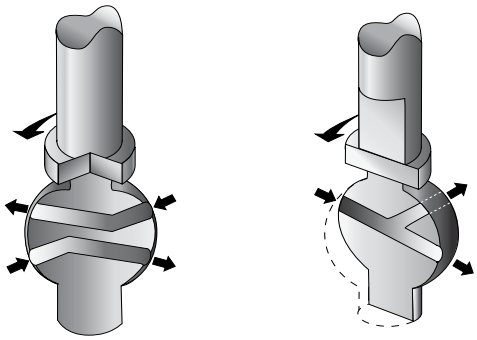
Autoclave Engineers high-pressure ball valves have been designed to provide superior quality for maximum performance within a variety of valve styles, sizes, and process connections. Some of the more unique design innovations include an integral one-piece trunnion mounted style ball and stem that eliminates the shear failure common in two piece designs, re-torqueable seat glands that result in longer seat life, and a low friction stem seal that reduces actuation torque and enhances cycle life.

These ball valves can also be modified to incorporate the use of special materials, seals for high temperature applications, subsea models, and valve actuators.

When it comes to high-pressure applications, these ball valves with the associated high-pressure components, provide the critical performance demanded by the high pressure market.



Flow Configuration



**4-Way Crossover**
90° Turn

**4-Way Switching**
180° Turn

## AE Ball Valve Features:

- One-piece, trunnion mounted style, stem design eliminates shear failure found in two piece designs and reduces the effects of side loading.
- Re-torqueable seat glands for longer seat life.
- PEEK seats offer excellent resistance to chemicals, heat, and wear/abrasion.
- Full-port flow path minimizes pressure drop.
- 316 cold worked stainless steel construction.
- Low friction pressure assisted graphite filled Teflon stem seal increases cycle life and reduces operating torque.
- Quarter turn crossover, and the half turn four way switching models available.
- Viton o-rings for operation from 0°F (-17.8°C) to 400°F (204°C).
- Optional o-rings available for high-temperature applications.
- Optional wetted materials.
- Wide selection of tube and pipe end fittings available.
- Electric and pneumatic actuator options.

## Applications:

- Laboratories
- Test Stands
- Control Panels
- Chemical Research
- Pilot Plants
- Water Blast Pumping Unit
- High volume chemical injection skids.

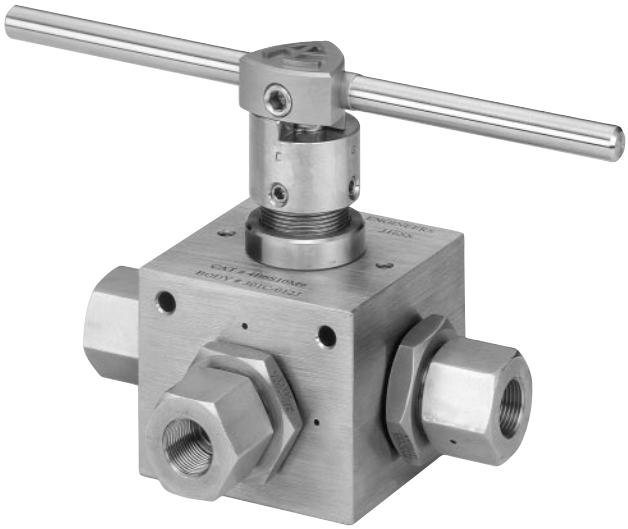
Autoclave Engineers
Fluid Components
Division of Snap-tite, Inc.
www.autoclaveengineers.com

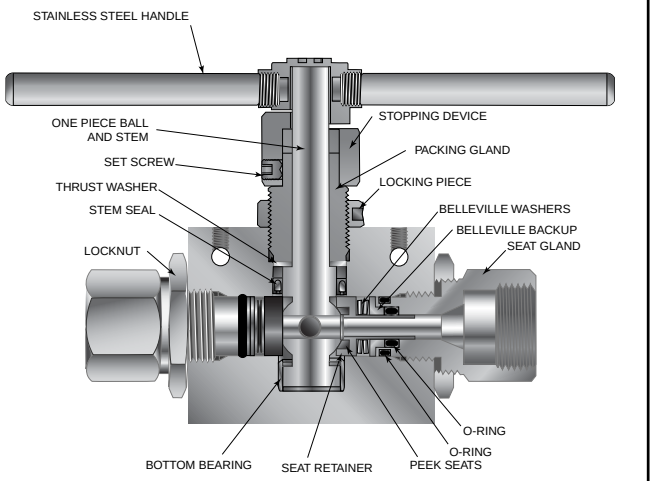
# Ball Valves - 4-Way Series (3/8" Orifice)

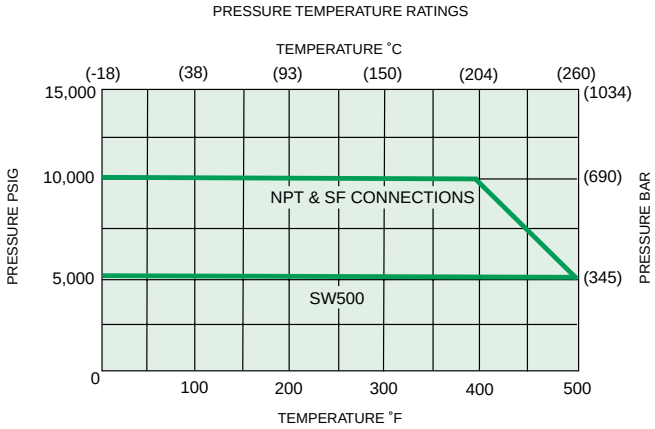
## Pressures to 10,000 psi (690 bar) .375" (9.52mm) Orifice

| Connection | MAWP @ Room Temperature | Minimum Orifice inches(mm) |
|---|---|---|
| SW500 | 10,000 psi (690 bar) | .375 (9.52) |
| SF375CX20 | 10,000 psi (690 bar) | .203 (5.16) |
| SF562CX20 | 10,000 psi (690 bar) | .312 (7.92) |
| SF750CX20 | 10,000 psi (690 bar) | .375 (9.52) |
| 1/4" NPT | 10,000 psi (690 bar) | .375 (9.52) |
| 3/8" NPT | 10,000 psi (690 bar) | .375 (9.52) |
| 1/2" NPT | 10,000 psi (690 bar) | .375 (9.52) |
| | Valve $C_V$=2.5 | |

MAWP: Maximum Allowable Working Pressure






*pressure ratings are determined by the end connections chosen, see chart.

NOTE: Ball valves are not recommended for critical gas applications such as Hydrogen, Helium or other small molecular gases.

## Ordering Procedure

For complete information on available end connections and material options, see next page. 4-way ball valves are furnished complete with tube or pipe connections.

Typical catalog number: **4B 6 S 10 M9** — **XXX**

| 4B | 6 | S | 10 | M9 | — | XXX |
|---|---|---|---|---|---|---|
| **Valve Series** | **Ball Orifice Diameter** | **Material** | **Pressure (X 1000 psi)** | **End Connection** | | **Options** |
| **4B:** 4-way crossover<br>**4BS:** 4--way switching | **6**-3/8" (9.52 mm) | **S** -316SS<br>(For material options contact factory) | | **M9** -SF562CX20<br>(See Chart on next page) | | **HT** - High Temperature<br>(Ball Valve Actuators, see next page) |

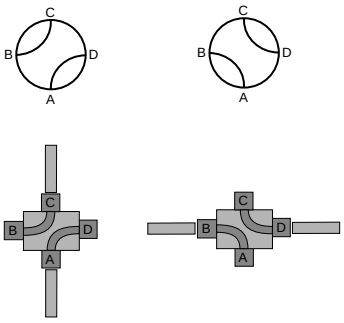
All general terms and conditions of sale, including limitations of our liability, apply to all products and services sold.

## End Connection Options

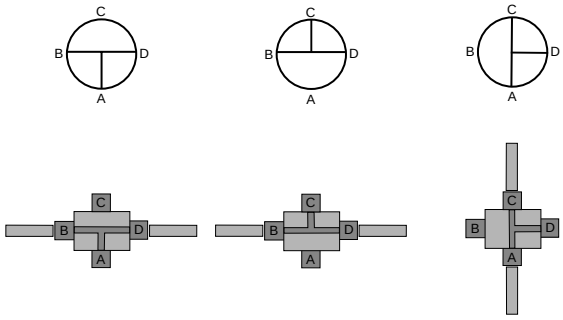
| Catalog Number | End Connection Number | Connection | MAWP @ Room Temperature | Hex Inches(mm) |
|---|---|---|---|---|
| 4B6S10L8<br>4BS6S10L8 | L8 | SW500 | 10,000 psi (690 bar) | 1.38 (35.05) |
| 4B6S10M6<br>4BS6S10M6 | M6 | SF375CX20 | 10,000 psi (690 bar) | 1.38 (35.05) |
| 4B6S10M9<br>4BS6S10M9 | M9 | SF562CX20 | 10,000 psi (690 bar) | 1.38 (35.05) |
| 4B6S10M12<br>4BS6S10M12 | M12 | SF750CX20 | 10,000 psi (690 bar) | 1.38 (35.05) |
| 4B6S10P4<br>4BS6S10P4 | P4 | 1/4” NPT | 10,000 psi (690 bar) | 1.38 (35.05) |
| 4B6S10P6<br>4BS6S10P6 | P6 | 3/8” NPT | 10,000 psi (690 bar) | 1.38 (35.05) |
| 4B6S10P8<br>4BS6S10P8 | P8 | 1/2” NPT | 10,000 psi (690 bar) | 1.38 (35.05) |

MAWP: Maximum Allowable Working Pressure

See ball valve option/details section for end connection details, material, and high temperature options.




4 Way Crossover
90° Turn




4-Way Switching
180° Turn
(supplied with "D" port plugged)

## Ball Valve Options

**Pneumatic Actuator**

AO - Air-to-open/Spring to close
AOC - Air-to-open-and-close (double action)

**Electric Actuator** -

EO1 - 120 volt AC 50/60 Hz
EO2 - 220 volt AC 50/60 Hz

**Actuator Operating Temperature:**

Pneumatic: -20˚F to 175˚F (-29˚C to 79˚C)
Electric: -20˚F to 160˚F (-29˚C to 71˚C)

*Note: Consult factory for additional actuator information.*

**High Temperature Option:**

HT - for media temperature up to 500˚F (260˚C)

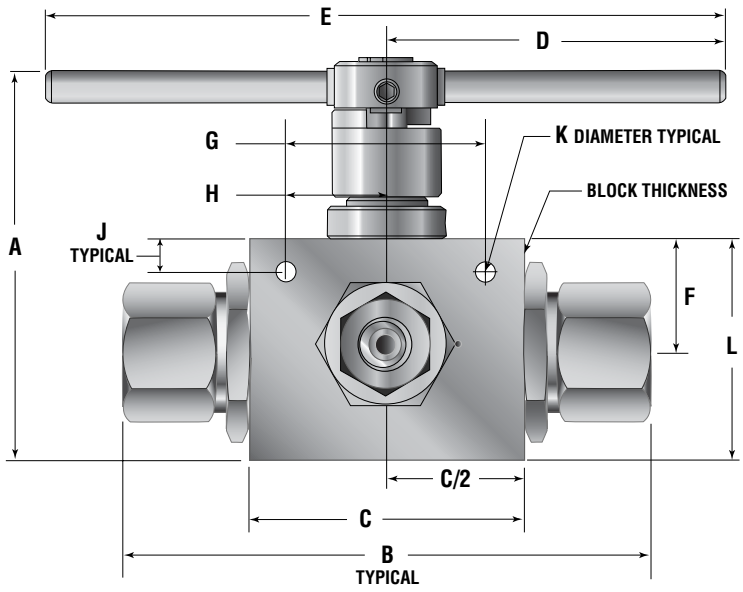
## Valve Maintenance

**Repair Kits:** add “**R**” to the front of valve catalog first 4 (5 for switching) numbers for proper repair kit.
(Example: **R4B6S**)

Consult your Autoclave representative for pricing on repair kits. Refer to the Operation and Maintenance manual for proper maintenance procedures.

## Ball Valve Dimensions - inches (mm)

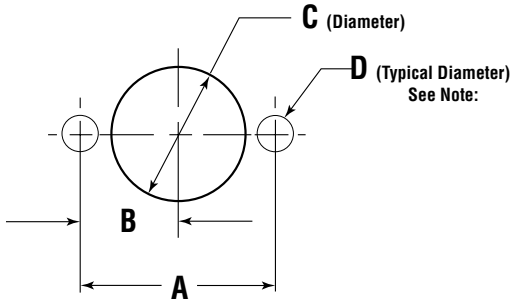
| VALVE MODEL | 4B6S/4BS6S |
|---|---|
| A | 5.78 (146.81) |
| B | 6.67 (169.42) |
| C | 3.50 (88.90) |
| D | 5.13 (130.18) |
| E | 10.25 (260.35) |
| F | 1.63 (41.28) |
| G | 2.63 (66.68) |
| H | 1.13 (33.34) |
| J | 0.41 (10.32) |
| K | 0.28 (7.11) |
| L | 2.97 (75.39) |
| Block Thickness | 3.50 (88.90) |




## Ball Valve Panel Mounting Dimensions - inches (mm)

| VALVE MODELS | 4B6S/4BS6S |
|---|---|
| A | 2.63 (66.68) |
| B | 1.31 (33.34) |
| C | 1.78 (45.21) |
| D | 0.28 (7.11) |

Note: Body mounting 1/4" - 20 threads




All dimensions are for reference only
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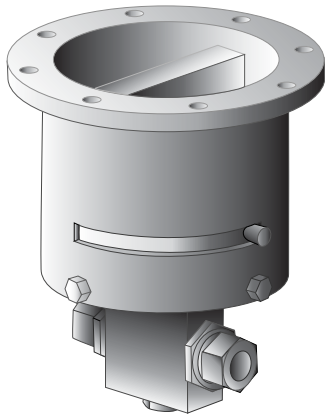
# Ball Valves

# Subsea Series

*Internal Pressures to 20,000 psi (1379 bar)*
*Water Depths to 12,500 ft (3810 meters)*

Autoclave Engineers subsea ball valves have been designed to fulfill the ever growing demand in the petroleum industry as well as the need for externally pressurized components in other markets. Utilizing the same design technology as the standard ball valve, the subsea design incorporates the necessary design alterations to provide a reliable externally pressurized valve for the subsea industry.

With the availability of fittings, tubing, and related equipment our ball valves can provide all your needs on high-pressure applications above or below the surface.



## AE Ball Valve Features:

- One-piece, trunnion mounted style, stem design eliminates shear failure found in two-piece designs.
- Re-torqueable seat glands for longer seat life.
- PEEK seats which offer excellent resistance to chemicals, heat, and wear/abrasion.
- Full-port flow path minimizes pressure drop.
- 316 cold worked stainless steel construction.
- Low friction pressure assisted graphite filled Teflon stem seal increases cycle life.
- Wide selection of tube and pipe end fittings available.
- Available to NACE MR-01-75.
- Optional wetted materials.
- Adaptable for Remote Operated Vehicle (ROV) operation.
- Available in a number of flow configurations and port sizes.

## Applications:

- Subsea hydraulic manifolds
- Subsea control panels
- Subsea trees

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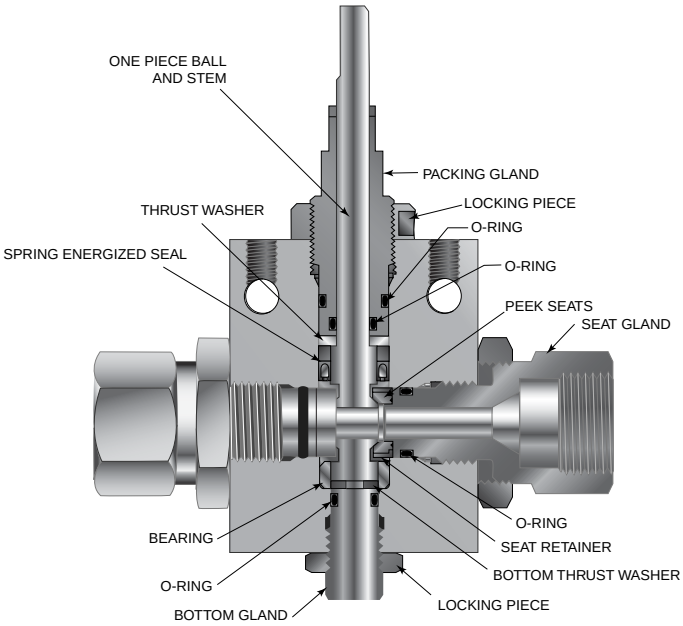
The Autoclave Engineers ball valves can be utilized to switch or isolate flow. The standard material of construction of the valve is 316 cold worked stainless steel with PEEK seats, graphite filled Teflon stem seal, and o-ring material as required by the process fluid.

The subsea ball valve design incorporates additional o-ring seals, which prevent the ingress of seawater into the valve which would adversely affect the operation of the valve as well as contaminate the process fluid. A significant feature of the subsea design is a thrust washer positioned under the stem preventing outside sea water from moving the stem from it's aligned position.




Typical 2-way Subsea Ball Valve


Subsea ball valves are designed to facilitate operation by a Remote Operated vehicle (ROV). Optional ROV operator assemblies are available for valve mounting and to provide positive stopping for precise 90° operation.

Various tube and pipe connections are available throughout a variety of valve configurations with standard port sizes from 3/16" to 1/2". Contact Autoclave Engineers technical sales support or your local distributor for more information on optional materials of construction, seal materials, and ROV operator designs to fit your application requirements.



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# Ball Valves

# Actuators

*Pneumatic Actuators*
*Electric Actuators*

Autoclave Engineers ball valves can be supplied with either pneumatic or electric operators for automated or remote operation.

Pneumatic and electric operators can be supplied with a variety of features and options. Operators are sized for each valve series to provide reliable and trouble free operation. Listed below are the operator features and available options.

## *AE Ball Valve Actuator Features/Options:*

### Pneumatic Operators

- Used for remote and automatic operation.
- Air-to-open/spring-to-close and air to open and close (double acting).
- Limit switches or limit switches with visual indicators available.
- High temperature option available.
- Stainless steel housing for corrosive applications available.
- Optional solenoid valve available
- Optional epoxy coated housing available

### Electric Operators

- Interface with control systems for automated operation and monitoring.
- 120 & 220 VAC, 50/60 Hz standard.
- Explosion proof available.
- CE mark available.



Ball Valves - Actuators

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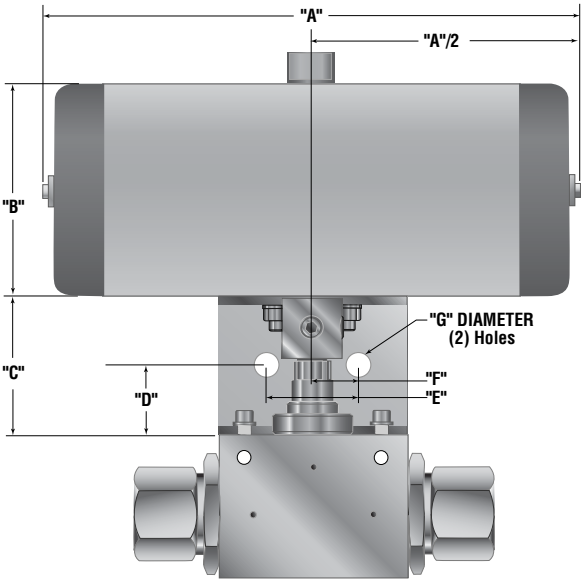
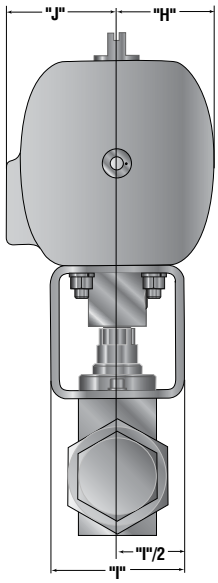
## Pneumatic Operated Ball Valves

Add the suffix **-AO** or **-AOC** to the appropriate valve catalog number for a complete valve assembly

| VALVE SERIES | DIMENSION DATA - Inches (mm) | | | | | | | | | | MINIMUM REQUIRED AIR PRESSURE |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | "A" | "B" | "C" | "D" | "E" | "F" | "G" | "H" | "I" | "J" | |
| 2B4-AO | 6.69 (169.92) | 2.56 (65.02) | 2.50 (63.50) | 1.25 (31.75) | 1.00 (25.40) | 0.50 (12.70) | 0.28 (7.11) | 1.14 (28.95) | 2.50 (63.50) | 1.58 (40.13) | 80 psi (5.51 bar) |
| 2B6-AO | 9.84 (249.93) | 3.94 (100.07) | 3.00 (76.20) | 1.50 (38.10) | 1.50 (25.40) | 0.75 (19.05) | 0.34 (8.63) | 1.87 (47.49) | 3.00 (76.20_) | 2.24 (56.89) | 80 psi (5.51 bar) |
| 2B8-AO * | 11.65 (259.91) | 4.57 (116.07) | 3.00 (76.20) | 1.50 (38.10) | 2.00 (50.80) | 1.00 (25.40) | 0.53 (13.46) | 2.17 (55.11) | 3.00 (76.20) | 2.48 (62.99) | 80 psi (5.51 bar) |
| 3BD3-AO | 6.69 (169.92) | 2.56 (65.02) | 2.50 (63.50) | 1.25 (31.75) | 1.00 (25.40) | 0.50 (12.70) | 0.28 (7.11) | 1.14 (28.95) | 2.50 (63.50) | 1.58 (40.13) | 80 psi (5.51 bar) |
| 3BD6-AO * | 9.84 (249.93) | 3.94 (100.07) | 3.00 (76.20) | 1.50 (38.10) | 1.50 (25.40) | 0.75 (19.05) | 0.34 (8.63) | 1.87 (47.49) | 3.00 (76.20_) | 2.24 (56.89) | 80 psi (5.51 bar) |
| 3BD8-AO | 11.65 (259.91) | 4.57 (116.07) | 3.00 (76.20) | 1.50 (38.10) | 2.00 (50.80) | 1.00 (25.40) | 0.53 (13.46) | 2.17 (55.11) | 3.00 (76.20) | 2.48 (62.99) | 80 psi (5.51 bar) |
| 2B4-AOC | 6.69 (169.92) | 2.56 (65.02) | 2.50 (63.50) | 1.25 (31.75) | 1.00 (25.40) | 0.50 (12.70) | 0.28 (7.11) | 1.14 (28.95) | 2.50 (63.50) | 1.58 (40.13) | 80 psi (5.51 bar) |
| 2B6-AOC | 7.95 (201.93) | 3.07 (77.97) | 3.00 (76.20) | 1.50 (38.10) | 1.50 (38.10) | 0.75 (19.05) | 0.34 (8.63) | 1.40 (35.56) | 3.00 (76.20_) | 1.77 (44.95) | 80 psi (5.51 bar) |
| 2B8-AOC | 9.84 (249.91) | 3.94 (100.07) | 3.00 (76.20) | 1.50 (38.10) | 2.00 (50.80) | 1.00 (25.40) | 0.53 (13.46) | 1.87 (47.49) | 3.00 (76.20) | 2.24 (56.89) | 80 psi (5.51 bar) |
| 3BD3-AOC | 6.69 (169.92) | 2.56 (65.02) | 2.50 (63.50) | 1.25 (31.75) | 1.00 (25.40) | 0.50 (12.70) | 0.28 (7.11) | 1.14 (28.95) | 2.50 (63.50) | 1.58 (40.13) | 80 psi (5.51 bar) |
| 3BD6-AOC | 7.95 (201.93) | 3.07 (77.97) | 3.00 (76.20) | 1.50 (38.10) | 1.50 (25.40) | 0.75 (19.05) | 0.34 (8.63) | 1.40 (35.56) | 3.00 (76.20_) | 1.77 (44.95) | 80 psi (5.51 bar) |
| 3BD8-AOC | 9.84 (249.91) | 3.94 (100.07) | 3.00 (76.20) | 1.50 (38.10) | 2.00 (50.80) | 1.00 (25.40) | 0.53 (13.46) | 1.87 (47.49) | 3.00 (76.20) | 2.24 (56.89) | 80 psi (5.51 bar) |

NOTE:
- Maximum allowable air pressure is 150 psi (10.34)
- 1/8" NPT female air connector (*= 1/4" NPT)
- AO: Air to open/spring to close
- AOC: Air to open/air to close (double acting)
- Actuators operating temperature: -20°F to 175°F (-29°C to 79°C)
- High Temperature actuator option available, consult factory
- Stainless steel housing actuator models available, consult factory
- Actuators available with limit switches and visual indicators.
- Corrosion resistant anodized aluminum housing.
- Epoxy coated housing available.
- Solenoids availabe, direct or nipple mount.



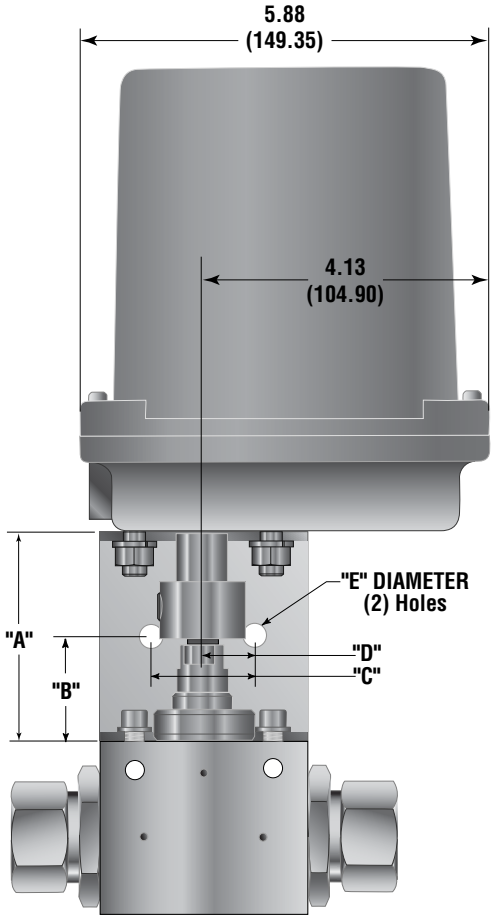



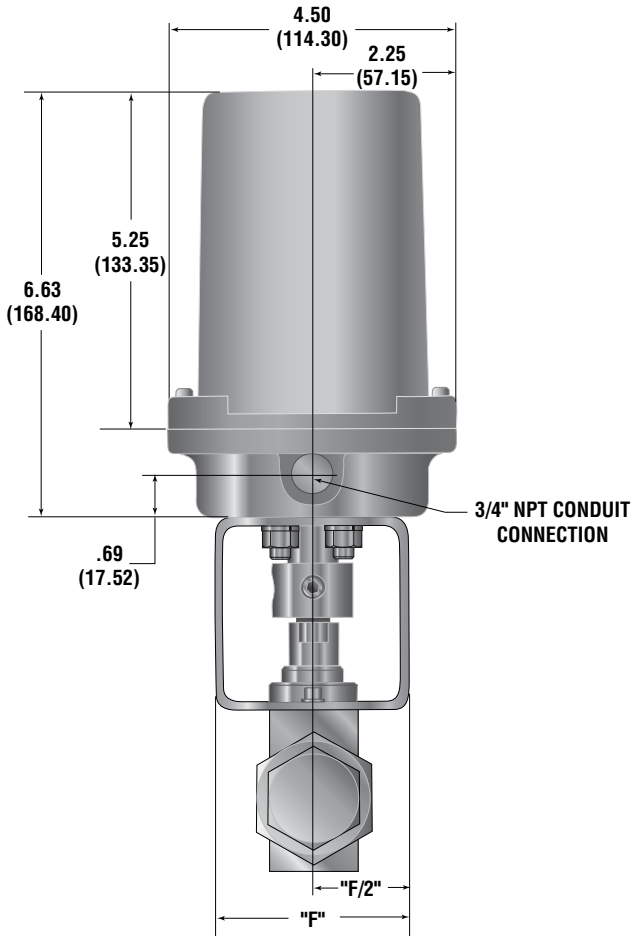
## Electric Operated Ball Valves

Add the suffix **-EO1** or **-EO2** to the appropriate valve catalog number for a complete valve assembly

| VALVE SERIES | DIMENSION DATA - Inches (mm) | | | | | | VOLTAGE |
|---|---|---|---|---|---|---|---|
| | | | | | | | 50/60 HZ |
| | "A" | "B" | "C" | "D" | "E" | "F" | |
| 2B4-EO1 | 2.50 (63.50) | 1.25 (31.75) | 1.00 (25.40) | 0.50 (12.70) | 0.28 (7.11) | 2.50 (63.50) | 120 VAC |
| 2B6-EO1 | 3.00 (76.20) | 1.50 (38.10) | 1.50 (38.10) | 0.75 (19.05) | 0.34 (8.63) | 3.00 (76.20) | 120 VAC |
| 3BD3-EO1 | 2.50 (63.50) | 1.25 (31.75) | 1.00 (25.40) | 0.50 (12.70) | 0.28 (7.11) | 2.50 (63.50) | 120 VAC |
| 3BD6-EO1 | 3.00 (76.20) | 1.50 (38.10) | 1.50 (38.10) | 0.75 (19.05) | 0.34 (8.63) | 3.00 (76.20) | 120 VAC |
| 2B4-EO2 | 2.50 (63.50) | 1.25 (31.75) | 1.00 (25.40) | 0.50 (12.70) | 0.28 (7.11) | 2.50 (63.50) | 220 VAC |
| 2B6-EO2 | 3.00 (76.20) | 1.50 (38.10) | 1.50 (38.10) | 0.75 (19.05) | 0.34 (8.63) | 3.00 (76.20) | 220 VAC |
| 3BD3-EO2 | 2.50 (63.50) | 1.25 (31.75) | 1.00 (25.40) | 0.50 (12.70) | 0.28 (7.11) | 2.50 (63.50) | 220 VAC |
| 3BD6-EO2 | 3.00 (76.20) | 1.50 (38.10) | 1.50 (38.10) | 0.75 (19.05) | 0.34 (8.63) | 3.00 (76.20) | 220 VAC |

NOTE:
- EO1: Electric 120 VAC
- EO2: Electric 220 VAC
- CSA approved for NEMA 4 & 4X
- For other voltages consult factory
- Actuator operating temperature: -20°F to 160°F (-29°C to 71°C)
- Corrosive resistant Zytel housing
- Consult factory for epoxy option



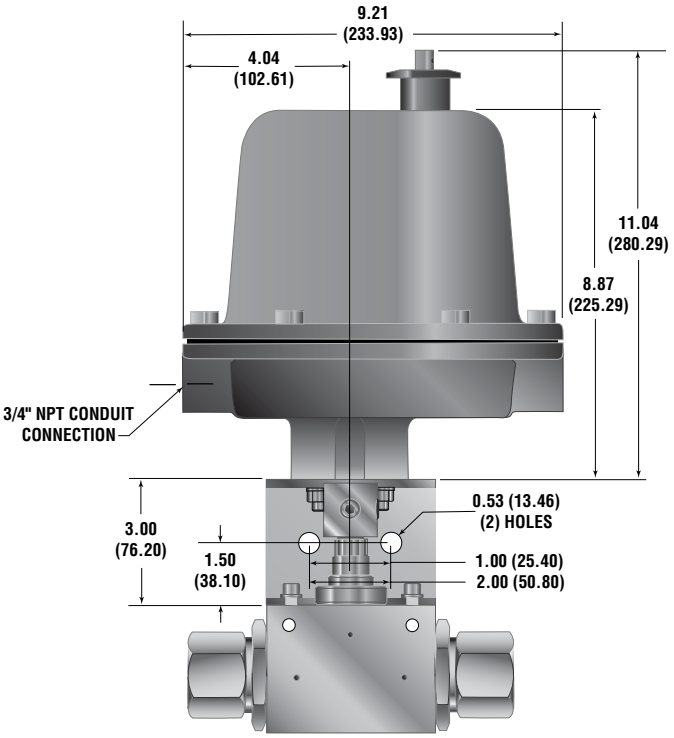



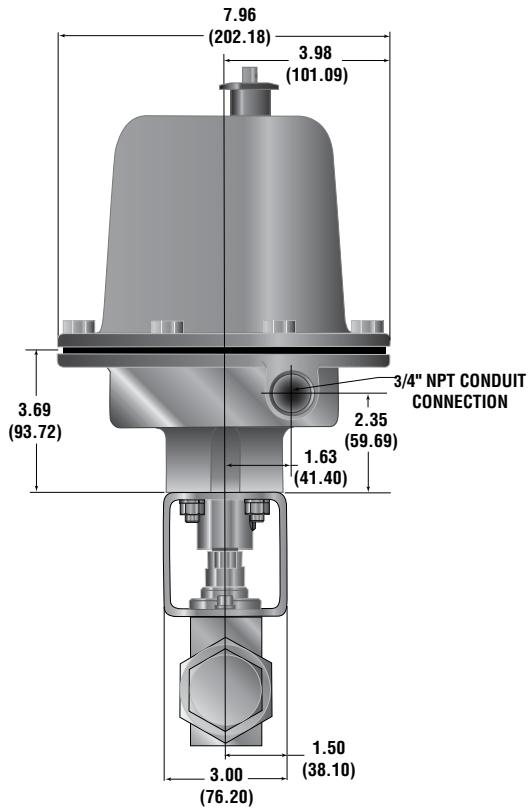
## Electric Operated Ball Valves

Add the suffix **-EO1** or **-EO2** to the appropriate valve catalog number for a complete valve assembly

| VALVE SERIES | VOLTAGE 50/60 HZ |
|---|---|
| 2B8-EO1 | 120 VAC |
| 3BD8-EO1 | 120 VAC |
| 2B8-EO2 | 220 VAC |
| 3BD8-EO2 | 220 VAC |

NOTE:
- EO1: Electric 120 VAC
- EO2: Electric 220 VAC
- For other voltages consult factory
- Actuator operating temperature: -20°F to 160°F (-29°C to 71°C)
- CE marked.
- UL listed & CSA approved for NEMA 4, 4x, 7 & 9
- Explosion proof.

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# Ball Valves

## Options / Details

Autoclave Engineers ball valves can be supplied with a number of options to meet your requirements. Options consist of different materials of construction, seal material, high temperature seals, handle colors, handle lockouts, limit switches or limit switches with visual indicators for pneumatic actuators.

Replacement of the old style ball valve with the new style is also addressed with complete ordering information.

The following pages provide details on the available options, as well as tube connection dimensions. For additional information on these options, or technical information not found in this or any other section, consult the factory or local distributor.



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## High Temperature Option

Ball valves are available with alternate o-rings for high temperature operation. Standard Viton o-rings are replaced with Kalrez o-rings to increase the operating temperature to 500°F (260°C). To specify this option, add "-HT" to the catalog number as shown in the ball valve sections.

High temperature pneumatic valve actuators are also available. Consult factory with your application and for specific information.

## Material Options

Standard ball valves are constructed of 316 stainless steel. Other materials are available for specific applications upon request. NACE (MR-01-75) approved materials for sour service can be supplied upon request. Consult factory for the materials available and the temperature and pressure ratings.

## Limit Switches or Limit Switches with Visual Indicators

Pneumatic actuators are available with limit switches or limit switches with visual indicators. Consult the factory for information on these items or questions concerning your applications.

## Handle Options

Ball valves can be purchased with optional handle colors for process or valve identification. Consult factory for available colors and other options.

## Handle Lockouts

Handle lockouts are available to lockout ball valves in the open or closed position preventing unauthorized personnel from actuating valves during shutdowns or emergency situations. Lockouts consist of two halves that completely cover the valve handle and can be locked for security. They are constructed of durable plastic resistant to abrasion, solvents, and chemical agents. Consult factory for details.

## Obsolete Ball Valves

Ball valves complete with connection adapters are available for direct replacement of our older obsolete ball valve. The ball valve seat glands are designed to permit replacement without having to modify your existing tubing. To order valves for direct replacement add "-OS" to the end of the standard ball valve catalog number.

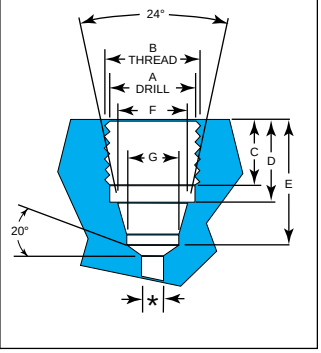
*Note: This applies only to the 1/4" 2-way ball valve.*

## Connection Detail Dimensions

The following are reference dimensions for the tube connections used in the ball valves. For complete connection information see the Tools, Installation, Operation and Maintenance section in the Autoclave Engineers Fluid Components complete catalog.

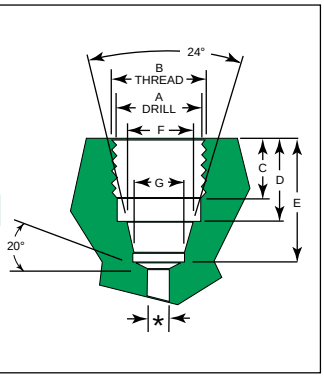
## Tube Connection Dimensions - *AE SpeedBite SW* *

| Tube Outside Diameter inches (mm) | Connection Type | Dimensions - Inches (mm) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E | F | G |
| 1/4 | SW250 | 29/64 | 1/2 -20 | 0.34 | 0.44 | 0.69 | 0.35 | "F" 0.257 |
| (6.35) | | (11.50) | (12.7) -20 | (8.64) | (11.20) | (17.50) | (8.89) | "F" (6.53) |
| 3/8 | SW375 | 37/64 | 5/8 -18 | 0.38 | 0.47 | 0.75 | 0.48 | "W" 0.386 |
| (19.50) | | (14.70) | (15.90) -18 | (9.65) | (11.90) | (19.10) | (12.20) | "W" (9.80) |
| 1/2 | SW500 | 3/4 | 13/16 -16 | 0.41 | 0.50 | 0.81 | 0.60 | 0.514 |
| (12.70) | | (19.10) | (20.60) -16 | (10.50) | (12.70) | (20.60) | (15.20) | (13.100) |




## Tube Connection Dimensions - *AE SpeedBite W* *

| Tube Outside Diameter inches (mm) | Connection Type | Dimensions - Inches (mm) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E | F | G |
| 1/8 | W125 | "Q" 0.332 | 3/8 -24 | 0.22 | 0.31 | 0.47 | 0.19 | #30 0.128 |
| (3.18) | | "Q" (8.43) | (9.53) -24 | (5.59) | (7.87) | (11.90) | (4.83) | #30 (3.25) |
| 1/4 | W250 | 11/16 | 3/4 -16 | 0.38 | 0.44 | 0.69 | 0.35 | "F" 0.257 |
| (6.35) | | (17.50) | (19.10) -16 | (9.65) | (11.20) | (17.50) | (8.89) | "F" (6.53) |
| 3/8 | W375 | 11/16 | 3/4 -16 | 0.38 | 0.44 | 0.69 | 0.48 | "W" 0.386 |
| (9.53) | | (17.50) | (19.10) -16 | (9.65) | (11.20) | (17.50) | (12.20) | "W" (9.80) |




For prompt service, Autoclave stocks select products. Consult factory.

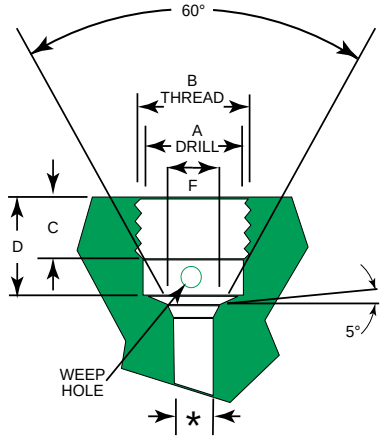
*Note: All dimensions are shown for reference only and should not be considered as actual machine dimensions.*

** For port diameter please see orifice sizes for specific valves and fittings.*

*All threads are manufactured to a class 2A or 2B fit.*

## Tube Connection Dimensions - *AE Medium Pressure SFCX* **

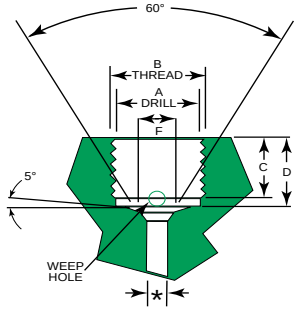
| Tube Outside Diameter inches (mm) | Connection Type | Dimensions - Inches (mm) | | | | |
|---|---|---|---|---|---|---|
| | | A | B | C | D | F |
| 1/4 (6.35) | SF250CX20 | 25/64 (9.92) | 7/16 -20 (11.10) -20 | 0.28 (7.11) | 0.50 (12.70) | 0.19 (4.83) |
| 3/8 (9.53) | SF375CX20 | 33/64 (13.10) | 9/16 -18 (14.30) -18 | 0.38 (9.65) | 0.62 (15.70) | 0.31 (7.87) |
| 9/16 (14.30) | SF562CX20 | 3/4 (19.10) | 13/16 -16 (20.60) -16 | 0.44 (11.20) | 0.75 (19.10) | 0.50 (12.70) |
| 3/4 (19.10) | SF750CX20 | 61/64 (24.20) | 3/4 -14$_Z$ (19.10) -14$_Z$ | 0.50 (12.70) | 0.94 (23.90) | 0.62 (15.70) |
| 1 (25.40) | SF100CX20 | 1 19/64 (32.90) | 1 3/8 -12 (34.90) -12 | 0.81 (20.60) | 1.31 (33.30) | 0.88 (22.40) |




Z = NPS Male Tap

## Tube Connection Dimensions - *AE HighPressure FC* **

| Tube Outside Diameter inches (mm) | Connection Type | Dimensions - Inches (mm) | | | | |
|---|---|---|---|---|---|---|
| | | A | B | C | D | F |
| 1/4 (6.35) | F250C | 33/64 (13.10) | 9/16 -18 (14.30) -18 | 0.38 (9.65) | 0.44 (11.20) | 0.17 (4.32) |
| 3/8 (9.53) | F375C | 11/16 (17.50) | 3/4 -16 (19.10) -16 | 0.53 (13.50) | 0.62 (15.70) | 0.26 (6.60) |
| 9/16 (14.30) | F562C | 1 3/64 (26.60) | 1 1/8 -12 (28.60) -12 | 0.62 (15.70) | 0.75 (19.10) | 0.38 (9.65) |




For prompt service, Autoclave stocks select products. Consult factory.

*Note: All dimensions are shown for reference only and should not be considered as actual machine dimensions.*

** For port diameter please see orifice sizes for specific valves and fittings.*

*** For male tubing end preparation, please see pages "Tools, Installation" section in main catalog.*

*All threads are manufactured to a class 2A or 2B fit.*



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# Relief Valve

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# Relief Valve

*Pressures to 75,000 psi ( 5171 bar)*

## *RVP Metal Seat Relief Valves*

***Series RVP*** relief valves provide reliable venting of gases or liquids for set pressures from 1,500 psi (103 bar) minimum to 75,000 psi (5171 bar). The standard temperature range for all models is -423° to 400° (-252° to 204°C). A high temperature option to 750°F (399°C) is also available.

These precision valves are designed for pressure gas systems, cryogenic systems, petrochemical applications and other special systems. Capable of handling air, gases, steam, vapor and liquids, they are however, **not recommended for steam boiler applications nor are they ASME code stampable.**

## *RVS Soft Seat Relief Valves*

***Series RVS*** relief valves utilize a soft seat design for reliable venting of gases at set pressures from 1,500 psi (103 bar) to 20,000 psi (1378 bar). The operating temperature range is 32°F (0°C) to 400°F (204°C).

The soft seat design provides bubble tight sealing, repeatable pop-off, and reseat. Additionally, soft seat valves provide a higher cycle life than metal seat relief valves.

These precision valves are designed for pressure gas systems, where zero leakage is critical. They are not recommended for liquid nitrogen or liquid carbon dioxide, which produce gas at cryogenic temperatures upon relief.

Relief valves are designed to open proportionally to increasing back pressure. Therefore, they are not recommended for applications requiring immediate full valve flow at set pressure (such as decompositions, polymerizations, etc.). Full flow of relief valve is defined at 10% over set pressure.

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## AE Relief Valves Features

***Materials:*** Standard models of Relief Valves are constructed of 316 stainless steel with selected components made of anti-galling stainless steel material for optimum economy and ruggedness.

***Connections:*** All models except 30, 60, & 75 RVP series are designed with 9/16" Autoclave Medium Pressure inlet connections. The 30 & 60 RVP have 3/8" high pressure connection, while the 75 RVP has a 5/16" high pressure connections. The outlet connection on all models is a female 3/4" NPT. While adapters to other sizes and connection types are available, they must be sized for specific flow requirements. See Adapter section.

***Orifice Sizes:*** Orifice diameters range from .062 (1.57mm) to .312" (7.92mm).

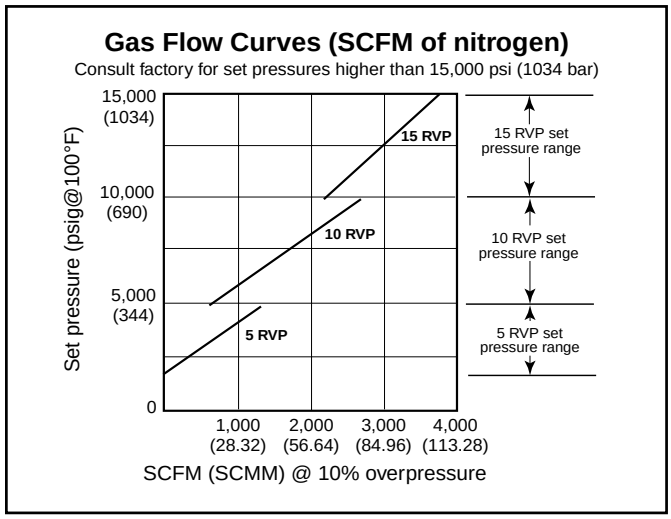
***Full Lift for Full Flow:*** These relief valves are designed to open as a function of increasing back pressure. Proper spring selection assures repeatability of opening, full lift and flow, and reseat pressures.

***Reliability and Long Service Life:*** Materials engineering and stringent quality control procedures combine to assure the highest quality, reliability and service life. Each valve is preset and factory sealed to ensure proper valve operation.

***High Set Pressure Capability:*** Unique seat construction plus over-the-nozzle guiding and proper selection of materials permits standard set pressures to 75,000 psi. (5171 bar)

***Dependable Shut-off:*** Series RVP relief valves are designed to provide shut-off of liquids and gases under pressure to commercial tightness standards. Series RVS relief valves are designed to provide bubble tight shut off of gases.

***Fewer Parts, Ease of Maintenance:*** Engineered to perform with fewer basic components, both RVP and RVS valves facilitate minimum stocking of spare parts and ease of maintenance. The combined angle seat in the RVP series eliminates the need for lapping in rework.




All RVP models are designed primarily for thermal expansion or low volume relief applications at high pressures where flow is not critical. Thus, liquid curves for these models are not shown.

*Note: Curves on this page are based on capacities of valves only and do not take tubing into account.*

*Caution should be exercised in proper selection of medium pressure tubing based on actual operating conditions. Two series available: 10,000 (690 bar) and 20,000 (1380 bar).*

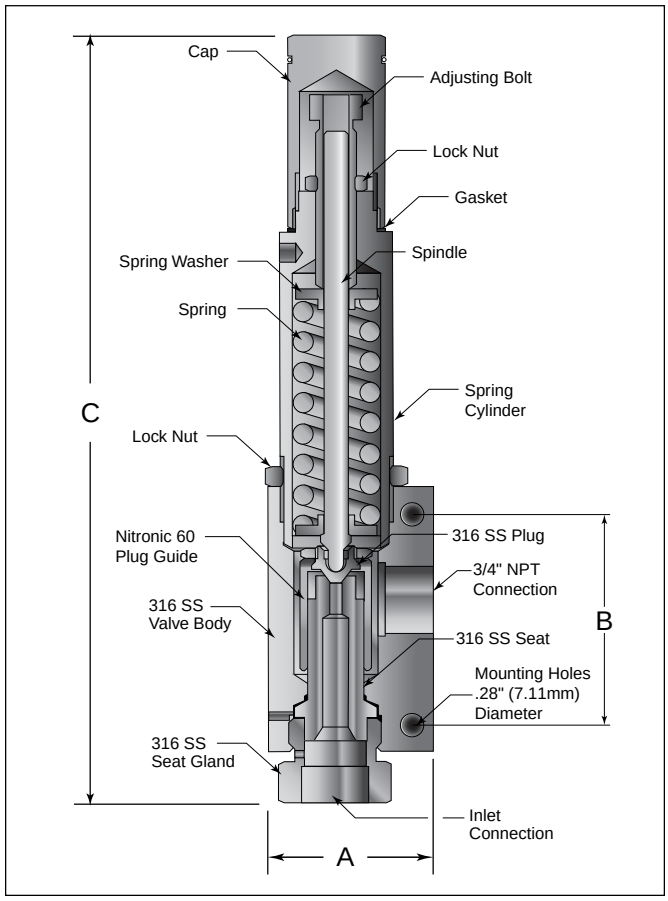



Figure 1 - RVP Series

*Note: See back cover for options and ordering information.*

## Ordering Table and Specifications

### *RVP Series* - See Figure 1

| Catalog* Number | Connection Size and Type | | Orfice Diameter inches (mm) | Pressure Rating psi (bar) @100°F (38°C)* | | | Dimension Inches (mm) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Inlet Connection | Outlet Connection NPT | | Minimum Setting | Maximum Setting | Maximum Back Pressure | A | B | C |
| 5RVP9072 | SF562CX | 3/4 | 0.312 **(7.92)** | 1,500 **(103.42)** | 5,000 **(344.73)** | 500 **(34.47)** | 2.00 **(50.80)** | 2.50 **(63.50)** | 9.40 **(238.76)** |
| 10RVP9072 | SF562CX | 3/4 | 0.250 **(6.35)** | 5,000 **(344.73)** | 10,000 **(689.46)** | 500 **(34.47)** | 2.00 **(50.80)** | 2.50 **(63.50)** | 9.40 **(238.76)** |
| 15RVP9072 | SF562CX | 3/4 | 0.188 **(4.78)** | 10,000 **(689.46)** | 15,000 **(1034.20)** | 500 **(34.47)** | 2.00 **(50.80)** | 2.50 **(63.50)** | 9.40 **(238.76)** |
| 20RVP9072 | SF562CX | 3/4 | 0.156 **(3.96)** | 15,000 **(1034.20)** | 20,000 **(1378.93)** | 500 **(34.47)** | 2.00 **(50.80)** | 2.50 **(63.50)** | 9.40 **(238.76)** |
| 30RVP6072 | F375C | 3/4 | 0.125 **(3.18)** | 20,000 **(1378.93)** | 30,000 **(2068.39)** | 500 **(34.47)** | 2.00 **(50.80)** | 2.50 **(63.50)** | 9.52 **(241.81)** |
| 45RVP9072 | F562C | 3/4 | 0.093 **(2.36)** | 25,000 **(1723.66)** | 45,000 **(3102.59)** | 500 **(34.47)** | 2.00 **(50.80)** | 2.50 **(63.50)** | 9.52 **(241.81)** |
| 60RVP9072 | F375C | 3/4 | 0.078 **(1.98)** | 30,000 **(2068.39)** | 60,000 **(4136.79)** | 500 **(34.47)** | 2.00 **(50.80)** | 2.50 **(63.50)** | 9.52 **(241.81)** |
| 75RVP5072 | F312C150 | 3/4 | 0.062 **(1.57)** | 37,000 **(2551.02)** | 75,000 **(5170.99)** | 500 **(34.47)** | 2.00 **(50.80)** | 2.50 **(63.50)** | 9.83 **(249.68)** |

*Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

Note: For pressure rating see selection chart.

*For prompt service, Autoclave stocks select products. Consult factory.*

## Ordering Table and Specifications

***Options:*** Autoclave Engineers can supply various inlet and outlet connections on special order. A high temperature option is also available for temperatures to 750°F (399°C) for RVP models.

To specify high temperature option:
Add suffix "HT" for 750°F (399°C) high temperature option (RVP series only)

**Caution:**

1. AE relief valves are preset and factory sealed. Warranty is voided if seal is broken by customer.
2. Maximum system operating pressure should not exceed 90% of relief valve set pressure. Operating pressures in excess of this may cause weepage resulting in damage to the plug and seat.

***Ordering Instructions:*** To permit prompt and correct responses to your order, we will require the following information: quantity, valve catalog number, service requirements (liquid, gas & vapor), set pressure (PSIG - bar), and service temperature range.

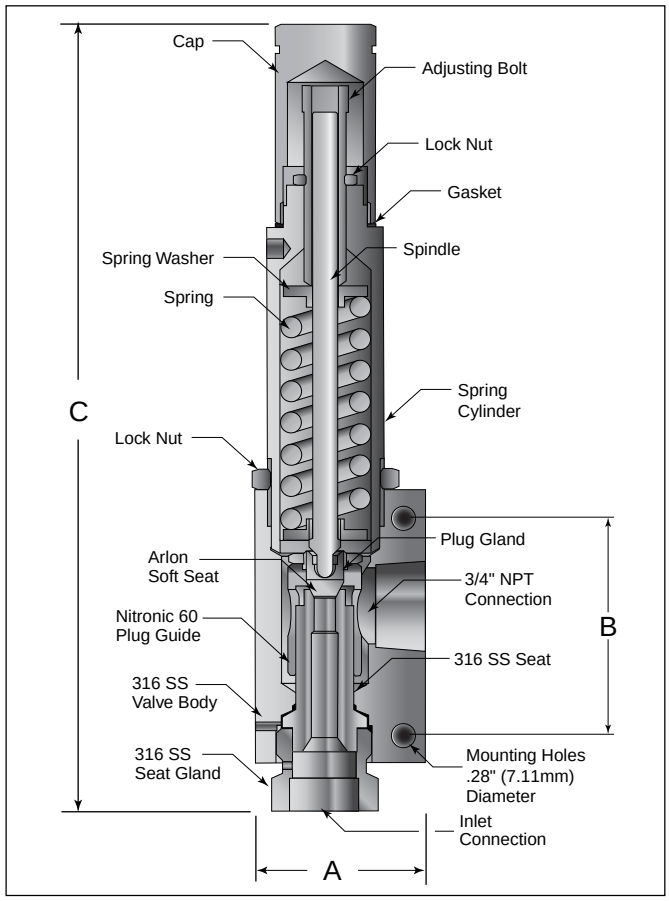



Figure 2 - RSV Series

***RVS Series*** - See Figure 2

| Catalog* Number | Connection Size and Type | | Orfice Diameter inches (mm) | Pressure Rating psi (bar) @100°F (38°C) | | | Dimension Inches (mm) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Inlet Connection | Outlet Connection NPT | | Minimum Setting | Maximum Setting | Maximum Back Pressure | A | B | C |
| 10RVS9072 | SF562CX | 3/4 | 0.25 **(6.35)** | 5,000 **(344.73)** | 10,000 **(689.46)** | 500 **(34.47)** | 2.00 **(50.80)** | 2.50 **(63.50)** | 9.40 **(238.76)** |
| 20RVS9072 | SF562CX | 3/4 | 0.156 **(3.96)** | 10,000 **(689.46)** | 20,000 **(1378.93)** | 500 **(34.47)** | 2.00 **(50.80)** | 2.50 **(63.50)** | 9.40 **(238.76)** |

*Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

Note: For pressure rating see selection chart.

*For prompt service, Autoclave stocks select products. Consult factory.*



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# Custom Valves & Manifolds

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# Custom Valves & Manifolds

Autoclave Engineer's offers special valves and manifolds designed to meet customer specific requirements.

The following pages provide a brief outline of our optional connections and valve styles. Other styles of connections are available such as flange, SAE, AE Easy-Union, or metric, upon request.

Manifolds are well suited for particular applications such as termination of common lines as a distribution source from a large line to several smaller ones. Autoclave manifolds are made to customer specifications and can be rated up to 100,000 psi (6895 bar). Manifolds can be supplied with any number and variety of connections, including our medium and high-pressure connections, NPT, SAE, BSPP, clamp-style, and others.

Both valves and manifolds are available in non-standard materials, and can be supplied with special testing, cleaning or other requirements.

Contact your local sales representative for availability and pricing of custom components.

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Custom Valves & Manifolds

Autoclave Engineers offers a product line of non-standard valves and fittings with alternate style connections.

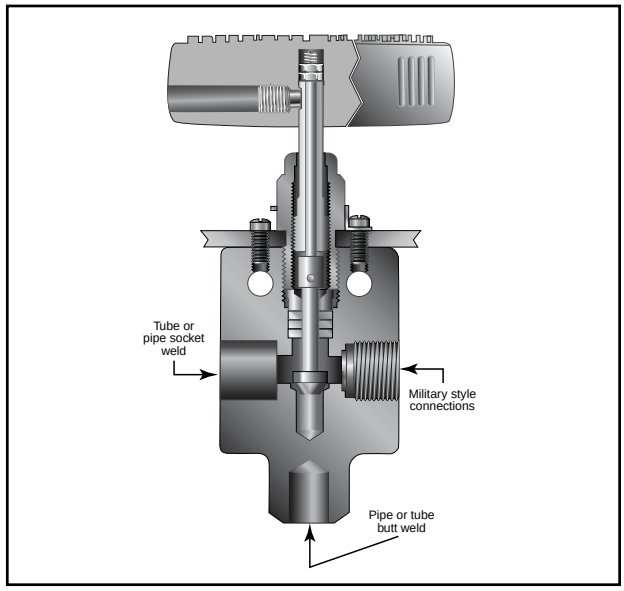
**Military Style Connections**
According to military standards
- MS16142
- MS33649
- MS33656

Up to 1” (25.4mm) in size.

**Tube or Pipe Socket Weld**
Weld connections up to 1” (25.4mm) in size.

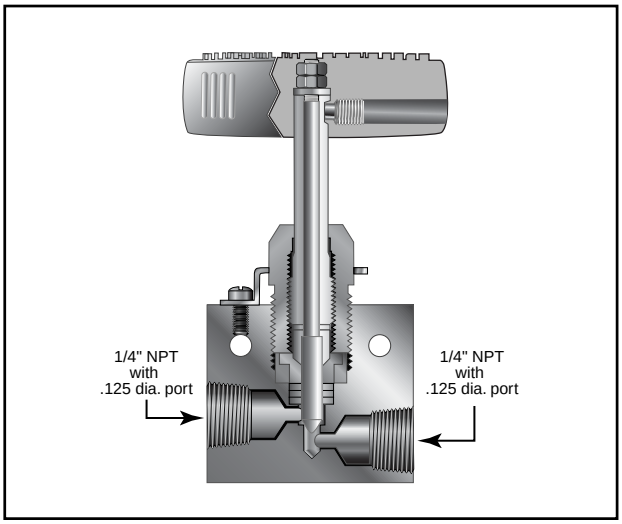
**Tube or Pipe Butt Weld**
Weld connections up to 1” (25.4mm) in size.

**British Standard Parallel Pipe Threads**
The type and method of seal must be specified.



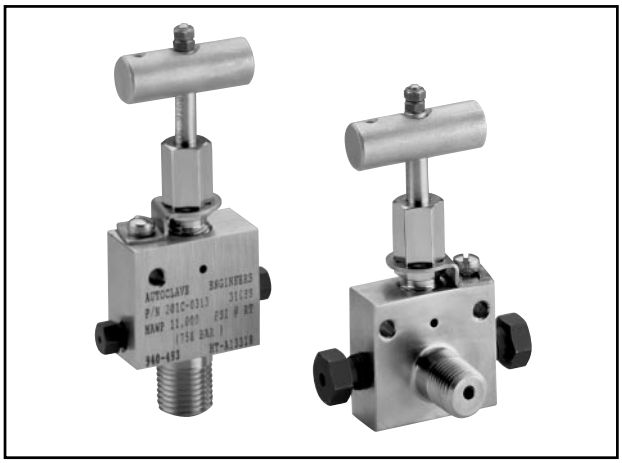

## NPT Valve

NPT style valves are available in various configurations as a non-standard product. Pressure ratings to 10,000 psi (690 bar) and connection sizes up to 1” (25.4 mm) can be furnished. Associated pipe fittings and components are available as required. Contact you local sales representative.




## Bottle Valve

Autoclave Engineers offers a product line of bottle valves for mounting directly to sample bottles/cylinders. Bottle style valves are available in various configurations and pressure ratings to 11,000 psi (758 bar). Connection sizes range from 1/8”(3.17mm) to 1”(25.4mm) in tube size or metric style threads. Consult factory.

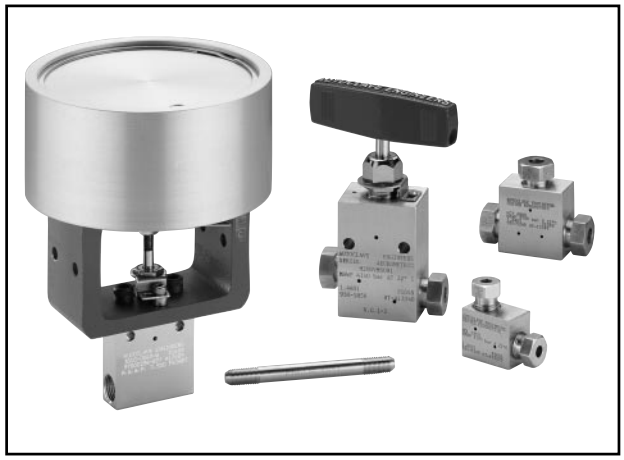


## Metric, Special Material & Special Configuration Valves, Fittings & Tubing

Autoclave medium and high pressure valves and fittings are available in a variety of special materials and configurations to satisfy most process requirements. Please refer to the Valve Options section for types of materials available and ordering information.

Other custom valves available include large port valves for ammonia, urea and polyethylene production service, and Y style straight-thru valves designed to minimize pressure drop.

Contact your local sales representative to find out more about these custom products. See the metric section in this catalog for our complete line of metric valves, fitting and tubing line.



## Manifold Block

Specialty pressure manifolds minimize space requirements and reduce the installation time necessary to plumb a pressure system. In addition, by reducing the number of components used in a system, manifolds also reduce the number of potential leak joints. Autoclave Engineers will design and build pressure manifolds to meet specific installation, layout, and pressure requirements. These manifolds are capable of withstanding pressures from vacuum to 100,000 psi (6895 bar), and are available in a variety of materials and sizes. Among the pressure connections that can be incorporated are Autoclave low, medium and high pressure, NPT, SAE, BSPP and others. Transitions in system line sizes and tubing pressure can be accomplished through a specialty manifold. These manifolds are appropriate wherever pressure tubing systems are utilized.

## Clamp Style Manifolds

Autoclave Engineers will design and build manifolds with clamp-type metal to metal seats to meet customer specific applications. Manifolds can be designed with various sizes of clamp type closure are rated in accordance with the maximum rating of the clamp type closure or other connections, whichever is lower. A wide variation of connections can be supplied to meet required applications. These manifolds are used anywhere multiple ports are needed. They are often used on high pressure liquid nitrogen pumping systems or other gas/liquid handling systems requiring high flow capacities with dependable seal integrity.

# Accessories

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# Accessories

Autoclave Engineers offers a complete selection of accessories to complete your system requirements.

Components such as thermocouples are used for monitoring and controlling temperatures, up to 100,000 psi (6895 bar).

Safety head assemblies are used to protect systems and pressure vessels from over-pressure conditions. Rupture discs are available in various pressure ranges and material options suitable for the application.

Pressure gauges are used to monitor and control pressure. Pressure gauges are available in two sizes, 4 1/2" and 6" (114.3 mm and 152.4 mm), and ranges from 0 to 80,000 psi (0 to 5116 bar). Optional electrical contact faces for pressure control are used to set high and low limits. Gauges are standard panel mount or can be flush mounted with an optional flush mount kit.

Accessories are also available as specials or non-standard items. Contact your local sales representative for more information.



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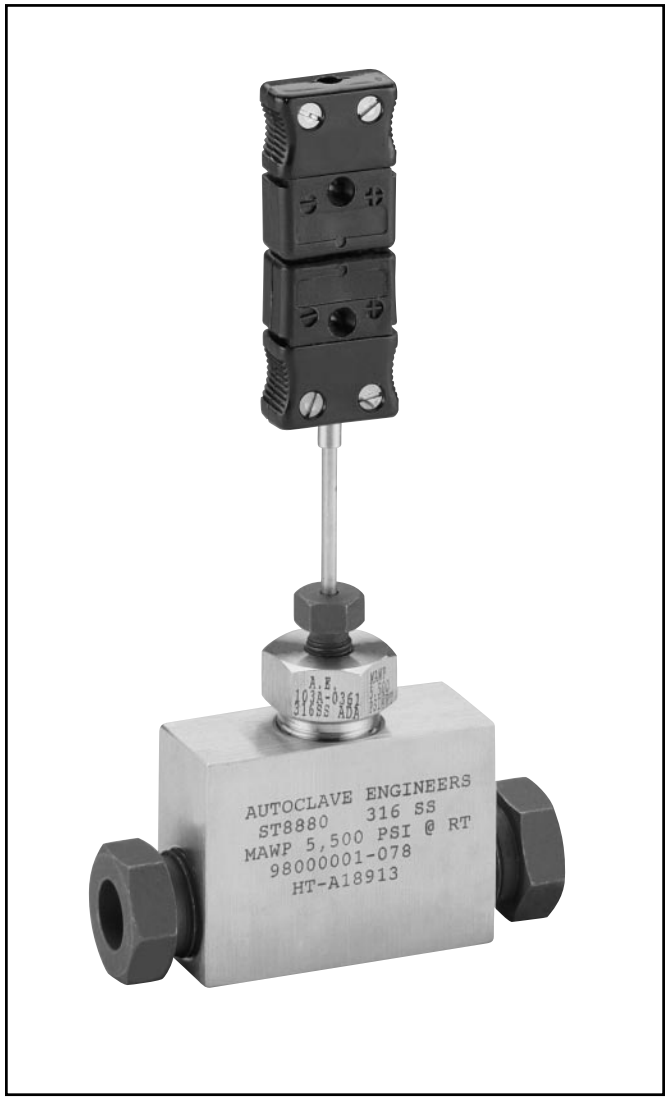
# Accessories - Pencil-type Thermocouples

## Pressures to 15,000 psi (1034 bar)

Thermocouples provide reliable temperature measurement within a fluid system.

The design permits installation of the element in direct contact with the fluid stream, thereby providing reliable temperature measurement. The quick-connector affords system flexibility. The thermocouple tip has a grounded-type junction.




### *Materials*

Precision-molded plastic connectors have heavy duty, spring-loaded jack inserts for positive contact. The sheath is type 316 stainless steel with 316 SS ferrule and gland. We offer a choice of iron contantan (J) or chromel-alumel (K) type elements (please specify when ordering). Basic assembly includes 1/8" Autoclave Speedbite connection with adapters for other connection sizes.

### *Pressure/Temperature Ratings*

Ratings to 15,000 psi (1034 bar) maximum working pressure. Temperatures at thermocouple tip can range to 1,200°F (649°C) (SpeedBite connection not recommended below 0°F (-17.8°C) or above 650°F (343°C).)

### *Ordering Information*

**Catalog order numbers** in the table refer to the complete assembly. Add suffix"J" for iron constantan element or "K" for chromel-alumel. To order a basic thermocouple with plug/jack assembly and connection (without through or angle block), change last digit in order number to "0" and specify sheath length if different from standard 3.62" (91.94 mm) length.

**Ordering examples:** TP4400K 6" (152.4 mm) denotes basic thermocouple to fit into a 1/4" Autoclave SpeedBite connection with chromel-alumel element and 6" (152.4 mm) sheath. TP 4401K denotes the above unit complete with through-type block and standard 3.62" (91.94 mm) sheath.

# Accessories - Pencil-type Thermocouples

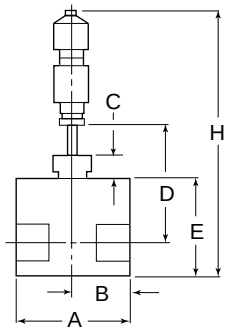
| Catalog Number | Fits Connection Type | Tubing Size Inches (mm) | Dimensions - inches (mm) | | | | | | Block Thickness | Fitting Pattern |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | A | B | C | D | E | H | | |
| **Through-Type** | | | | | | | | | | |
| TP2201 | W125 | 1/8 (3.18) | 1.38 (35.05) | 0.69 (17.53) | 0.31 (7.87) | 3.62 (91.95) | 1.00 (25.40) | 7.18 (182.37) | 0.50 (12.70) | See Figure 1 |
| TP4401 | SW250 | 1/4 (6.35) | 1.75 (44.45) | 0.88 (22.35) | 0.44 (11.18) | 3.62 (91.95) | 1.19 (30.23) | 7.25 (184.15) | 0.62 (15.75) | |
| TP6601 | SW375 | 3/8 (9.52) | 2.00 (50.80) | 1.00 (25.40) | 0.53 (13.46) | 3.62 (91.95) | 1.38 (35.05) | 7.31 (185.67) | 0.75 (19.05) | |
| TP8801 | SW500 | 1/2 (12.70) | 2.50 (63.50) | 1.25 (31.75) | 0.53 (13.46) | 3.62 (91.95) | 1.75 (44.45) | 7.44 (188.98) | 1.00 (25.40) | |
| **Angle-Type** | | | | | | | | | | |
| TP2202 | W125 | 1/8 (3.18) | 1.00 (25.40) | 0.75 (19.05) | 0.31 (7.87) | 3.62 (91.95) | 1.38 (35.05) | 7.62 (193.55) | 0.50 (12.70) | See Figure 2 |
| TP4402 | SW250 | 1/4 (6.35) | 1.19 (30.23) | 0.88 (22.35) | 0.44 (11.18) | 3.62 (91.95) | 1.75 (44.45) | 7.81 (198.37) | 0.62 (15.75) | |
| TP6602 | SW375 | 3/8 (9.52) | 1.38 (35.05) | 1.00 (25.40) | 0.53 (13.46) | 3.62 (91.95) | 2.00 (50.80) | 7.94 (201.68) | 0.75 (19.05) | |
| TP8802 | SW500 | 1/2 (12.70) | 1.75 (44.45) | 1.25 (31.75) | 0.53 (13.46) | 3.62 (91.95) | 2.50 (63.50) | 8.19 (208.03) | 1.00 (25.40) | |

Note: All thermocouples are furnished complete with connection components unless otherwise specified.

Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

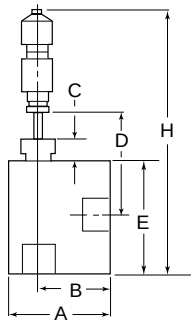
*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

**Figure 1**




**Through-Type**

**Figure 2**




**Angle-Type**

# Accessories - Sheath-type Thermocouples

## Pressures to 60,000 psi (4137 bar)

Thermocouples provide reliable temperature measurement within a fluid system.

Similar to low pressure thermocouples, this design also permits direct temperature monitoring at any point in a fluid system. The sheath type thermocouple features grounded junction and rapid response - 100 milliseconds or less at 63.3% of a step charge.

### Temperature Rating

Rating to 2,000 °F (1093°C) at tip of thermocouple. (Refer to adjacent Pressure/Temperature chart for elevated temperatures.) Minimum operating temperature 0°F (-17.8°C)

### Sheath Length

Differs for each size connection for optimum tip contact with fluid stream.

### Materials

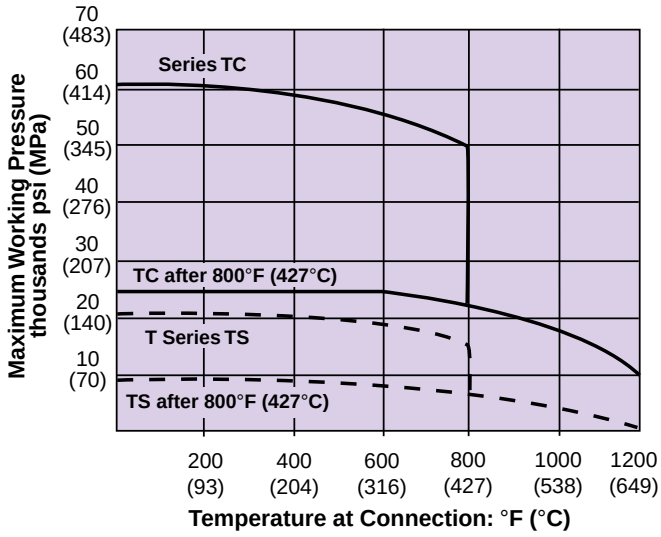
Bodies heat-treated 15-5 PH SS. 316 sheath brazed into body with gold-nickel alloy brazing material. An aluminum terminal housing is threaded into the body for ready access to terminals. An o-ring seal provides moisture protection.

### Ordering Information

To order thermocouples for use in standard Autoclave tees or crosses, use order numbers listed in table. For custom length sheaths, to extend through a vessel wall or cover, calculate sheath length as follows:

1. Add vessel wall or cover thickness to the distance the sheath will extend into vessel.
2. When using a basic 1/4" Autoclave connection, subtract dimension "M" for proper sheath length to order.
3. For all other connection sizes, add dimension "N" to measurement obtained in step 1.
4. Order a custom length sheath by adding desired length in inches as suffix to order number.

**Pressure/Temperature Rating Curve**




Standard collar and gland are cold worked 316 SS for use up to 1200°F (649°C). When cold worked 316 SS collar and gland are used, the physical properties are permanently altered after use above 800°F (427°C).

CAUTION: While testing has shown O-rings to provide satisfactory service life, both cyclic and shelf life may vary widely with differing service conditions, properties of reactants, pressure and temperature cycling, and age of the O-ring. FREQUENT INSPECTION SHOULD BE MADE to detect any deterioration, and O-rings replaced as required.

CAUTION: See appropriate pressure section in reference to proper selection of tubing.

# Accessories - Sheath-type Thermocouples

| Catalog Number | Fits Connection Type | Tubing Size Inches (mm) | Element Type | Dimensions - inches (mm) | | | | Fitting Pattern |
|---|---|---|---|---|---|---|---|---|
| | | | | L | M | N | H | |

## Series TS 20,000 psi (1379 bar)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TSJ4 | SF250CX | 1/4 | iron constantan | 0.28 | 0.95 | | 5.78 | |
| TSK4 | | (3.18) | chromel-alumel | (7.11) | (24.13) | | (146.81) | |
| TSJ6 | SF375CX | 3/8 | iron constantan | 1.19 | | 0.19 | 6.67 | |
| TSK6 | | (9.52) | chromel-alumel | (30.23) | | (4.83) | (166.88) | |
| TSJ9 | SF562CX | 9/16 | iron constantan | 1.19 | | 0.13 | 6.50 | See |
| TSK9 | | (14.28) | chromel-alumel | (30.23) | | (3.30) | (165.10) | Figure 1 |
| TSJ12 | SF750CX | 3/4 | iron constantan | 2.00 | | 0.50 | 6.88 | |
| TSK12 | | (19.05) | chromel-alumel | (50.80) | | (12.70) | (174.75) | |
| TSJ16 | SF1000CX | 1 | iron constantan | 2.62 | | 0.57 | 6.94 | |
| TSK16 | | (25.4) | chromel-alumel | (66.55) | | (14.48) | (176.28) | |

## Series TC 60,000 psi (4137 bar)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TCJ4 | F250C | 1/4 | iron constantan | 0.38 | 0.50 | | 5.88 | |
| TCK4 | | (3.18) | chromel-alumel | (9.65) | (12.70) | | (149.35) | |
| TCJ6 | F375C | 3/8 | iron constantan | 1.38 | | 0.32 | 6.69 | See |
| TCK6 | | (9.52) | chromel-alumel | (35.05) | | (8.13) | (169.93) | Figure 2 |
| TCJ9 | F562C | 9/16 | iron constantan | 1.62 | | 0.25 | 6.62 | |
| TCK9 | | (14.28) | chromel-alumel | (41.15) | | (6.35) | (168.15) | |

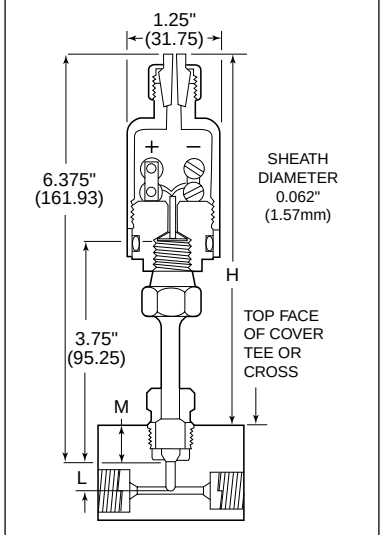
Note: All thermocouples are furnished complete with connection components unless otherwise specified.

Basic assembly includes 1/4" connection with adapters for other O.D. tube sizes.

Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

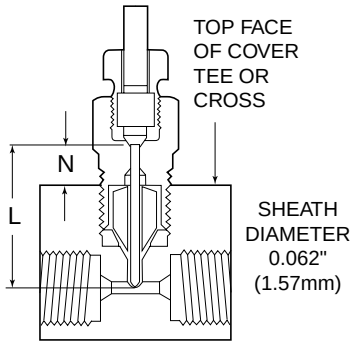
*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

**Figure 1**




**Series TS**

**Figure 2**




**Series TC**

# Accessories - Universal Safety Heads

## Pressures to 110,000 psi (7584 bar)

**Safety Heads/Rupture Discs** - Safety Heads and Rupture Discs offer an economical and dependable relief port to guard against system over-pressure.

Autoclave Engineers offers universal safety heads in three series compatible in orifice size and maximum pressure rating with Autoclave Low Pressure, Medium Pressure and High Pressure valves, fittings and tubing.

Autoclave Low Pressure Series SS: Autoclave SpeedBite Ermeto-type tube connection, maximum rupture pressures to 15,000 psi (1034 bar).

Autoclave Medium Pressure Series SFCX: Autoclave Medium-Pressure coned-and-threaded tube connection, maximum rupture pressures to 20,000 psi (1379 bar).

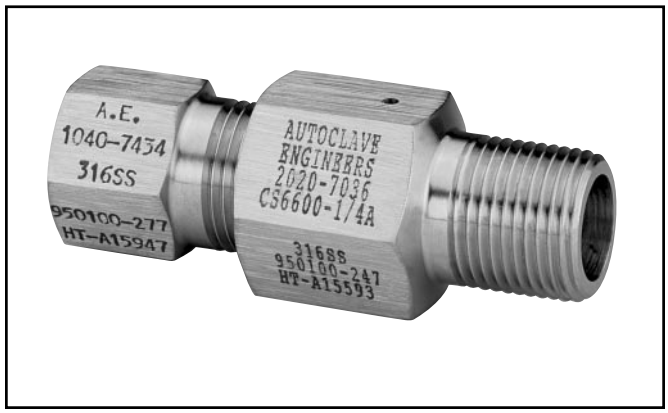
Autoclave High Pressure Series FC: Autoclave High Pressure coned-and-threaded tube connection, maximum rupture pressure to 110,000 psi (7584 bar).

The 3/16F style features a 3/16" blow-out diameter and a flat seat which can be ordered in pressure range from 200 to 27,000 psi (13.8 to 1862 bar).

The 1/4A style features a 1/4" blow-out diameter and an angular seat which can be ordered in pressures from 900 to 60,000 psi (62 to 4137 bar).

The 1/4F style features a 1/4" blow-out diameter and a flat seat which is used for pressure above 60,000 psi (4137 bar).

The 1/2F style features a 1/2" blow-out diameter and a flat seat which can be ordered in pressures from 500 to 10,000 psi (35 to 690 bar).




## *Materials and Features*

• Non-rotating double-cone plug design avoids galling and scoring of safety head or connection during installation. Reduces likelihood of leakage.

• Interchangeable hold-down rings permit use of several different sizes and types of rupture discs in a single safety head. Accommodates discs with rupture pressures as low as 90 psi (6.2 bar) and ranging to 60,000 psi (4137 bar) and above.

• Install in any standard Autoclave coupling, elbow, cross or tee, directly into a pressure vessel.

• Cold-worked Type 316 SS body hold down gland and plug, all series.

• Hold down rings are corrossion resistant steel.

*Consult Local Sales Representative for safety head assemblies rated above 60,000 psi (4137 bar).*

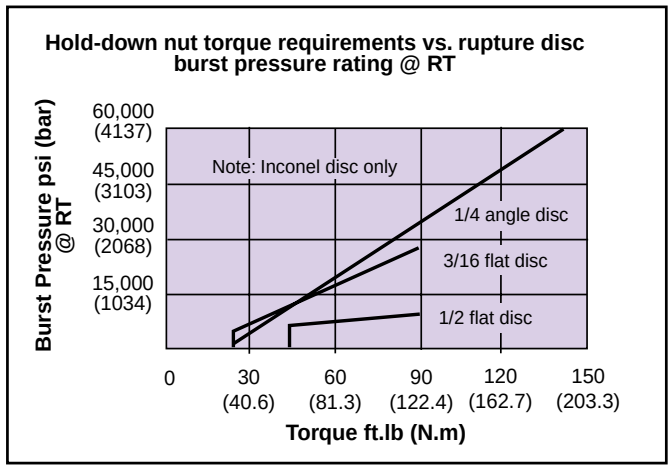
## Ordering Information

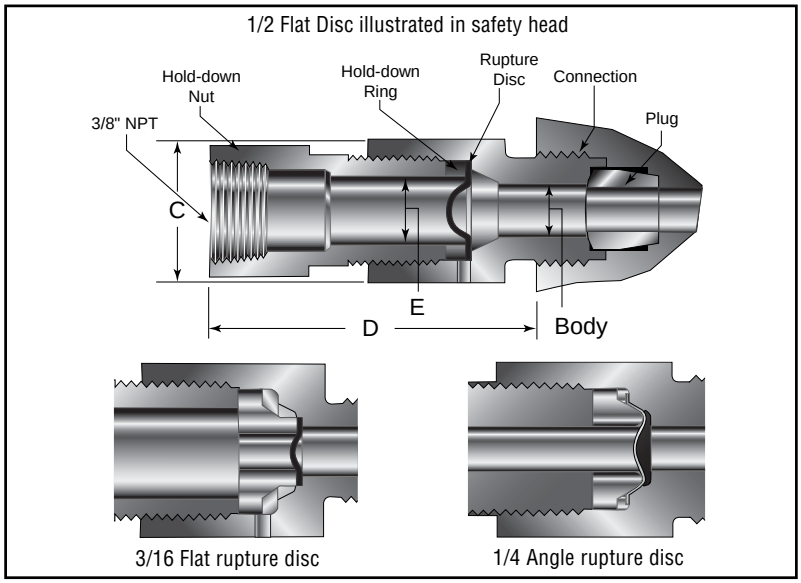
To order an Autoclave Universal Safety Head, use the catalog order number from table. ADD THE SIZE OF THE RUPTURE DISC YOU WANT AS A SUFFIX TO THE CATALOG NUMBER; SUCH AS CS6600-1/4A. Then order desired rupture discs from rupture disc section. (This is important since the disc size determines which hold-down ring will be furnished with the safety head.)

### Hold-down nut torque values

| Torque@ Minimum Pressure Ft. lb. (N.m) | Torque@ Minimum Pressure psi (bar) | Torque@ Maximum Pressure Ft. lb. (N.m) | Torque@ Maximum Pressure psi (bar) | Rupture Disc inches | Hold-down Ring Part Number |
|---|---|---|---|---|---|
| 20 (27.1) | 5,000 (345) | 90 (122.0) | 26,500 (1827) | 3/16 Flat† | 101A-0439 |
| 40 (54.2) | 4,000 (276) | 90 (122.0) | 10,000 (690) | 1/2 Flat | 1020-7434 |
| 20 (27.1) | 4,000 (276) | 140 (189.8) | 60,000 (4137) | 1/4 Angle | 102A-0439 |

*† 3/16 flat seat disc cannot be used with safety head assemblies SS6600, SS8600 and CSX9600. Torque values for intermediate pressures may be linearily interpolated. Use minimum torque value for pressures lower than those shown.*



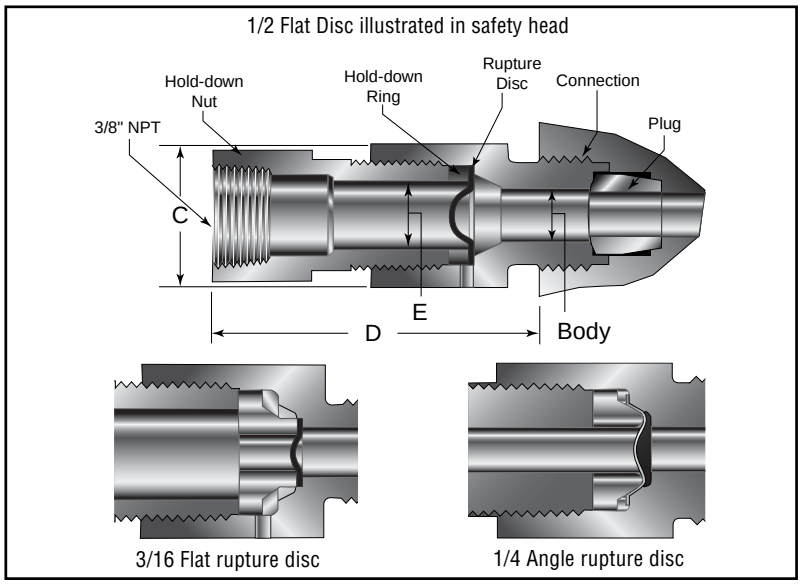

| Catalog Number Without Disc | Body Part Number | Plug Part Number | Hold-down Gland Part Number | Fits Connection Type | Fitting Pressure Rating psi (bar) | Body Torque Ft.lb. (N.m) | Plug Orifice inches (mm) | Body Orifice inches (mm) | Rupture Disc Size inches (mm) 3/16F Port E* | 1/4A Port E* | 1/2F Port E* | Dimensions inches (mm) C | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Low-Pressure** | | | | | | | | | | | | | |
| SS2600 | 2010-7035 | 101A-0434 | 3/16 & 1/2 Flat 1040-7434 | W125 | 15,000 (1034.2) | 15 (20.3) | 0.094 (2.39) | 0.125 (3.15) | 0.188 (4.78) | 0.25 (6.35) | 0.50 (12.7) | 1.00 (25.4) | 1.12 (28.45) |
| SS4600 | 2020-7035 | 102A-0434 | | SW250 | 15,000 (1034.2) | 15 (20.3) | 0.125 (3.18) | 0.250 (6.35) | 0.188 (4.78) | 0.25 (6.35) | 0.50 (12.7) | 1.00 (25.4) | 1.12 (28.45) |
| SS6600 | 2030-7035 | 103A-0434 | 1/4 Angle 1030-0241 | SW375 | 15,000 (1034.2) | 15 (20.3) | 0.250 (6.35) | 0.375 (9.53) | NA | 0.25 (6.35) | 0.50 (12.7) | 1.00 (25.4) | 1.12 (28.45) |
| SS8600 | 2040-7035 | 104A-0434 | | SW500 | 10,000 (690.0) | 20 (22.1) | 0.375 (9.53) | 0.375 (9.53) | NA | 0.25 (6.35) | 0.50 (12.7) | 1.00 (25.4) | 1.12 (28.45) |

Port E* - Minimum disc blow-out diameter of hold down ring

Note: Interchangeable hold-down rings permit use of several different sizes and types of rupture disc in a single safety head. Series SS, CS, and CSX-1/4, 3/8 and 9/16 have stainless steel hold-down gland with tool steel hold-down ring.

Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.




| Catalog Number Without Disc | Body Part Number | Plug Part Number | Hold-down Gland Part Number | Fits Connection Type | Fitting Pressure Rating psi (bar) | Body Torque Ft.lb. (N.m) | Plug Orifice inches (mm) | Body Orifice inches (mm) | Rupture Disc Size inches (mm) | | | Dimensions inches (mm) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 3/16F Port E* | 1/4A Port E* | 1/2F Port E* | C | D |
| **Medium-Pressure** | | | | | | | | | | | | | |
| CSX4600 | 101A-1731 | 2010-7823 | 3/16 & 1/2 Flat 1040-7434 | SF250CX | 20,000 (1378.9) | 15 (20.3) | 0.094 (2.39) | 0.141 (3.58) | 0.188 (4.78) | 0.25 (6.35) | 0.50 (12.7) | 1.00 (25.4) | 2.19 (55.63) |
| CSX6600 | 102A-1731 | 2010-7844 | | SF375CX | 20,000 (1378.9) | 20 (27.1) | 0.171 (4.34) | 0.250 (6.35) | 0.188 (4.78) | 0.25 (6.35) | 0.50 (12.7) | 1.00 (25.4) | 2.19 (55.63) |
| CSX9600 | 101A-0438 | 102A-0438 | 1/4 Angle 1030-0241 | SF562CX | 20,000 (1378.9) | 30 (40.6) | 0.312 (7.92) | 0.375 (9.53) | NA | 0.25 (6.35) | 0.50 (12.7) | 1.00 (25.4) | 2.19 (55.63) |
| **High-Pressure** | | | | | | | | | | | | | |
| CS4600 | 2010-7036 | 1030-4877 | 3/16 & 1/2 Flat 1040-7434 | F250C | 60,000 (4136.8) | 20 (2.8) | 0.082 (2.08) | 0.125 (3.18) | 0.188 (4.78) | 0.25 (6.35) | 0.50 (12.7) | 1.00 (25.4) | 2.25 (57.15) |
| CS6600 | 2020-7036 | 1030-6096 | | F375C | 60,000 (4136.8) | 40 (5.5) | 0.125 (3.18) | 0.219 (5.56) | 0.188 (4.78) | 0.25 (6.35) | 0.50 (12.7) | 1.00 (25.4) | 2.25 (57.15) |
| CS9600 | 2030-7036 | 1030-6097 | | F562C | 60,000 (4136.8) | 80 (11.1) | 0.188 (4.78) | 0.281 (7.13) | 0.188 (4.78) | 0.25 (6.35) | 0.50 (12.7) | 1.19 (30.23) | 2.25 (57.15) |
| 40CS9600 | 2030-7036 | 101C-7192 | 1/4 Angle 1030-0241 | F562C40 | 40,000 (2757.9) | 80 (11.1 | 0.250 (6.35) | 0.281 (7.13) | NA | 0.25 (6.35) | 0.50 (12.7) | 1.19 (30.23) | 2.25 (57.15) |

Port E* - Minimum disc blow-out diameter of hold down ring

Note: Interchangeable hold-down rings permit use of several different sizes and types of rupture disc in a single safety head. Series SS, CS, and CSX-1/4, 3/8 and 9/16 have stainless steel hold-down gland with tool steel hold-down ring.

Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

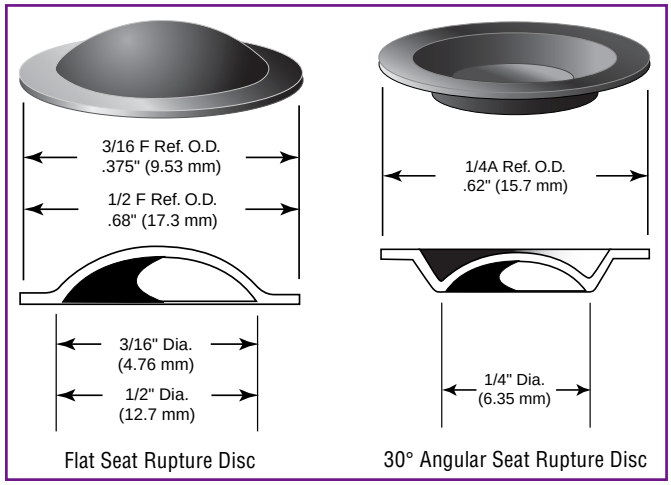
*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

# Accessories - Prebulged Rupture Discs

## Ordering Information

- Specify quantity, disc size, type, material and temperature.
- Indicate desired rupture rating which should be at least 110% of operating pressure. Manufacturing tolerances are +6% to -3% of nominal rating and will burst at ±5% of furnished rating. Discs are rated at 72°F (22°C).
- Minimum order of 6 discs required for materials other than Inconel.
- See next page for standard part numbers.

*Note: Inconel disc normally available from stock.*



Flat Seat Rupture Disc

30° Angular Seat Rupture Disc

| Disc Material | Disc Size Seat Type | Rupture Pressures Standard Available Range ±5% | Maximum Temperature Rating |
|---|---|---|---|
| | Inches | psi (bar) | °F (°C) |
| **Aluminum** | 3/16 flat | 220 to 1,750 (15.2 to 120.7) | 250 (121) |
| | 1/4 angle | 160 to 2,000 (11.0 to 137.9) | 250 (121) |
| | 1/2 flat | 90 to 1,000 (6.2 to 68.9) | 250 (121) |
| **Silver** | 3/16 flat | 500 to 4,500 (34.5 to 310.3) | 250 (121) |
| | 1/4 angle | 360 to 6,000 (24.8 to 413.7) | 250 (121) |
| | 1/2 flat | 190 to 1,700 (13.1 to 117.2) | 250 (121) |
| **Hastelloy C** | 3/16 flat | 3,000 to 65,000 (206.8 to 4481.5) | 1,000 (538) |
| | 1/4 angle | 2,500 to 70,000 (172.4 to 4826.3) | 1,000 (538) |
| | 1/2 flat | 1,300 to 11,500 (89.6 to 792.9) | 1,000 (538) |
| **Nickel** | 3/16 flat | 770 to 20,000 (53.1 to 1378.9) | 750 (399) |
| | 1/4 angle | 550 to 35,000 (37.9 to 2413.1) | 750 (399) |
| | 1/2 flat | 300 to 7,500 (20.7 to 517.1) | 750 (399) |
| **Monel** | 3/16 flat | 960 to 20,000 (66.2 to 1378.9) | 800 (427) |
| | 1/4 angle | 690 to 40,000 (47.6 to 2757.9) | 800 (427) |
| | 1/2 flat | 375 to 7,500 (25.9 to 517.1) | 800 (427) |
| **Inconel (Standard)** | 3/16 flat | 1,250 to 20,000 (86.2 to 1378.9) | 900 (482) |
| | 1/4 angle | 900 to 60,000 (62.1 to 4136.8) | 900 (482) |
| | 1/2 flat | 500 to 10,000 (34.5 to 690.0) | 900 (482) |
| **Type 316 Stainless Steel** | 3/16 flat | 1,750 to 20,000 (120.7 to 1378.9) | 900 (482) |
| | 1/4 angle | 1,250 to 60,000 (86.2 to 4136.8) | 900 (482) |
| | 1/2 flat | 700 to 10,000 (48.3 to 690.0) | 900 (482) |

Teflon coating available on one or both sides to increase minimum rupture rating.

CAUTION: High pressure-to-rupture ratios, severe pressure or temperature cycling, corrosion and metal fatigue affect disc life and rupture pressure. Frequent disc replacement may be desirable to avoid premature rupture. Rupture disc manufacturers recommended a 140 to 170 percent margin on disc ratings for extended disc life.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

## Rupture Disc Stock Part List - 3/16 Flat Disc

| Part Number | Description | Material | Pressure Range (psi) | Pressure Range (bar) |
|---|---|---|---|---|
| P-7003 | 3/16F DISC | Inconel | 1940-2120 | 134-146 |
| P-7674 | 3/16F DISC | Inconel | 2231-2438 | 154-168 |
| P-7005 | 3/16F DISC | Inconel | 2910-3180 | 201-219 |
| P-7007 | 3/16F DISC | Inconel | 3201-3498 | 221-241 |
| P-7009 | 3/16F DISC | Inconel | 3880-4240 | 268-292 |
| P-7011 | 3/16F DISC | Inconel | 4365-4700 | 301-324 |
| P-7013 | 3/16F DISC | Inconel | 4850-5300 | 334-365 |
| P-7015 | 3/16F DISC | Inconel | 5141-5618 | 355-387 |
| P-7017 | 3/16F DISC | Inconel | 5335-5830 | 368-402 |
| P-7018 | 3/16F DISC | Inconel | 5626-6148 | 388-424 |
| P-7019 | 3/16F DISC | Inconel | 5723-6254 | 395-431 |
| P-7020 | 3/16F DISC | Inconel | 5820-6360 | 401-439 |
| P-7021 | 3/16F DISC | Inconel | 6014-6572 | 415-453 |
| P-7022 | 3/16F DISC | Inconel | 6111-6678 | 421-460 |
| P-7024 | 3/16F DISC | Inconel | 6305-6890 | 435-475 |
| P-7026 | 3/16F DISC | Inconel | 6790-7420 | 468-512 |
| P-7028 | 3/16F DISC | Inconel | 7275-7950 | 502-548 |
| P-7030 | 3/16F DISC | Inconel | 7760-8480 | 535-585 |
| P-7032 | 3/16F DISC | Inconel | 8245-9010 | 568-621 |
| P-7034 | 3/16F DISC | Inconel | 8730-9540 | 602-658 |
| P-7040 | 3/16F DISC | Inconel | 10185-11130 | 702-767 |
| P-7044 | 3/16F DISC | Inconel | 11155-12190 | 769-840 |
| P-7046 | 3/16F DISC | Inconel | 11640-12720 | 803-877 |
| P-7048 | 3/16F DISC | Inconel | 12125-13250 | 836-914 |
| P-7050 | 3/16F DISC | Inconel | 12610-13780 | 869-950 |
| P-7052 | 3/16F DISC | Inconel | 13095-14310 | 903-987 |
| P-7054 | 3/16F DISC | Inconel | 13580-14840 | 936-1023 |
| P-7056 | 3/16F DISC | Inconel | 14065-15370 | 970-1060 |
| P-7058 | 3/16F DISC | Inconel | 14550-15900 | 1003-1096 |
| P-7060 | 3/16F DISC | Inconel | 15035-16430 | 1037-1133 |
| P-7062 | 3/16F DISC | Inconel | 15520-16960 | 1070-1169 |
| P-7064 | 3/16F DISC | Inconel | 16005-17490 | 1103-1206 |
| P-7068 | 3/16F DISC | Inconel | 16975-18550 | 1170-1279 |
| P-7072 | 3/16F DISC | Inconel | 17945-19610 | 1237-1352 |
| P-7074 | 3/16F DISC | Inconel | 18430-20140 | 1271-1389 |
| P-7080 | 3/16F DISC | Inconel | 19885-21730 | 1371-1498 |
| P-7082 | 3/16F DISC | Inconel | 20370-22260 | 1404-1535 |
| P-7084 | 3/16F DISC | Inconel | 20885-22790 | 1440-1571 |
| P-7086 | 3/16F DISC | Inconel | 21340-23320 | 1471-1608 |
| P-7088 | 3/16F DISC | Inconel | 21825-23850 | 1505-1644 |
| P-7094 | 3/16F DISC | Inconel | 23280-25440 | 1605-1754 |
| P-7096 | 3/16F DISC | Inconel | 24250-26500 | 1672-1827 |
| P-7098 | 3/16F DISC | Inconel | 24735-27030 | 1705-1864 |

## Rupture Disc Stock Part List - 1/4 Angle Disc

| Part Number | Description | Material | Pressure Range (psi) | Pressure Range (bar) |
|---|---|---|---|---|
| P-7301 | 1/4A DISC | Inconel | 970-1060 | 67-73 |
| P-7303 | 1/4A DISC | Inconel | 1164-1272 | 80-88 |
| P-7305 | 1/4A DISC | Inconel | 1445-1590 | 100-110 |
| P-7307 | 1/4A DISC | Inconel | 1697-1855 | 117-128 |
| P-7309 | 1/4A DISC | Inconel | 1940-2120 | 134-146 |
| P-7311 | 1/4A DISC | Inconel | 2425-2650 | 167-183 |
| P-7313 | 1/4A DISC | Inconel | 2910-3180 | 201-219 |
| P-7315 | 1/4A DISC | Inconel | 3395-3710 | 234-256 |
| P-7317 | 1/4A DISC | Inconel | 3880-4240 | 268-292 |
| P-7319 | 1/4A DISC | Inconel | 4365-4770 | 301-329 |
| P-7321 | 1/4A DISC | Inconel | 4850-5300 | 334-365 |
| P-7323 | 1/4A DISC | Inconel | 5335-5830 | 368-402 |
| P-7325 | 1/4A DISC | Inconel | 5820-6360 | 401-438 |
| P-7327 | 1/4A DISC | Inconel | 6305-6890 | 435-475 |
| P-7329 | 1/4A DISC | Inconel | 6790-7420 | 468-512 |
| P-7331 | 1/4A DISC | Inconel | 7275-7950 | 502-548 |
| P-7333 | 1/4A DISC | Inconel | 7760-8480 | 535-585 |
| P-7335 | 1/4A DISC | Inconel | 8245-9010 | 568-621 |
| P-7337 | 1/4A DISC | Inconel | 8730-9540 | 602-658 |
| P-7339 | 1/4A DISC | Inconel | 9215-10070 | 635-694 |
| P-7341 | 1/4A DISC | Inconel | 9700-10600 | 669-731 |
| P-7343 | 1/4A DISC | Inconel | 10185-11130 | 702-767 |
| P-7345 | 1/4A DISC | Inconel | 10670-11660 | 736-804 |
| P-7347 | 1/4A DISC | Inconel | 11155-12190 | 769-841 |
| P-7349 | 1/4A DISC | Inconel | 11640-12720 | 803-877 |
| P-7351 | 1/4A DISC | Inconel | 12125-13250 | 836-914 |
| P-7353 | 1/4A DISC | Inconel | 12610-13780 | 869-950 |
| P-7355 | 1/4A DISC | Inconel | 13095-14310 | 903-987 |
| P-7357 | 1/4A DISC | Inconel | 13580-14840 | 936-1023 |
| P-7361 | 1/4A DISC | Inconel | 14550-15900 | 1003-1096 |
| P-7363 | 1/4A DISC | Inconel | 15035-16430 | 1037-1133 |
| P-7365 | 1/4A DISC | Inconel | 15520-16960 | 1070-1169 |
| P-7367 | 1/4A DISC | Inconel | 16005-17490 | 1103-1206 |
| P-7369 | 1/4A DISC | Inconel | 16490-18020 | 1137-1242 |
| P-7371 | 1/4A DISC | Inconel | 16975-18550 | 1170-1279 |
| P-7373 | 1/4A DISC | Inconel | 17460-19080 | 1204-1315 |
| P-7375 | 1/4A DISC | Inconel | 17945-19610 | 1237-1352 |
| P-7377 | 1/4A DISC | Inconel | 18915-20670 | 1304-1425 |
| P-7379 | 1/4A DISC | Inconel | 19400-21200 | 1338-1462 |
| P-7381 | 1/4A DISC | Inconel | 19885-21730 | 1371-1498 |
| P-7382 | 1/4A DISC | Inconel | 21000-22000 | 1448-1517 |
| P-7383 | 1/4A DISC | Inconel | 21825-23850 | 1505-1644 |
| P-7385 | 1/4A DISC | Inconel | 24250-26500 | 1672-1827 |

## Rupture Disc Stock Part List - 1/4 Angle Disc - con't

| Part Number | Description | Material | Pressure Range (psi) | Pressure Range (bar) |
|---|---|---|---|---|
| P-7387 | 1/4A DISC | Inconel | 25220-27560 | 1739-1900 |
| P-7389 | 1/4A DISC | Inconel | 26190-28620 | 1806-1973 |
| P-7391 | 1/4A DISC | Inconel | 27160-29680 | 1873-2046 |
| P-7393 | 1/4A DISC | Inconel | 29100-31800 | 2006-2192 |
| P-7395 | 1/4A DISC | Inconel | 30070-32860 | 2073-2266 |
| P-7397 | 1/4A DISC | Inconel | 31525-34450 | 2174-2375 |
| P-7399 | 1/4A DISC | Inconel | 33950-37100 | 2341-2558 |
| P-7401 | 1/4A DISC | Inconel | 36375-39750 | 2508-2741 |
| P-7403 | 1/4A DISC | Inconel | 38880-42400 | 2681-2923 |
| P-7405 | 1/4A DISC | Inconel | 41255-45050 | 2844-3106 |
| P-7407 | 1/4A DISC | Inconel | 43650-47700 | 3010-3289 |
| P-7409 | 1/4A DISC | Inconel | 48500-53000 | 3344-3654 |
| P-7411 | 1/4A DISC | Inconel | 53350-58300 | 3678-4020 |
| P-7413 | 1/4A DISC | Inconel | 58200-63600 | 4013-4385 |
| P-7415 | 1/4A DISC | Inconel | 62155-66000 | 4285-4550 |
| P-7417 | 1/4A DISC | Inconel | 65960-72080 | 4548-4970 |
| P-7419 | 1/4A DISC | Inconel | 68870-75260 | 4748-5189 |

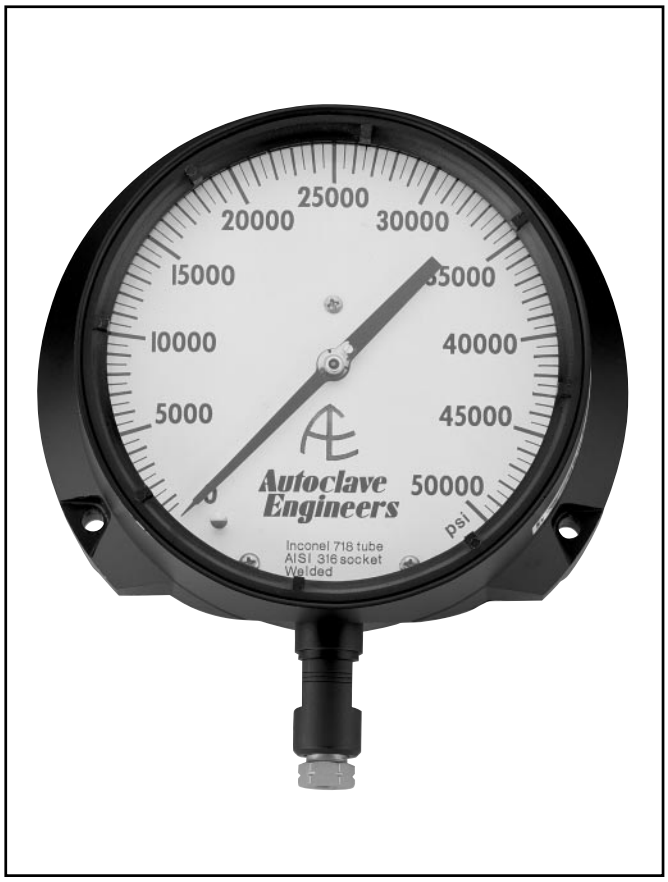
## Rupture Disc Stock Part List - 1/2 Flat Disc

| Part Number | Description | Material | Pressure Range (psi) | Pressure Range (bar) |
|---|---|---|---|---|
| P-7601 | 1/2F DISC | Inconel | 485-530 | 33-37 |
| P-7603 | 1/2F DISC | Inconel | 679-742 | 47-51 |
| P-7605 | 1/2F DISC | Inconel | 727-795 | 50-55 |
| P-7607 | 1/2F DISC | Inconel | 873-954 | 60-73 |
| P-7609 | 1/2F DISC | Inconel | 970-1060 | 67-75 |
| P-7610 | 1/2F DISC | Inconel | 1006-1100 | 69-76 |
| P-7611 | 1/2F DISC | Inconel | 1164-1272 | 80-88 |
| P-7613 | 1/2F DISC | Inconel | 1213-1323 | 84-91 |
| P-7615 | 1/2F DISC | Inconel | 1358-1484 | 94-102 |
| P-7617 | 1/2F DISC | Inconel | 1455-1590 | 100-110 |
| P-7619 | 1/2F DISC | Inconel | 1552-1696 | 107-117 |
| P-7621 | 1/2F DISC | Inconel | 1697-1855 | 117-128 |
| P-7623 | 1/2F DISC | Inconel | 1746-1908 | 120-132 |
| P-7625 | 1/2F DISC | Inconel | 1940-2120 | 134-146 |
| P-7627 | 1/2F DISC | Inconel | 2183-2385 | 151-164 |
| P-7629 | 1/2F DISC | Inconel | 2271-2438 | 157-168 |
| P-7631 | 1/2F DISC | Inconel | 2425-2650 | 167-183 |
| P-7633 | 1/2F DISC | Inconel | 2619-2862 | 181-197 |
| P-7635 | 1/2F DISC | Inconel | 2716-2968 | 187-204 |
| P-7637 | 1/2F DISC | Inconel | 2910-3180 | 201-219 |
| P-7639 | 1/2F DISC | Inconel | 3104-3392 | 214-234 |
| P-7641 | 1/2F DISC | Inconel | 3395-3710 | 234-256 |
| P-7643 | 1/2F DISC | Inconel | 3589-3922 | 247-270 |
| P-7645 | 1/2F DISC | Inconel | 3637-3975 | 251-274 |
| P-7647 | 1/2F DISC | Inconel | 3880-4240 | 268-292 |
| P-7649 | 1/2F DISC | Inconel | 4365-4770 | 301-329 |
| P-7651 | 1/2F DISC | Inconel | 4462-4876 | 308-336 |
| P-7653 | 1/2F DISC | Inconel | 4850-5300 | 334-365 |
| P-7655 | 1/2F DISC | Inconel | 5335-5830 | 368-402 |
| P-7657 | 1/2F DISC | Inconel | 5626-6148 | 388-424 |
| P-7659 | 1/2F DISC | Inconel | 5820-6360 | 401-438 |
| P-7661 | 1/2F DISC | Inconel | 6305-6890 | 435-475 |
| P-7663 | 1/2F DISC | Inconel | 6790-7420 | 468-512 |
| P-7665 | 1/2F DISC | Inconel | 7275-7950 | 502-548 |
| P-7667 | 1/2F DISC | Inconel | 7760-8480 | 535-585 |
| P-7669 | 1/2F DISC | Inconel | 8245-9010 | 568-621 |
| P-7671 | 1/2F DISC | Inconel | 8730-9540 | 602-658 |
| P-7673 | 1/2F DISC | Inconel | 9700-10600 | 669-731 |

# Accessories - Instrument Quality Pressure Gauges

## Pressures to 80,000 psi (5116 bar)

**Gauges** - Pressure gauges are offered for use in low, medium and high pressure systems. Instrument quality gauges are available with pressure to 80,000 psi (5115.7 bar).




### *Materials and Features*

- Accuracy within ±0.5% of full scale range.
- Plastic dial cover/solid front aluminum alloy case.
- Blow-out back panel for pressure relief in the event of Bourdon tube failure.
- 316 Stainless steel Bourdon tubes**
- Precision stainless steel movement for accuracy and resistance to atmospheric corrosion.
- Pointer zero adjustment located on front of gauge behind dial cover for convenience
- Gauges are commercially cleaned when shipped.
- Gauges available oxygen cleaned up to 20,000 psi (1379 bar) upon request.
- Gauges glycerin filled upon request.
- Gauges available with dual scale face plates.

### *Instrument quality gauges*

- **Flush panel mounting** - Interchangeable dial cover retaining rings are stocked to permit flush panel mounting of any instrument quality gauge. These will be furnished at an additional charge when specified - add “PM” to order number.
- **Optional electrical contact face** - Available for all instrument quality gauges. With adjustable low and high electrical contacts, this option permits gauges to provide pressure control for automatic or remote operation, or for fail-safe set points.

**Bourdon tube material for 0-30,000 psi (0-2068 bar) gauge is K Monel. Bourdon tube material for 0-50,000 psi (0-3447 bar) and 0-80,000 psi (0-5116 bar) gauge is Inconel 718.

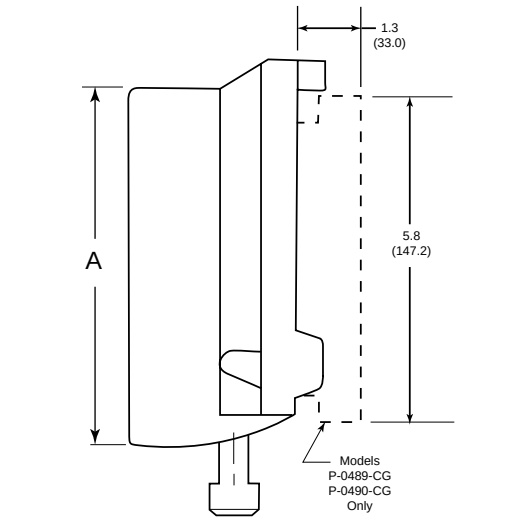


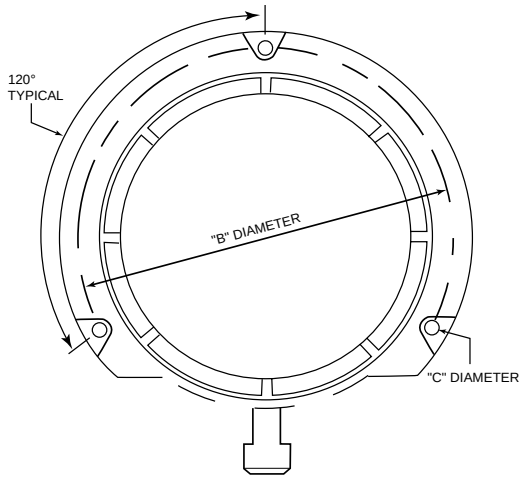
Note: Gauge connections are 1/4" (F250C) coned-and-threaded connection. Furnished with collar and gland.

| Calibrated in psi Only | | | |
|---|---|---|---|
| Catalog Number | Pressure Range psi (bar) | Minor Interval Value psi (bar) | Dial Diameter inches (mm) |
| P-0499-CG | 0-1,000 (0-69) | 10 (.69) | 41/2 (114.3) |
| P-0479-CG | 0-1,500 (0-103) | 10 (.69) | 41/2 (114.3) |
| P-0480-CG | 0-3,000 (0-207) | 20 (1.38) | 41/2 (114.3) |
| P-0481-CG | 0-5,000 (0-345) | 50 (3.44) | 41/2 (114.3) |
| P-0482-CG | 0-10,000 (0-690) | 100 (6.89) | 41/2 (114.3) |
| P-0483-CG | 0-15,000 (0-1034) | 100 (6.89) | 41/2 (114.3) |
| P-0487-CG | 0-20,000 (0-1379) | 200 (13.79) | 41/2 (114.3) |
| P-0488-CG** | 0-30,000 (0-2068) | 200 (13.79) | 6 (152.4) |
| P-0489-CG** | 0-50,000 (0-3447) | 500 (34.47) | 6 (152.4) |
| P-0490-CG** | 0-80,000 (0-5116) | 1,000 (68.94) | 6 (152.4) |

| Optional Electrical Contact Face | |
|---|---|
| Catalog Number | Fits Gauge Dial Diameter inches - (mm) |
| P-0713 | 41/2 (114.3) |
| P-0714 | 6 (152.4) |

**Bourdon tube material for 0-30,000 psi (0-2068 bar) gauge is K Monel. Bourdon tube material for 0-50,000 psi (0-3447 bar) and 0-80,000 psi (0-5116 bar) gauge is Inconel 718.




| Gauge Size inches - (mm) | "A" cutout inches - (mm) | "B" inches - (mm) | "C" inches - (mm) |
|---|---|---|---|
| 41/2" (114.3) | 4.937 (125.39) | 5.375 (136.52) | .281 (7.14) |
| 6" (152.4) | 6.437 (163.49) | 7.0 (177.80) | .281 (7.14) |

# Sour Service Products

## Index



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Certified

*02-0135CE-0103*

Autoclave Engineers
Fluid Components
Division of Snap-tite, Inc.
*www.autoclaveengineers.com*

# Sour Service Products

*Pressures to 30,000 psi (2068 bar)*

For over 50 years Autoclave Engineers has designed and built premium quality valves, fittings and tubing. This commitment to engineering and manufacturing excellence has earned Autoclave a reputation for reliable, efficient product performance and has established Autoclave as the worldwide leader in high pressure fluid components for the oil and gas industry.

Autoclave designs and builds high pressure valves, fittings and tubing for use with sour oil and gas ($H_2S$). Autoclave "SOG" components meet or exceed all requirements of NACE MR0175.


## *High Pressure Valve Features:*

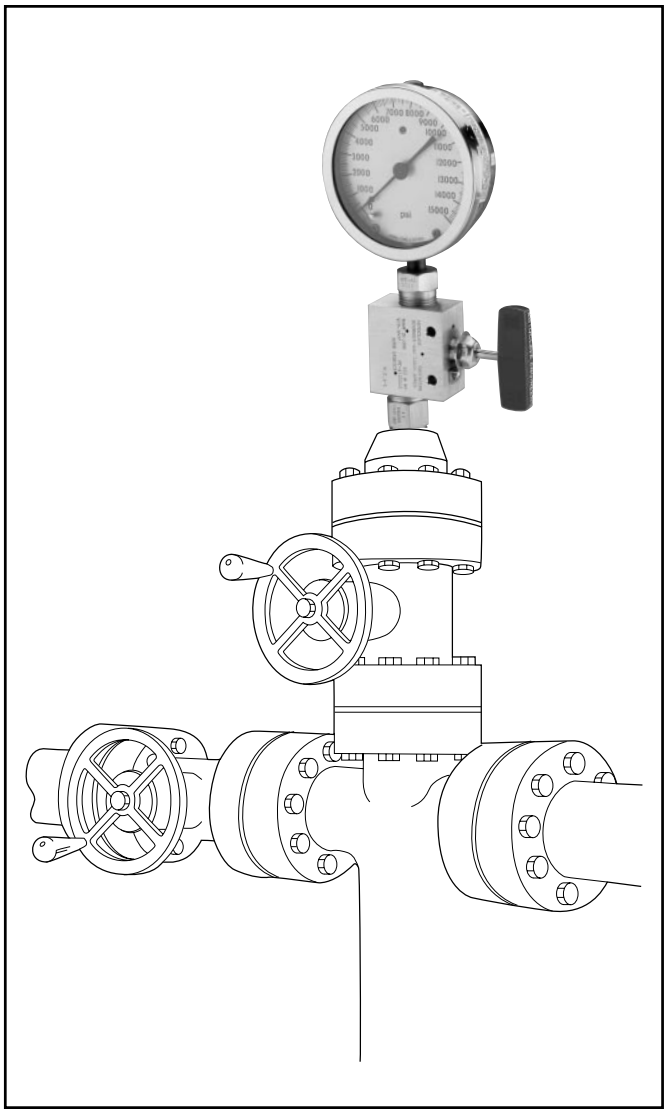
- Rising stem/barstock body design.
- Metal-to-metal seating achieves bubble-tight shut-off, longer stem/seat life in abrasive flow, greater durability for repeated on/off cycles and excellent corrosion resistance.
- PTFE encapsulated packing provides dependable stem and body sealing.
- Solid, one-piece stem provides an economical valve for SOG service.
- Optional non-rotating stem assembly available.
- Stem and packing gland materials have been selected to optimize thread cycle life.

Autoclave valves are complemented by a complete line of high pressure fittings, tubing and check valves. All high pressure valves and fittings use Autclave's high pressure coned-and-threaded connections for dependable performance under widely varying conditions.

Autoclave Engineers
Fluid Components
Division of Snap-tite, Inc.

## Oil and Gas Service Valves and Fittings

Autoclave Engineers offers a complete series of high pressure valves and fittings for wellhead christmas trees. Autoclave components are designed and manufactured to meet or exceed API and other applicable specifications for wellhead equipment, as well as Autoclave's own exacting standards for safety, reliability and service life under high pressure operation.



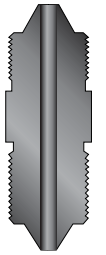
### *Sour Oil and Gas Service ($H_2S$) or Standard Service*

Autoclave oilfield components are offered for standard oil field service where $H_2S$ is not present and type "SOG" for service where $H_2S$ is present. Autoclave SOG components are manufactured with materials and procedures specified for optimum resistance to $H_2S$. These material specifications and manufacturing procedures are continually updated to incorporate the latest advances and customer requirements. All pressure-containing materials comply with the requirements of NACE MR0175.

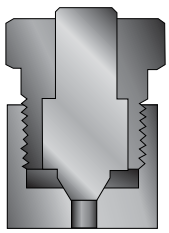
***Pressure/Temperature Ratings:*** Valves and fittings for standard service are rated for working pressure up to 60,000 psi (4137 bar) at 100°F (38°C). Type SOG components are rated up to 30,000 psi (2068 bar) at 100°F (38°C).

***Sizes:*** Autoclave type SOG valves and fittings are supplied with standard API test and gage connections (Autoclave F562C). Coned-and-threaded tubing connections in other sizes are available to meet individual requirements. Autoclave stocks a wide selection of sizes for immediate shipment.

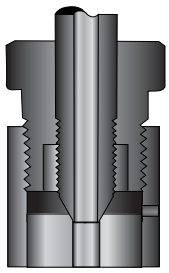
***Materials:*** Autoclave standard series valves and fittings are type 316 stainless steel, cold worked material. Type SOG valves and fittings are 316 stainless steel annealed material with Teflon packing below the stem threads on all needle valves. If required, complete material specifications are provided. All pressure-containing materials used are in accordance with NACE MR0175.



API Type I connector



API Type II connector



API Type III connector

Note All sour oil and gas valves and fittings supplied without collars and glands unless otherwise specified.

# Sour Service Products - Wellhead Gauge and Bleed Valves

## Pressures to 20,000 psi (1379 bar)

| Series | Tube Outside Diameter Size Inches | Connection Type | Orifice Size Inches (mm) | Rated $C_v$ | Pressure/ Temperature Rating psi (bar) @ Room Temperature |
|---|---|---|---|---|---|
| **Wellhead Gauge Valve** | | | | | |
| 20GV | 3/8 | F375C | 0.125 (3.18) | 0.23 | 10,000 (690) |
| 20GV | 9/16 | SF562CX | 0.125 (3.18) | 0.23 | 10,000 (690) |
| 30GV | 9/16 | F562C | 0.125 (3.18) | 0.33 | 20,000 (1379) |
| **Bleed Valve** | | | | | |
| 20BV | 3/8 | SM375CX | 0.093 (2.36) | - | 10,000 (690) |
| 20BV | 9/16 | SM562CX | 0.093 (2.36) | - | 10,000 (690) |
| 30BV | 9/16 | M562C | 0.093 (2.36) | - | 20,000 (1379)* |

*Notes:*
** Rating shown is in closed position.*
*Rating @ 10,000 psi (690 bar) in open position.*

Autoclave's Wellhead Gauge valves are designed for reliable shut-off service at a maximum working pressure of 20,000 psi (1379 bar). The Wellhead Gauge and Bleed Valves are standard in 316 stainless steel annealed material and comply with NACE MR0175. Special materials available on request.

### *Applications:*

**Wellhead Gauge Valve**
- Sample Lines
- Instrument calibration

**Bleed Valve**
- Pressure bleed

### *Gauge Valve Features:*
- One inlet, three outlet ports, all ports are API test and gauge connection ports.
- Metal-to-metal bubble tight shut-off
- Packing below stem threads
- Two piece non-rotating stem on standard service and SOG valves
- Optional use of long nipples in the inlet for installation on headers that are insulated.

### *Bleed Valve Features:*
- One piece hex construction allows easy installation
- Vent port tapped for plumbing to safe area
- Tee handle for easy operation
- Positive blow out prevention on stem
- Compatible with standard API test and gauge connections for 15,000 psi (1034 bar) service.

## Ordering Procedure

***Wellhead Gauge Valve*** - 30GV-SOGWO valves are furnished without collars and glands unless otherwise specified.

Typical catalog number: **30GV9078 - SOGWO**

| 30GV | 9 | 07 | 8 | — | SOGWO |
|---|---|---|---|---|---|
| **Valve Series** | **Outside Diameter Tube Size** | **Stem Type** | **Body Pattern** | | |
| **20GV** **30GV** | **6**-3/8" **9**-9/16" | **00** - one piece VEE stem **07**- non-rotating VEE stem | **8** - 4 ports, 1 inlet, 3 outlets | | Sour gas without glands and collars |

***Bleed Valve***

Typical catalog number: **30BV9002- SOG**

| 30BV | 9 | 00 | 2 | — | SOG |
|---|---|---|---|---|---|
| **Valve Series** | **Outside Diameter Tube Size** | **Stem Type** | **Body Pattern** | | |
| **20BV** **30BV** | **6**-3/8" **9**-9/16" | **00** - one piece VEE stem | **2** -Angle | | Sour gas |

## Wellhead Gauge Valve

| Catalog Number | Connection Type | Connection Size | Pressure Rating psi (bar) | Dimensions - inches (mm) | | | | | | | | | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | E | F | G | H | J | |
| 20GV6078-SOG | SF375CX | 3/8 | 10,000 | 2.00 | 3.12 | 2.00 | 4.75 | 1.13 | 1.00 | 0.50 | 0.94 | 3.00 | See Figure 1 |
| | | | (690) | (50.80) | (79.25) | (50.80) | (120.65) | (28.58) | (25.40) | (12.70) | (23.83) | (76.20) | |
| 20GV9078-SOG | SF562CX | 9/16 | 10,000 | 2.00 | 3.88 | 2.75 | 4.54 | 1.31 | 1.38 | 0.66 | 0.94 | 3.00 | |
| | | | (690) | (50.80) | (98.55) | (69.85) | (115.31) | (33.27) | (34.93) | (16.76) | (23.83) | (76.20) | |
| 30GV9078-SOG | F562C | 9/16 | 20,000 | 2.00 | 3.88 | 2.75 | 4.75 | 1.31 | 1.38 | 0.66 | 0.94 | 3.00 | |
| | | | (1379) | (50.80) | (98.55) | (69.85) | (120.65) | (33.27) | (34.93) | (16.76) | (23.83) | (76.20) | |

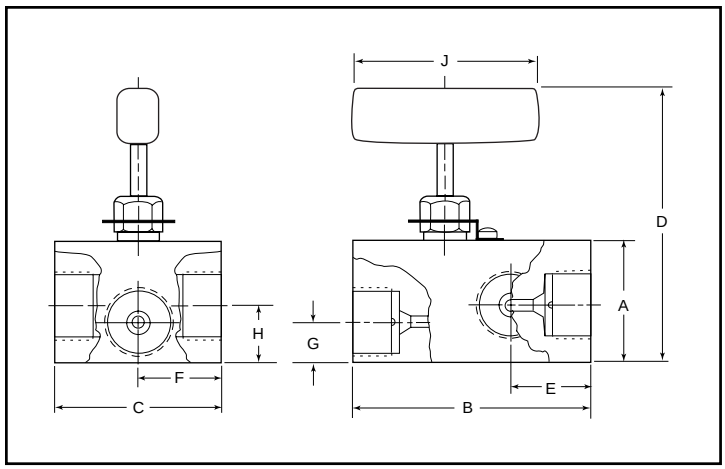



**Figure 1 - Wellhead Gauge Valve**

## Bleed Valve

| Catalog Number | Connection Type | Connection Size | Pressure Rating psi (bar) | Dimensions - inches (mm) | | | | | | | | | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | E | F | G | H | J | |
| 20BV6002-SOG | SM375CX | 3/8 | 10,000 | 3.23 | 2.42 | 1.12 | 1.38 | 1.50 | | | | | See Figure 2 |
| | | | (690) | (82.04) | (61.47) | (28.45) | (35.05) | (38.10) | | | | | |
| 20BV9002-SOG | SM562CX | 9/16 | 10,000 | 3.68 | 2.86 | 1.13 | 1.38 | 1.50 | | | | | |
| | | | (690) | (93.47) | (76.64) | (28.70) | (35.05) | (38.10) | | | | | |
| 30BV4002-SOG | M250C | 1/4 | 20,000 | 3.06 | 2.24 | 1.12 | 1.38 | 1.50 | | | | | |
| | | | (1379) | (77.72) | (56.90) | (28.45) | (35.05) | (38.10) | | | | | |
| 30BV9002-SOG | M562C | 9/16 | 20,000 | 3.44 | 2.61 | 1.12 | 1.38 | 1.50 | | | | | |
| | | | (1379) | (87.38) | (66.29) | (28.45) | (35.05) | (38.10) | | | | | |

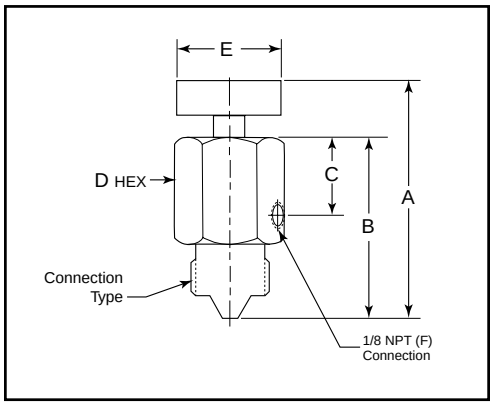



**Figure 2 - Bleed Valve**

# Sour Service Products - 30VM-SOGWO Series

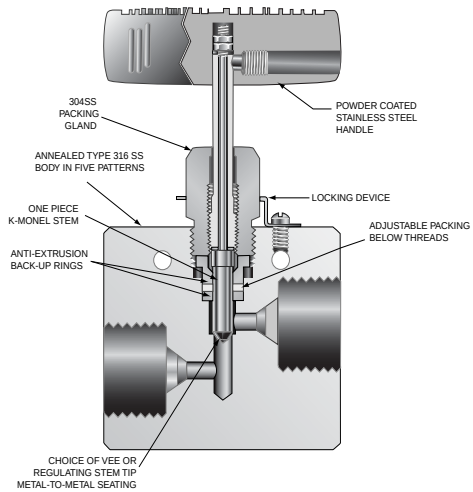
## Pressures to 20,000 psi (1379 bar)

| Tube Outside Diameter Size Inches | Connection Type | Orifice Size Inches (mm) | Rated $C_V$* | Pressure/ Temperature Rating psi (bar) @ Room Temperature** |
|---|---|---|---|---|
| 1/4 | F250C | 0.094 (2.39) | 0.12 | 20,000 (1379) |
| 3/8 | F375C | 0.125 (3.18) | 0.23 | 20,000 (1379) |
| 9/16 | F562C | 0.125 (3.18) | 0.33 | 20,000 (1379) |

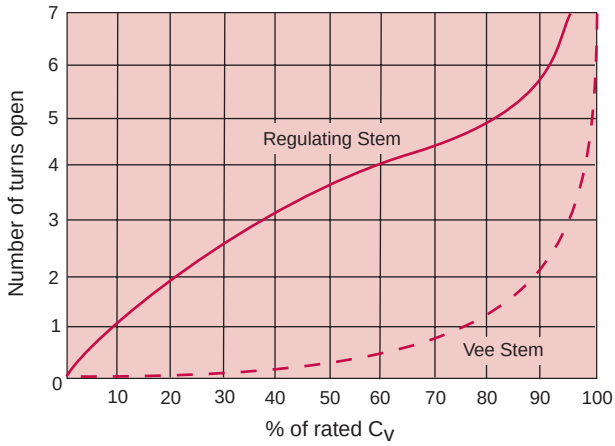
*Notes:*

* *$C_V$ values shown are for 2-way straight valve pattern. For 2-way angle patterns, increase $C_V$ value 50%.*

** *For complete temperature ratings see pressure/temperature rating guide in Technical Information section.*


**Generalized Flow Coefficient Curves ($C_V$)**




Note: For information on standard 30VM valves, refer to the Needle Valve Section.

## Ordering Procedure

The 30VM-SOGWO Series valves are furnished **without** collars and glands, unless otherwise specified.

Typical catalog number: **30VM4001-SOGWO**

**30VM** — Valve Series

**4** — Outside Diameter Tube Size
- **4**-1/4"
- **6**-3/8"
- **9**-9/16"

**00** — Stem/Seat Type
- **00** - One piece rotating Vee stem
- **01** - One piece rotating Regulating stem
- **07** - non-rotating Vee stem (on-off service)
- **08** - non-rotating Regulating stem (tapered tip for regulating and shutoff)
- **80** - One piece Vee stem with replaceable seat
- **81** - One piece Regulating stem with replaceable seat

**1** — Body Pattern
- **1** - two-way straight
- **2** - two-way angle
- **3** - three-way, two on pressure
- **4** - three-way, one on pressure
- **5** - three-way, two-stem manifold valve

—

**SOGWO**

Sour gas without glands and collars

Repair Kits: add "R" to the front of valve catalog number for proper repair kit. (Example: **R30VM4001-SOGWO**)

Valve Bodies: Valve bodies are available. Order using the eight (8) digit part number found in the valve drawing or contact your Sales Representative for information.

Consult your Autoclave representative for pricing on repair kits and valve bodies. Refer to the Tools, Installation, Operation and Maintenance section for proper maintenance procedures.

**Note:**
All sour service valves and fittings supplied without collars and glands unless otherwise specified.

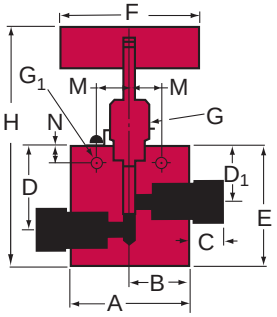
| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions - inches (mm) | | | | | | | | | | | | Block Thickness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | | |
| **2-Way Straight** | | | | | | | | | | | | | | | | | |
| 30VM4001-SOGWO | VEE | 1/4 | 0.094 | 2.00 | 1.00 | 0.50 | 1.50 | 1.12 | 2.00 | 3.00 | 1.00 | 0.22 | 4.62 | 0.69 | 0.38 | 1.00 | See Figure 1 |
| 30VM4081-SOGWO | REG | (6.35) | (2.39) | (50.80) | (25.40) | (12.70) | (38.10) | (28.45) | (50.80) | (76.20) | (25.40) | (5.59) | (117.35) | (17.53) | (9.65) | (25.40) | |
| 30VM6001-SOGWO | VEE | 3/8 | 0.125 | 2.00 | 1.00 | 0.53 | 1.50 | 1.12 | 2.00 | 3.00 | 1.00 | 0.22 | 4.68 | 0.69 | 0.38 | 1.00 | |
| 30VM6081-SOGWO | REG | (9.53) | (3.18) | (50.80) | (25.40) | (13.46) | (38.10) | (28.45) | (50.80) | (76.20) | (25.40) | (5.59) | (118.87) | (17.53) | (9.65) | (25.40) | |
| 30VM9001-SOGWO | VEE | 9/16 | 0.125 | 2.62 | 1.31 | 0.81 | 1.56 | 1.12 | 2.44 | 3.00 | 1.00 | 0.28 | 5.06 | 0.69 | 0.38 | 1.50 | |
| 30VM9081-SOGWO | REG | (14.29) | (3.18) | (66.55) | (33.27) | (20.57) | (39.62) | (28.45) | (61.98) | (76.20) | (25.40) | (7.11) | (128.52) | (17.53) | (9.65) | (38.10) | |
| **2-Way Angle** | | | | | | | | | | | | | | | | | |
| 30VM4002-SOGWO | VEE | 1/4 | 0.094 | 2.00 | 1.00 | 0.50 | | 1.12 | 2.00 | 3.00 | 1.00 | 0.22 | 4.62 | 0.69 | 0.38 | 1.00 | See Figure 2 |
| 30VM4082-SOGWO | REG | (6.35) | (2.39) | (50.80) | (25.40) | (12.70) | | (28.45) | (50.80) | (76.20) | (25.40) | (5.59) | (117.35) | (17.53) | (9.65) | (25.40) | |
| 30VM6002-SOGWO | VEE | 3/8 | 0.125 | 2.00 | 1.00 | 0.53 | | 1.12 | 2.12 | 3.00 | 1.00 | 0.22 | 4.74 | 0.69 | 0.38 | 1.00 | |
| 30VM6082-SOGWO | REG | (9.53) | (3.18) | (50.80) | (25.40) | (13.46) | | (28.45) | (53.85) | (76.20) | (25.40) | (5.59) | (120.40) | (17.53) | (9.65) | (25.40) | |
| 30VM9002-SOGWO | VEE | 9/16 | 0.125 | 2.62 | 1.31 | 0.81 | | 1.12 | 2.44 | 3.00 | 1.00 | 0.28 | 5.06 | 0.69 | 0.38 | 1.50 | |
| 30VM9082-SOGWO | REG | (14.29) | (3.18) | (66.55) | (33.27) | (20.57) | | (28.45) | (61.98) | (76.20) | (25.40) | (7.11) | (128.52) | (17.53) | (9.65) | (38.10) | |
| **3-Way / 2 on Pressure** | | | | | | | | | | | | | | | | | |
| 30VM4003-SOGWO | VEE | 1/4 | 0.094 | 2.00 | 1.00 | 0.50 | 1.50 | 1.12 | 2.12 | 3.00 | 1.00 | 0.22 | 4.74 | 0.69 | 0.38 | 1.00 | See Figure 3 |
| 30VM4083-SOGWO | REG | (6.35) | (2.39) | (50.80) | (25.40) | (12.70) | (38.10) | (28.45) | (53.85) | (76.20) | (25.40) | (5.59) | (120.40) | (17.53) | (9.65) | (25.40) | |
| 30VM6003-SOGWO | VEE | 3/8 | 0.125 | 2.00 | 1.00 | 0.53 | 1.50 | 1.12 | 2.50 | 3.00 | 1.00 | 0.22 | 5.12 | 0.69 | 0.38 | 1.00 | |
| 30VM6083-SOGWO | REG | (9.53) | (3.18) | (50.80) | (25.40) | (13.46) | (38.10) | (28.45) | (63.50) | (76.20) | (25.40) | (5.59) | (130.05) | (17.53) | (9.65) | (25.40) | |
| 30VM9003-SOGWO | VEE | 9/16 | 0.125 | 2.62 | 1.31 | 0.81 | 1.56 | 1.12 | 2.88 | 3.00 | 1.00 | 0.28 | 5.49 | 0.69 | 0.38 | 1.50 | |
| 30VM9083-SOGWO | REG | (14.29) | (3.18) | (66.55) | (33.27) | (20.57) | (39.62) | (28.45) | (73.15) | (76.20) | (25.40) | (7.11) | (139.45) | (17.53) | (9.65) | (38.10) | |

*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*
*Panel mounting drill size: 0.22" all valves.*

*All dimensions for reference only and subject to change.*
** H Dimension is with stem in the closed position.*

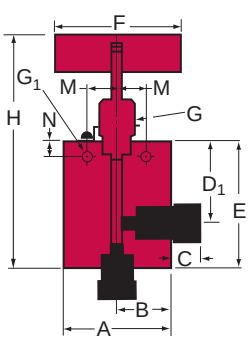
**For prompt service, Autoclave stocks select products. Consult factory.**

**Figure 1**



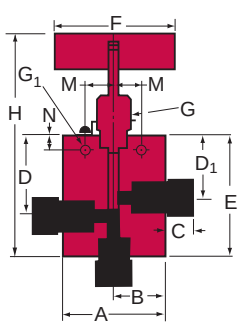

**2-Way Straight**

**Figure 2**




**2-Way Angle**

**Figure 3**




**3-Way / 2 on Pressure**

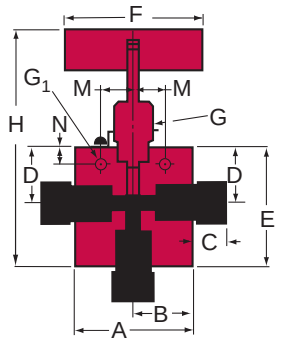
| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions - inches (mm) | | | | | | | | | | | | Block Thick-ness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | | |
| **3-Way / 1 on Pressure** | | | | | | | | | | | | | | | | | |
| 30VM4004-SOGWO | VEE | 1/4 | 0.094 | 2.00 | 1.00 | 0.50 | 1.12 | | 2.00 | 3.00 | 1.00 | 0.22 | 4.62 | 0.69 | 0.38 | 1.00 | |
| 30VM4084-SOGWO | REG | (6.35) | (2.39) | (50.80) | (25.40) | (12.70) | (28.45) | | (50.80) | (76.20) | (25.40) | (5.59) | (117.35) | (17.53) | (9.65) | (25.40) | |
| 30VM6004-SOGWO | VEE | 3/8 | 0.125 | 2.00 | 1.00 | 0.53 | 1.12 | | 2.12 | 3.00 | 1.00 | 0.22 | 4.74 | 0.69 | 0.38 | 1.00 | **See Figure 4** |
| 30VM6084-SOGWO | REG | (9.53) | (3.18) | (50.80) | (25.40) | (13.46) | (28.45) | | (53.85) | (76.20) | (25.40) | (5.59) | (120.40) | (17.53) | (9.65) | (25.40) | |
| 30VM9004-SOGWO | VEE | 9/16 | 0.125 | 2.62 | 1.31 | 0.81 | 1.12 | | 2.44 | 3.00 | 1.00 | 0.28 | 5.12 | 0.69 | 0.38 | 1.50 | |
| 30VM9084-SOGWO | REG | (14.29) | (3.18) | (66.55) | (33.27) | (20.57) | (28.45) | | (61.98) | (76.20) | (25.40) | (7.11) | (130.05) | (17.53) | (9.65) | (38.10) | |
| **2-Way Angle / Replaceable Seat** | | | | | | | | | | | | | | | | | |
| 30VM4802-SOGWO | VEE | 1/4 | 0.094 | 2.00 | 1.00 | 0.50 | 1.12 | 2.06 | 2.38 | 3.00 | 1.00 | 0.22 | 5.80 | 0.69 | 0.38 | 1.00 | |
| 30VM4882-SOGWO | REG | (6.35) | (2.39) | (50.80) | (25.40) | (12.70) | (28.45) | (52.32) | (60.45) | (76.20) | (25.40) | (5.59) | (147.32) | (17.53) | (9.65) | (25.40) | |
| 30VM6802-SOGWO | VEE | 3/8 | 0.125 | 2.00 | 1.00 | 0.53 | 1.12 | 2.31 | 2.38 | 3.00 | 1.00 | 0.22 | 6.05 | 0.69 | 0.38 | 1.00 | **See Figure 5** |
| 30VM6882-SOGWO | REG | (9.53) | (3.18) | (50.80) | (25.40) | (13.46) | (28.45) | (58.67) | (60.45) | (76.20) | (25.40) | (5.59) | (153.67) | (17.53) | (9.65) | (25.40) | |
| 30VM9802-SOGWO | VEE | 9/16 | 0.125 | 2.62 | 1.31 | 0.81 | 1.19 | 2.62 | 2.44 | 3.00 | 1.00 | 0.28 | 5.12 | 0.69 | 0.38 | 1.50 | |
| 30VM9882-SOGWO | REG | (14.29) | (3.18) | (66.55) | (33.27) | (20.57) | (30.23) | (66.55) | (61.98) | (76.20) | (25.40) | (7.11) | (168.83) | (17.53) | (9.65) | (38.10) | |
| **3-Way / 2-Stem Manifold** | | | | | | | | | | | | | | | | | |
| 30VM4005-SOGWO | VEE | 1/4 | 0.094 | 2.00 | 1.00 | 0.50 | 1.53 | 1.12 | 3.06 | 3.00 | 1.00 | 0.22 | 5.68 | 0.69 | 0.38 | 1.00 | |
| 30VM4085-SOGWO | REG | (6.35) | (2.39) | (50.80) | (25.40) | (12.70) | (38.86) | (28.45) | (77.72) | (76.20) | (25.40) | (5.59) | (144.27) | (17.53) | (9.65) | (25.40) | |
| 30VM6005-SOGWO | VEE | 3/8 | 0.125 | 2.00 | 1.00 | 0.53 | 1.62 | 1.12 | 3.25 | 3.00 | 1.00 | 0.22 | 5.87 | 0.69 | 0.38 | 1.00 | **See Figure 6** |
| 30VM6085-SOGWO | REG | (9.53) | (3.18) | (50.80) | (25.40) | (13.46) | (41.15) | (28.45) | (82.55) | (76.20) | (25.40) | (5.59) | (149.10) | (17.53) | (9.65) | (25.40) | |
| 30VM9005-SOGWO | VEE | 9/16 | 0.125 | 2.62 | 1.31 | 0.81 | 1.88 | 1.12 | 3.75 | 3.00 | 1.00 | 0.28 | 6.37 | 0.69 | 0.38 | 1.50 | |
| 30VM9085-SOGWO | REG | (14.29) | (3.18) | (66.55) | (33.27) | (20.57) | (47.75) | (28.45) | (95.25) | (76.20) | (25.40) | (7.11) | (161.80) | (17.53) | (9.65) | (38.10) | |

*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*
*Panel mounting drill size: 0.22" all valves.*

*All dimensions for reference only and subject to change.*
** H Dimension is with stem in the closed position.*

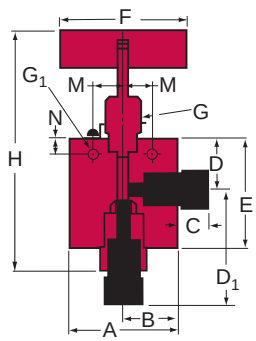
**For prompt service, Autoclave stocks select products. Consult factory.**

**Figure 4**



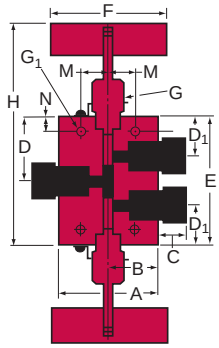

**3-Way / 1 on Pressure**

**Figure 5**




**2-Way Angle / Replacable Seat**

**Figure 6**




**3-Way / 2-Stem Manifold**

# Sour Service Products - 60VM-SOGWO Series

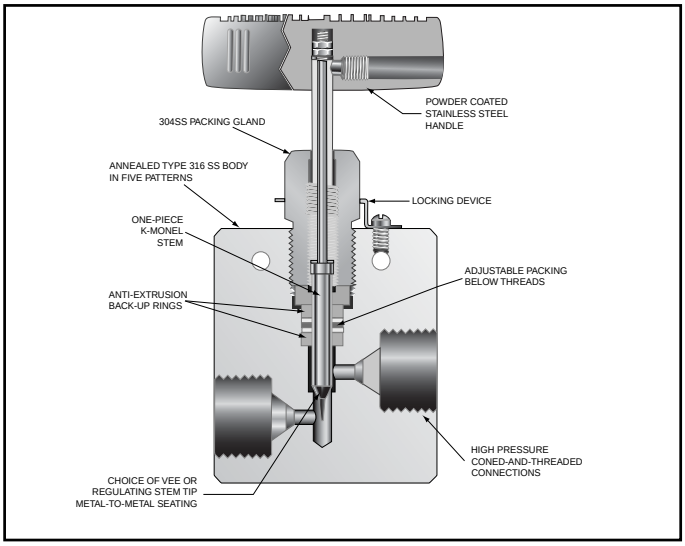
## Pressures to 30,000 psi (2068 bar)

| Tube Outside Diameter Size Inches | Connection Type | Orifice Size Inches (mm) | Rated $C_V$* | Pressure/ Temperature Rating psi (bar) @ Room Temperature** |
|---|---|---|---|---|
| 1/4 | F250C | 0.062 (1.57) | 0.08 | 30,000 (2068) |
| 3/8 | F375C | 0.062 (1.57) | 0.09 | 30,000 (2068) |
| 9/16 | F562C | 0.078 (1.98) | 0.14 | 30,000 (2068) |

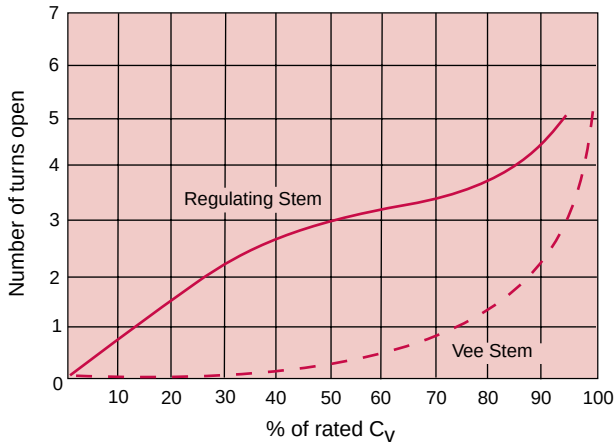
*Notes:*

* *$C_V$ values shown are for 2-way straight valve pattern. For 2-way angle patterns, increase $C_V$ value 50%.*

** *For complete temperature ratings see pressure/temperature rating guide in Technical Information section.*


Generalized Flow Coefficient Curves ($C_V$)




Note: For information in standard 60VM valves refer to the Needle Valve Section.

## Ordering Procedure

The 60VM-SOGWO Series valves are furnished **without** glands and collars, unless otherwise specified.

Typical catalog number: **60VM4071-SOGWO**

**60VM** — Valve Series

**4** — Outside Diameter Tube Size
- **4**-1/4”
- **6**-3/8”
- **9**-9/16”

**07** — Stem/Seat Type
- **07** - non-rotating Vee stem (on-off service)
- **08** - non-rotating regulating stem (tapered tip for regulating and shutoff)
- **81** - Regulating one piece stem with replaceable seat
- **87** - Vee stem with replaceable seat
- **88** - Regulating stem with replaceable seat

**1** — Body Pattern
- **1** - two-way straight
- **2** - two-way angle
- **3** - three-way, two on pressure
- **4** - three-way, one on pressure
- **5** - three-way, two-stem manifold valve

—

**SOGWO**

Sour gas without glands and collars

Repair Kits: add "R" to the front of valve catalog number for proper repair kit. (Example: **R60VM4071-SOGWO**)

Valve Bodies: Valve bodies are available. Order using the eight (8) digit part number found in the valve drawing or contact your Sales Representative for information.

Consult your Autoclave representative for pricing on repair kits and valve bodies. Refer to the Tools, Installation, Operation and Maintenance section for proper maintenance procedures.

**Note:**
All sour service valves and fittings supplied without collars and glands unless otherwise specified.

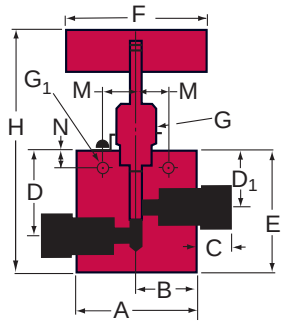
| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions - inches (mm) | | | | | | | | | | | | Block Thickness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | | |
| **2-Way Straight** | | | | | | | | | | | | | | | | | |
| 60VM4071-SOGWO | VEE | 1/4 | 0.062 | 2.00 | 1.00 | 0.50 | 1.69 | 1.31 | 2.12 | 3.00 | 1.00 | 0.22 | 4.75 | 0.69 | 0.38 | 1.00 | See Figure 1 |
| 60VM4081-SOGWO | REG | (6.35) | (1.57) | (50.80) | (25.40) | (12.70) | (42.93) | (33.27) | (53.85) | (76.20) | (25.40) | (5.59) | (120.65) | (17.53) | (9.65) | (25.40) | |
| 60VM6071-SOGWO | VEE | 3/8 | 0.062 | 2.00 | 1.00 | 0.53 | 1.69 | 1.31 | 2.25 | 3.00 | 1.00 | 0.22 | 4.87 | 0.69 | 0.38 | 1.00 | |
| 60VM6081-SOGWO | REG | (9.53) | (1.57) | (50.80) | (25.40) | (13.46) | (42.93) | (33.27) | (57.15) | (76.20) | (25.40) | (5.59) | (123.70) | (17.53) | (9.65) | (25.40) | |
| 60VM9071-SOGWO | VEE | 9/16 | 0.078 | 2.62 | 1.31 | 0.72 | 1.75 | 1.31 | 2.50 | 3.00 | 1.00 | 0.28 | 5.13 | 0.69 | 0.38 | 1.50 | |
| 60VM9081-SOGWO | REG | (14.29) | (1.98) | (66.55) | (33.27) | (18.29) | (45.45) | (33.27) | (63.50) | (76.20) | (25.40) | (7.11) | (130.30) | (17.53) | (9.65) | (38.10) | |
| **2-Way Angle** | | | | | | | | | | | | | | | | | |
| 60VM4072-SOGWO | VEE | 1/4 | 0.062 | 2.00 | 1.00 | 0.50 | | 1.31 | 2.38 | 3.00 | 1.00 | 0.22 | 5.00 | 0.69 | 0.38 | 1.00 | See Figure 2 |
| 60VM4082-SOGWO | REG | (6.35) | (1.57) | (50.80) | (25.40) | (12.70) | | (33.27) | (60.45) | (76.20) | (25.40) | (5.59) | (127.00) | (17.53) | (9.65) | (25.40) | |
| 60VM6072-SOGWO | VEE | 3/8 | 0.062 | 2.00 | 1.00 | 0.53 | | 1.31 | 2.62 | 3.00 | 1.00 | 0.22 | 5.25 | 0.69 | 0.38 | 1.00 | |
| 60VM6082-SOGWO | REG | (9.53) | (1.57) | (50.80) | (25.40) | (13.46) | | (33.27) | (66.55) | (76.20) | (25.40) | (5.59) | (133.35) | (17.53) | (9.65) | (25.40) | |
| 60VM9072-SOGWO | VEE | 9/16 | 0.078 | 2.62 | 1.31 | 0.72 | | 1.31 | 2.81 | 3.00 | 1.00 | 0.28 | 5.44 | 0.69 | 0.38 | 1.50 | |
| 60VM9082-SOGWO | REG | (14.29) | (1.98) | (66.55) | (33.27) | (18.29) | | (33.27) | (71.37) | (76.20) | (25.40) | (7.11) | (138.18) | (17.53) | (9.65) | (38.10) | |
| **3-Way / 2 on Pressure** | | | | | | | | | | | | | | | | | |
| 60VM4073-SOGWO | VEE | 1/4 | 0.062 | 2.00 | 1.00 | 0.50 | 1.69 | 1.31 | 2.12 | 3.00 | 1.00 | 0.22 | 4.75 | 0.69 | 0.38 | 1.00 | See Figure 3 |
| 60VM4083-SOGWO | REG | (6.35) | (1.57) | (50.80) | (25.40) | (12.70) | (42.93) | (33.27) | (53.85) | (76.20) | (25.40) | (5.59) | (120.65) | (17.53) | (9.65) | (25.40) | |
| 60VM6073-SOGWO | VEE | 3/8 | 0.062 | 2.00 | 1.00 | 0.53 | 1.69 | 1.31 | 2.25 | 3.00 | 1.00 | 0.22 | 4.87 | 0.69 | 0.38 | 1.00 | |
| 60VM6083-SOGWO | REG | (9.53) | (1.57) | (50.80) | (25.40) | (13.46) | (42.93) | (33.27) | (57.15) | (76.20) | (25.40) | (5.59) | (123.70) | (17.53) | (9.65) | (25.40) | |
| 60VM9073-SOGWO | VEE | 9/16 | 0.078 | 2.62 | 1.31 | 0.72 | 1.75 | 1.31 | 2.50 | 3.00 | 1.00 | 0.28 | 5.13 | 0.69 | 0.38 | 1.50 | |
| 60VM9083-SOGWO | REG | (14.29) | (1.98) | (66.55) | (33.27) | (18.29) | (45.45) | (33.27) | (63.50) | (76.20) | (25.40) | (7.11) | (130.30) | (17.53) | (9.65) | (38.10) | |

*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*
*Panel mounting drill size: 0.22" all valves.*

*All dimensions for reference only and subject to change.*
** H Dimension is with stem in the closed position.*

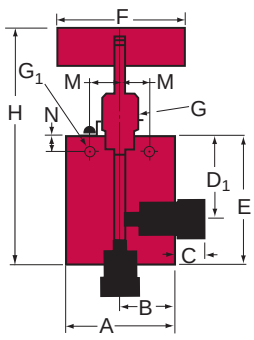
**For prompt service, Autoclave stocks select products. Consult factory.**

**Figure 1**



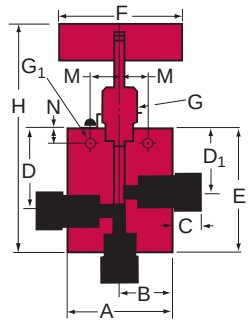

**2-Way Straight**

**Figure 2**




**2-Way Angle**

**Figure 3**




**3-Way / 2 on Pressure**

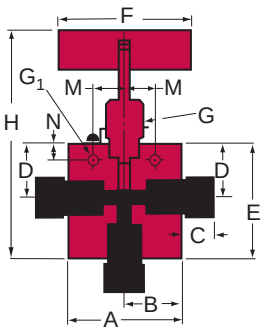
| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions - inches (mm) | | | | | | | | | | | | Block Thick-ness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | | |
| **3-Way / 1 on Pressure** | | | | | | | | | | | | | | | | | |
| 60VM4074-SOGWO | VEE | 1/4 | 0.062 | 2.00 | 1.00 | 0.50 | 1.31 | | 2.38 | 3.00 | 1.00 | 0.22 | 5.00 | 0.69 | 0.38 | 1.00 | See Figure 4 |
| 60VM4084-SOGWO | REG | (6.35) | (1.57) | (50.80) | (25.40) | (12.70) | (33.27) | | (60.45) | (76.20) | (25.40) | (5.59) | (127.00) | (17.53) | (9.65) | (25.40) | |
| 60VM6074-SOGWO | VEE | 3/8 | 0.062 | 2.00 | 1.00 | 0.53 | 1.31 | | 2.62 | 3.00 | 1.00 | 0.22 | 5.25 | 0.69 | 0.38 | 1.00 | |
| 60VM6084-SOGWO | REG | (9.53) | (1.57) | (50.80) | (25.40) | (13.46) | (33.27) | | (66.55) | (76.20) | (25.40) | (5.59) | (133.35) | (17.53) | (9.65) | (25.40) | |
| 60VM9074-SOGWO | VEE | 9/16 | 0.078 | 2.62 | 1.31 | 0.72 | 1.31 | | 2.81 | 3.00 | 1.00 | 0.28 | 5.44 | 0.69 | 0.38 | 1.50 | |
| 60VM9084-SOGWO | REG | (14.29) | (1.98) | (66.55) | (33.27) | (18.29) | (33.27) | | (71.37) | (76.20) | (25.40) | (7.11) | (138.18) | (17.53) | (9.65) | (38.10) | |
| **2-Way Angle / Replaceable Seat** | | | | | | | | | | | | | | | | | |
| 60VM4872-SOGWO | VEE | 1/4 | 0.062 | 2.00 | 1.00 | 0.50 | 1.31 | 2.12 | 2.62 | 3.00 | 1.00 | 0.22 | 6.28 | 0.69 | 0.38 | 1.00 | See Figure 5 |
| 60VM4882-SOGWO | REG | (6.35) | (1.57) | (50.80) | (25.40) | (12.70) | (33.27) | (53.85) | (66.55) | (76.20) | (25.40) | (5.59) | (159.51) | (17.53) | (9.65) | (25.40) | |
| 60VM6872-SOGWO | VEE | 3/8 | 0.062 | 2.00 | 1.00 | 0.53 | 1.31 | 2.36 | 2.62 | 3.00 | 1.00 | 0.22 | 6.52 | 0.69 | 0.38 | 1.00 | |
| 60VM6882-SOGWO | REG | (9.53) | (1.57) | (50.80) | (25.40) | (13.46) | (33.27) | (59.94) | (66.55) | (76.20) | (25.40) | (5.59) | (165.60) | (17.53) | (9.65) | (25.40) | |
| 60VM9872-SOGWO | VEE | 9/16 | 0.078 | 2.62 | 1.31 | 0.72 | 1.31 | 2.68 | 2.62 | 3.00 | 1.00 | 0.28 | 6.90 | 0.69 | 0.38 | 1.50 | |
| 60VM9882-SOGWO | REG | (14.29) | (1.98) | (66.55) | (33.27) | (18.29) | (33.27) | (68.07) | (66.55) | (76.20) | (25.40) | (7.11) | (175.26) | (17.53) | (9.65) | (38.10) | |
| **3-Way / 2-Stem Manifold** | | | | | | | | | | | | | | | | | |
| 60VM4075-SOGWO | VEE | 1/4 | 0.062 | 2.00 | 1.00 | 0.50 | 1.72 | 1.31 | 3.44 | 3.00 | 1.00 | 0.22 | 6.07 | 0.69 | 0.38 | 1.00 | See Figure 6 |
| 60VM4085-SOGWO | REG | (6.35) | (1.57) | (50.80) | (25.40) | (12.70) | (43.69) | (33.27) | (87.38) | (76.20) | (25.40) | (5.59) | (154.18) | (17.53) | (9.65) | (25.40) | |
| 60VM6075-SOGWO | VEE | 3/8 | 0.062 | 2.00 | 1.00 | 0.53 | 1.88 | 1.31 | 3.75 | 3.00 | 1.00 | 0.22 | 6.37 | 0.69 | 0.38 | 1.00 | |
| 60VM6085-SOGWO | REG | (9.53) | (1.57) | (50.80) | (25.40) | (13.46) | (47.75) | (33.27) | (95.25) | (76.20) | (25.40) | (5.59) | (161.80) | (17.53) | (9.65) | (25.40) | |
| 60VM9075-SOGWO | VEE | 9/16 | 0.078 | 2.62 | 1.31 | 0.72 | 2.06 | 1.31 | 4.12 | 3.00 | 1.00 | 0.28 | 6.37 | 0.69 | 0.38 | 1.50 | |
| 60VM9085-SOGWO | REG | (14.29) | (1.98) | (66.55) | (33.27) | (18.29) | (52.32) | (33.27) | (104.65) | (76.20) | (25.40) | (7.11) | (161.80) | (17.53) | (9.65) | (38.10) | |

*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*
*Panel mounting drill size: 0.22" all valves.*

*All dimensions for reference only and subject to change.*
** H Dimension is with stem in the closed position.*

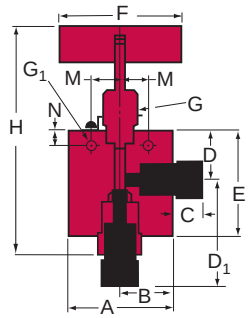
**For prompt service, Autoclave stocks select products. Consult factory.**

**Figure 4**



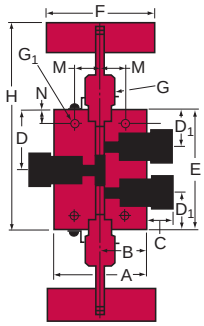

**3-Way / 1 on Pressure**

**Figure 5**




**2-Way Angle / Replaceable Seat**

**Figure 6**

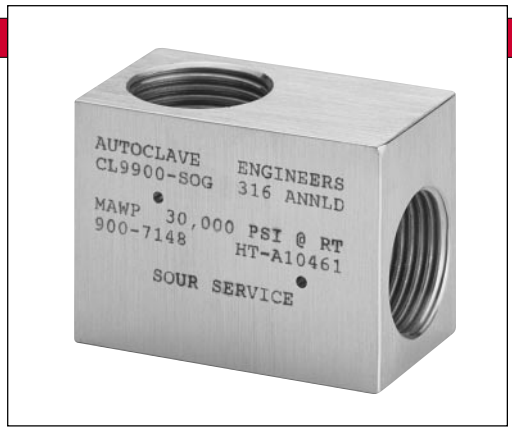



**3-Way / 2 Stem Manifold**

# Sour Service Products - High Pressure Fittings

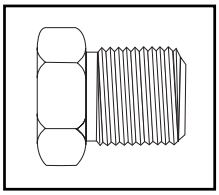
## Pressures to 30,000 psi (2068 bar)

Autoclave Engineers manufactures high pressure fittings for both standard oil field service where $H_2S$ is not present and type SOGWO for service where $H_2S$ is present. Utilizing Autoclave high pressure coned-and-threaded connections, the SOGWO fittings detailed on this page are correlated for use with series 30VM-SOGWO and 60VM-SOGWO valves. Standard service fittings are correlated for use with series 30VM and 60VM valves. For complete information on standard service fittings, refer to Fitting and Tubing High Pressure Section.



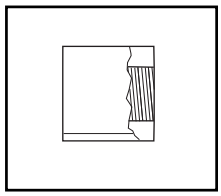

## Connection Components

Type SOGWO valves and fittings are furnished **without** glands and collars. To order these components separately, use order numbers listed. When using plug, collar is not required.



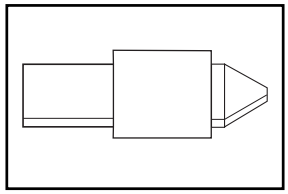
### Gland

CGL ( )- 316 SOG



### Collar

CCL ( )- 316 SOG



### Plug

CP ( )- 316 SOG

Add tube size ( )
1/4" - 40
3/8" - 60
9/16" - 90

Example:
1/4" Gland - CGL (40) - 316 SOG

To ensure proper fit use Autoclave Engineers tubing.

| Connection Type | Gland | Collar | Plug | Connection Components (Industry Standard) |
|---|---|---|---|---|
| F250C<br>F375C<br>F562C | CGL40-316SOG<br>CGL60-316SOG<br>CGL90-316SOG | CCL40-316SOG<br>CCL60-316SOG<br>CCL90-316SOG | CP40-316SOG<br>CP60-316SOG<br>CP90-316SOG | Autoclave Engineer's high pressure SOG fittings 1/4, 3/8 and 9/16 connection components to 30,000 psi (2068 bar). For use with 30VM-SOGWO, 60VM-SOGWO valves and fittings. |

## Associated Products

A complete line of high pressure anti-vibration collet gland assemblies is available. Please refer to high pressure fitting and tubing section.

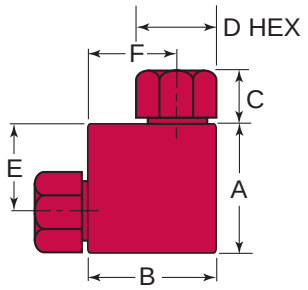
| Catalog Number | Connection Type | Outside Diameter Tube | Pressure Rating psi (bar)* | Minimum Opening | Dimensions - inches (mm) | | | | | | | Block Thickness | Fitting Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | A | B | C | D Typical | E | F | G Thickness | | |
| **Elbow** | | | | | | | | | | | | | |
| CL4400-SOGWO | F250C | 1/4 **(6.35)** | 60,000 **(4136.79)** | 0.094 **(2.39)** | 1.00 **(25.40)** | 1.50 **(38.10)** | 0.50 **(12.70)** | 0.63 **(15.88)** | 0.62 **(15.75)** | 0.88 **(22.35)** | | 0.75 **(19.05)** | **See Figure 1** |
| CL6600-SOGWO | F375C | 3/8 **(9.53)** | 60,000 **(4136.79)** | 0.125 **(3.18)** | 1.50 **(38.10)** | 2.00 **(50.80)** | 0.53 **(13.46)** | 0.81 **(20.62)** | 1.00 **(25.40)** | 1.25 **(31.75)** | | 1.00 **(25.40)** | |
| CL9900-SOGWO | F562C | 9/16 **(14.29)** | 60,000 **(4136.79)** | 0.188 **(4.78)** | 1.88 **(47.75)** | 2.62 **(66.55)** | 0.81 **(20.57)** | 1.19 **(30.23)** | 1.12 **(28.45)** | 1.88 **(47.75)** | | 1.50 **(38.10)** | |
| **Tee** | | | | | | | | | | | | | |
| CT4440-SOGWO | F250C | 1/4 **(6.35)** | 60,000 **(4136.79)** | 0.094 **(2.39)** | 1.25 **(31.75)** | 2.00 **(50.80)** | 0.50 **(12.70)** | 0.63 **(15.88)** | 0.88 **(22.35)** | 1.00 **(25.40)** | | 1.00 **(25.40)** | **See Figure 2** |
| CT6660-SOGWO | F375C | 3/8 **(9.53)** | 60,000 **(4136.79)** | 0.125 **(3.18)** | 1.56 **(39.62)** | 2.00 **(50.80)** | 0.53 **(13.46)** | 0.81 **(20.62)** | 1.06 **(26.92)** | 1.00 **(25.40)** | | 1.00 **(25.40)** | |
| CT9990-SOGWO | F562C | 9/16 **(14.29)** | 60,000 **(4136.79)** | 0.188 **(4.78)** | 2.12 **(53.85)** | 2.62 **(66.55)** | 0.81 **(20.57)** | 1.19 **(30.23)** | 1.38 **(35.05)** | 1.31 **(33.27)** | | 1.50 **(38.10)** | |
| **Cross** | | | | | | | | | | | | | |
| CX4444-SOGWO | F250C | 1/4 **(6.35)** | 60,000 **(4136.79)** | 0.094 **(2.39)** | 1.25 **(31.75)** | 2.00 **(50.80)** | 0.50 **(12.70)** | 0.63 **(15.88)** | 0.62 **(15.75)** | 1.00 **(25.40)** | | 1.00 **(25.40)** | **See Figure 3** |
| CX6666-SOGWO | F375C | 3/8 **(9.53)** | 60,000 **(4136.79)** | 0.125 **(3.18)** | 2.12 **(53.85)** | 2.00 **(50.80)** | 0.53 **(13.46)** | 0.81 **(20.62)** | 1.06 **(26.92)** | 1.00 **(25.40)** | | 1.00 **(25.40)** | |
| CX9999-SOGWO | F562C | 9/16 **(14.29)** | 60,000 **(4136.79)** | 0.188 **(4.78)** | 2.75 **(69.85)** | 2.62 **(66.55)** | 0.81 **(20.57)** | 1.19 **(30.23)** | 1.38 **(35.05)** | 1.31 **(33.27)** | | 1.50 **(38.10)** | |

*Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

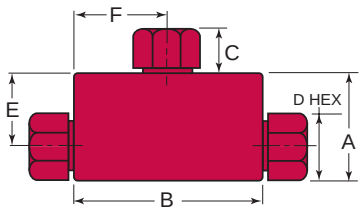
***NOTE:** All sour oil and gas valves and fittings supplied without collars and glands unless otherwise specified.*

**Figure 1**



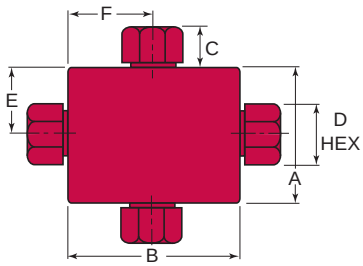

**Elbow**

**Figure 2**




**Tee**

**Figure 3**




**Cross**

Note: Fittings such as 45° elbows, reducer elbows, and reducer 45° elbows are available upon request.
For mounting hole option add suffix PM to catalog number, consult factory for mounting hole dimensions.
Contact your local sales representative for additional information.

| Catalog Number | Connection Type | Outside Diameter Tube | Pressure Rating psi (bar)* | Minimum Opening | Dimensions - inches (mm) | | | | | | | Block Thickness | Fitting Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | A | B | C | D Typical | E | F | G Thickness | | |

## Straight Coupling/Union Coupling

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 60F4433-SOGWO | F250C | 1/4 | 60,000 | 0.094 | 0.75 | 1.38 | 0.50 | 0.63 | Straight | See Figure 4 |
| 60UF4433-SOGWO | | **(6.35)** | **(4136.79)** | **(2.39)** | **(19.05)** | **(35.05)** | **(12.70)** | **(15.88)** | Union | |
| 60F6633-SOGWO | F375C | 3/8 | 60,000 | 0.125 | 1.00 | 1.75 | 0.53 | 0.81 | Straight | |
| 60UF6633-SOGWO | | **(9.53)** | **(4136.79)** | **(3.18)** | **(25.40)** | **(44.45)** | **(13.46)** | **(20.62)** | Union | |
| 60F9933-SOGWO | F562C | 9/16 | 60,000 | 0.188 | 1.38 | 2.19 | 0.81 | 1.19 | Straight | |
| 60UF9933-SOGWO | | **(14.29)** | **(4136.79)** | **(4.78)** | **(35.05)** | **(55.63)** | **(20.57)** | **(30.15)** | Union | |

## Bulkhead Coupling

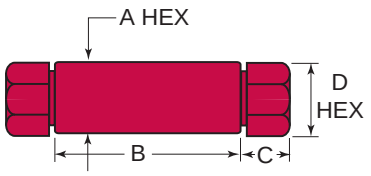
| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 60BF4433-SOGWO | F250C | 1/4 | 60,000 | 0.094 | 0.094 | 1.88 | 0.50 | 0.63 | 0.50 | 1.00 | 0.38 | | See Figure 5 |
| | | **(6.35)** | **(4136.79)** | **(2.39)** | **(23.88)** | **(47.75)** | **(12.70)** | **(15.88)** | **(12.70)** | **(25.40)** | **(9.65)** | | |
| 60BF6633-SOGWO | F375C | 3/8 | 60,000 | 0.125 | 1.12 | 2.38 | 0.53 | 0.81 | 0.78 | 1.38 | 0.38 | | |
| | | **(9.53)** | **(4136.79)** | **(3.18)** | **(28.45)** | **(60.45)** | **(13.46)** | **(20.62)** | **(19.81)** | **(35.05)** | **(9.65)** | | |
| 60BF9933-SOGWO | F562C | 9/16 | 60,000 | 0.188 | 1.69 | 2.75 | 0.81 | 1.19 | 1.00 | 1.88 | 0.38 | | |
| | | **(14.29)** | **(4136.79)** | **(4.78)** | **(42.93)** | **(69.85)** | **(20.57)** | **(30.23)** | **(25.40)** | **(47.75)** | **(9.65)** | | |

*Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

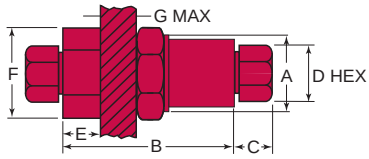
***NOTE:** All sour oil and gas valves and fittings supplied without collars and glands unless otherwise specified.*

**Figure 4**




**Straight Coupling / Union Coupling**

**Figure 5**




**Bulkhead Coupling**

Union Couplings are designed with a removable seat insert allowing disassembly and tubing removal without the necessity of loosening other items in a line.

# Sour Service Products - High Pressure Tubing

## Pressures to 30,000 psi (2068 bar)

Autoclave Engineers offers a complete selection of seamless annealed stainless steel tubing designed to match the performance standards of Autoclave valves and fittings for sour oil and gas service. Autoclave high pressure tubing is manufactured specifically for high pressure applications requiring both strength and corrosion resistance. The tubing is furnished in random lengths between 20 feet (6 meters) and 27 feet (8.2 meters). The average is 24 feet (7.3 meters). Sour service tubing is available in three sizes.

### Inspection and Testing

Autoclave Engineer's high pressure tubing is inspected to assure freedom from seams, laps, fissures or other flaws, as well as carburization or intergranular carbide precipitation. The outside and inside diameters of the tubing are controlled within close tolerences. Sample pieces of tubing for each lot are tested to confirm mechanical properties. Hydrostatic testing is also performed on a statistical basis and is conducted at the working pressure of the tube. Autoclave will perform 100% hydrostatic testing at additional cost if desired.

### Tubing Tolerance

| Nominal Tubing Size inches (mm) | Tolerance/Outside Diameter inches (mm) |
|---|---|
| 1/4 (6.35) | .248/.243 (6.30/6.17) |
| 3/8 (9.53) | .370/.365 (9.40/9.27) |
| 9/16 (14.29) | .557/.552 (14.15/14.02) |

| Catalog Number | Tube Material | Fits Connection Type | Tube Size Inches (mm) | | | Flow Area $in.^2$ ($mm^2$) | Working Pressure psi (bar)* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Outside Diameter | Inside Diameter | Wall Thickness | | -325 to 100°F -198 - 37.8°C | 200°F 93°C | 400°F 204°C | 600°F 316°C | 800°F 427°C |
| MS15-254 | 316SS | F250C | 1/4 **(6.35)** | 0.083 **(2.77)** | 0.083 **(1.78)** | 0005 **(0.23)** | 30,000 **(2068.39)** | 30,000 **(2068.39)** | 28,750 **(1982.21)** | 27,000 **(1861.56)** | 25,250 **(1741.00)** |
| MS15-252 | 316SS | F375C | 3/8 **(9.53)** | 0.125 **(3.18)** | 0.125 **(3.18)** | 0.012 **(0.30)** | 30,000 **(2068.39)** | 30,000 **(2068.39)** | 28,750 **(1982.21)** | 27,000 **(1861.56)** | 25,250 **(1741.00)** |
| MS15-251 | 316SS | F562C | 9/16 **(14.29)** | 0.188 **(4.78)** | 0.187 **(4.75)** | 0.028 **(0.71)** | 30,000 **(2068.39)** | 30,000 **(2068.39)** | 28,750 **(1982.21)** | 27,000 **(1861.56)** | 25,250 **(1741.00)** |

***NOTE:*** *All sour oil and gas valves and fittings supplied without collars and glands unless otherwise specified.*

* 316SS annealed material complies with NACE MR0175 material requirements.

*Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

# Sour Service Products - High Pressure Coned-and-Threaded Nipples

## Pressures to 30,000 psi (2068 bar)

For rapid system make-up, Autoclave Engineers supplies pre-cut, coned-and-threaded nipples in various sizes and lengths for Autoclave high pressure valves and fittings.

### Special lengths

In addition to the standard lengths listed in the table below, nipples are available in any custom length. Consult factory.

### Materials

Catalog numbers in table refer to Type 316 Stainless steel. Catalog numbers with suffix 316SOG denote 316SS annealed in compliance with NACE MR0175.

*Material in table is 316 Stainless steel*

| Catalog Number Nipple Length In (mm) | | | | | | | Fits Connection Type | Tube Size inches (mm) | | Working Pressure at 100°F (37.8°C) psi (bar) |
|---|---|---|---|---|---|---|---|---|---|---|
| 2.75" **(69.85)** | 3.00" **(76.20)** | 4.00" **(101.60)** | 6.00" **(152.40)** | 8.00" **(203.20)** | 10.00" **(254.00)** | 12.00" **(304.80)** | | O.D. | I.D. | |
| CN4402-316SOG | CN4403-316SOG | CN4404-316SOG | CN4406-316SOG | CN4408-316SOG | CN44010-316SOG | CN44012-316SOG | F250C | 1/4 **(6.35)** | 0.083 **(2.11)** | 30,000 **(2068.39)** |
| | CN6603-316SOG | CN6604-316SOG | CN6606-316SOG | CN6608-316SOG | CN66010-316SOG | CN66012-316SOG | F375C | 3/8 **(9.53)** | 0.125 **(3.18)** | 30,000 **(2068.39)** |
| | | CN9904-316SOG | CN9906-316SOG | CN9908-316SOG | CN99010-316SOG | CN99012-316SOG | F562C | 9/16 **(14.29)** | 0.188 **(4.78)** | 30,000 **(2068.39)** |

*Note:*
*1. See Sour Service tubing section for pressure ratings at various temperatures.*
*2. Autocalve Engineers does not recommend bending of SOG tubing.*

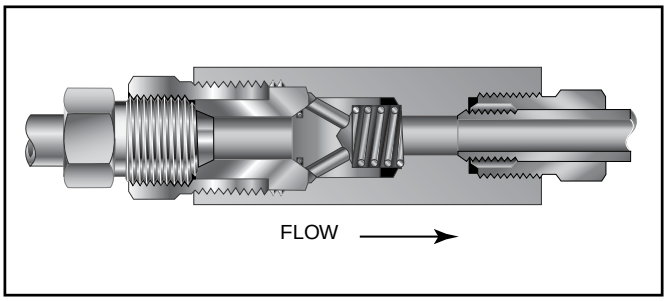
*Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

# Sour Service Products - High Pressure Check Valves

## Pressures to 30,100 (2068 bar)

### O-Ring Check Valves

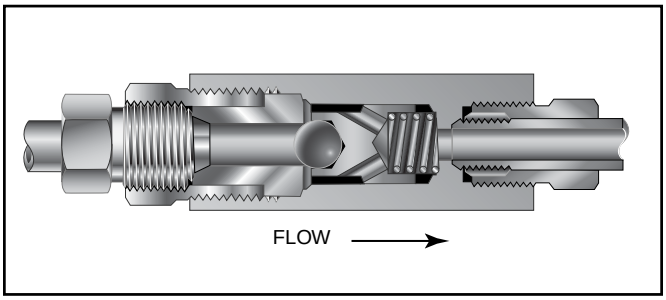



Provides unidirectional flow and tight shut-off for liquids and gas with high reliability. When differential drops below cracking pressure*, valve shuts off. **(Not for use as relief valve.)**

**Materials:** Body, cover, poppet: 316 Annealed Stainless Steel, Cover gland: Annealed Stainless Steel: High Nickel Alloy, Standard O-ring: Viton, for operation to 500° F (260°C). Buna-N or Teflon available for 250°F (121°C) or 400°F (204°C) respectively; specify when ordering.

***Cracking Pressure:** 20 psi (1.38 bar) ±30%. Springs for higher cracking pressures (up to 100 psi (6.89 bar)) available on special order for O-ring style check valves only.

### Ball Check Valves

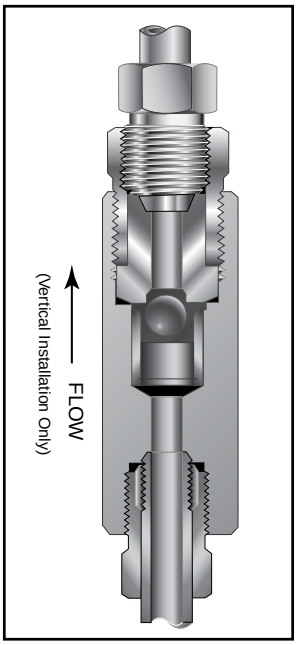



Prevents reverse flow where **leak-tight shut-off is not mandatory**. When differential drops below cracking pressure, valve closes. With all-metal components, valve can be used up to 1200°F (649°C). See Technical Information section for connection temperature limitations. **(Not for use as a relief valve.)**

**Ball is cradled in floating poppet** to assure positive, in-line seating without "chatter". Poppet is designed essentially for axial flow with minimum pressure drop.

**Materials:** Body, cover, poppet: 316 Annealed Stainless Steel, Cover gland: Annealed Stainless Steel, Ball, Spring: High Nickel Alloy

### Ball Type Excess Flow Valves




Protects pressure gauges and pressure instrumentation from surges in flow or sudden venting in the event of line failure.

**Materials:** Body, cover, sleeve: Type 316 Annealed Stainless Steel, Ball: 300 Series Annealed Stainless Steel, Cover gland: annealed stainless steel.

**Vertical Installation:** Since this type of check valve employs a non-spring loaded ball, valve MUST be installed in VERTICAL position with arrow on valve body pointing UP. (cover gland up).

**Resetting Valve:** Equalize the pressure across the ball. The ball will drop and reset automatically.

***NOTE:*** *All sour oil and gas valves and fittings supplied without collars and glands unless otherwise specified.*

***CAUTION:*** *While testing has shown O-Rings to provide satisfactory service life, both cyclic and shelf life may vary widely with differing service conditions, properties of reactants, pressure and temperature cycling and age of the O-ring. FREQUENT INSPECTIONS SHOULD BE MADE to detect any deterioration, and O-rings replaced as required.*

| Catalog Number | Fits Connection Type | Pressure Rating psi (bar)* | Orifice inches (mm) | Rated $C_V$ | Dimensions - inches (mm) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | A | B | C | D Typical | Hex | |

## O-Ring Check Valves

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CKO4400-SOGWO | F250C | 30,000 | 0.094 | 0.15 | 3.38 | 2.50 | 0.50 | 0.63 | 1.18 | See Figure 1 |
| | | **(2068.39)** | **(2.39)** | | **(85.85)** | **(63.50)** | **(12.70)** | **(16.00)** | **(29.97)** | |
| CKO6600-SOGWO | F375C | 30,000 | 0.125 | 0.28 | 3.75 | 2.62 | 0.53 | 0.75 | 1.18 | |
| | | **(2068.39)** | **(3.18)** | | **(95.25)** | **(66.55)** | **(13.46)** | **(19.05)** | **(29.97)** | |
| CKO9900-SOGWO | F562C | 30,000 | 0.187 | 0.63 | 4.62 | 3.38 | 0.81 | 1.12 | 1.50 | |
| | | **(2068.39)** | **(4.75)** | | **(117.35)** | **(85.85)** | **(20.57)** | **(28.45)** | **(38.10)** | |

## Ball Check Valves

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CB4400-SOGWO | F250C | 30,000 | 0.094 | 0.15 | 3.38 | 2.50 | 0.50 | 0.63 | 1.18 | See Figure 1 |
| | | **(2068.39)** | **(2.39)** | | **(85.85)** | **(63.50)** | **(12.70)** | **(16.00)** | **(29.97)** | |
| CB6600-SOGWO | F375C | 30,000 | 0.125 | 0.28 | 3.75 | 2.62 | 0.53 | 0.75 | 1.18 | |
| | | **(2068.39)** | **(3.18)** | | **(95.25)** | **(66.55)** | **(13.46)** | **(19.05)** | **(29.97)** | |
| CB9900-SOGWO | F562C | 30,000 | 0.187 | 0.63 | 4.62 | 3.38 | 0.81 | 1.12 | 1.50 | |
| | | **(2068.39)** | **(4.75)** | | **(117.35)** | **(85.85)** | **(20.57)** | **(28.45)** | **(38.10)** | |

## Ball Type Excess Flow Valves

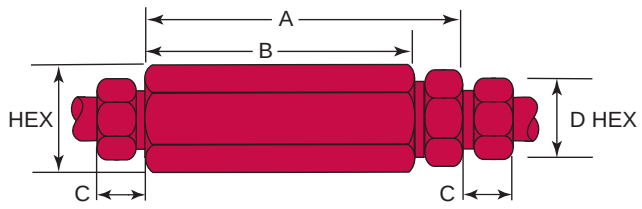
| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CK4402-SOGWO | F250C | 30,000 | 0.094 | | 3.38 | 2.50 | 0.50 | 0.63 | 1.18 | See Figure 1 |
| | | **(2068.39)** | **(2.39)** | | **(85.85)** | **(63.50)** | **(12.70)** | **(16.00)** | **(29.97)** | |
| CK6602-SOGWO | F375C | 30,000 | 0.125 | | 3.75 | 2.62 | 0.53 | 0.75 | 1.18 | |
| | | **(2068.39)** | **(3.18)** | | **(95.25)** | **(66.55)** | **(13.46)** | **(19.05)** | **(29.97)** | |
| CK9902-SOGWO | F562C | 30,000 | 0.187 | | 4.62 | 3.38 | 0.81 | 1.12 | 1.50 | |
| | | **(2068.39)** | **(4.75)** | | **(117.35)** | **(85.85)** | **(20.57)** | **(28.45)** | **(38.10)** | |

*Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

***NOTE:** All sour oil and gas valves and fittings supplied without collars and glands unless otherwise specified.*

**Figure 1**

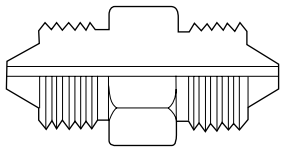


# Sour Service Products - Adapters/Couplings

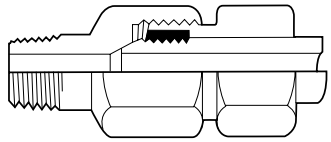
## Pressures to 30,000 psi (2068 bar)

### How to use the Ordering Chart below:

1. Locate Male or Female end in horizontal heading.
2. Locate desired Female or Male emd of adapter down the side of chart.
3. Catalog number of required adapter is located at intersection of columns.



**Male By Male**
(w/High-Pressure shown)



**Male NPT**
(w/High-Pressure shown)

| | | | "A" Connection | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Male | | | Female | | |
| | | Connection "A" | **1/4" M250C** | **3/8" M375C** | **9/16" M562C** | **1/4" F250C** | **3/8" F375C** | **9/16" F562C** |
| | | Connection "B" | | | | | | |
| AE High Pressure 30,000 psi @100°F | Male | **1/4" M250C** | 60MAH4H4-SOG | 60MAH4H6-SOG | 60MAH4H9-SOG | | 60M46B3-OPSOGWO | 60M49B3-OPSOGWO |
| | | **3/8" M375C** | | 60MAH6H6-SOG | 60MAH6H9-SOG | 60M64B3-OPSOGWO | | 60M69B3-OPSOGWO |
| | | **9/16" M562C** | | | 60MAH9H9-SOG | 60M94B3-OPSOGWO | 60M96B3-OPSOGWO | |
| | Female | **1/4" F250C** | | 60M64B3-OPSOGWO | 60M94B3-OPSOGWO | 60F4433-SOGWO | 60F4633-SOGWO | |
| | | **3/8" F375C** | 60M46B3-OPSOGWO | | 60M96B3-OPSOGWO | 60F4633-SOGWO | 60F6633-SOGWO | 60F6933-SOGWO |
| | | **9/16" F562C** | 60M49B3-OPSOGWO | 60M69B3-OPSOGWO | | 60F4933-SOGWO | 60F6933-SOGWO | 60F9933-SOGWO |
| NPT 10,000 psi* @100°F | Male | **1/4" NPT** | 10MAH4P6-SOG | 10MAH6P4-SOG | 10MAH9P4-SOG | 6M44N3-SOGWO | 6M46N3-SOGWO | 6M49N3-SOGWO |
| | | **3/8" NPT** | | 10MAH6P6-SOG | 10MAH9P6-SOG | 6M64N3-SOGWO | 6M66N3-SOGWO | 6M69N3-SOGWO |
| | | **1/2" NPT** | 10MAH4P8-SOG | 10MAH6P8-SOG | 10MAH9P8-SOG | 6M84N3-SOGWO | 6M86N3-SOGWO | 6M89N3-SOGWO |
| | | **3/4" NPT** | | | 10MAH9P12-SOG | 6M124N3-SOGWO | 6M126N3-SOGWO | 6M129N3-SOGWO |
| | | **1" NPT** | | | 10MAH9P16-SOG | 6M164N3-SOGWO | 6M166N3-SOGWO | 6M169N3-SOGWO |
| | Female | **1/4" NPT** | 6M44B8-SOG | 6M64B8-SOG | 6M94B8-SOG | 6F4483-SOGWO | 6F4683-SOGWO | 6F4983-SOGWO |
| | | **3/8" NPT** | 6M46B8-SOG | 6M66B8-SOG | 6M96B8-SOG | 6F6483-SOGWO | 6F6683-SOGWO | 6F6983-SOGWO |
| | | **1/2" NPT** | 6M48B8-SOG | 6M68B8-SOG | 6M98B8-SOG | 6F8483-SOGWO | 6F8683-SOGWO | 6F8983-SOGWO |
| | | **3/4" NPT** | 6M412B8-SOG | 6M612B8-SOG | 6M912B8-SOG | 6F12483-SOGWO | 6F12683-SOGWO | 6F12983-SOGWO |
| | | **1" NPT** | | 6M616B8-SOG | 6M916B8-SOG | 6F16483-316SOG | 6F16683-316SOG | 6F16983-316SOG |

*The maximum pressure for an adapter coupling is determined by the connection component with the LOWEST pressure rating; that is, the two end connections and the tubing or pipe used, whichever is LOWER.

In selecting an adapter involving two different sized connections, the larger connection should be on the male end where maximum the mechanical strength of the adapter.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.
CAUTION: See appropriate pressure section in reference to proper selection of tubing.

***NOTE:** All sour oil and gas valves and fittings supplied without collars and glands unless otherwise specified.*

***NOTE:** -OP is one piece adapter.*

# Sour Service Products - Severe Service Valve

## Pressures to 10,000 psi (690 bar)

| Valve Size (inches) | Orifice inches (mm) | Rated Cv | Maximum Working Pressure psi (bar) |
|---|---|---|---|
| 1/4 | .188 (4.76) | .61 | 10,000 (690) |
| 1/2 | .250 (6.35) | .78 | 10,000 (690) |
| 3/4 | .375 (9.53) | 1.79 | 7,500 (517) |

**Operating temperature: -20°F to 275°F (-29°C to 135°C)**

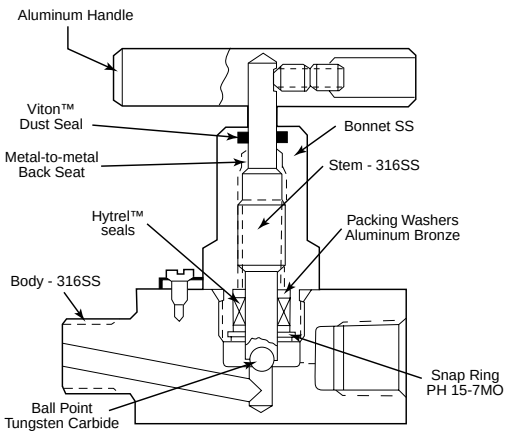

Autoclave's severe service valve is designed for reliable shut-off service with maximum working pressure to 10,000 psi (690 bar). They are suitable for a wide range of severe duty applications and comply with NACE MR0175. The valve's unique stem design includes a non-rotation ball point as well as blow-out protection.

***Applications:***

- All areas where reliable shut-off is required in severe service including abrasive, erosive, corrosive and sour fluids.
- Sampling and blowdown lines.
- Blow-out preventers
- Wireline service equipment
- Chemical processing industry

Autoclave Engineers service valves feature:

- Low operating torque
- Non-rotating tungsten carbide (ball point) stem
- Stem back seat for blow-out prevention
- Dust seal prevents stem thread contamination
- Stem packing adjustment not required
- Complies with NACE MR0175
- Moly lubricated stem threads
- Panel mount option available



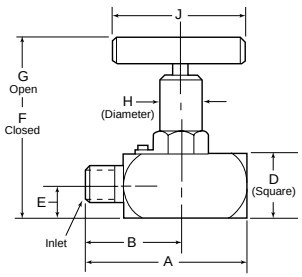

All valves 100% factory tested

| Catalog Number | End Connection | | Dimensions - inches (mm) | | | | | | | | | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inlet N.P.T. | Outlet N.P.T. | A | B | C | D | E | F | G | H | J | |
| **2-Way Straight** | | | | | | | | | | | | |
| **SSV71M4F4** | 1/4" male | 1/4" Female | 3.00 | 1.75 | - | 1.25 | .625 | 3.25 | 3.41 | 0.75 | 2.50 | **See Figure 1** |
| | | | (76.20) | (44.45) | - | (31.75) | (15.88) | (82.55) | (86.51) | (19.05) | (63.50) | |
| **SSV71F4** | 1/4" Female | 1/4" Female | 3.00 | 1.50 | - | 1.25 | 0.63 | 3.25 | 3.41 | 0.75 | 2.50 | |
| | | | (76.20) | (38.10) | - | (31.75) | (15.88) | (82.55) | (86.51) | (19.05) | (63.50) | |
| **SSV71M8F8** | 1/2" Male | 1/2" Female | 3.81 | 2.22 | - | 1.50 | 0.75 | 4.25 | 4.41 | 1.00 | 3.25 | |
| | | | (96.82) | (56.34) | - | (38.10) | (19.05) | (107.95) | (111.91) | (25.40) | (82.55) | |
| **SSV71F8** | 1/2" Female | 1/2" Female | 3.81 | 1.91 | - | 1.50 | 0.75 | 4.25 | 4.41 | 1.00 | 3.25 | |
| | | | (96.82) | (48.41) | - | (38.10) | (19.05) | (107.95) | (111.91) | (25.40) | (82.55) | |
| **SSV71M12F12** | 3/4" Male | 3/4" Female | 3.81 | 2.19 | - | 1.75 | 0.88 | 4.94 | 5.13 | 1.00 | 3.25 | |
| | | | (96.82) | (55.55) | - | (44.45) | (22.23) | (125.40) | (130.18) | (25.40) | (82.55) | |
| **SSV71F12** | 3/4" Female | 3/4" Female | 3.81 | 1.91 | - | 1.75 | 0.88 | 4.94 | 5.13 | 1.00 | 3.25 | |
| | | | (96.82) | (48.41) | - | (44.45) | (22.23) | (125.40) | (130.18) | (25.40) | (82.55) | |
| **2-Way Angle** | | | | | | | | | | | | |
| **SSV72M4F4** | 1/4" Female | 1/4" Male | 3.75 | 1.63 | 1.16 | 1.25 | 0.63 | 3.25 | 3.41 | 0.75 | 2.50 | **See Figure 2** |
| | | | (95.25) | (41.28) | (29.36) | (31.75) | (15.88) | (82.55) | (86.51) | (19.05) | (63.50) | |
| **SSV72F4** | 1/4" Female | 1/4" Female | 3.00 | 1.63 | 1.16 | 1.25 | 0.63 | 3.25 | 3.41 | 0.75 | 2.50 | |
| | | | (76.20) | (41.28) | (29.63) | (31.75) | (15.88) | (82.55) | (86.51) | (19.05) | (63.50) | |
| **SSV72M8F8** | 1/2" Female | 1/2" Male | 4.25 | 2.03 | 1.28 | 1.50 | 0.75 | 4.25 | 4.41 | 1.00 | 3.25 | |
| | | | (107.95) | (51.59) | (32.54) | (38.10) | (19.05) | (107.95) | (111.91) | (25.40) | (82.55) | |
| **SSV72F8** | 1/2" Female | 1/2" Female | 3.81 | 2.00 | 1.28 | 1.50 | 0.75 | 4.25 | 4.41 | 1.00 | 3.25 | |
| | | | (96.82) | (50.80) | (32.54) | (38.10) | (19.05) | (107.95) | (111.91) | (25.40) | (82.55) | |
| **SSV72M12F12** | 3/4" Female | 3/4" Male | 4.94 | 2.75 | 2.00 | 1.75 | 0.88 | 4.94 | 5.13 | 1.00 | 3.25 | |
| | | | (125.40) | (69.85) | (50.80) | (44.45) | (22.23) | (125.40) | (130.18) | (25.40) | (82.55) | |
| **SSV72F12** | 3/4" Female | 3/4" Female | 4.50 | 2.75 | 2.00 | 1.75 | 0.88 | 4.94 | 5.13 | 1.00 | 3.25 | |
| | | | (114.30) | (69.85) | (50.80) | (44.45) | (22.23) | (125.40) | (130.18) | (25.40) | (82.55) | |

*All dimensions for reference only and subject to change.*
**For prompt service, Autoclave stocks select products. Consult factory.**

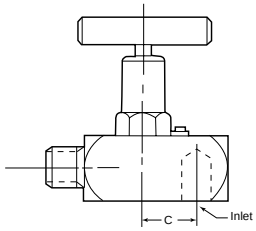
All general terms and conditions of sale, including limitations of our liability, apply to all products and service sold.

**Figure 1**




**2-Way Straight**

**Figure 2**




**2-Way Angle**

# Sour Service Products - Pressure Gauges

## Pressures to 20,000 psi (1379 bar)


***Material and Features:***

- Accuracy within 1.0% of full scale range
- Stainless steel case and ring
- Monel Bourdon tube and socket
- M562C male 9/16" tube connection in bottom (API Type III)
- Precision stainless steel movement for accuracy and resistance to atmospheric corrosion.
- Pointer zero adjustment located on front of gauge behind dial cover for convenience.
- Gauges can be liquid filled (Add - LF to Catalog #)*
- All gauges furnished with SOG collar and gland

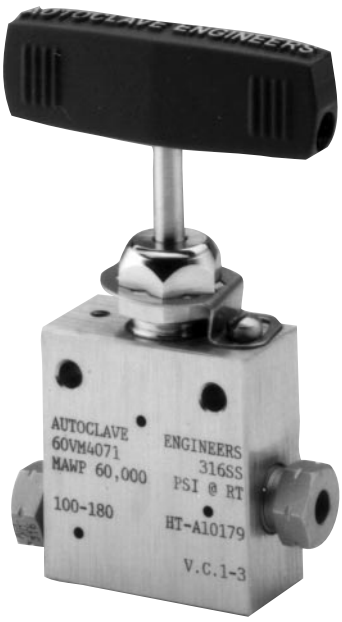
| Calibrated in PSI Only | | | |
|---|---|---|---|
| Catalog Number | Pressure psi (bar) | Minor Interval Value psi (bar) | Dial Diameter inches (mm) |
| H-0336 | 0-10,000 (690) | 100 (6.90) | 41/2 (114.30) |
| H-0071 | 0-15,000 (1034) | 100 (6.90) | 41/2 (114.30) |
| H-0304 | 0-20,000 (1379) | 200 (13.79) | 41/2 (114.30) |

* Glycerine is standard liquid fill for "LF" option.

# Metric Series

# Index



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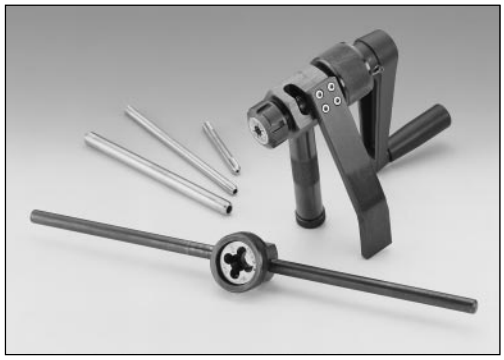
Autoclave Engineers
Fluid Components
Division of Snap-tite, Inc.
*www.autoclaveengineers.com*

# Metric Series

## High Pressure

*Pressures to 4000 bar (58016 psi)*

Autoclave Engineers offers a complete line of high-pressure Metric valves, fittings, and tubing. This line features the same quality built design and function as our standard 60VM series, in a metric format. As the leader in the high pressure industry, Autoclave has earned a reputation for reliable and efficient product performance while servicing markets in chemical/petrochemical, research, oil and gas, waterjet, and waterblast industries since 1945.

Autoclave Engineers
Fluid Components
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*www.autoclaveengineers.com*

# Metric Series - Needle Valves

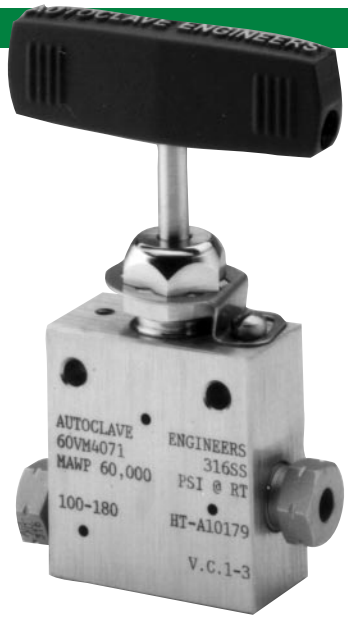
## Pressures to 4,000 bar (58016 psi)

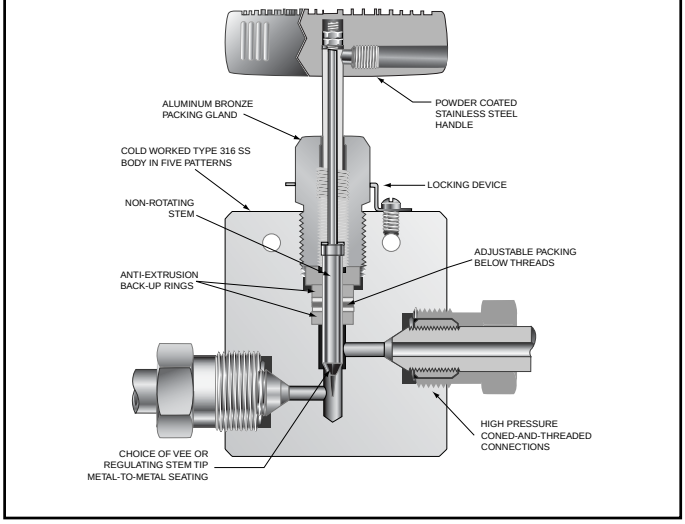
| Tube Outside Diameter Size Inches | Connection Type | Orifice Size mm (inches) | Rated $C_V$* | Pressure/ Temperature Rating psi (bar) @ Room Temperature** |
|---|---|---|---|---|
| 1/4 | MF250C | 3 (.118) | 0.25 | 4,000 (58016) |
| 3/8 | MF375C | 3 (.118) | 0.25 | 4,000 (58016) |
| 9/16 | MF562C400 | 3 (.118) | 0.32 | 4,000 (58016) |
| 9/16 | MF562C200 | 5 (.196) | 0.80 | 2,000 (29008) |

*Notes:*

* *$C_V$ values shown are for 2-way straight valve pattern. For 2-way angle patterns, increase $C_V$ value 50%.*

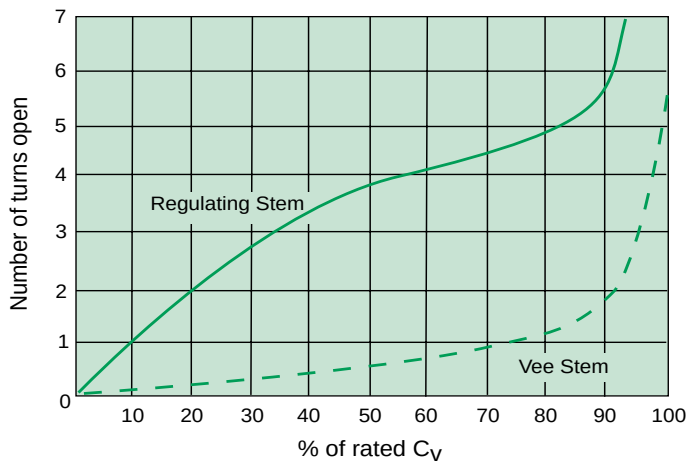
** *For complete temperature ratings see pressure/temperature rating guide in Technical Information section.*




To ensure proper fit use Autoclave tubing

**Generalized Flow Coefficient Curves ($C_V$)**




## Ordering Procedure

For complete information on available stem types, optional connections and additional valve options, see Needle Valve Options section or contact your Sales Representative. The Metric Series valves are furnished complete with connection components, unless otherwise specified.

Typical catalog number: **NM400VM4071**

**NM400VM** — Valve Series
- **NM200VM** (2000 bar)
- **NM400VM** (4000 bar)

**4** — Outside Diameter Tube Size
- **4**-1/4”
- **6**-3/8”
- **9**-9/16”

**07** — Stem/Seat Type
- **07** - non-rotating Vee stem (on-off service)
- **08** - non-rotating regulating stem (tapered tip for regulating and shutoff)
- **87** - Vee stem with replaceable seat
- **88** - Regulating stem with replaceable seat

**1** — Body Pattern
- **1** - two-way straight
- **2** - two-way angle
- **3** - three-way, two on pressure
- **4** - three-way, one on pressure
- **5** - three-way, two-stem manifold valve

—

**Options** — Options

For extreme temperature and other options, see Valve Options.

## Valve Options

**Extreme Temperatures**

Standard Autoclave valves with Teflon packing may be operated to 232°C (450°F). High temperature packing is available for service from -252°C (-423°F) to 649°C (1200°F) by adding the following suffixes to catalog order number.

**TG** - standard valve with Teflon glass packing to 316°C (600°F).
**GY** - standard valve with graphite braided yarn packing to 427°C (800°F).
**HT** - extended stuffing box valve with graphite braided yarn packing to 649°C (1200°F).
**B** - standard valve with cryogenic trim material and Teflon packing to -73°C (-100°F).
**LT** - extended stuffing box valve with Teflon packing & Cryogenic trim materials to -252°C (-423°F).

## Valve Maintenance

Repair Kits: add "R" to the front of valve catalog number for proper repair kit. (Example: **RNM400VM4071**)

Valve Bodies: Valve bodies are available. Order using the eight (8) digit part number found in the valve drawing or contact your Sales Representative for information.

Consult your Autoclave representative for pricing on repair kits and valve bodies. Refer to the Tools, Installation, Operation and Maintenance section for proper maintenance procedures.

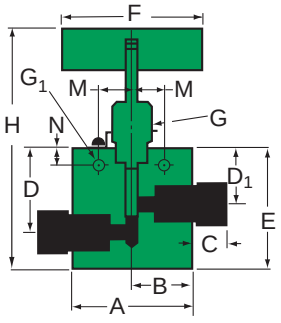
| Catalog Number | Stem Type | Outside Diameter Tube | Orifice Diameter | Dimensions - mm (inches) | | | | | | | | | | | | Block Thick-ness | Valve Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A | B | C | D | $D_1$ | E | F | G | $G_1$ | H* | M | N | | |
| **2-Way Straight** | | | | | | | | | | | | | | | | | |
| NM400VM4071 | VEE | 6.35 | 3.00 | 50.00 | 25.00 | 12.70 | 50.00 | 38.00 | 65.00 | 101.60 | 23.80 | 7.00 | 132.08 | 17.53 | 16.00 | 30.00 | See Figure 1 |
| NM400VM4081 | REG | (1/4) | (0.12) | (1.97) | (0.98) | (0.50) | (1.97) | (1.50) | (2.56) | (4.00) | (0.94) | (0.28) | (5.20) | (0.69) | (0.63) | (1.18) | |
| NM400VM6071 | VEE | 9.53 | 3.00 | 50.00 | 25.00 | 13.46 | 50.00 | 38.00 | 65.00 | 101.60 | 23.80 | 7.00 | 132.08 | 17.53 | 16.00 | 30.00 | |
| NM400VM6081 | REG | (3/8) | (0.12) | (1.97) | (0.98) | (0.53) | (1.97) | (1.50) | (2.56) | (4.00) | (0.94) | (0.28) | (5.20) | (0.69) | (0.63) | (1.18) | |
| NM200VM9071 | VEE | 14.29 | 5.00 | 64.00 | 32.00 | 18.29 | 50.00 | 38.00 | 70.00 | 101.60 | 23.80 | 7.00 | 136.91 | 17.53 | 16.00 | 38.00 | |
| NM200VM9081 | REG | (9/16) | (0.20) | (2.52) | (1.26) | (0.72) | (1.97) | (1.50) | (2.76) | (4.00) | (0.94) | (0.28) | (5.39) | (0.69) | (0.63) | (1.50) | |
| NM400VM9071 | VEE | 14.29 | 3.00 | 64.00 | 32.00 | 18.29 | 50.00 | 38.00 | 70.00 | 101.60 | 23.80 | 7.00 | 136.91 | 17.53 | 16.00 | 38.00 | |
| NM400VM9081 | REG | (9/16) | (0.12) | (2.52) | (1.26) | (0.72) | (1.97) | (1.50) | (2.76) | (4.00) | (0.94) | (0.28) | (5.39) | (0.69) | (0.63) | (1.50) | |
| **2-Way Angle** | | | | | | | | | | | | | | | | | |
| NM400VM4072 | VEE | 6.35 | 3.00 | 50.00 | 25.00 | 12.70 | | 38.00 | 70.00 | 101.60 | 23.80 | 7.00 | 136.91 | 17.53 | 16.00 | 30.00 | See Figure 2 |
| NM400VM4082 | REG | (1/4) | (0.12) | (1.97) | (0.98) | (0.50) | | (1.50) | (2.76) | (4.00) | (0.94) | (0.28) | (5.39) | (0.69) | (0.63) | (1.18) | |
| NM400VM6072 | VEE | 9.53 | 3.00 | 50.00 | 25.00 | 13.46 | | 38.00 | 80.00 | 101.60 | 23.80 | 7.00 | 146.81 | 17.53 | 16.00 | 30.00 | |
| NM400VM6082 | REG | (3/8) | (0.12) | (1.97) | (0.98) | (0.53) | | (1.50) | (3.15) | (4.00) | (0.94) | (0.28) | (5.78) | (0.69) | (0.63) | (1.18) | |
| NM200VM9072 | VEE | 14.29 | 5.00 | 64.00 | 32.00 | 18.29 | | 38.00 | 88.00 | 101.60 | 23.80 | 7.00 | 154.69 | 17.53 | 16.00 | 38.00 | |
| NM200VM9082 | REG | (9/16) | (0.20) | (2.52) | (1.26) | (0.72) | | (1.50) | (3.46) | (4.00) | (0.94) | (0.28) | (6.09) | (0.69) | (0.63) | (1.50) | |
| NM400VM9072 | VEE | 14.29 | 3.00 | 64.00 | 32.00 | 18.29 | | 38.00 | 88.00 | 101.60 | 23.80 | 7.00 | 154.69 | 17.53 | 16.00 | 38.00 | |
| NM400VM9082 | REG | (9/16) | (0.12) | (2.52) | (1.26) | (0.72) | | (1.50) | (3.46) | (4.00) | (0.94) | (0.28) | (6.09) | (0.69) | (0.63) | (1.50) | |

*G - Packing gland mounting hole drill size*
*$G_1$ - Bracket mounting hole size*
*Panel mounting drill size: 0.22" (5.59 mm) all valves.*

*All dimensions for reference only and subject to change.*
** H Dimension is with stem in the closed position.*

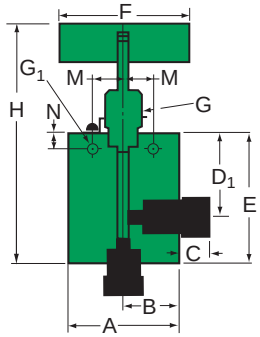
**For prompt service, Autoclave stocks select products. Consult factory.**

**Figure 1**




**2-Way Straight**

**Figure 2**

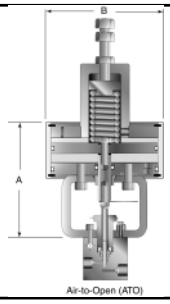
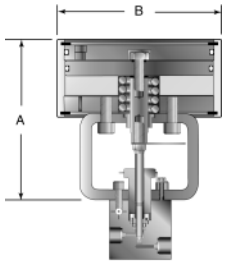



**2-Way Angle**

# Metric Series - Air Operated Valves

## Pressures to 4000 bar (58016 psi)

### Dimensions of the Air Operator

| Actuators type: O1S and O2S | Actuators type: C1S and C2S | Dimensions- mm (inches) | | | |
|---|---|---|---|---|---|
| | | Actuator type | A | B | Piston stages |
|   Air-to-Open (ATO) |   Air-to-Close (ATC) | O1S | 208.6 (8.21) | 144.5 (5.69) | 1 |
| | | C1S | 138.5 (5.45) | 144.5 (5.69) | 1 |
| | | O2S | 301.8 (11.88) | 144.5 (5.69) | 2 |
| | | C2S | 215.9 (8.50) | 144.5 (5.69) | 2 |

### Air Operator materials

Cylinder, piston, cover plates, spring housing: Anodiozed aluminum (for corrosion and wear resistance) Yoke: Painted Steel

*Technical Data*

- Maximum allowable working pressure: 7 bar (101.5 psi)
- Allowable piston temperature:-30° to +90°C (-22° to 194.°F)
- Area of piston: O1S and C1S types: 125 cm2 (19.37 $in^2$)
  O2S and C2S types: 250 cm2 (38.75 $in^2$)
- Approximate air usage/cycle at 7 bar:
  O1S and C1S types: .0011 SCM (.04 SCF)
  O2S and C2S types: .0025 SCM (.08 SCF)

## Ait-to-Close Type ( normally open)

| Valve Catalog Number | Operator Duty | | System pressure - bar (psi) | | | | | | | | | | | | Maximum Pressure bar (psi) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 600 (8,702) | 800 (11,603) | 1200 (17,405) | 1400 (20,306) | 1600 (23,206) | 2000 (29,008) | 2400 (34,810) | 2800 (40,611) | 3000 (43,512) | 3200 (46,413) | 3600 (52,214) | 4000 (58,016) | |
| **Series NM400VM Valves** | | | | | | | | | | | | | | | |
| NM400VM4071-C1S | Medium Duty C1S Series | Air Pressure: bar (psi) | 2.30 | 2.70 | 3.50 | 3.90 | 4.30 | 5.00 | 5.80 | 6.60 | 7.00 | | | | 3,000 (43,512) |
| NM400VM4072-C1S | | | (33) | (39) | (51) | (57) | (62) | (73) | (84) | (96) | (102) | | | | |
| NM400VM6071-C1S | | Stem travel: mm (in) | 6.40 | 6.40 | 6.40 | 6.40 | 6.40 | 6.40 | 6.40 | 6.40 | 6.40 | | | | |
| NM400VM6072-C1S | | | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | | | | |
| NM400VM9071-C1S | | Flow Coefficient Cv | | | | | | | | | | | | | |
| NM400VM9072-C1S | | | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | | | | |
| **Series NM200VM Valves** | | | | | | | | | | | | | | | |
| | Medium Duty C1S Series | Air Pressure: bar (psi) | 3.50 | 4.30 | 5.80 | 6.60 | | | | | | | | | 1,400 (20,306) |
| | | | (51) | (62) | (84) | (96) | | | | | | | | | |
| NM200VM9071-C1S | | Stem travel: mm (in) | 6.40 | 6.40 | 6.40 | 6.40 | | | | | | | | | |
| NM200VM9072-C1S | | | (0.25) | (0.25) | (0.25) | (0.25) | | | | | | | | | |
| | | Flow Coefficient Cv | | | | | | | | | | | | | |
| | | | 0.78 | 0.78 | 0.78 | 0.78 | | | | | | | | | |
| **Series NM400VM Valves** | | | | | | | | | | | | | | | |
| NM400VM4071-C2S | Heavy Duty C2S Series | Air Pressure: bar (psi) | 1.00 | 1.10 | 1.50 | 1.70 | 1.90 | 2.30 | 2.70 | 3.10 | 3.30 | 3.35 | 3.80 | 4.20 | 4,000 (58,016) |
| NM400VM4072-C2S | | | (15) | (16) | (22) | (25) | (28) | (33) | (39) | (45) | (48) | (51) | (55) | (61) | |
| NM400VM6071-C2S | | Stem travel: mm (in) | 6.40 | 6.40 | 6.40 | 6.40 | 6.40 | 6.40 | 6.40 | 6.40 | 6.40 | 6.40 | 6.40 | 6.40 | |
| NM400VM6072-C2S | | | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | |
| NM400VM9071-C2S | | Flow Coefficient Cv | | | | | | | | | | | | | |
| NM400VM9072-C2S | | | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | |
| **Series NM200VM Valves** | | | | | | | | | | | | | | | |
| | Heavy Duty C2S Series | Air Pressure: bar (psi) | 1.50 | 1.90 | 2.70 | 3.10 | 3.50 | 4.20 | | | | | | | 2,000 (29,008) |
| | | | (22) | (28) | (39) | (45) | (51) | (61) | | | | | | | |
| NM200VM9071-C2S | | Stem travel: mm (in) | 6.40 | 6.40 | 6.40 | 6.40 | 6.40 | 6.40 | | | | | | | |
| NM200VM9072-C2S | | | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | | | | | | | |
| | | Flow Coefficient Cv | | | | | | | | | | | | | |
| | | | 0.78 | 0.78 | 0.78 | 0.78 | 0.78 | 0.78 | | | | | | | |

## Ait-to-Open Type ( normally closed)

| Valve Catalog Number | Operator Duty | | System pressure - bar (psi) | | | | | | | | | | | | Maximum Pressure bar (psi) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 600 (8,702) | 800 (11,603) | 1200 (17,405) | 1400 (20,306) | 1600 (23,206) | 2000 (29,008) | 2400 (34,810) | 2800 (40,611) | 3000 (43,512) | 3200 (46,413) | 3600 (52,214) | 4000 (58,016) | |
| **Series NM400VM Valves** | | | | | | | | | | | | | | | |
| NM400VM4071-01S | Medium Duty 01S Series | Air Pressure: bar (psi) | 3.80 | 4.20 | 4.90 | 5.40 | 5.70 | 6.50 | 6.40 | 6.40 | 6.50 | | | | 4,000 (58,016) |
| NM400VM4072-01S | | | (55) | (61) | (71) | (78) | (83) | (94) | (93) | (93) | (94) | | | | |
| NM400VM6071-01S | | String Pre-Compression: mm (in) | 2.90 | 3.90 | 5.80 | 6.70 | 7.70 | 9.60 | 11.60 | 13.50 | 14.50 | | | | |
| NM400VM6072-01S | | | (0.11) | (0.15) | (0.23) | (0.26) | (0.30) | (0.38) | (0.46) | (0.53) | (0.57) | | | | |
| NM400VM9071-01S | | Stem travel: (mm) | 6.40 | 6.40 | 6.40 | 6.40 | 6.40 | 6.40 | 4.10 | 2.30 | 1.50 | | | | |
| NM400VM9072-01S | | | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | (0.16) | (0.09) | (0.06) | | | | |
| | | Flow Coefficient Cv | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.23 | 0.22 | 0.21 | | | | |
| **Series NM200VM Valves** | | | | | | | | | | | | | | | |
| | Medium Duty 01S Series | Air Pressure: bar (psi) | 5 | 5.7 | 6.0 | 6.4 | | | | | | | | | 1,400 (20,306) |
| | | | (73) | (83) | (87) | (93) | | | | | | | | | |
| NM200VM9071-01S | | String Pre-Compression: mm (in) | 5.80 | 7.70 | 11.60 | 13.50 | | | | | | | | | |
| NM200VM9072-01S | | | (0.23) | (0.30) | (0.46) | (0.53) | | | | | | | | | |
| | | Stem travel: (mm) | 6.40 | 6.40 | 3.00 | 2.30 | | | | | | | | | |
| | | | (0.25) | (0.25) | (0.12) | (0.09) | | | | | | | | | |
| | | Flow Coefficient Cv | 0.78 | 0.78 | 0.74 | 0.70 | | | | | | | | | |
| **Series NM400VM Valves** | | | | | | | | | | | | | | | |
| NM400VM4071-02S | Heavy Duty 02S Series | Air Pressure: bar (psi) | 2.50 | 2.90 | 3.30 | 3.50 | 3.60 | 4.00 | 4.40 | 4.80 | 5.00 | 5.30 | 5.20 | 5.20 | 4,000 (58,016) |
| NM400VM4072-02S | | | (36) | (42) | (48) | (51) | (52) | (58) | (64) | (70) | (73) | (77) | (75) | (75) | |
| NM400VM6071-02S | | String Pre-Compression: mm (in) | 2.30 | 2.40 | 3.60 | 4.20 | 4.80 | 6.00 | 7.20 | 8.40 | 9.00 | 9.60 | 10.06 | 12.00 | |
| NM400VM6072-02S | | | (0.09) | (0.09) | (0.14) | (0.17) | (0.19) | (0.24) | (0.28) | (0.33) | (0.35) | (0.38) | (0.42) | (0.47) | |
| NM400VM9071-02S | | Stem travel: (mm) | 6.40 | 6.40 | 6.40 | 6.40 | 6.40 | 6.40 | 6.40 | 6.40 | 6.40 | 6.40 | 5.10 | 4.10 | |
| NM400VM9072-02S | | | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | (0.20) | (0.16) | |
| | | Flow Coefficient Cv | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | |
| **Series NM200VM Valves** | | | | | | | | | | | | | | | |
| | Heavy Duty 02S Series | Air Pressure: bar (psi) | 3.30 | 3.60 | 4.40 | 4.80 | 5.20 | 5.20 | | | | | | | 2,000 (29,008) |
| | | | (48) | (52) | (64) | (70) | (75) | (75) | | | | | | | |
| NM200VM9071-02S | | String Pre-Compression: mm (in) | 3.60 | 4.80 | 7.20 | 8.40 | 9.60 | 12.0 | | | | | | | |
| NM200VM9072-02S | | | (0.14) | (0.19) | (0.28) | (0.33) | (0.38) | (0.47) | | | | | | | |
| | | Stem travel: (mm) | 6.40 | 6.40 | 6.40 | 6.40 | 6.40 | 4.00 | | | | | | | |
| | | | (0.25) | (0.25) | (0.25) | (0.25) | (0.25) | (0.16) | | | | | | | |
| | | Flow Coefficient Cv | 0.78 | 0.78 | 0.78 | 0.78 | 0.78 | 0.73 | | | | | | | |

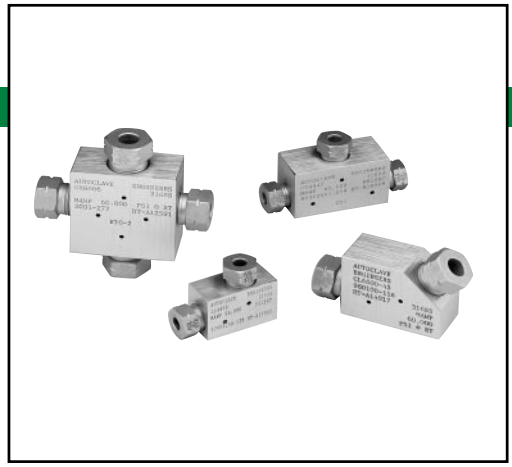
***Caution:*** While testing has shown O-rings to provide satisfactory service life, both cyclic and shelf life may vary widely with differing service conditions, properties of reactants, pressure and temperature cycling and age of the O-ring. FREQUENT INSPECTIONS SHOULD BE MADE to detect any deterioration, and O-rings replaced as required.

*Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

# Metric Series

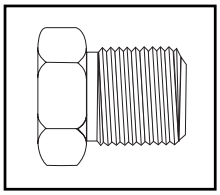
## Pressures to 4000 bar (58016 psi)



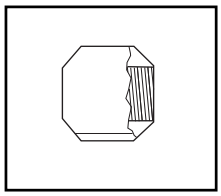
Autoclave Engineers high pressure metric fittings are rated for pressures to 58016 psi (4,000 bar). Utilizing Autoclave Engineers high pressure coned-and-threaded connections, these fittings are correlated with Series NM200VM and NM400VM valves, and Autoclave Engineers high pressure tubing.

## Connection Components

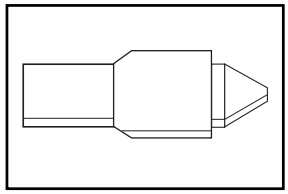
All Autoclave Engineers valves and fittings are supplied complete with appropriate glands and collars. To order these components separately, use order numbers listed. When using plug, collar is not required.



**Gland**
MAGL ( )



**Collar**
ACL ( )



**Plug**
AP ( )

Add tube size ( )
1/4" - 40
3/8" - 60
9/16" - 90

Example:
1/4" Gland - MAGL (40)

To ensure proper fit use Autoclave Engineers tubing.

| Connection Type | Gland | Collar | Plug | Connection Components (Industry Standard) |
|---|---|---|---|---|
| MF250C<br>MF375C<br>MF562C200<br>MF562C400 | MAGL( ) | ACL( ) | AP( ) | Autoclave Engineers high pressure fittings 1/4, 3/8 and 9/16 connection components to 4000 bar (58016 psi).<br>For use with MN200VM and MN400VM valves and fittings. |

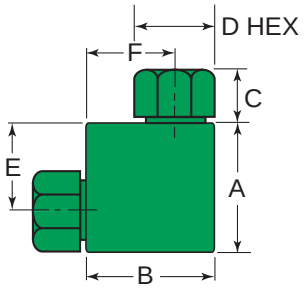
Note: Special material glands may be supplied with four flats in place of the standard hex.

| Catalog Number | Connection Type | Outside Diameter Tube mm (in) | Pressure Rating bar (psi)* | Minimum Opening | Dimensions - inches (mm) | | | | | | | Block Thickness | Fitting Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | A | B | C | D Typical | E | F | G Thickness | | |
| **Elbow** | | | | | | | | | | | | | |
| MCL4400 | MF250C | 3.63 **(1/4)** | 4,000 **(58,016)** | 3.00 **(0.12)** | 29.00 **(1.14)** | 36.00 **(1.42)** | 12.70 **(0.50)** | 17.00 **(0.67)** | 18.00 **(0.71)** | 25.00 **(0.98)** | | 22.00 **(0.87)** | **See Figure 1** |
| MCL6600 | MF375C | 5.45 **(3/8)** | 4,000 **(58,016)** | 3.00 **(0.12)** | 36.00 **(1.42)** | 44.00 **(1.73)** | 15.50 **(0.61)** | 22.00 **(0.87)** | 22.00 **(0.87)** | 30.00 **(1.18)** | | 26.00 **(1.02)** | |
| MCL9900 | MF562C400 | 8.16 **(9/16)** | 4,000 **(58,016)** | 5.00 **(0.20)** | 50.00 **(1.97)** | 64.00 **(2.52)** | 19.30 **(0.76)** | 32.00 **(1.26)** | 30.00 **(1.18)** | 44.00 **(1.73)** | | 38.00 **(1.50)** | |
| MCLX9900 | MF562C200 | 8.16 **(9/16)** | 2,000 **(29,008)** | 8.00 **(0.31)** | 50.00 **(1.97)** | 64.00 **(2.52)** | 19.30 **(0.76)** | 32.00 **(1.26)** | 30.00 **(1.18)** | 44.00 **(1.73)** | | 38.00 **(1.50)** | |
| **Tee** | | | | | | | | | | | | | |
| MTC4440 | MF250C | 3.63 **(1/4)** | 4,000 **(58,016)** | 3.00 **(0.12)** | 36.00 **(1.42)** | 36.00 **(1.42)** | 12.70 **(0.50)** | 17.00 **(0.67)** | 25.00 **(0.98)** | 18.00 **(0.71)** | | 22.00 **(0.87)** | **See Figure 2** |
| MTC6660 | MF375C | 5.45 **(3/8)** | 4,000 **(58,016)** | 3.00 **(0.12)** | 44.00 **(1.73)** | 44.00 **(1.73)** | 15.50 **(0.61)** | 22.00 **(0.87)** | 30.00 **(1.18)** | 22.00 **(0.87)** | | 26.00 **(1.02)** | |
| MTC9990 | MF562C400 | 8.16 **(9/16)** | 4,000 **(58,016)** | 5.00 **(0.20)** | 58.00 **(2.28)** | 64.00 **(2.52)** | 19.30 **(0.76)** | 32.00 **(1.26)** | 38.00 **(1.50)** | 32.00 **(1.26)** | | 38.00 **(1.50)** | |
| MTCX9990 | MF562C200 | 8.16 **(9/16)** | 2,000 **(29,008)** | 8.00 **(0.31)** | 58.00 **(2.28)** | 64.00 **(2.52)** | 19.30 **(0.76)** | 32.00 **(1.26)** | 38.00 **(1.50)** | 32.00 **(1.26)** | | 38.00 **(1.50)** | |
| **Cross** | | | | | | | | | | | | | |
| MCX4444 | MF250C | 3.63 **(1/4)** | 4,000 **(58,016)** | 3.00 **(0.12)** | 36.00 **(1.42)** | 50.00 **(1.97)** | 12.70 **(0.50)** | 17.00 **(0.67)** | 18.00 **(0.71)** | 25.00 **(0.98)** | | 22.00 **(0.87)** | **See Figure 3** |
| MCX6666 | MF375C | 5.45 **(3/8)** | 4,000 **(58,016)** | 3.00 **(0.12)** | 44.00 **(1.73)** | 60.00 **(2.36)** | 15.50 **(0.61)** | 22.00 **(0.87)** | 22.00 **(0.87)** | 30.00 **(1.18)** | | 26.00 **(1.02)** | |
| MCX9999 | MF562C400 | 8.16 **(9/16)** | 4,000 **(58,016)** | 5.00 **(0.20)** | 64.00 **(2.52)** | 76.00 **(2.99)** | 19.30 **(0.76)** | 32.00 **(1.26)** | 32.00 **(1.26)** | 38.00 **(1.50)** | | 38.00 **(1.50)** | |
| MCXX9999 | MF562C200 | 8.16 **(9/16)** | 2,000 **(29,008)** | 8.00 **(0.31)** | 64.00 **(2.52)** | 76.00 **(2.99)** | 19.30 **(0.76)** | 32.00 **(1.26)** | 32.00 **(1.26)** | 38.00 **(1.50)** | | 38.00 **(1.50)** | |

*Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

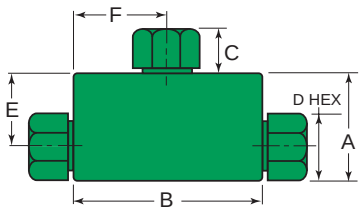
*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

**Figure 1**



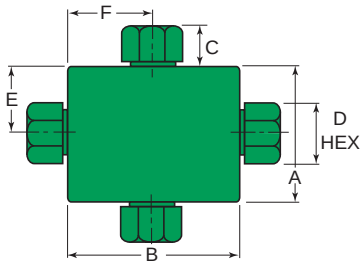

**Elbow**

**Figure 2**




**Tee**

**Figure 3**




**Cross**

Note: Fittings such as 45° elbows, reducer elbows, and reducer 45° elbows are available upon request.
For mounting hole option add suffix PM to catalog number, consult factory for mounting hole dimensions.
Contact your local sales representative for additional information.

| Catalog Number | Connection Type | Outside Diameter Tube mm (in) | Pressure Rating bar (psi)* | Minimum Opening | Dimensions - inches (mm) | | | | | | | Block Thickness | Fitting Pattern |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | A | B | C | D Typical | E | F | G Thickness | | |

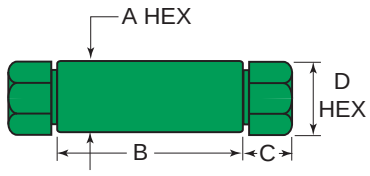
## Straight Coupling

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M400F4433 | MF250C | 3.63 **(1/4)** | 4,000 **(58,016)** | 3.00 **(0.12)** | 22.00 **(0.87)** | 42.00 **(1.65)** | 12.70 **(0.50)** | 17.00 **(0.67)** | | | | | **See Figure 4** |
| M400F6633 | MF375C | 5.45 **(3/8)** | 4,000 **(58,016)** | 3.00 **(0.12)** | 27.00 **(1.06)** | 48.00 **(1.89)** | 15.50 **(0.61)** | 22.00 **(0.87)** | | | | | |
| M400F9933 | MF562C400 | 8.16 **(9/16)** | 4,000 **(58,016)** | 5.00 **(0.20)** | 36.00 **(1.42)** | 55.00 **(2.17)** | 19.30 **(0.76)** | 32.00 **(1.26)** | | | | | |
| M200F9933 | MF562C200 | 8.16 **(9/16)** | 2,000 **(29,008)** | 8.00 **(0.31)** | 36.00 **(1.42)** | 55.00 **(2.17)** | 19.30 **(0.76)** | 32.00 **(1.26)** | | | | | |

*Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

**Figure 4**




**Straight Coupling**

Union Couplings are designed with a removable seat insert allowing disassembly and tubing removal without the necessity of loosening other items in a line.

# Anti-Vibration Collet Gland Assembly

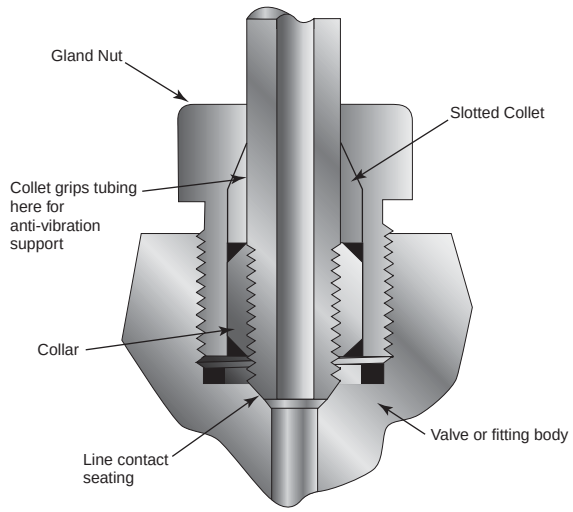
## Pressures to 4000 bar (58016 psi)

### Series MKCGL Sizes to 14.29 mm (9/16")

For extreme conditions of vibration and/or shock in tubing systems, such as a valve or fitting on an unsupported line near a compressor, Autoclave coned-and-threaded connections are offered with the Anti-Vibration Collet Gland Assemblies. Completely interchangeable with standard Autoclave high pressure connections, the Collet Gland Assemblies provide equally effective pressure handling capability.

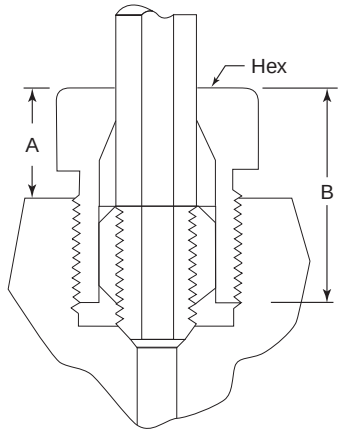
In standard connection systems, the bending stresses on the threaded area of the tubing imposed by excessive vibration or movement may cause premature fatigue failure of the tubing at the back of the thread. By moving the stress concentration back to the unthreaded part of the tubing and providing a wedge-type gripping action, the Autocalve Engineers anti-vibration collet gland assembly strengthens the entire structure. With stress concentration reduced and overall stress level maintained well below the endurance limit of the material, the result is virtually unlimited vibrational fatigue life.

A less complex and more economical design than other vibration-resistant connections, the Collet Gland Assembly utilizes the same coned-and-threaded features of Autoclave high pressure connections. In Series KCGL the gland nut is recessed to accommodate a tapered, slotted collet that grips the tubing at a point behind the threaded area of the tubing.The design provides a slight difference in angles between the collet and the corresponding taper of the gland nut. As the nut is tightened, it acts to wedge the tapered end of the collet into a gripping engagement with the tubing and, at the same time, forces the collar and tubing assembly into line contact with the connection seat.




**Series MKCGL**
Pressures to 4,000 bar (58016 psi)

| Catalog Number | Part | Outside Diameter Tubing Size mm (in) | Dimensions -mm (inches) | | |
|---|---|---|---|---|---|
| | | | A | B | Hex |
| **MKCGL40-316** | Complete assembly | 6.35 (1/4) | 12.70 (0.50) | 24.00 (0.94) | 17.00 (0.67) |
| **MKCL40-316** | Slotted collet | | | | |
| **MKGL40-316** | Gland nut | | | | |
| **MKCGL60-316** | Complete assembly | 9.53 (3/8) | 15.50 (0.61) | 27.00 (1.06) | 22.00 (0.87) |
| **MKCL60-316** | Slotted collet | | | | |
| **MKGL60-316** | Gland nut | | | | |
| **MKCGL90-316** | Complete assembly | 14.29 (9/16) | 19.30 (0.76) | 32.0 (1.26) | 32.0 (1.26) |
| **MKCL90-316** | Slotted collet | | | | |
| **MKGL90-316** | Gland nut | | | | |




**Series KCGL**
4,000 bar (58016 psi)

Standard Autoclave Engineers collar not included in complete assembly

*All dimensions for reference only and subject to change.*

For prompt service, Autoclave stocks select products. Consult your local representative.

# Metric Tubing

## Pressures to 4000 bar (58016 psi)

Autoclave Engineers offers a complete selection of austenetic, cold drawn stainless steel tubing designed to match the performance standards of Autoclave valves and fittings. Autoclave high pressure tubing is manufactured specifically for high pressure applications requiring both strength and corrosion resistance. The tubing is furnished in random lengths between 6 meters (20 feet) and 8.2 meters (27 feet). The average is 7.3 meters (24 feet ). High pressure tubing is available in five sizes and a variety of materials. Special longer lengths are available. Consult factory.

### Inspection and Testing

Autoclave Engineer's high pressure tubing is inspected to assure freedom from seams, laps, fissures or other flaws, as well as carburization or intergranular carbide precipitation. The outside and inside diameters of the tubing are controlled within close tolerences. Sample pieces of tubing for each lot are tested to confirm mechanical properties. Hydrostatic testing is also performed on a statistical basis and is conducted at the working pressure of the tube. Autoclave will perform 100% hydrostatic testing at additional cost if desired.

### Special Materials

In addition to the type 316 and 304 stainless steel tubing listed in this section, Autoclave has limited stock of hard-to-obtain shorter lengths of the following tubing materials in some sizes:

*Monel 400*, Inconel 600*, Titanium Grade 2*, Nickel 200*, Hastelloy C276** - (* Trademark names)

Please consult factory for stock availabilty.

### Tubing Tolerance

| Nominal Tubing Size mm (inches) | Tolerance/Outside Diameter mm (inches) |
|---|---|
| 6.35 (1/4) | 6.30/6.17 (.248/.243) |
| 9.53 (3/8) | 9.40/9.27 (.370/.365) |
| 14.29 (9/16) | 14.15/14.02 (.557/.552) |

| Catalog Number | Tube Material | Fits Connection Type | Tube Size Inches (mm) Outside Diameter | Inside Diameter | Wall Thickness | Flow Area in.² (mm²) | Working Pressure psi (bar)* -325 to 100°F -198 - 37.8°C | 200°F 93°C | 400°F 204°C | 600°F 316°C | 800°F 427°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **2000 BAR** | | | | | | | | | | | |
| MS15-089 | 316SS | MF250C | **6.35** (1/4) | **2.77** (0.109) | **1.78** (0.070) | **5.89** (0.009) | 2,070 **(30,023)** | 2,070 **(30,023)** | 1,990 **(28,863)** | 1,890 **(27,413)** | 1,750 **(25,382)** |
| MS15-191 | 304SS | | | | | | 2,070 **(30,023)** | 1,950 **(28,283)** | 1,780 **(25,817)** | 1,750 **(25,382)** | 1,670 **(24,222)** |
| MS15-088 | 316SS | MF375C | **9.52** (3/8) | **5.16** (0.203) | **2.18** (0.086) | **20.93** (0.032) | 2,070 **(30,023)** | 2,070 **(30,023)** | 1,990 **(28,863)** | 1,890 **(27,413)** | 1,750 **(25,382)** |
| MS15-190 | 304SS | | | | | | 2,070 **(30,023)** | 1,950 **(28,283)** | 1,780 **(25,817)** | 1,750 **(25,382)** | 1,670 **(24,222)** |
| MS15-086 | 316SS | MF562C200 | **14.28** (9/16) | **7.92** (0.312) | **3.18** (0.125) | **49.72** (0.076) | 2,070 **(30,023)** | 2,070 **(30,023)** | 1,990 **(28,863)** | 1,890 **(27,413)** | 1,750 **(25,382)** |
| MS15-188 | 304SS | | | | | | 2,070 **(30,023)** | 1,950 **(28,283)** | 1,780 **(25,817)** | 1,750 **(25,382)** | 1,670 **(24,222)** |
| **4000 BAR** | | | | | | | | | | | |
| MS15-081 | 316SS | MF250C | **6.35** (1/4) | **2.11** (0.083) | **2.11** (0.083) | **3.27** (0.005) | 4,140 **(60,047)** | 4,140 **(60,047)** | 3,980 **(57,726)** | 3,780 **(54,825)** | 3,500 **(50,764)** |
| MS15-192 | 304SS | | | | | | 4,140 **(60,047)** | 3,900 **(56,556)** | 3,560 **(51,634)** | 3,500 **(50,764)** | 3,340 **(48,443)** |
| MS15-087 | 316SS | MF375C | **9.52** (3/8) | **3.18** (0.125) | **3.18** (0.125) | **7.85** (0.012) | 4,140 **(60,047)** | 4,140 **(60,047)** | 3,980 **(57,726)** | 3,780 **(54,825)** | 3,500 **(50,764)** |
| MS15-183 | 304SS | | | | | | 4,140 **(60,047)** | 3,900 **(56,556)** | 3,560 **(51,634)** | 3,500 **(50,764)** | 3,340 **(48,443)** |
| MS15-083 | 316SS | MF562C400 | **14.28** (9/16) | **4.75** (0.187) | **4.75** (0.187) | **17.66** (0.027) | 4,140 **(60,047)** | 4,140 **(60,047)** | 3,980 **(57,726)** | 3,780 **(54,825)** | 3,500 **(50,764)** |
| MS15-185 | 304SS | | | | | | 4,140 **(60,047)** | 3,900 **(56,556)** | 3,560 **(51,634)** | 3,500 **(50,764)** | 3,340 **(48,443)** |

Note:
1. Autofrettaged tubing available (see technical Information section: Pressure Cycling for Autofrettage information)
2. For HighPressure, High Cycle (HPHC) tubing, MS15-201 and MS15-202 are available. (See Technical Information section: Pressure Cycling for additional information)

*Maximum pressure rating is based on the lowest rating of any component. Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

# Metric Coned-and-Threaded Nipples

## Pressures to 4000 bar (58016 psi)

For rapid system make-up, Autoclave Engineers supplies pre-cut, coned-and-threaded nipples in various sizes and lengths for Autoclave high pressure valves and fittings.

### Special lengths

In addition to the standard lengths listed in the table below, nipples are available in any custom length. Consult factory.

### Materials**

Catalog numbers in table refer to Type 316 Stainless steel.

| Catalog Number | | | | | | | 2000 bar | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Nipple Length mm (In) | | | | | | | Fits Connection Type | Tube Size mm (in) | | Working Pressure at 37.8°C (100°F) bar (psi) * |
| 69.85 **(2.75)** | 76.20 **(3.00)** | 101.60 **(4.00)** | 152.40 **(6.00)** | 203.20 **(8.00)** | 254.00 **(10.00)** | 304.80 **(12.00)** | | O.D. | I.D. | |
| MCN4402-316 | MCN4403-316 | MCN4404-316 | MCN4406-316 | MCN4408-316 | MCN44010-316 | MCN44012-316 | MF250C | 6.35 **(1/4)** | 2.77 **(0.019)** | 2,000 **(29,008)** |
| | MCN6603-316 | MCN6604-316 | MCN6606-316 | MCN6608-316 | MCN66010-316 | MCN66012-316 | MF375C | 9.53 **(3/8)** | 5.16 **(0.203)** | 2,000 **(29,008)** |
| | | MCN9904-316 | MCN9906-316 | MCN9908-316 | MCN99010-316 | MCN99012-316 | MF562C200 | 14.29 **(9/16)** | 7.92 **(0.312)** | 2,000 **(29,008)** |

| Catalog Number | | | | | | | 4000 bar | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Nipple Length mm (In) | | | | | | | Fits Connection Type | Tube Size mm (in) | | Working Pressure at 37.8°C (100°F) bar (psi) * |
| 69.85 **(2.75)** | 76.20 **(3.00)** | 101.60 **(4.00)** | 152.40 **(6.00)** | 203.20 **(8.00)** | 254.00 **(10.00)** | 304.80 **(12.00)** | | O.D. | I.D. | |
| CN4402-316 | CN4403-316 | CN4404-316 | CN4406-316 | CN4408-316 | CN44010-316 | CN44012-316 | MF250C | 6.35 **(1/4)** | 2.11 **(0.083)** | 4,000 **(58,016)** |
| | CN6603-316 | CN6604-316 | CN6606-316 | CN6608-316 | CN66010-316 | CN66012-316 | MF375C | 9.53 **(3/8)** | 3.18 **(0.203)** | 4,000 **(58,016)** |
| | | CN9904-316 | CN9906-316 | CN9908-316 | CN99010-316 | CN99012-316 | MF562C200 | 14.29 **(9/16)** | 4.75 **(0.187)** | 4,000 **(58,016)** |

*Note:*
**See High pressure tubing section for pressure ratings at various temperatures.*
***Type 304 stainless steel nipples available.*

*Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

# Metric Series - Safety Heads

## Ordering Information

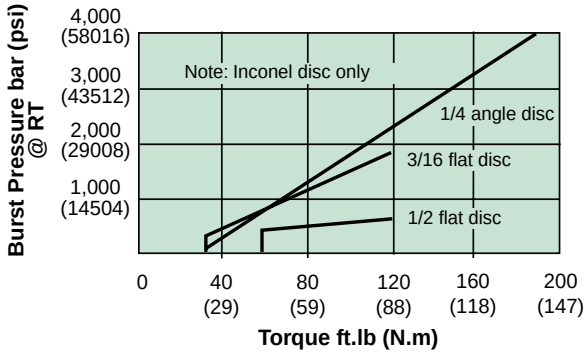
To order an Autoclave Universal Safety Head, use the catalog order number from table. ADD THE SIZE OF THE RUPTURE DISC YOU WANT AS A SUFFIX TO THE CATALOG NUMBER; SUCH AS MCS6600-1/4A. Then order desired rupture discs from rupture disc section. (This is important since the disc size determines which hold-down ring will be furnished with the safety head.)

### Hold-down nut torque values

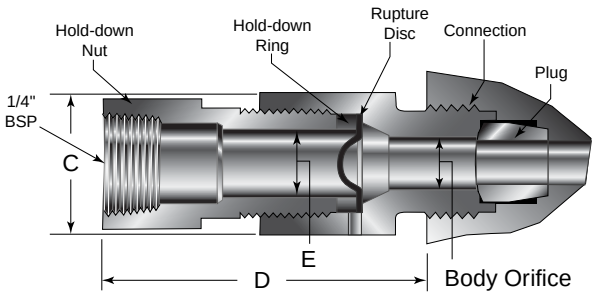
| Torque@ Minimum Pressure N.m (Ft. lb.) | Torque@ Minimum Pressure bar (psi) | Torque@ Maximum Pressure N.m (Ft. lb.) | Torque@ Maximum Pressure bar (psi) | Rupture Disc inches | Hold-down Ring Part Number |
|---|---|---|---|---|---|
| 30 (22) | 345 (5,000) | 130 (95) | 1830 (26,542) | 3/16 Flat† | 101A-0439 |
| 60 (44) | 280 (4,061) | 130 (95) | 690 (10,000) | 1/2 Flat | 1020-7434 |
| 30 (22) | 280 (4,061) | 200 (147) | 4,000 (58,016) | 1/4 Angle | 102A-0439 |

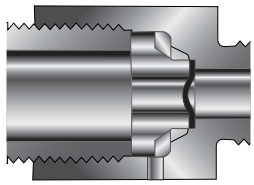
*† 3/16 flat seat disc cannot be used with safety head assemblies SS6600, SS8600 and CSX9600. Torque values for intermediate pressures may be linearily interpolated. Use minimum torque value for pressures lower than those shown.*

**Hold-down nut torque requirements vs. rupture disc burst pressure rating @ RT**

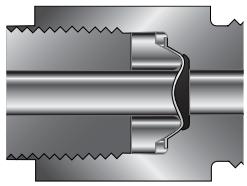



1/2 Flat Disc illustrated in Safety Head



3/16 Flat rupture disc



1/4 Flat rupture disc

| Catalog Number Without Disc | Body Part Number | Plug Part Number | Hold-down Gland Part Number | Fits Connection Type | Fitting Pressure Rating bar (psi) | Body Torque N.m (Ft.lb. ) | Plug Orifice mm (inches) | Body Orifice mm (inches) | Rupture Disc Size mm (inches) 3/16F Port E* | 1/4A Port E* | 1/2F Port E* | Dimensions mm (inches) C | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **High-Pressure: 4,000 bar (58,016 psi)** | | | | | | | | | | | | | |
| MCS4600 | 101C-6570 | 1030-4877 | 3/16 & 1/2 Flat 101C-6569 | MF250C | 4,000 (58,016) | 30 (22) | 2.08 (.082) | 3.18 (.125) | 4.78 (0.188) | 6.35 (0.25) | 12.7 (0.50) | 27.00 (1.06) | 63.00 (2.48) |
| MCS6600 | 101C-6571 | 1030-6096 | | MF375C | 4,000 (58,016) | 60 (44) | 3.17 (.125) | 5.56 (.219) | 4.78 (0.188) | 6.35 (0.25) | 12.7 (0.50) | 27.00 (1.06) | 58.00 (2.28) |
| MCS9600 | 101C-6572 | 1030-6097 | 1/4 Angle 101C-6575 | MF562C400 | 4,000 (58,016) | 110 (81) | 4.70 (.188) | 7.13 (.281) | 4.78 (0.188) | 6.35 (0.25) | 12.7 (0.50) | 27.00 (1.06) | 56.50 (2.22) |
| | | | | | | | | | | | | | |

Port E* - Minimum disc blow-out diameter of hold down ring

Note: Interchangeable hold-down rings permit use of several different sizes and types of rupture disc in a single safety head.

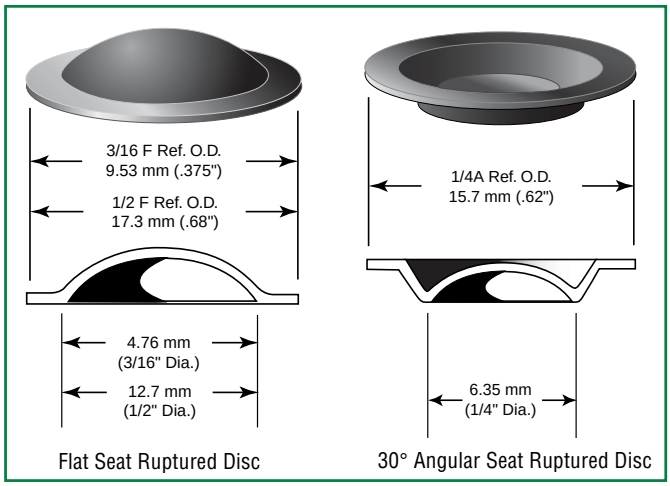
Maximum pressure rating is based on the lowest rating of any component.
Actual working pressure may be determined by tubing pressure rating, if lower.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

# Metric Series - Prebulged Rupture Discs

## Ordering Information

- Specify quantity, disc size, type, material and temperature.
- Indicate desired rupture rating which should be at least 110% of operating pressure. Tolerances are +6% to -3% of nominal rating and will burst at ±5% of furnished rating. Discs are rated at 22°C (72°F).
- Minimum order of 6 discs required for materials other than Inconel.



Flat Seat Ruptured Disc

30° Angular Seat Ruptured Disc

| Disc Material | Disc Size Seat Type | Rupture Pressures Standard Available Range ±5% | Maximum Temperature Rating |
|---|---|---|---|
| | Inches | bar (psi) | °C (°F) |
| **Inconel (Standard)** | 3/16 flat | 86.2 to 1378.9 (1,250 to 20,000) | 482 (900) |
| | 1/4 angle | 62.1 to 4136.8 (900 to 60,000) | 482 (900) |
| | 1/2 flat | 34.5 to 690.0 (500 to 10,000) | 482 (900) |

Note: A- Inconel discs are normally available from stock. For the other materials, the minimum quantity to be ordered is six pieces.
B- Other materials are available upon request.
C- Frequent replacement may be desirable to avoid premature rupture due to repetitive pressure/temperature cycling and corrosion.
D- For a complete list of stock rupture discs, see pages 10-13 in the accessories section of the catalog.

Teflon coating available on one or both sides to increase minimum rupture rating.

CAUTION: High pressure-to-rupture ratios, severe pressure or temperature cycling, corrosion and metal fatigue affect disc life and rupture pressure. Frequent disc replacement may be desirable to avoid premature rupture. Rupture disc manufactures recommended a 140 to 170 percent margin on disc ratings for extended disc life.

*All dimensions for reference only and subject to change.*
For prompt service, Autoclave stocks select products. Consult your local representative.

# Metric Series - Manual Coning and Threading Tools

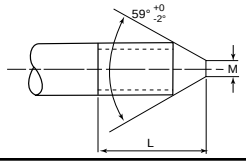
## Ordering Information

| OD tube | | ID tube | | Coning tools and components | | | Threading tools and components | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| inches | mm | inches | mm | Complete Tool | Collet | Coning blade set of 2 | Complete Tool | Tool only | Threading die | | Guide Bushing |
| | | | | | | | | | Catalog | Thread Type | |
| 1/4” | 6.35 | 0.109 | 2.77 | MCTM4 | 90248 | 101F-1577 | 402A | 402 | PO214 | 1/4-28 | 1010-0343 |
| 1/4” | 6.35 | 0.083 | 2.11 | | | | | | | | |
| 3/8” | 9.52 | 0.203 | 5.15 | MCTM6 | 90250 | 101F-1601 | 402C | 402 | PO215 | 3/8-24 | 1010-0344 |
| 3/8” | 9.52 | 0.125 | 3.17 | MCTH6 | 90250 | 101F-1578 | | | | | |
| 9/16” | 14.28 | 0.312 | 7.92 | MCTM920 | 90251 | 1010-5218 | 402E | 402 | PO216 | 9/16-18 | 1010-0345 |
| 9/16” | 14.28 | 0.187 | 4.76 | MCTH960 | 90251 | 1010-0883 | | | | | |

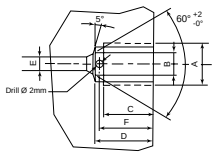
Note: Complete tool comes with collet and blade. Only one tool is required for all tubing sizes.

**Make up of tube connection**

**Tube male connection**




**Female connection**



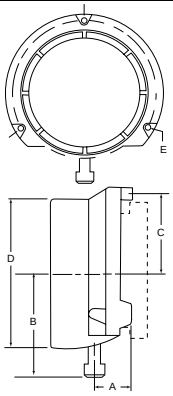

| OD tube | | ID tube | | Coning tools and components | | | | Threading tools and components | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| inches | mm | inches | mm | Dimensions mm (in) | | Left Hand Thread* | Male Connection Type | Female Connection type | Dimensions mm (inches) | | | | | |
| | | | | L | M | | | | A thread | B | C | D | E | F |
| 1/4” | 6.35 | 0.109 | 2.77 | 15.1 (.594) | 3.6 (.141) | 1/4-28 | MM250CX | MF250C | M16x1.5 | 5 (.196) | 9.5 (.374) | 12 (.472) | 3 (.118) | 10.7 (.421) |
| 1/4” | 6.35 | 0.083 | 2.11 | 14.3 (.566) | 3.6 (.141) | 1/4-28 | M250C | | | | | | | |
| 3/8” | 9.52 | 0.203 | 5.15 | 19.4 (.754) | 6.4 (.251) | 3/8-24 | MM375CX | MF375C | M20x1.5 | 8 (.314) | 13.5 (.531) | 15 (.590) | 3 (.118) | 14 (.551) |
| 3/8” | 9.52 | 0.125 | 3.17 | 19.1 (.751) | 5.6 (.220) | 3/8-24 | M375C | | | | | | | |
| 9/16” | 14.28 | 0.312 | 7.92 | 24.2 (.956) | 10.3 (.405) | 9/16-18 | MM562CX | MF562C200 | M30x2 | 12.7 (.500) | 15 (.590) | 19 (.748) | 8 (.314) | 17 (.669) |
| 9/16” | 14.28 | 0.187 | 4.76 | 23.8 (.437) | 7.1 (.2.79) | 9/16-18 | M562C | MF562C400 | M30x2 | 10 (.393) | 15 (.590) | 19 (.748) | 5 (.296) | 17 (.669) |

*UNF thread class 2 (National fine)

Note: For the female connection, the 60° cones and the threads must be concentric (0.08 mm (.003 in) from the center).

# Metric Series - Pressure Gauges

## Pressures to 7000 bar (101,528 psi)




| Catalog Number | Pressure Range bar (psi) | Minor Interval Value | | Dial Diameter mm (inches) | Dimension mm (inches) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Internal-bar (psi) | Min-bar (psi) | | A | B | C | D | E |
| P-80063 | 0-1000 (0-14,504) | 100 (1450) | 10 (145) | 114 (4.5) | 40 (1.56) | 100 (3.94) | 136 (5.35) | 125 (4.92) | 7 (0.29) |
| P-80064 | 0-1600 (0-23,206) | 200 (2901) | 20 (290) | 114 (4.5) | 40 (1.56) | 100 (3.94) | 136 (5.35) | 125 (4.92) | 7 (0.29) |
| P-80048 | 0-2500 (0-36,260) | 500 (7252) | 20 (290) | 152 (6.0) | 40 (1.56) | 100 (3.94) | 136 (5.35) | 125 (4.92) | 7 (0.29) |
| P-80049 | 0-4000 (0-58,016) | 500 (7252) | 50 (725) | 152 (6.0) | 67 (2.64) | 120 (4.72) | 191 (7.50) | 164 (6.44) | 7 (0.29) |
| P-80050 | 0-6000 (0-87,024) | 1,000 (14,504) | 50 (725) | 152 (6.0) | 67 (2.64) | 120 (4.72) | 191 (7.50) | 164 (6.44) | 7 (0.29) |
| P-80009 | 0-7000 (0-101,528) | 1,000 (14,504) | 50 (725) | 152 (6.0) | 67 (2.64) | 120 (4.72) | 191 (7.50) | 164 (6.44) | 7 (0.29) |

### Characteristics and features

Materials:
- Aluminum case
- Safety pattern for gas service with blow out back
- 316 stainless steel Bourdon tubes
- Security glass dial cover
- Pointer zero adjustment located on front of gauge
- Back panel for panel mounting
- 1/4" (MF250C) coned and threaded connection
- Dual scale BAR/MPa

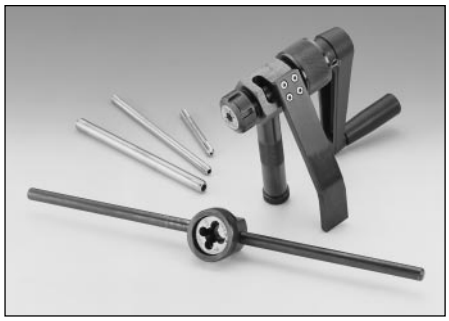
Accuracy:
- 1% full scale range up to 2500 bar
- 2% full scale range from 4000 up to 7000 bar

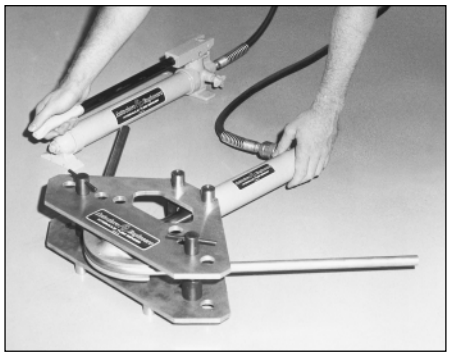
Options:
- Electric contacts (min/max)
- Front panel for panel mounting

# Tools, Installation, Operation and Maintenance

## Index









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Autoclave Engineers
Fluid Components
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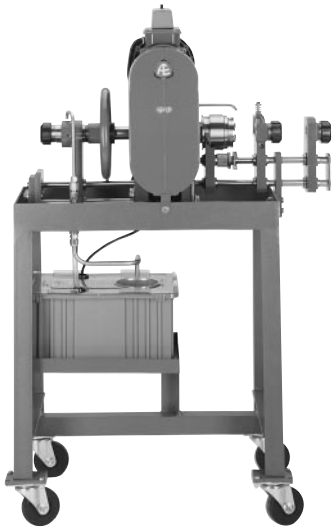
*www.autoclaveengineers.com*

# Tools, Installation, Operation and Maintenance

Safe, efficient operation of any product is inherently dependent upon its proper installation. In this section the preparation and assembly of low, medium and high pressure connections is explained. Also covered is the assembly procedure for medium and high pressure anti-vibration collet gland assemblies.

Correct installation procedures are further promoted by providing dimensional information associated with a variety of Autoclave Engineers tube connections as well as the torque required to properly seat numerous Autoclave components. Several tools developed by Autoclave are presented to help accomplish proper valve, fitting and tubing installation and maintenance.

When installing or maintaining any pressure component, common practice dictates the use of proper safety equipment at all times.



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## Autoclave Speedbite Connections

### Fast, Positive Sealing for Pressures up to 15,000 psi* (1034 bar)

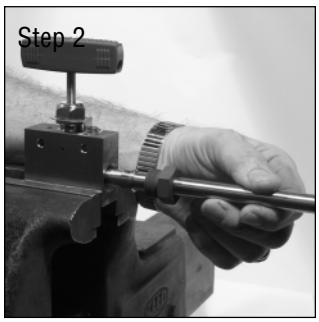
1. Cut tubing to length and deburr. Allow extra length for proper engagement (per table below).

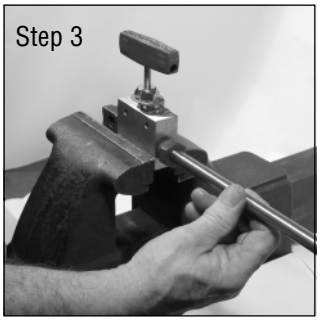
| Outside Diameter Tube Size inches (mm) | Extra Allowance** for Engagement inches (mm) |
|---|---|
| 1/16 (1.59) | 0.50 (12.70) |
| 1/8 (3.18) | 0.50 (12.70) |
| 1/4 (6.35) | 0.75 (19.05) |
| 3/8 (9.53) | 0.75 (19.05) |
| 1/2 (12.70) | 0.88 (22.35) |

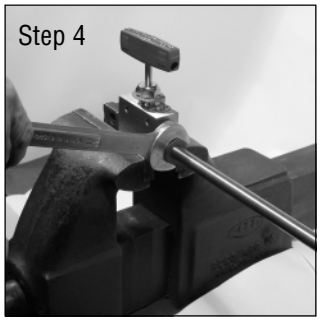
2. Lubricate male threads. (Lubrication not necessary if tube nut has Bonded Dry-Film Lubricant.) Slip gland and sleeve onto tubing.
*Note: Be sure to remove gland and sleeve from components and slide them onto the tubing before inserting the tubing into the components.* **Make sure larger end of sleeve is toward gland.** Push tubing into valve or fitting until it bottoms. If process tolerable, a slight amount of inert grease on the nose of the compression sleeve will improve sealability.

3. TIGHTEN GLAND UNTIL SLEEVE BEGINS TO GRIP TUBING.

4. Note starting position of wrench. Tighten gland approximately 1-1/4 turns for the SW connection.

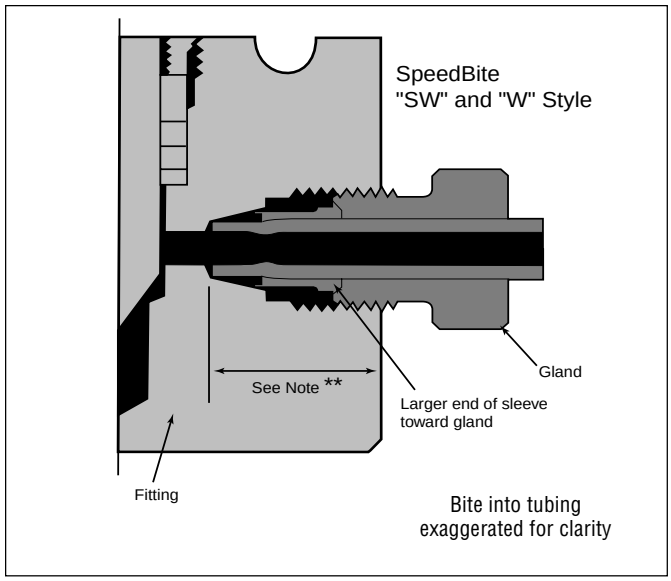




### Complete Connection

The illustration below shows the condition of sleeve and tubing after completion of "sleeve seating." The sleeve has cut into the tubing as it moved forward into the tapered seat, upsetting material ahead of it and establishing a shoulder on the tubing to provide positive mechanical support for the tubing end-load. A properly seated sleeve cannot be displaced back and forth along the tubing but may be rotated around the tubing.

### Reassembly

To reassemble a connection, insert tubing with sleeve and gland into valve or fitting. Tighten gland "finger-tight". Tighten gland with a wrench approximately 3/8 of a turn for a gas-tight seal. After frequent reassemblies, it may take less than 3/8 turn to effect a gas-tight seal, and as little as 1/8 of a turn may be sufficient.




* No special torque wrenches or mandrels required.

** Distance tubing protrudes into connection from face of fitting.

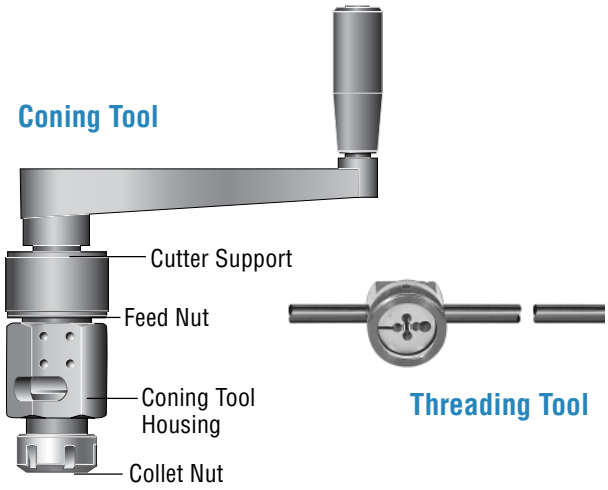
Fully annealed tubing with proper outside diameter tolerences is recommended for these connection components.

## Manual Coning & Threading Tools

Autoclave Engineers manufactures a manual coning and threading tool for optimum performance with tubing sizes up to 9/16" (14.3 mm) outside diameter. These precision quality manual tools to permit on-site end preparation for Autoclave Engineers medium and high pressure tubing installations. One coning and one threading tool with optional sizes of collets, blades dies and guide bushings eliminates the need of multiple tools for different size tubing.

Interchangeable collets for each size tubing provides proper centering of tubing. The cutting feed arrangement permits the operator to control the length of the cut. Interchangeable tool steel cutting blades are used in pairs to assure more accurate and faster coning, and are designed to square-off and finish the tube as the cone is completed. There is a provision for applying metal cutting lubricants to the cutting zone.

For coning tool with optional support arm (for holding in vise) and chip/oil catch reservoir, add RS to suffix of model number.Example: MCTM4-RS For threading operation the threading die holder is designed to hold the appropriate die for any of the standard Autoclave Engineers tubing sizes through 9/16" (14.3 mm) outside diameter. Interchangeable guide bushings properly guide the tool for accurate thread cutting.




Note: Collet nut wrench (not shown) supplied with coning tool.

| | Tube Size | | Coning Tools and Components Catalog Number | | | Threading Tools and Components Catalog Number | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Outside Diameter in.(mm) | Inside Diameter in.(mm) | Tool with Collet & Blades | Collet | Coning Blades (set of 2) | Tool with Die & Bushing | Tool Only | Threading Die | | Guide Bushing |
| | | | | | | | | Order No. | Size-type* | |
| AE Medium Pressure | 1/4 (6.35) | .109 (2.77) | MCTM4† | 90248 | 101F-1577 | 402A | 402 | P-0214 | 1/4-28 | 1010-0343 |
| | 3/8 (9.53) | .203 (5.16) | MCTM6 | 90250 | 101F-1601 | 402C | 402 | P-0215 | 3/8-24 | 1010-0344 |
| | 9/16 (14.3) | .312 (7.92) | MCTM920 | 90251 | 1010-5218 | 402E | 402 | P-0216 | 9/16-18 | 1010-0345 |
| | 9/16 (14.3) | .359 (9.12) | MCTM910 | 90251 | 101A-1897 | 402E | 402 | P-0216 | 9/16-18 | 1010-0345 |
| AE High Pressure | 1/4 (6.35) | .083 (2.11) | MCTH4† | 90248 | 101F-1577 | 402A | 402 | P-0214 | 1/4-28 | 1010-0343 |
| | 5/16 (7.92) | .062 (1.57) | MCTH5 | 90249 | 101F-1577 | 402B | 402 | P-0205 | 5/16-24 | 1030-0343 |
| | 3/8 (9.53) | .125 (3.18) | MCTH6 | 90250 | 101F-1578 | 402C | 402 | P-0215 | 3/8-24 | 1010-0344 |
| | 9/16 (14.3) | .188 (4.78) | MCTH960 | 90251 | 1010-0883 | 402E | 402 | P-0216 | 9/16-18 | 1010-0345 |
| | 9/16 (14.3) | .250 (6.35) | MCTH940 | 90251 | 101C-7214 | 402E | 402 | P-0216 | 9/16-18 | 1010-0345 |

**Options:** **Cutting Oil: P-8784** **CTM-SA: Support Arm Assembly**
**CTM-RES: Reservoir Assembly** **90286: Instructions**

** All threads for AE medium pressure and high pressure tubing are LH national fine (class 2). † 1/4" models use same collets and blades.*

*Note: Manual coning and threading tools for 3/4" (19.1 mm) and 1" (25.4 mm) outside diameter medium pressure tubing are not available. Model AEGCTM-2 Power Coning-and-Threading Machine is recommended for this tubing. A minimum of 3" (76 mm) straight length is required to perform coning and threading operation for manual coning tool.*

## Coning and Coning and Threading Tool Kits

Autoclave Engineers offers coning kits as well as coning and threading tool kits. Each kit consists of the required tools, and other items necessary for your coning or coning and threading needs. All kit items are placed in a hand-carry tool case with top tray. The coning tools supplied in the tool kits come complete with the vise stand and chip/oil reservoir standard. The following is a list of items included in each kit.

Included with all kits: Coning tool assembly, three collets, collet nut wrench, three sets of coning blades, tool box with tray, de-burring tool, one quart of cutting oil, 3/32 Allen wrench, four spare set screws, and laminated instruction sheet.

### Coning Kit:

Medium pressure kit

**KMCT-M** Coning tool with vise stand and reservoir
1/4, 3/8 and 9/16" collets
1/4, 3/8 and 9/16" blades
(9/16" blades for 20,000 psi tubing only)

High pressure kit

**KMCT-H** Coning tool with vise stand and reservoir
1/4, 3/8 and 9/16" collets
1/4, 3/8 and 9/16" blades
(5/16" collets not included)
(9/16" blades for 60,000 psi tubing only)

### Coning and Threading Kit:

Included with all kits: Coning tool assembly, three collets, collet nut wrench, three sets of coning blades, tool box with tray, de-burring tool, one quart of cutting oil, 3/32 Allen wrench, four spare set screws, threading tool, three guide bushings, three threading dies, and laminated instruction sheet.

Medium pressure kit

**KMCT-MT** Coning tool with vise stand and reservoir
1/4, 3/8 and 9/16" collets
1/4, 3/8 and 9/16" blades
(9/16" blades for 20,000 psi tubing only)
Threading tool
1/4, 3/8 and 9/16" guide bushing
1/4, 3/8 and 9/16" dies

High pressure kit

**KMCT-HT** Coning tool with vise stand and reservoir
1/4, 3/8 and 9/16" collets
1/4, 3/8 and 9/16" blades
(5/16" collets not included)
(9/16" blades for 60,000 psi tubing only)
Threading tool
1/4, 3/8 and 9/16" guide bushing
1/4, 3/8 and 9/16" dies



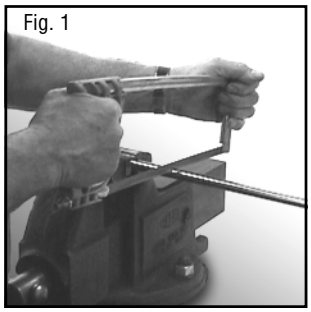
***Note**: Additional blades available for other sizes of tubing. See manual coning and threading tool on page 3 for sizes and part numbers.*

## Coning and Threading Installation

### Manual Kit:

1. **Fig. 1** Cut tubing to length and deburr. Allow extra length for proper engagement into the connection as listed in Table 1. Allow an additional 1/16" (1.57 mm) each end for squaring off the tube ends. ***Note****: Abrasive cut of wheels should not be used to cut tubing.*

Fig. 1



2. Install the collet and collet nut into the bottom of the coning tool housing.Remove the cutter support feed nut from the coning tool housing and install the cutters. This can be done by backing out the four set screws in the cutter support. ***Note****: When installing new blades, be sure the blades are flat against the holder. There should be no space between the blades and the holder.*

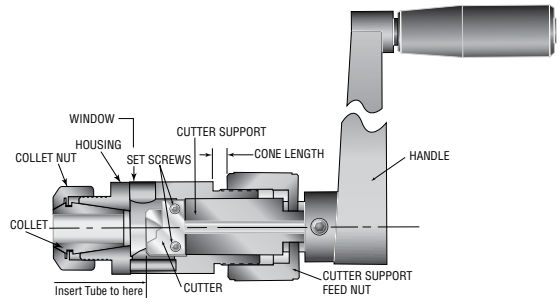
3. **Fig. 2** Place the coning tool housing (or optional support arm), without the feed nut/cutter support assembly, in a vice. The vice should be equipped with soft jaws, and the housing should be placed in the vice to allow lubricant to flow to the cutters and cone.

**TABLE 1**

| | Tube Size | Connection Type | Extra Allowance** for Engagement inches (mm) |
|---|---|---|---|
| Medium Pressure | 1/4" | SF250CX | 0.55 (13.97) |
| | 3/8" | SF375CX | 0.69 (17.53) |
| | 9/16" | SF562CX | 0.84 (21.34) |
| | 3/4" | SF750CX | 1.00 (25.4) |
| | 1" | SF1000CX | 1.44 (36.6) |
| High Pressure | 1/4" | F250C | 0.50 (12.70) |
| | 5/16" | F312C150 | 1.25 (31.75) |
| | 3/8" | F375C | 0.69 (17.53) |
| | 9/16" | F562C | 0.84 (21.34) |
| | 9/16" | F562C40 | 0.81 (20.57) |
| | 1" | SF1000CX-43 | 1.62 (41.1) |

** See Note on page 2.

**TABLE 2**




| Medium Pressure Tubing | | |
|---|---|---|
| | Cone Length inches (mm) | No. of Turns |
| 1/4" | 0.11 (2.79) | 4 |
| 3/8" | 0.13 (3.30) | 5 |
| 9/16"(CX-20) | 0.16 (4.06) | 5-1/2 |
| 9/16"(CX-10) | 0.13 (3.30) | 5 |

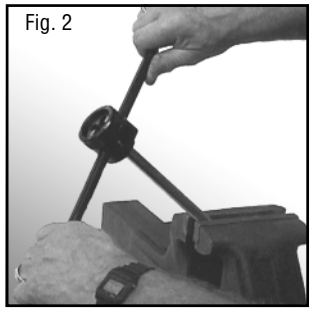
| High Pressure Tubing | | |
|---|---|---|
| Tube O.D. (inches) | Cone Length inches (mm) | No. of Turns |
| 1/4" | 0.13 (3.30) | 5 |
| 5/16" | 0.19 (4.83) | 6 |
| 3/8" | 0.16 (4.06) | 5-1/2 |
| 9/16" | 0.28 (7.11) | 8-1/2 |
| 9/16"(C40) | 0.21 (5.33) | 7-1/2 |

Manual coning and threading tools are not available for 3/4" and 1" tubing, see page 8 Coning and Threading Machine.

All dimensions for reference only and subject to change.

4. **Fig. 2** Slide the tubing through the collet until the end of the tube appears in the coning tool housing window. Line the end of the tube with the edge of the window and tighten the collet nut firmly in place using the collet nut wrench.

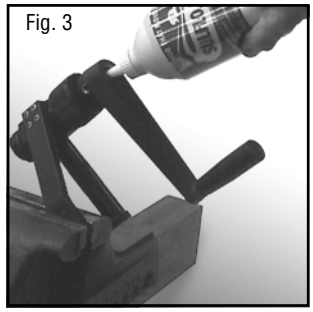
Fig. 2



5. **Fig. 3** Install the feed nut/cutter support assembly into the coning tool housing. Rotate the feed nut clockwise until the top of the cutters just contact the top of the tube. **Do not** rotate the feed nut any further at this point.

6. **Fig. 3** Apply cutting oil through the lubricant opening in the end of the cutter holder. A medium weight high sulphur content cutting fluid is recommended. Use the cutting oil freely during the coning operation.

Fig. 3



7. a. Note the position of the feed nut in relation to the undercut of the thread on the coning tool housing. This can be used to gauge the amount of feed nut travel to properly cone the tube. The amount of travel is shown in Table 2 and is labeled on the graphic as "Cone Length". ***Note****: An additional 1/16" (1.57 mm) further coning will be needed to square the end of the tube.*

b. Another method to determine proper cone length is to count the number of turns of the feed nut. The number of turns is listed in Table 2 under the heading "Number of Turns". This includes enough advancement of the feed nut to face off the tube. This assumes the tube is cut to length in accordence with these instructions.

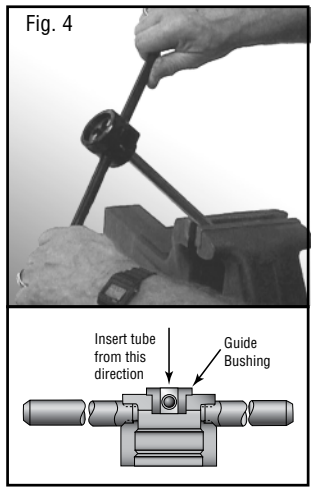
8. Rotate the handle in a clockwise direction while simultaneously **slowly** turning the feed nut in a clockwise direction. Rotate the feed nut slowly and evenly to smoothly cone the tube. Loosen collet nut, remove tubing and visually inspect the cone. Use deburring tool to remove any burr on inside edge of tube after coning.

### Manual Threading:

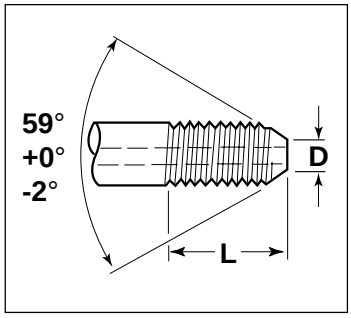
9. **Fig. 4** Clamp the tubing in a soft jaw vice. Do not overtighten. Slide the threading tool over the tube through the guide bushing.

10. Apply a medium weight,high sulphur cutting oil to threading area.

Fig. 4



11. Apply pressure to the top of the threading tool to start the cutting action. The threads are left handed, so turn the threader **counterclockwise** to thread the tube. The threading tool may need to be periodically rotated clockwise to break and discharge metal chips.Apply lubricant freely during the threading process. ***Note****: Lettering on die faces toward guide bushing.*




12. Continue to rotate die holder counterclockwise while applying cutting oil generously throughout the process until threads of the following lengths have been cut.

13. After tube is coned, threaded and deburred, check for proper thread fit and length with a new collar of the proper size. ***Note****: Rememebr to flush all tubing prior to installation with a fluid that is compatiable with the process fluid being used.*

**TABLE 3**

| Male Connection Type | Tube Size Outside Diameter x Inside Diameter inches (mm) | Dimensions inches (mm) | | Thread size* and type (inches) |
|---|---|---|---|---|
| | | D | L (max) | |
| SM250CX20 | 1/4" x 0.109 (6.35 x 2.77) | 0.141 3.58 | 0.344 8.74 | 1/4" - 28 |
| SM375CX20 | 3/8" x 0.203 (9.53 x 5.16) | 0.25 6.35 | 0.438 11.13 | 3/8" - 24 |
| SM562CX20 | 9/16 x 0.312 (14.29 x 7.92) | 0.406 10.31 | 0.500 12.70 | 9/16" - 18 |
| SM562CX10 | 9/16" x 0.359 (14.29 x 9.12) | 0.438 11.13 | 0.500 12.70 | 9/16" - 18 |
| SM750CX20 | 3/4" x 0.438 (19.05 x 11.13) | 0.562 14.27 | 0.625 15.88 | 3/4" - 16 |
| SM750CX10 | 3/4" x 0.516 (19.05 x 13.11) | 0.578 14.68 | 0.625 15.88 | 3/4" - 16 |
| M1000C43 | 1" x 0.438 (25.4 x 11.13) | 0.562 14.27 | 0.91 23.11 | 1" - 14 |
| SM1000CX20 | 1" x 0.562 (25.4 x 14.27) | 0.719 18.26 | 0.781 19.84 | 1" - 14 |
| SM1000CX10 | 1" x 0.688 (25.4 x 17.48) | 0.812 20.62 | 0.781 19.84 | 1" - 14 |
| M250C | 1/4" x 0.083 (6.35 x 2.10) | 0.125 3.18 | 0.562 14.27 | 1/4" - 28 |
| M312C150 | 5/16" x 0.062 (7.94 x 1.57) | 0.125 3.18 | 0.687 17.45 | 5/16" - 24 |
| M375C | 3/8" x 0.125 (9.53 x 3.18) | 0.219 5.56 | 0.75 19.05 | 3/8" - 24 |
| M562C | 9/16" x 0.187 (14.29 x 4.78) | 0.281 7.14 | 0.938 23.83 | 9/16" - 18 |
| M562C40 | 9/16" x 0.250 (14.29 x 6.35) | 0.312 7.92 | 0.938 23.83 | 9/16" - 18 |

* Thread is left-hand national fine (Class 2). All dimensions for reference only and subject to change.

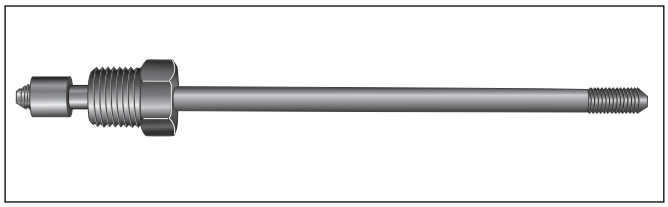
## Assembly and Makeup of Connection

1. Lubricate male threads of gland with a metal based thread lubricant.† Slip gland on tubing as shown and thread collar on tubing until one to two threads are exposed between collar and cone.

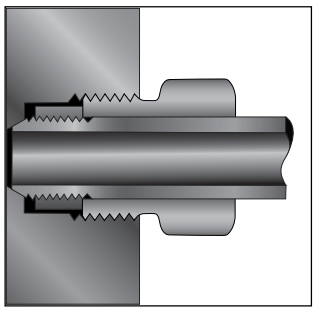
2. A small amount of process tolerable lubricant, such as silicone grease, on the cone tip will help with the sealing process. Insert tubing in connection, engage gland and tighten "fingertight".

3. Tighten gland with torque wrench to specified values on page 10. When tightening, the use of an additional wrench is recommended to hold the fitting.

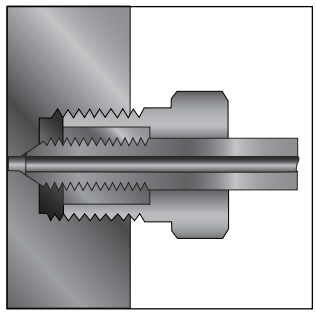
† Anti-Seize Lubricant: P-3580



Step 1, 2



Completed Autoclave Engineers Medium Pressure Connection.



Completed Autoclave Engineers High Pressure Connection.

## Anti-Vibration Collet Gland

### Assembly Procedure

Anti-vibration collet gland assembly replaces the standard gland nut.

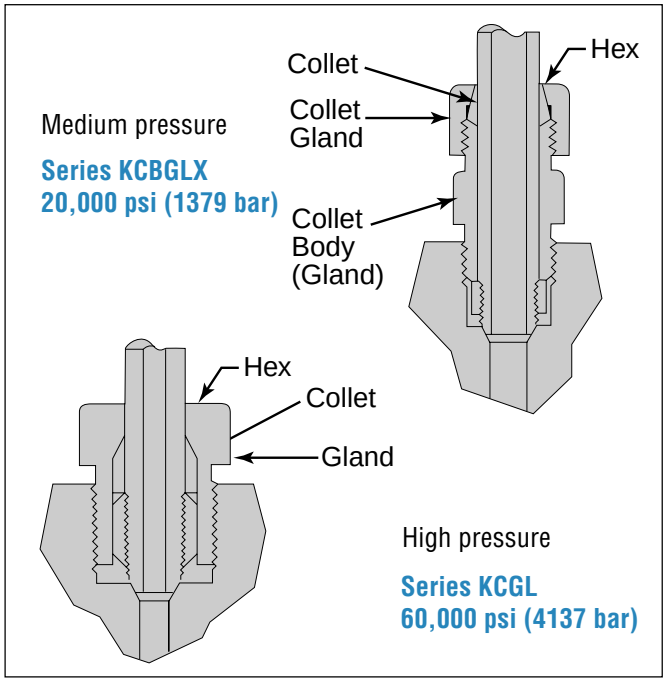
1. Cone and thread tubing as defined on pages 5 and 6.

2. Slide collet assembly onto tube and install collar as described in the assembly and makeup of connections on page 6. One or two threads should be exposed between the collar and cone.

3. Lubricate male threads on glands (medium pressure anti-vibration assemblies supplied with a baked on dry film lubricant. Lubrication not required.)

4. Tighten gland or collet body to specified torque on page 10. The high pressure collet will grip the tube when the connection gland is tightened.

5. For the medium pressure collet gland assembly, hand tighten the collet gland in place and further tighten 1-1/4 turns with a wrench. This will lock the collet against the tube. For subsequent retightening of the medium pressure anti-vibration collet gland, use 3/4 turns past finger tight.




***Note**: Always use a back-up wrench on collet body to prevent over tightening of collet body into connection.*

## Reseating tool - For female tubing connection cone seat

1. Clamp fitting in soft-jawed vise.

2. Thread gland nut into connection and tighten to 10 ft. lbs. (13.6 N.m).

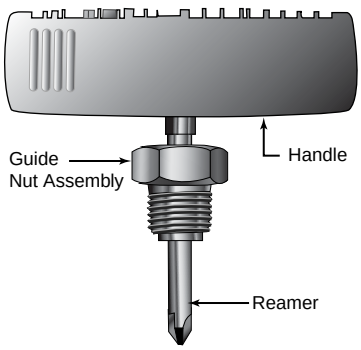
3. Apply a medium weight high sulfur cutting oil generously through opening in nut.

4. Insert reamer through guide bushing and press down firmly while rotating clockwise approximately two full turns, relieving pressure gradually toward end of second turn.

5. Remove reamer, guide nut and bushing and inspect cone seat.

6. Repeat steps 2,3,4 and 5, if necessary, until cone surface has been restored and finish is smooth.

7. Clean fitting thoroughly to remove all chips and residue.




| Connection Type | Reamer Complete | Guide Nut Assembly | Reamer | Handle |
|---|---|---|---|---|
| SF250CX | P-0270CX | A101A-2005 | P-0270 | 102B-7568 |
| SF375CX | P-0271CX | A2020-7310 | P-0271 | 102B-7568 |
| SF562CX | P-0272CX | A2030-7310 | P-0896 | 102B-7568 |
| SF750CX | P-1726CX | A102A-3376 | P-1726 | 103B-7568 |
| SF1000CX | P-1727CX | A102A-3375 | P-1727 | 103B-7568 |
| F250C | P-0270C | A1010-0453 | P-0270 | 102B-7568 |
| F312C150 | P-0271C150 | A2040-7310 | P-0271 | 102B-7568 |
| F375C | P-0271C | A1020-0453 | P-0271 | 102B-7568 |
| F562C / C40 | P-0272C | A1030-0453 | P-0272 | 102B-7568 |

## Coning and Threading Machine

### Benefits

- Coning and Threading of AE Medium and High Pressure Tubing.
- Separate heads for coning and threading are powered by a single motor and drive system.
- New design collet / support system allows for easier coning and threading of long tube lengths.
- New design tube depth gauge eliminates movement of tubing during the threading operation.

### Features

- 1/2-HP TEFC motor, capacitor start
- Pop-Open die prevents thread damage; no reversing necessary on threading
- Complete tooling available; order separately
- Supplied with oil pump and reservoir
- Available optional oil reservoir heater for operation below 65° F (18.3°C)
- Available CE marked
- Unit mounted on stand with locking casters for ease of mobility and stability

### Ordering Procedure

(Tooling must be ordered separately see Table).

| Model | Description |
|---|---|
| AEGCTM-2 | 115/230 VAC 60Hz |
| AEGCTM-2E | 220 VAC 50Hz |
| AEGCTM-2WOH | Standard unit with optional heater |

* Optional "CE Marked" available on AEGCTM-2E only

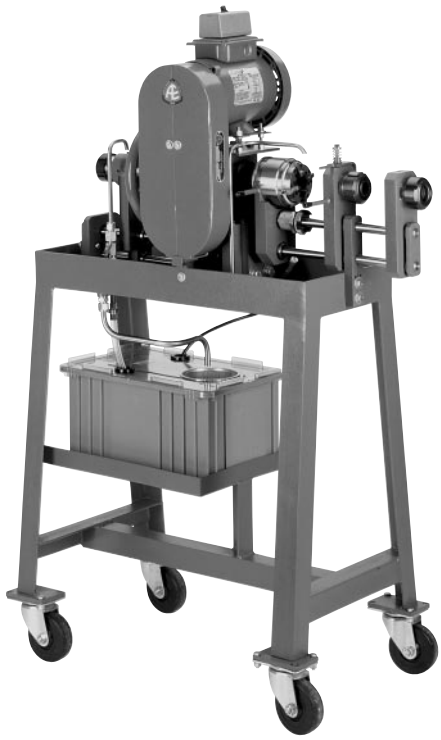
*Approximate Dimensions:*
56"h x 28"w x 20"d (142cm x 71cm x 51cm)

*Shipping Weight:*
350 pounds (158.7 Kg)

*Cutting Oil:*
Part number: P-8699: 3 Gal (11.36 Liter) Reservoir Capacity

*Note 1:*
A minimum of 5" (127mm) straight length of tubing is required to perform coning & threading operations.

Video Aids Available:
Coning & Threading video P-9930
Coning & Threading Video (Pal Format) P-9933-P



| Tube Size Inches (mm) | Collet Only (set) | Cutters Only (set) | Die Chasers (set) | Complete Set |
|---|---|---|---|---|
| 1/4" x 0.109 (6.35 x 2.77) | CTM4C-2 | CTM4BX | AEGCTM4D | AEGCTM4X-2 |
| 1/4" x 0.083 (6.35 x 2.10) | CTM4C-2 | CTM4B | AEGCTM4D | AEGCTM4-2 |
| 5/16" x 0.062 (7.94 x 1.57) | CTM5C-2 | CTM5B | AEGCTM5D | AEGCTM5-2 |
| 3/8" x 0.203 (9.53 x 5.16) | CTM6C-2 | CTM6BX | AEGCTM6D | AEGCTM6X-2 |
| 3/8" x 0.125 (9.53 x 3.18) | CTM6C-2 | CTM6B | AEGCTM6D | AEGCTM6-2 |
| 9/16" x 0.359 (14.29 x 9.12) | CTM9C-2 | CTM9BXX | AEGCTM9D | AEGCTM9XX-2 |
| 9/16" x 0.312 (14.29 x 7.92) | CTM9C-2 | CTM9BX | AEGCTM9D | AEGCTM9X-2 |
| 9/16" x 0.187 (14.29 x 4.78) | CTM9C-2 | CTM9B | AEGCTM9D | AEGCTM9-2 |
| 9/16" x 0.250 (14.29 x 6.35) | CTM9C-2 | CTM9B40 | AEGCTM9D | AEGCTM940-2 |
| 3/4" x 0.516 (19.05 x 13.11) | CTM12C-2 | CTM12BX | AEGCTM12D | AEGCTM12X-2 |
| 3/4" x 0.438 (19.05 x 11.13) | CTM12C-2 | CTM12B | AEGCTM12D | AEGCTM12-2 |
| 1" x 0.688 (25.4 x 17.48) | CTM16C-2 | CTM16BX | AEGCTM16D | AEGCTM16X-2 |
| 1" x 0.562 (25.4 x 14.27) | CTM16C-2 | CTM16B | AEGCTM16D | AEGCTM16-2 |
| 1" x 0.438 (25.4 x 11.13) | CTM16C-2 | CTM16BXX | AEGCTM16D | AEGCTM16XX-2 |

## Coning and Threading Machine

### Coning Operation

1. Insert appropriate collet and cutting blades for desired outside diameter tube size.

2. Insert tubing into collet until it bottoms on cutting blades. Back off hand wheel one complete turn. Tighten collet nut with spanner wrench furnished with machine.

3. Start machine and advance tubing once oil is flowing, by turning feed wheel, continuing until completion of coning is "felt." Visually inspect to see cone is complete and cutters have faced the end of the tubing. One revolution of the feed wheel advances tubing 1/16" (1.59 mm).

4. Hold feed wheel stationary for three revolutions of the cutting blades. This squares and finishes the coned end.

5. Reverse feed wheel smoothly until tubing is disengaged from cutting blades. Push the switch to "STOP", loosen collet nut and remove tubing.

### Threading Operation

1. Install appropriate collets for desired outside diameter tube size. Place appropriate size chasers, numbered 1 through 4 in die head. Match the numbers on the chasers to the diehead.

2. Before threading each size tubing, use a sample tube to check thread length and pitch diameter. Stop collar adjustment gives fine adjustment of thread length. Die head is marked "S" for smaller and "L" for larger pitch diameters.

3. Inserting tubing loosely in collet. Rotate tube stop 90° to the left by lifting up, rotating and letting down. Bottom tube against tube stop and tighten inner collet nut by hand. Then rotate tube stop back to original position and tighten collet nut with spanner wrench. Pull back outer pivot arm and tighten outer collet nut with spanner wrench.

4. Start machine; once oil is flowing apply slight pressure to start tubing into die chasers. After threads start cutting, machine is self-feeding.

5. When pre-set thread length has been reached, the stop collar and trip yoke will automatically open die. Manually stop machine at that point by pushing stop switch.

6. Loosen collet nuts and remove threaded tubing.

***Note**: These instructions are for general guielines only. Detailed operational instructions are supplied with the machine in two forms, printed and video tape. Refer to these instructions for tooling installation, machine adjustment, and maintenance instructions.*

# Torque Values

## Autoclave Micrometer Adjustable Torque Wrench (P-1680)

Accurate tightening for all Autoclave Engineers valve packing glands and tube nuts is essential. The wrench can be adjusted from 20 to 150 ft.-lbs. (27 to 203 Nm), and is used with interchangeable wrench adapters for hex sizes from 1/2" through 1-1/2". Part numbers for wrench adapters are listed below.*Wrench adapters sold separately*

## Standard Wrench Adapters

| Wrench Adapter Number | Packing Gland or Tube Nut Hex Size (inches) |
|---|---|
| P-1681 | 1/2 |
| P-1682 | 9/16 |
| P-1683 | 5/8 |
| P-1684 | 11/16 |
| P-9813 | 3/4 |
| P-1685 | 13/16 |
| P-1686 | 7/8 |
| P-1687 | 15/16 |
| P-9901 | 1" |
| P-1688 | 1-1/16 |
| P-1689 | 1-3/16 |
| P-1690 | 1-3/8 |
| P-6040 | 1-1/2 |

## Autoclave Engineer Tube Connection Glands

| | Tube Connection Size (Inches) | Tube Nut Hex Size (Inches) | Required Torque ft.-lbs. (N.m) |
|---|---|---|---|
| Medium Pressure | 1/4 | 1/2 | 20 (27.1) |
| | 3/8 | 5/8 | 30 (40.6) |
| | 9/16 | 15/16 | 55 (74.5) |
| | 3/4 | 1-3/16 | 90 (122.0) |
| | 1" | 1-3/8 | 150 (203.3) |
| High Pressure | 1/4 | 5/8 | 25 (33.9) |
| | 3/8 | 13/16 | 50 (67.8) |
| | 9/16 | 1-3/16 | 110 (149.1) |
| | 5/16 | 3/4 | 70 (94.9) |
| | 1" (See Note **) | 1-3/8 | 150 (203.3) |
| | 1" (See Note ***) | 1-3/8 | 180 (244.0) |

Note: All valve stem torques are based on standard teflon packing. For valves with option "TG" (Teflon Glass) or "GY" (graphite - yarn packing), the following equations should be used to estimate torques.

Running Torque "GY" = 2 x running torque
Seating Torque "GY" = 2 x running torque + seating torque - running torque
Running Torque "TG" = 1.1 x running torque
Seating Torque "TG" = 1.1 x running torque + seating torque - running torque

## Valve Stem Maximum Running and Seating Torques* (Typical Values)

| Valve Series | Tube Size (Inches) | Running Torque in.-lbs. (N.m) | Seating Torque in.-lbs. (N.m) | Pressure psi (bar) |
|---|---|---|---|---|
| 10V | 1/8 | 25 (2.80) | 35 (3.90) | 15,000 (1034) |
| | 1/4 | 40 (4.50) | 50 (5.60) | 15,000 (1034) |
| | 3/8 | 40 (4.50) | 50 (5.60) | 15,000 (1034) |
| | 1/2 | 60 (6.80) | 80 (9.10) | 10,000 (690) |
| SW | 1/4 | 25 (2.80) | 35 (3.90) | 15,000 (1034) |
| | 3/8 | 40 (4.50) | 50 (5.60) | 15,000 (1034) |
| | 1/2 | 70 (7.90) | 90 (10.20) | 10,000 (690) |
| 10SM | 9/16 | 60 (6.80) | 80 (9.10) | 10,000 (690) |
| | 3/4 | 210(23.80) | 240 (27.20) | 10,000 (690) |
| | 1 | 180 (20.40) | 540 (61.10) | 10,000 (690) |
| 20SM | 1/4 | 40 (4.50) | 55 (6.20) | 20,000 (1379) |
| | 3/8 | 40 (4.50) | 55 (6.20) | 20,000 (1379) |
| | 9/16 | 60 (6.80) | 90 (10.20) | 20,000 (1379) |
| | 3/4 | 300 (33.90) | 360 (40.70) | 20,000 (1379) |
| | 1 | 360 (40.70) | 600 (67.90) | 20,000 (1379) |
| 30SC | 1 | 360 (40.70) | 1000 (113.0) | 30,000 (2068) |
| 30VM | 1/4 | 40 (4.50) | 55 (6.20) | 30,000 (2068) |
| | 3/8 | 45 (5.00) | 55 (6.20) | 30,000 (2068) |
| | 9/16 | 50 (5.60) | 55 (6.20) | 30,000 (2068) |
| 40VM | 9/16 | 40 (4.50) | 55 (6.20) | 40,000 (2758) |
| 60VM | 1/4 | 65 (7.30) | 70 (7.90) | 60,000 (4137) |
| | 3/8 | 65 (7.30) | 70 (7.90) | 60,000 (4137) |
| | 9/16 | 65 (7.30) | 70 (7.90) | 60,000 (4137) |
| 100V | 5/16 | 100 (11.3) | 120 (13.6) | 100,000 (6895) |

## Autoclave Engineers Flat Top/Bottom Adapters

| | Size inches | Maximum Working Pressure psi (bar) | Connection | Required Torque ft. - lbs. (N.m) |
|---|---|---|---|---|
| Flat Top Gasket | 9/16 | 10,000 (690) | F562FT | 60 (81.3) |
| Flat Bottom Gasket | 7/16 | 10,000 (690) | F437FB | 25 (33.9) |
| | 9/16 | 10,000 (690) | F562FB | 40 (54.2) |
| | 3/4 | 5,000 (345) | F750FB | 60 (81.3) |

* These are not specifications.

** Torque for 1" tubing @ 30,000 psi (2068 bar) or lower

*** Torque for 1" tubing @ 43,000 psi (2965 bar).

Torque wrench not required for Autoclave Engineers UniVersaLok or Autoclave Engineers SpeedBite tube connection see page 2.

All dimensions for reference only and subject to change.

# Torque Values

## Autoclave Engineers Packing Glands

| Valve Series | Outside Diameter Size (inches) | Packing Gland Hex (Inches) | Required Torque[1] ft.-lbs. (N.m) |
|---|---|---|---|
| 10V | 1/8 | 1/2 | 12 (16.3) |
| | 1/4 | 13/16 | 40 (54.2) |
| | 3/8 | 13/16 | 40 (54.2) |
| | 1/2 | 13/16 | 30 (40.7) |
| SW | 1/4 | 5/8 | 30 (40.7) |
| | 3/8 | 5/8 | 4 (54.2) |
| | 1/2 | 13/16 | 50 (67.8) |
| 10SM & 20SM | 1/4 | 5/8 | 40 (54.2) |
| | 3/8 | 5/8 | 40 (54.2) |
| | 9/16 | 13/16 | 80 (108.5) |
| | 3/4 | 13/16 | Note: [2] |
| | 1 | 1-3/8 | Note: [2] |
| 30SC | 1 | 1-3/8 | 230 (311.8) |
| 30VM | 1/4 | 13/16 | 60 (81.3) |
| | 3/8 | 13/16 | 60 (81.3) |
| | 9/16 | 13/16 | 60 (81.3) |

## Autoclave Engineers Packing Glands

| Valve Series | Outside Diameter Size (Inches) | Packing Gland Hex (Inches) | Required Torque[1] ft.-lbs. (N.m) |
|---|---|---|---|
| 40VM | 9/16 | 13/16 | 40 (54.2) |
| 60VM | 1/4 | 13/16 | 60 (81.3) |
| | 3/8 | 13/16 | 60 (81.3) |
| | 9/16 | 13/16 | 60 (81.3) |
| 100V | 5/16 | 15/16 | 60 (81.3) |
| 150V | 5/16 | 1-3/8 | 150 (203.3) |
| 15Y | 3/4 | 15/16 | 130 (176.3) |
| | 1 | 1-1/16 | 150 (203.3) |
| 50Y | 9/16 | 15/16 | 85 (115.2) |
| 10VRMM | 9/16 | 9/16 | 20 (27.1) |
| 30VRMM | 3/4 | 13/16 | 50 (67.8) |
| 60VRMM | 1/4 | 13/16 | 50 (67.8) |
| | 3/8 | 13/16 | 50 (67.8) |

*1 - Torque may vary ±10%. Torque values apply to standard Teflon packing. For graphite yarn packing, add 25% to tthe above values.*

*2 - 3/4 turn past finger tight with hex wrench.*

## Special Material Connection Torque Table Pressure psi (bar) vs. Torque ft.-lbs. (N.m)

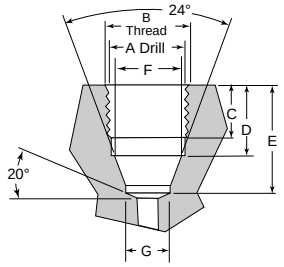
*Note: Use the recommended torque value for special material valves and fittings based on the maximum allowable working pressure of the valve or fitting*

| Connection | Pressure psi (bar) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Minumum | 2,500 (172) | 5,000 (345) | 10,000 (690) | 15,000 (1034) | 20,000 (1379) | 25,000 (1724) | 30,000 (2068) | 40,000 (2758) | 50,000 (3447) | 60,000 (4137) |
| SF250CX | 10 (13.6) | 10 (13.6) | 10 (13.6) | 10 (13.6) | 15 (20.3) | 20 (27.1) | — | — | — | — | — |
| SF375CX | 10 (13.6) | 10 (13.6) | 10 (13.6) | 15 (20.3) | 25 (33.9) | 30 (40.7) | — | — | — | — | — |
| SF562CX10 | 20 (27.1) | 20 (27.1) | 30 (40.7) | 55 (74.6) | — | — | — | — | — | — | — |
| SF562CX20 | 15 (20.3) | 15 (20.3) | 15 (20.3) | 30 (40.7) | 40 (54.2) | 55 (74.6) | — | — | — | — | — |
| SF750CX10 | 25 (33.9) | 25 (33.9) | 40 (54.2) | 75 (101.7) | — | — | — | — | — | — | — |
| SF750CX20 | 20 (27.1) | 20 (27.1) | 25 (33.9) | 45 (61.0) | 70 (94.9) | 90 (122.0) | — | — | — | — | — |
| SF1000CX10 | 40 (54.2) | 40 (54.2) | 65 (88.1) | 125 (169.5) | — | — | — | — | — | — | — |
| SF1000CX20 | 35 (47.5) | 35 (47.5) | 50 (67.8) | 100 (135.6) | 125 (169.5) | 150 (203.3) | — | — | — | — | — |
| F1000C43 | 30 (40.7) | 30 (40.7) | 50 (67.8) | 65 (88.1) | 75 (101.7) | 100 (135.6) | 125 (169.5) | 150 (203.3) | — | — | — |
| F250C | 10 (13.6) | 10 (13.6) | 10 (13.6) | 10 (13.6) | 10 (13.6) | 10 (13.6) | 15 (20.3) | 15 (20.3) | 20 (27.1) | 25 (33.9) | 25 (33.9) |
| F375C | 10 (13.6) | 10 (13.6) | 10 (13.6) | 10 (13.6) | 15 (20.3) | 20 (27.1) | 25 (33.9) | 25 (33.9) | 35 (47.5) | 45 (61.0) | 50 (67.8) |
| F562C | 15 (20.3) | 15 (20.3) | 15 (20.3) | 20 (27.1) | 30 (40.7) | 40 (54.2) | 50 (67.86) | 55 (74.6) | 75 (101.7) | 95 (128.8) | 110 (149.1) |
| F562C40 | 15 (20.3) | 15 (20.3) | 15 (20.3) | 25 (33.9) | 35 (47.5) | 45 (61.0) | 55 (74.6) | 65 (88.1) | 85 (115.2) | — | — |

## Tube Connection Dimensions

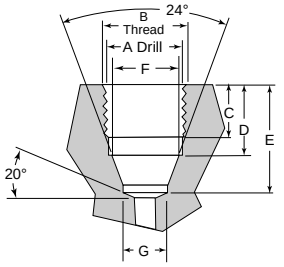
### Autoclave SpeedBite SW *

| Tube Outside Diameter (inches) | Connection Type | Dimensions inches (mm) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E | F | G |
| 1/4 | SW250 | 29/64 (11.5) | 1/2 -20 | 0.34 (8.6) | 0.44 (11.1) | 0.69 (17.5) | 0.34 (8.6) | "F" 0.257 (6.5) |
| 3/8 | SW375 | 37/64 (14.7) | 5/8 -18 | 0.38 (9.7) | 0.47 (11.9) | 0.75 (19.1) | 0.48 (12.1) | "W" 0.386 (9.8) |
| 1/2 | SW500 | 3/4 (19.1) | 13/16 -16 | 0.41 (10.4) | 0.50 (12.7) | 0.81 (20.6) | 0.60 (15.21) | 0.514 (13.1) |




### Autoclave SpeedBite W *

| Tube Outside Diameter (inches) | Connection Type | Dimensions inches (mm) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E | F | G |
| 1/8 | W125 | "Q" 0.332 (8.4) | 3/8 -24 | 0.22 (5.6) | 0.31 (7.9) | 0.47 (11.9) | 0.19 (4.8) | #30 0.128 (3.3) |
| 1/4 | W250 | 11/16 (17.4) | 3/4 -16 | 0.38 (9.7) | 0.44 (11.1) | 0.69 (17.7) | 0.35 (8.9) | "F" 0.257 (6.5) |
| 3/8 | W375 | 11/16 (17.4) | 3/4 -16 | 0.38 (9.7) | 0.44 (11.1) | 0.69 (17.7) | 0.48 (12.1) | "W" 0.386 (9.8) |




*Note: All dimensions are shown for reference only and should not be considered as actual machining dimensions.*

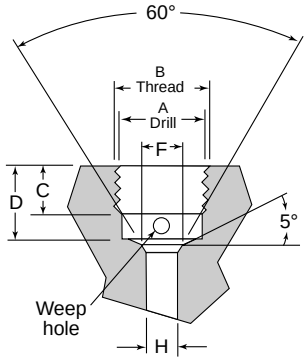
** For port diameter please see orifice sizes for specific valves and fittings. All threads are manufactured to a class 2A or 2B fit.*

For prompt service. Autoclave stocks select products. Consult factory.
All general terms and conditions of sale, including limitations of our liability, apply to all products and service sold.

# Tube Connection Dimensions

## Autoclave Medium Pressure SFCX **

| Tube Outside (inches) | Connection Type | Dimensions inches (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | B | C | D | F | H |
| 1/4 | SF250CX20 | 25/64 (9.9) | 7/16 -20 | 0.28 (7.1) | 0.50 (12.7) | 0.19 (4.8) | 0.109 (2.8) |
| 3/8 | SF375CX20 | 33/64 (13.1) | 9/16 -18 | 0.38 (9.7) | 0.62 (15.7) | 0.31 (7.9) | 0.203 (5.2) |
| 9/16 | *SF562CX10 SF562CX20 | 3/4 (19.1) | 13/16 -16 | 0.44 (11.1) | 0.75 (19.1) | 0.50 (12.7) | 0.359 (9.1) 0.312 (7.9) |
| 3/4 | *SF750CX10 SF750CX20 | 61/64 (24.2) | 3/4 -14z | 0.50 (12.7) | 0.94 (23.9) | 0.62 (15.7) | 0.516 (13.1) 0.438 (11.1) |
| 1 | *SF1000CX10 SF1000CX20 | 1-19/64 (32.9) | 1-3/8 -12 | 0.81 (20.6) | 1.31 (33.3) | 0.88 (22.4) | 0.688 (17.5) 0.562 (14.3) |
| 1 | F1000C43 | 1-19/64 (32.9) | 1-3/8 -12 | 0.81 (20.6) | 1.31 (33.3) | 0.88 (22.4) | 0.438 (11.1) |

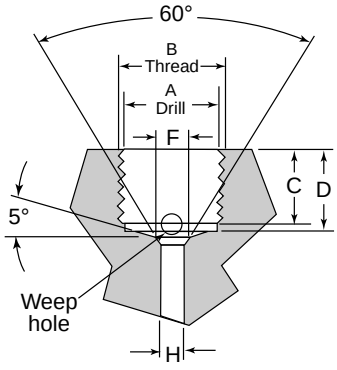



Z = NPS Male Tap

* Connection used in fittings rated for 20,000 psi (1379 bar) .

## Autoclave High Pressure FC **

| Tube Outside (inches) | Connection Type | Dimensions inches (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | B | C | D | F | H |
| 1/4 | F250C | 33/64 (13.1) | 9/16 -18 | 0.38 (9.7) | 0.44 (11.1) | 0.17 (4.3) | 0.094 (2.4) |
| 3/8 | F375C | 11/16 (17.4) | 3/4 -16 | 0.53 (13.5) | 0.62 (15.7) | 0.26 (6.6) | 0.125 (3.2) |
| 9/16 | F562C | 1-3/64 (26.6) | 1-1/8 -12 | 0.62 (15.7) | 0.75 (19.1) | 0.38 (9.7) | 0.188 (4.8) |
| 9/16 | F562C40 | 1-3/64 (26.6) | 1-1/8 -12 | 0.62 (15.7) | 0.75 (19.1) | 0.38 (9.7) | 0.250 (6.4) |
| 5/16 | F312C150 | 37/64 (14.7) | 5/8 -18 | 0.62 (15.7) | 1.06 (26.9) | 0.25 (6.4) | 0.094 (2.4) |




*Note: All dimensions are shown for reference only and should not be considered as actual machining dimensions.*

** For port diameter please see orifice sizes for specific valves and fittings.*

*** For male tubing end preparation, please see pages 5 and 6.*

*All threads are manufactured to a class 2A or 2B fit.*

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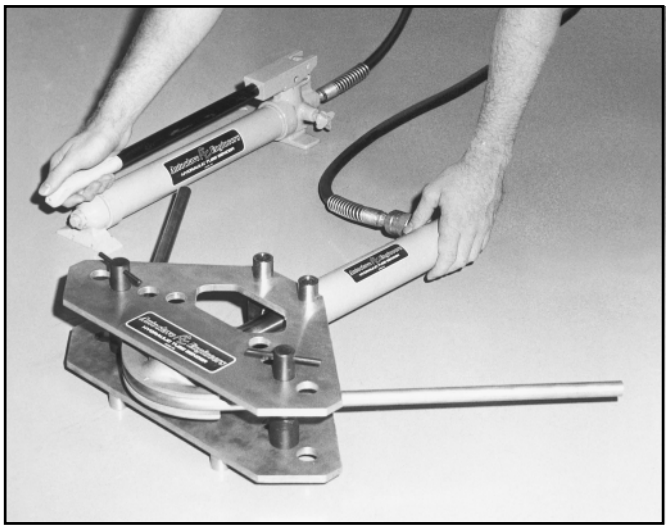
# Hydraulic Tube Bender

## For Single Pass Bending of High Pressure Tubing

The Autoclave hydraulic tube bender is designed to bend heavy wall tubing and provide fast, accurate and reliable bending with only one setup. The tube bender is complete with pump, cylinder, frame and bending shoes which are self contained in a portable, lockable case. (Order number: HTB)



## Features

**Dimensions:** 26"W x 11.5"H x 11.5"D (66cm x 29.2cm x 29.2cm).

**Weight:** 85 lbs. (38.6 Kg)

**Single-stage hydraulic hand pump (standard)**

**Ram retractor valve** relieves system pressure after bending. The spring loaded ram retracts for easy removal of tubing after bending is completed.

**Quick release pivot pins** lock and unlock easily for tube removal.

**One-piece shoe locking pin** locks bending shoe securely but allows for quick release to interchange shoes.

**Rugged bending frame** is lightweight, aircraft quality, aluminum alloy.

**Precision one-piece bending shoes** are permanent mold, heat-treated, aircraft quality, aluminum alloy.

**Air-operated hydraulic pump option** can be furnished in place of standard hand pump. (Add "-A" to order number) Operating pressure 0 to 10,000 psi (0 to 690 bar). Required air pressure 30 psi (2.1 bar) minimum 120 psi ( 8.3 bar) maximum. Reservoir capacity 24 cu. in. (393cm$^3$). Available with optional hydraulic pressure gauge and gauge adapter. A lubricator/air separator is recommended for air operated units.

## Minimum Bend (Mandrel) Radius

| Shoe* Catalog Number | Tube Size Inches (mm) | | †† Rated Pressure (bar) | †† Minimum Bend Inside Radius Inches (mm) | Minimum Length Required 90° Bend Inches (mm) |
|---|---|---|---|---|---|
| | Outside Diameter | Inside Diameter | | | |
| **201A-6016** | 9/16 (14.29) | 0.359 (9.12) | 10,000 (690) | 2.62 (66.5) | 14 (35.6) |
| **201A-6018** | 3/4 (19.05) | 0.516 (13.11) | 10,000 (690) | 3.50 (88.9) | 16 (40.6) |
| **201A-6020** | 1 (25.4) | 0.688 (17.48) | 10,000 (690) | 4.62 (117.3) | 22 (55.8) |
| **201A-6014†** | 1/4 (6.35) | 0.109 (2.77) | 20,000 (1379) | 1.25† (31.8) | 8 (20.3) |
| **201A-6014** | 3/8 (9.53) | 0.203 (5.16) | 20,000 (1379) | 1.75 (44.5) | 8 (20.3) |
| **201A-6016** | 9/16 (14.29) | 0.312 (7.92) | 20,000 (1379) | 2.62 (66.5) | 14 (35.6) |
| **201A-6018** | 3/4 (19.05) | 0.438 (11.13) | 20,000 (1379) | 3.50 (88.9) | 16 (40.6) |
| **201A-6020** | 1 (25.4) | 0.562 (14.27) | 20,000 (1379) | 4.62 (117.3) | 22 (55.8) |
| **201A-6020** | 1 (25.4) | 0.438 (11.13) | 43,000 (2965) | 4.62 (117.3) | 22 (55.8) |
| **201A-6014†** | 1/4 (6.35) | 0.083 (2.10) | 60,000 (4137) | 1.25 (31.8) | 8 (20.3) |
| **201A-6014** | 3/8 (9.53) | 0.125 (3.18) | 60,000 (4137) | 1.75 (44.5) | 8 (20.3) |
| **201A-6016** | 9/16 (14.29) | 0.250 (6.35) | 40,000 (2758) | 2.62 (66.5) | 14 (35.6) |
| **201A-6016** | 9/16 (14.29) | 0.188 (4.78) | 60,000 (4137) | 2.62 (66.5) | 14 (35.6) |
| **N/A**** | 5/16 (7.94) | 0.062 (1.57) | 150,000 (10342) | 6.00 (152.4) | 8 (20.3) |

Annealed Autoclave Engineeers pressure tubing may also be bent on HTB tube bender using bending shoe sizes specified above.

* HTB bending shoes are constructed of heat-treated aluminum alloy and designed specifically for use with Autoclave Engineers' heavy wall stainless tubing. They are not intended for bending such components as commercial pipe. Because of diameter differences, such misuse could fracture the bending shoe.

** Information on bending 150,000 psi (10342 bar) tubing is included here for reference only. This tubing should not be bent on HTB hydraulic tube bender because of the 6" required minimum radius.

† Value shown is mimimum bend radius of the tubing; bending shoe furnished (201A-6014) will bend tubing to 1.75" (44.5).

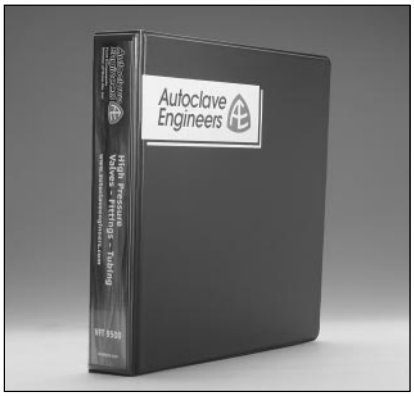
†† Pressure rating of the bent tube will be reduced. Consult the Technical Application section for pressure rating at various bend radii.

All dimensions for reference only and subject to change.

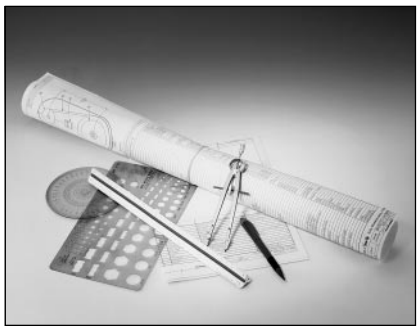
# Technical Information

## Index









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Autoclave Engineers
Fluid Components
Division of Snap-tite, Inc.
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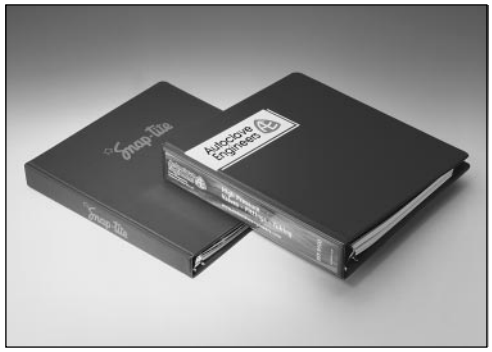
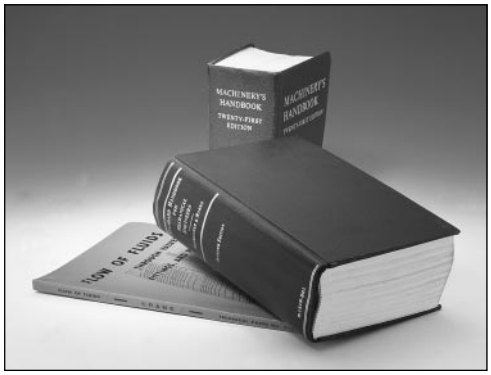
# Technical Information

The information presented in this section is intended to assist designers in the proper selection of Autoclave Engineers' valves, fittings and tubing for fluid handling systems. This technical data does not represent product specifications but rather guidelines for direction in the proper application of the referenced equipment. These guidelines are general in nature because of the many process variables.

For severe service applications, selection of the appropriate valves, fittings and tubing is essential in order to optimize the service life of these products. Autoclave Engineers' technical staff is available to assist in the interpretation of this information.



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## Technical and Application Information

### Materials:

Widely varying conditions frequently require that valves, fittings and tubing be constructed of materials other than conventional stainless steel. Since many variables affect the corrosion resistance of metallic materials, it is Autoclave Engineers' policy not to recommend materials based on corrosion resistance for specific fluid applications. We can, however, suggest materials based on mechanical strength and also indicate materials generally used in a specific application. Other materials not listed in this section are also available.

### Pressure:

Included in this section are the standard pressure ratings for several common materials for valves and fittings as well as tubing. Autoclave stocks a select quantity of special material tubing for immediate delivery.

### Temperature:

Also contained in this section are pressure reduction factors at various temperatures for several materials. To obtain the maximum pressure rating at an elevated temperature, multiply the maximum pressure rating of the item at room temperature by the elevated temperature factor (% of RT).

High and low temperatures or high heat up and/or cool down rates can affect the capability of a metal-to-metal seal. When selecting a valve series, consideration should not only be given to static pressure rating, but also static and dynamic temperature conditions. Generally, the smaller the seal diameter of a metal-to-metal seal, the more reliable the seal will be.

### Gas or Liquid Service:

Light gases such as hydrogen and helium are more difficult to seal than liquids. When selecting a valve series, consideration should be given to the fluid application and not just pressure and temperature requirements. The higher the rating of the valve or fitting, the less the likelihood of weepage problems with light gases. Tubing selections should also consider the service requirements, since thicker wall, smaller outside diameter tube sizes will produce a more reliable connection seal. Handling of fittings and tubing during installation will make a difference in sealability of light gases as well as liquids. Do not handle the tube or fitting in such a way as to damage the sealing surfaces. If it is process tolerable, a small amount of lubrication (or even process fluid) on the seal area during installation will help the sealing process. Refer to the Tools, Installation, Operation and Maintenance section for further information.

### Valve Stem Packing Materials:

The considerations listed thus far should be applied when selecting a suitable valve stem packing material (Teflon, Teflon glass or Graphite yarn). Where possible, Teflon packing is the most reliable, low maintenance, packing choice; Teflon/glass is the second. While graphite yarn packing is a reliable packing material for the majority of extremely high temperature applications, some gases may permeate more readily through graphite yarn packing than through the Teflon packing in a valve with an extended stuffing box. The packing material must be kept below the maximum permitted temperature listed on page 5.

### Valve Stem Seating:

Abrasive flow or high cycle service will require more frequent maintenance. Special materials and the proper valve series selection may extend service life. For example, if flow is not critical, a 30VM valve with an **N-Dura** stem will require less maintenance than an SW series valve used in a low pressure, high cycle, abrasive flow application. Although all application parameters cannot be considered in this section, the user can generally expect several thousand cycles in a liquid application and several hundred cycles for gas service. The packing gland may require adjustment, however, to achieve these results.

### Pressure Cycling:

In medium and high pressure applications, static as well as dynamic (cyclic) pressure must be considered when selecting an appropriate valve series. If fatigue life is a concern, Autoclave Engineers can supply tubing which has been autofrettaged for improved fatigue resistance. For internally pressurized tubing, **autofrettaging** is a method by which the inner wall of the tube is precompressed to reduce the tube operating bore stresses. By applying sufficient internal pressure, greater than the maximum working pressure of the tube, the inner wall is plastically deformed by a controlled amount. The remaining outer portion of the wall acts elastically, and when the pressure is released, a positive compressive load at the bore will exist. As mentioned previously, the result is reduced bore stress and increased fatigue life. In addition to the autofrettaging method to increase cycle life, Autoclave offers HP-HC (high-pressure — high cycle) tubing, rated to 95,000 psi (6550 bar). This tubing can be substituted for our standard 60,000 psi (4137 bar) tubing providing longer life at 60,000 psi (4137 bar) operation.

### Vacuum Service:

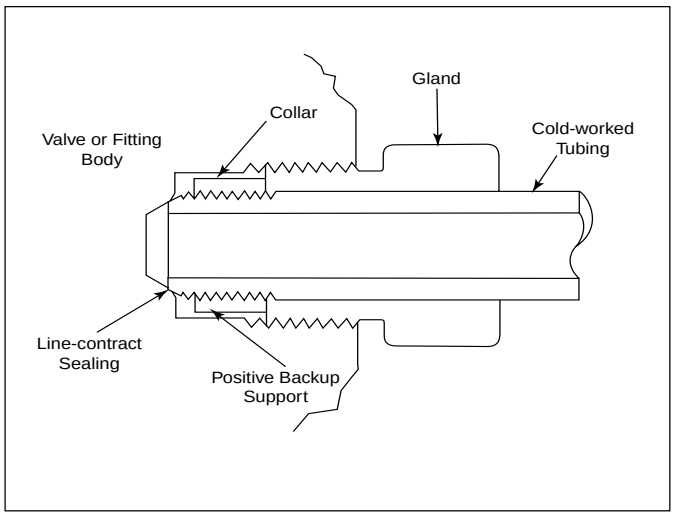
The high, medium and low pressure series of Autoclave Engineers' standard valves, fittings and tubing can be used in light vacuum services to $10^{-2}$ torr. For high vacuums to $10^{-5}$ or $10^{-6}$ torr, Autoclave Engineers' high pressure series is recommended. Extreme care and proper seal lubrication is required (as mentioned in the Gas or Liquid Service paragraph) to achieve these degrees of vacuum. The pump type and size will determine the final vacuum pressure.

## Autoclave Engineers Medium & High Pressure Coned and Threaded Connections

### Autoclave Engineers' Medium Pressure Coned and Threaded Connections

**Features:**

- Pressures to 43,000 psi (2965 bar)
- Uncompromised reliability under rigorous thermal and pressure cycling.
- Design is a more compact version of the original Autoclave Engineers High Pressure connections.
- Well suited to installations which require repeated assembly and disassembly with consistent reliability.
- Available in tube outside diameter sizes from 1/4"(6.35 mm) through 1" (25.40 mm) and bore sizes from .109"(2.77 mm) to .688"(17.48mm).

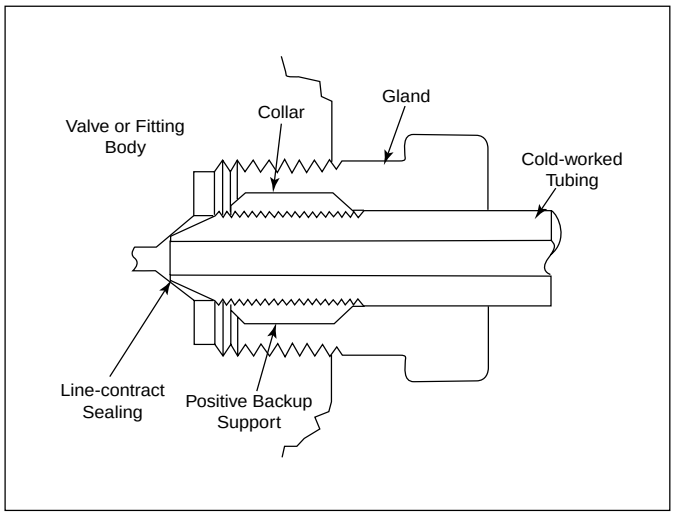



Differences in angles exaggerated for clarity.

### Autoclave Engineers' High Pressure Coned and Threaded Connections

**Features:**

- Pressures to 60,000 psi (4137 bar)
- Increased pressure handling capabilities
- Uncompromised reliability under rigorous thermal and pressure cycling
- Well suited to installations which require repeated assembly and disassembly with consistent reliability.
- Available in tube outside diameter sizes of 1/4" (6.35mm), 3/8"(9.53mm) and 9/16"(14.27mm) and bore sizes of .083(2.11mm), .125"(3.18mm), .188"(4.78mm) and .250"(6.35mm).




Differences in angles exaggerated for clarity.

## Design Considerations - Why Coning and threading?

High-pressure designs require a superior joining technique for valves, fitting and tubing. Conventional joining methods fall short of the reliability needed for pressures above 10,000 - 15,000 psi (690-1034 bar) and tube sizes above 1/4" outside diameter. Dissimilar angles between the body and the tube cone provide line contact sealing along the perimeter of a contact circle. The sealing contact area is therefore, maintained at its practical minimum for the given tube size and a reliable seal is produced due to high sealing stresses that occur at low sealing loads. When process tolerable, a small amount of lubricant (or even process fluid) on the seal area will help improve the reliability of the metal to metal seals, especially when light molecule gases are to be sealed. The metal to metal seal also eliminates the need for elastomers in the connections.

Positive backup support occurs with the collar threaded (left-handed) directly onto the tubing to form a positive integral retaining surface. This allows for a consistent connection make up that is required at higher pressures and temperatures. When the gland nut is threaded into the connection, the tubing is locked securely in place and the possibility for the ejection of the tubing from a properly assembled and used connection is extremely remote.

### Remarks:

Since the glands and threaded collars can be removed from the tubing, properly lubricated Autoclave Medium-Pressure and High-Pressure connections can be disassembled and reassembled repeatedly without loss of relability. These connections are used with cold-worked valve and fitting bodies which can withstand many repeated sealings. Therefore, valves, fittings and accessories can be inserted or removed from the pressure system or the system can be altered or expanded in a fraction of the time and cost that may be imposed by welded, screwed, flared or other types of connections.

### Vacuum Service:

Autoclave Medium-Pressure connections can be reliably used in light vacuum service to $10^{-2}$ torr. Autocalve High-Pressure connections are recommended for vacuum to $10^{-5}$ torr. Extreme care and proper seal lubrication are required to successfully achieve these levels of vacuum.

### Pressure Cycling:

Since the metal to metal seal is pre-torqued to a specified value greater than the end load generated from the pressure, fatigue concerns of the connection due to pressure cycling are minimal.

### Thermal Cycling:

Because of the threaded on collar design, Autoclave Medium and High-Pressure connections can take repeated thermal cycling under pressure with no loss in reliability. These connections can also handle a wider range of temperatures than swaged or bite type connections and are designed to maintain integrity from -423°F to 1200°F (-252°C to 649°C).

### Pre-Rated Systems:

Valves, fittings and tubing with Autoclave Medium and High-Pressure connections provide a fully engineered, pre-rated system of components that are interchangeable from assembly to assembly. They are not over sensitive to abuse or careless assembly and no special gauges or tools are needed to check the connection. Weep holes are provided in every connection to permit fast visual inspection for leakage, and prevent pressure build up in the threads.

### Materials:

Autoclaves' standard gland and collar material is type 316 cold-worked stainless steel. This material provides high strength and good impact resistance over the temperature range mentioned above. A bonded dry film lubricant, to be used as an anti-galling agent, is available.

## Pressure/temperature Rating Guide

Information in this rating guide is furnished to approximate the pressure/temperature capabilities of Autoclave valves and fittings with various options.

To determine approximate ratings, the following factors should be considered:

- Refer to valve or fitting ordering pages for the base pressure rating of component at room temperature (R.T.).
- Refer to Technical Information section for pressure ratings of materials at elevated temperatures.
- Refer to appropriate tubing section for pressure ratings of standard Autoclave tubing at various temperatures to 800°F (427°C).
- Note maximum temperature ratings for Autocalve valves with various packing and stem options in table below.
- Note pressure/temperature curve on page 6 for type 316 stainless steel bodies and tubing.
- Note temperature information checklist on page 6.

| Valve Stem | Stem Type | Packing Temperature: °F (°C) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Standard Teflon Packing | | Standard Nylon-Leather | | Optional Teflon Glass | | Optional Graphite Yarn[1] | | Optional Extended Stuffing Box |
| | | Min | Max | Min | Max | Min | Max | Min | Max | |
| 10V | Vee or Reg., Metal-to-Metal | -100 (-73) | 450 (232) | NA | NA | -100 (-73) | 600 (316) | 0 (-17.8) | 800[2] (427) | See page 2 of Extreme Temperature Series Needle Valve Section for information on extended stuffing box. |
| SW | Vee or Reg., Metal-to-Metal | -100 (-73) | 450 (232) | NA | NA | -100 (-73) | 600 (316) | 0 (-17.8) | 800[2] (427) | |
| 10SM/20SM | Vee or Reg., Metal-to-Metal | -100 (-73) | 450 (232) | NA | NA | -100 (-73) | 600 (316) | 0 (-17.8) | 800[2] (427) | |
| 30SC | Vee or Reg., Metal-to-Metal | -100 (-73) | 450 (232) | NA | NA | -100 (-73) | 600 (316) | NA | NA | |
| 30VM | Vee or Reg., Metal-to-Metal | -100 (-73) | 450 (232) | NA | NA | -100 (-73) | 600 (316) | 0 (-17.8) | 800[2] (427) | |
| 40VM | Vee or Reg., Metal-to-Metal | NA | NA | 40 (4.4) | 230 (110) | -100 (-73) | 600 (316) | 0 (-17.8) | 800[2] (427) | |
| 60VM | Vee or Reg., Metal-to-Metal | NA | NA | 40 (4.4) | 230 (110) | -100 (-73) | 600 (316) | 0 (-17.8) | 800[2] (427) | |
| 100VM | Vee Stem, Metal-to-Metal | NA | NA | 40 (4.4) | 230 (110) | NA | NA | NA | NA | |
| 15Y | Vee or Reg., Metal-to-Metal | -100 (-73) | 450 (232) | NA | NA | -100 (-73) | 600 (316) | 0 (-17.8) | 800[2] (427) | |
| 50Y | Vee or Reg., Metal-to-Metal | -100 (-73) | 450 (232) | NA | NA | NA | NA | 0 (-17.8) | 800[2] (427) | |
| 10VRMM | Micrometering | -100 (-73) | 450 (232) | NA | NA | -100 (-73) | 600 (316) | 0 (-17.8) | 800[2] (427) | |
| 30VRMM | Micrometering | -100 (-73) | 450 (232) | NA | NA | -100 (-73) | 600 (316) | 0 (-17.8) | 800[2] (427) | |
| 60VRMM | Micrometering | NA | NA | 40 (4.4) | 230 (110) | -100 (-73) | 600 (316) | 0 (-17.8) | 800[2] (427) | |
| | | (No Suffix Required) | | | | (Add "TG" to Order Number) | | (Add "GY" to Order Number) | | |

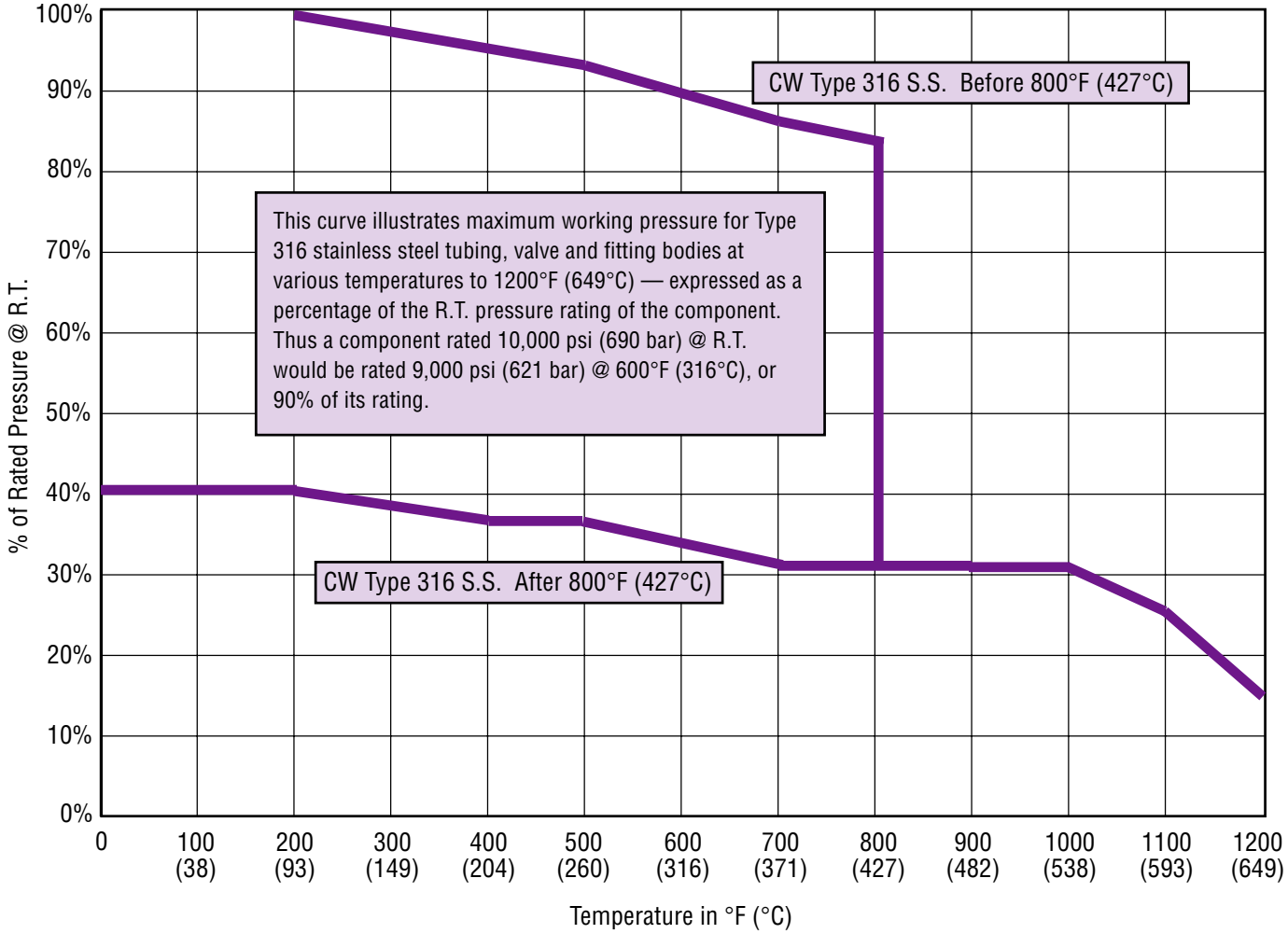
Caution: While testing has shown O-rings to provide satisfactory service life, both cyclic and shelf life may vary widely with differing service conditions, properties of reactants, pressure and temperature cycling and age of the O-ring. FREQUENT INSPECTION SHOULD BE MADE to detect any deterioration, and O-rings replaced as required.

Note:
1. Optional graphite-yarn packing not recommended for hydrogen or helium service.

2. Compression sleeve-type connections such as Autoclave Engineers' UniVersaLok, Autoclave Engineers' SpeedBite or other swaged or bite-type connections are not recommended for service above 650°F (343°C) or below 0°F (-17.8°C). For such applications, Autoclave Engineers recommends its medium pressure components with Autoclave Engineers Medium Pressure coned-and -threaded connections, offering excellent thermal cycling capability.

3. Pressure Limitations: Consult factory on 3/4 and 1 inch sizes.

## Pressure/Temperature Rating Curve: 316 SS & 304 SS




Note:

Curves and ratings presented here are average values for reference only, and can be significantly affected by pressure and temperature characteristics of trim and packing materials. For unusual pressure/temperature requirements, please consult factory for recommended body, trim and packing specifications.

For pressure temperature information on components supplied in materials other than Type 316 stainless steel, refer to pages 9-10.

* Curve is valid for cold-worked Type 316 stainless steel components as long as operating temperature does not exceed 800°F (427°C). When exceeding this temperature, the cold worked effect is PERMANENTLY altered, and the components should be considered as annealed material, using 40% of its cold-worked rating for future operation of the components.

## Temperature Information Checklist

| | -423° to -100°F (-253° to -73°C) | -100° to 0°F (-73° to -17.8°C) | 0° to 650°F (-17.8° to 343°C) | 650° to 800°F (343° to 427°C) | 800° to 1200°F (427° to 649°C) |
|---|---|---|---|---|---|
| **Compression Type Connections** | Not Recommended | Not Recommended | Recommended | Not Recommended | Not Recommended |
| **Coned-and-Threaded Connections** | Required | Required | Recommended | Required | Required |
| **Extended Stuffing Box** | Required (Teflon Packing)* | May be Required** | May be Required** | May be Required** | Required (Graphite-Yarn Packing)† |

† Packing temperature not to exceed 800°F (427°C)
* Packing temperature not to go below -100°F (-73°C)

** Extended stuffing box required for operation below -100°F (-73°C) and above 450°F (232°C) (with Teflon packing) or 600°F (316°C) (with Teflon glass packing).

For prompt service, Autoclavce stocks select products. Consult factory.

# Technical Information - Material vs. Pressure Rating

## Autocalve Engineers Valves, Fittings and Tubing

### Valves & Fittings

| Valve Series | Connection Type | Tube Size (in.) | Material vs. Pressure Rating psi (bar) @ Room Temperature * | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 316CW (Std.) | Hastelloy C276 | Inconel 600 | Monel 400 | Nickel 200 | Titanium Gr2 | Titanium 6AL4V |
| 10V | W125 | 1/8 | 15,000 (1034) | 13,700 (945) | 11,000 (758) | 9,900 (683) | 6,000 (414) | 7,500 (531) | 11,000 (758) |
| | W250 | 1/4 | 15,000 (1034) | 11,500 (793) | 11,500 (793) | 9,900 (683) | 6,000 (414) | 7,500 (531)) | 11,500 (793) |
| | W375 | 3/8 | 15,000 (1034) | 7,500 (517) | 7,500 (517) | 6,300 (434) | 3,800 (262) | 4,800 (331) | 7,500 (517) |
| | W500 | 1/2 | 10,000 (690) | 5,500 (379) | 5,500 (379) | 4,600 (317) | 2,700 (186) | 3,400 (234) | 5,500 (379) |
| SW | SW250 | 1/4 | 15,000 (1034) | 9,600 (662) | 7,700 (531) | 6,300 (434) | 3,800 (262) | 4,800 (331) | 11,500 (793) |
| | SW375 | 3/8 | 15,000 (1034) | 7,500 (517) | 7,500 (517) | 6,300 (434) | 3,800 (262) | 4,800 (331) | 7,500 (517) |
| | SW500 | 1/2 | 10,000 (690) | 5,500 (379) | 5,500 (379) | 4,600 (317) | 2,700 (186) | 3,400 (234) | 5,500 (379) |
| 10SM | SF562CX10 | 9/16 | 10,000 (690) | 10,000 (690) | 9,300 (641) | 6,600 (455) | 4,000 (276) | 6,600 (455) | 10,000 (690) |
| | SF70CX10 | 3/4 | 10,000 (690) | 10,000 (690) | 9,300 (641) | 6,600 (455) | 4,000 (276) | 6,600 (455) | 10,000 (690) |
| | SF1000CX10 | 1 | 10,000 (690) | 10,000 (690) | 9,300 (641) | 6,600 (455) | 4,000 (276) | 6,600 (455) | 10,000 (690) |
| 20SM | SF250CX | 1/4 | 20,000 (1379) | 12,200 (841) | 9,300 (641) | 6,600 (455) | 4,000 (276) | 6,600 (455) | 20,000 (1379) |
| | SF375CX | 3/8 | 20,000 (1379) | 12,200 (841) | 9,300 (641) | 6,600 (455) | 4,000 (276) | 6,600 (455) | 20,000 (1379) |
| | SF562CX20 | 9/16 | 20,000 (1379) | 12,200 (841) | - | - | - | - | 20,000 (1379) |
| | SF750CX20 | 3/4 | 20,000 (1379) | 12,200 (841) | - | - | - | - | 20,000 (1379) |
| | SF1000CX20 | 1 | 20,000 (1379) | 12,200 (841) | - | - | - | - | 20,000 (1379) |
| 30VM | F250C | 1/4 | 30,000 (2068) | 22,400 (1544) | 17,300 (1193) | 13,000 (896) | 8,200 (565) | 15,200 (1048) | 30,000 (2068) |
| | F375C | 3/8 | 30,000 (2068) | 22,400 (1544) | 17,300 (1193) | 13,000 (896) | 8,200 (565) | 15,200 (1048) | 30,000 (2068) |
| | F562C | 9/16 | 30,000 (2068) | 22,400 (1544) | 17,300 (1193) | 13,000 (896) | 8,200 (565) | 15,200 (1048) | 30,000 (2068) |
| 60VM | F250C | 1/4 | 60,000 (4137) | 35,900 (2475) | 27,700 (1910) | 20,800 (1434) | 13,100 (903) | 24,300 (1675) | 60,000 (4137) |
| | F375C | 3/8 | 60,000 (4137) | 35,900 (2475) | 27,700 (1910) | 20,800 (1434) | 13,100 (903) | 24,300 (1675) | 60,000 (4137) |
| | F562C | 9/16 | 60,000 (4137) | 35,900 (2475) | 27,700 (1910) | 20,800 (1434) | 13,100 (903) | 24,300 (1675) | 60,000 (4137) |

* For ratings at elevated temperatures see P/T Rating Curves on pages 9 and 10.

Tubing, connection type and/or packing material may limit maximum temperature rating. See pages 5 and 6 for further temperature limitations.

### Tubing (Seamless) - Low Pressure

| Valve Series | Tubing Size Outside x Inside Diameter Inches (mm) | Material vs. Pressure Rating psi (bar) @ Room Temperature †† | | | | | |
|---|---|---|---|---|---|---|---|
| | | 316CW† | Hastelloy C276 | Inconel 600 | Monel 400 | Nickel 200 | Titanium Gr2 |
| Low Pressure | 1/16 x 0.026 **(1.59 x 0.66)** | 15,000 **(1034.20)** | 15,000 **(1034.20)** | 15,000 **(1034.20)** | 11,500 **(792.88)** | 7,100 **(489.52** | 11,500 **(792.88** |
| | 1/8 x 0.052 **(3.19 x 1.32)** | 15,000 **(1034.20)** | 15,000 **(1034.20)** | 15,000 **(1034.20)** | 12,000 **(827.36)** | 7,200 **(496.41)** | 12,000 **(827.36)** |
| | 1/8 x 0.062 **(3.19 x 1.57)** | 11,650 **(803.44)** | 11,000 **(758.41)** | 11,000 **(758.41)** | 9,900 **(682.57)** | 6,000 **(413.68)** | 7,500 **(517.10)** |
| | 1/8 x 0.069 **(3.19 x 1.75)** | 9,950 **(686.02)** | 11,000 **(758.41)** | 10,600 **(730.83)** | 9,300 **(641.26)** | 5,300 **(365.42)** | 6,650 **(458.49)** |
| | 1/8 x 0.085 **(3.19 x 2.16)** | 6,850 **(472.28)** | 7,750 **(534.34)** | 7,300 **(503.31)** | 6,400 **(441.26)** | 3,650 **(251.65)** | 4,450 **(306.81)** |
| | 1/4 x 0.125 **(6.35 x 3.18)** | 11,650 **(803.23)** | 11,500 **(792.88)** | 11,500 **(792.88)** | 9,900 **(682.57)** | 6,000 **(413.68)** | 7,500 **(517.10)** |
| | 1/4 x 0.180 **(6.35 x 4.57)** | 5,450 **(375.76)** | 6,650 **(458.49)** | 6,300 **(434.36)** | 5,500 **(379.21)** | 3,150 **(217.18)** | 3,900 **(268.89)** |
| | 1/4 x 0.194 **(6.35 x 4.93)** | 4,600 **(317.15)** | 5,200 **(358.52)** | 4,900 **(337.84)** | 4,300 **(296.47)** | 2,450 **(168.92)** | 3,050 **(210.29)** |

***Tubing (Seamless) - Low Pressure, continued on page 8***

†† The tubing pressure rating in some instances is lower than the rating of the valve and fitting. Tubing connection type and/or packing material may limit maximum temperature rating. See pages 5 & 6 for further temperature limitations.

† Except low pressure sereis which is 316 annealed.
* For ratings at elevated temperatures see P/T Rating Curves on pages 9 & 10.
** Except Hastelloy C276 which is welded and drawn or seamless.

## Tubing (Seamless) - Low Pressure - continued

| Valve Series | Tubing Size Outside x Inside Diameter Inches (mm) | Material vs. Pressure Rating psi (bar) @ Room Temperature †† | | | | | |
|---|---|---|---|---|---|---|---|
| | | 316CW† | Hastelloy C276 | Inconel 600 | Monel 400 | Nickel 200 | Titanium Gr2 |
| Low Pressure | 3/8 x 0.195 **(9.53 x 4.95)** | 10,000 **(689.46)** | 10,000 **(689.46)** | 10,000 **(689.46)** | 8,800 **(606.73)** | 5,300 **(365.42)** | 6,600 **(455.05)** |
| | 3/8 x 0.250 **(9.53 x 6.35)** | 7,500 **(517.10)** | 7,500 **517.10)** | 7,500 **(517.10)** | 6,300 **(434.36)** | 3,800 **(262.00)** | 4,800 **(330.94)** |
| | 3/8 x 0.277 **(9.53 x 7.04)** | 5,450 **(375.76)** | 6,150 **(424.02)** | 5,800 **(399.89)** | 5,100 **(351.63)** | 2,900 **(199.942)** | 3,600 **(248.21)** |
| | 3/8 x 0.305 **(9.53 x 7.75)** | 3,800 **(262.00)** | 4,250 **(293.02)** | 4,000 **(275.79)** | 3,500 **(241.31)** | 2,100 **(144.79)** | 2,500 **(172.37)** |
| | 1/2 x 0.375 **(12.70 x 9.53)** | 5,500 **(379.21)** | 5,500 **(379.21)** | 5,500 **(379.21)** | 4,600 **(317.15)** | 2,700 **(186.16)** | 3,450 **(237.87)** |
| | 1/2 x 0.402 **(12.70 x 10.21)** | 4,000 **(275.79)** | 4,500 **(310.26)** | 4,250 **(293.02)** | 3,700 **(255.10)** | 2,100 **(144.79)** | 2,650 **(182.71)** |

†† The tubing pressure rating in some instances is lower than the rating of the valve and fitting. Tubing connection type and/or packing material may limit maximum temperature rating. See pages 5 & 6 for further temperature limitations.

† Except low pressure sereis which is 316 annealed.
* For ratings at elevated temperatures see P/T Rating Curves on pages 9 & 10.
** Except Hastelloy C276 which is welded and drawn or seamless.

## Tubing (Seamless) - Medium Pressure

| Valve Series | Tubing Size Outside x Inside Diameter Inches (mm) | Material vs. Pressure Rating psi (bar) @ Room Temperature †† | | | | | |
|---|---|---|---|---|---|---|---|
| | | 316CW | Hastelloy C276 | Inconel 600 | Monel 400 | Nickel 200 | Titanium Gr2 |
| Medium Pressure | 1/4 x 0.109 **(6.35 x 2.77)** | 20,000 **(1378.93)** | 9,900 **(682.57)** | 8,450 **(582.60)** | 6,600 **(455.05)** | 3,600 **(248.21)** | 6,600 **(455.05)** |
| | 3/8 x 0.203 **(9.53 x 5.16)** | 20,000 **(1378.93)** | 9,900 **(682.57)** | 8,450 **(582.60)** | 6,600 **(455.05)** | 3,600 **(248.21)** | 6,600 **(455.05)** |
| | 9/16 x 0.312 **(14.29 x 7.92)** | 20,000 **(1378.93)** | 9,900 **(682.57)** | 8,450 **(582.60)** | 6,600 **(455.05)** | 3,600 **(248.21)** | 6,600 **(455.05)** |
| | 9/16 x 0.359 **(14.29 x 9.12)** | 10,000 **(689.46)** | 6,075 **(418.85)** | 5,175 **(356.80)** | 4,150 **(286.13)** | 2,225 **(153.41)** | 5,925 **(408.51)** |
| | 3/4 x 0.438 **(19.05 x 11.13)** | 20,000 **(1378.93)** | 9,900 **(682.57)** | 8,450 **(582.60)** | 6,600 **(455.05)** | 3,600 **(248.21)** | 6,600 **(455.05)** |
| | 3/4 x 0.516 **(19.05 x 13.11)** | 10,000 **(689.46)** | 6,075 **(418.85)** | 5,175 **(356.80)** | 4,150 **(286.13)** | 2,225 **(153.41)** | 5,925 **(408.51)** |
| | 1.00 x 0.562 **(25.40 x 14.27)** | 20,000 **(1378.93)** | 9,900 **(682.57)** | 8,450 **(582.60)** | 6,600 **(455.05)** | 3,600 **(248.21)** | 6,600 **(455.05)** |
| | 1.00 x 0.688 **(25.40 x 17.48)** | 10,000 **(689.46)** | 6,075 **(418.85)** | 5,175 **(356.80)** | 4,150 **(286.13)** | 2,225 **(153.41)** | 5,925 **(408.51)** |

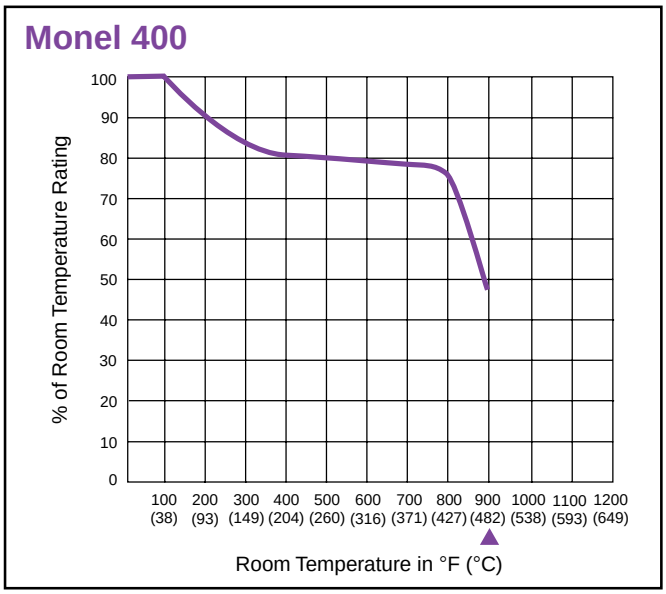
## Tubing (Seamless) - High Pressure

| Valve Series | Tubing Size Outside x Inside Diameter Inches (mm) | Material vs. Pressure Rating psi (bar) @ Room Temperature †† | | | | | |
|---|---|---|---|---|---|---|---|
| | | 316CW | Hastelloy C276 | Inconel 600 | Monel 400 | Nickel 200 | Titanium Gr2 |
| High Pressure | 1/4 x 0.083 **(6.35 x 2.11)** | 60,000 **(4136.79)** | 22,400 **(1544.40)** | 21,300 **(1468.56)** | 17,025 **(1173.81)** | 9,125 **(629.14)** | 24,300 **(1675.40)** |
| | 3/8 x 0.125 **(9.53 x 3.18)** | 60,000 **(4136.79)** | 22,400 **(1544.40)** | 21,300 **(1468.56)** | 17,025 **(1173.81)** | 9,125 **(629.14)** | 24,300 **(1675.40)** |
| | 9/16 x 0.188 **(14.27 x 4.78)** | 60,000 **(4136.79)** | 22,400 **(1544.40)** | 21,300 **(1468.56)** | 17,025 **(1173.81)** | 9,125 **(629.14)** | 24,300 **(1675.40)** |
| | 9/16 x 0.250 **(14.27 x 6.35)** | 40,000 **(2757.86)** | 17,500 **(1206.56)** | 15,400 **(1061.78)** | 11,000 **(758.41)** | 6,600 **(455.05)** | 17,600 **(1213.46)** |
| | 1 x 0.438 **(25.40 x 11.13)** | 43,000 **(2964.70)** | 18,000 **(1241.04)** | 15,900 **(1096.25)** | 11,300 **(779.10)** | 6,800 **(468.84)** | 18,200 **(1254.83)** |

†† The tubing pressure rating in some instances is lower than the rating of the valve and fitting. Tubing connection type and/or packing material may limit maximum temperature rating. See pages 5 & 6 for further temperature limitations.

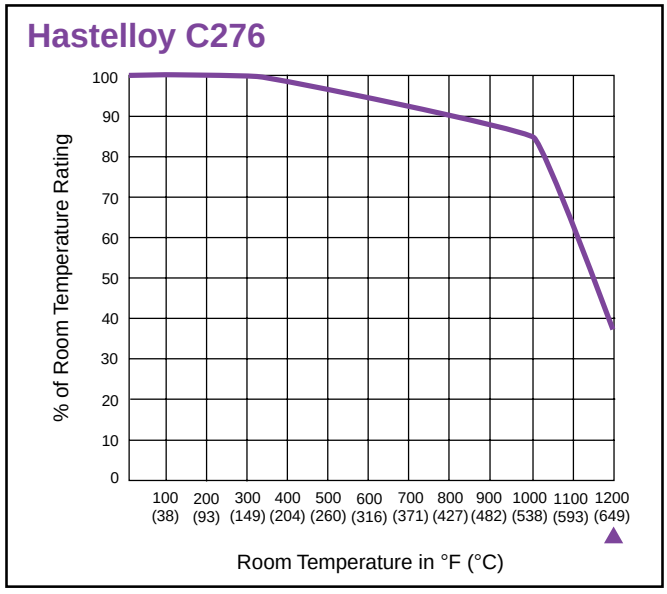
† Except low pressure series which is 316 annealed.
* For ratings at elevated temperatures see P/T Rating Curves on pages 9 & 10.
** Except Hastelloy C276 which is welded and drawn or seamless.

## Monel 400



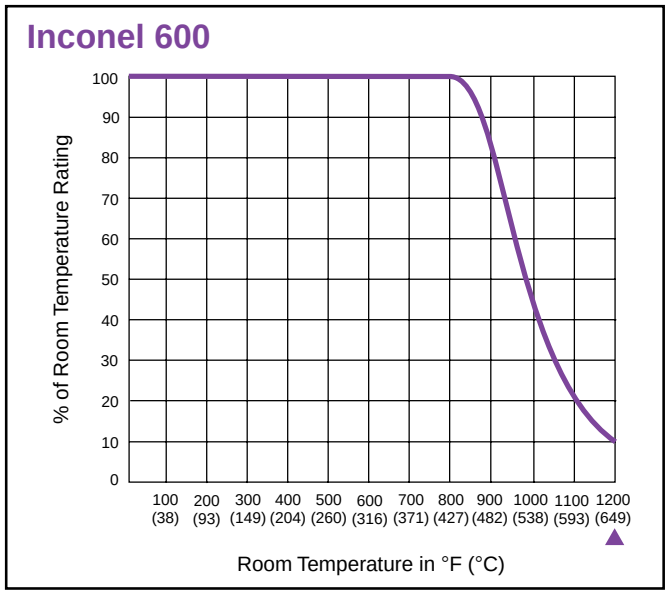

▲ Maximum Coincident Metal Temperature

## Hastelloy C276




▲ Maximum Coincident Metal Temperature

## Inconel 600




▲ Maximum Coincident Metal Temperature

Curves and ratings presented here are average values for reference only and can be significantly affected by pressure and temperature characteristics of trim materials, stem packing materials (or o-rings), and connection type. Other options such as an extended stuffing box will be required to achieve the maximum temperature rating. See pages 5 and 6 for further temperature limitations. For unusual pressure/temperature requirements, please consult factory for recommended body, trim and packing specifications.

To obtain the maximum pressure rating at an elevated temperature, multiply the maximum pressure rating of the item (in special material) at room temperature, by the elevated temperature factor (% of RT).

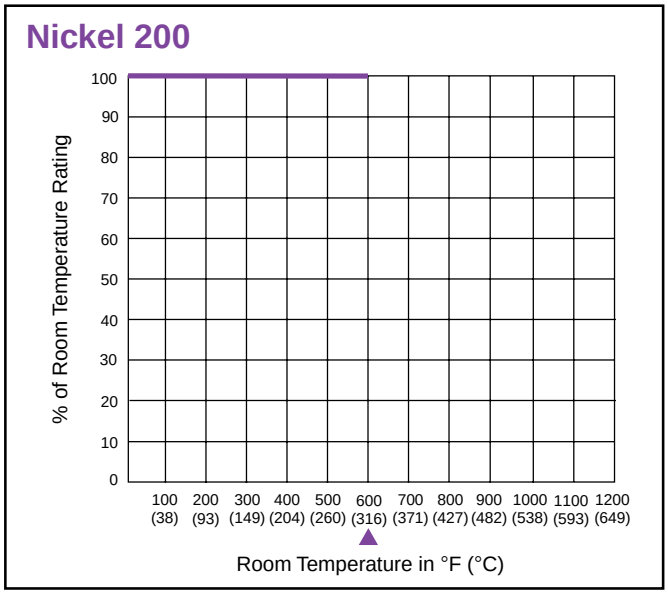
***Example:*** What would be the pressure rating of a 30VM 1/4 inch valve constructed of Hastelloy C276 at 600°F (316°C)?

From the Material vs. Pressure rating chart on pages 7 & 8 for valves and fittings, the maximum pressure rating for a 30VM 1/4 inch valve constructed of Hastelloy C276 would be 22,400 psi (1544 bar).

To determine the approximate pressure rating at 600°F (316°C), the Pressure vs. Temperature Rating Curves will be used. A vertical line on the x-axis (Temperature) is traced at 600°F (316°C) [on the Hastelloy C276 graph], until it intersects the curve. A horizontal line is then drawn to the y-axis (% of rated pressure @ RT) and read as 93%. The room temperature rating of the Hastelloy C276 valve is multiplied by the temperature reduction factor (.93) (22,400 psi (1544 bar) to approximate the temperature corrected pressure of 20,800 psi (1434 bar).

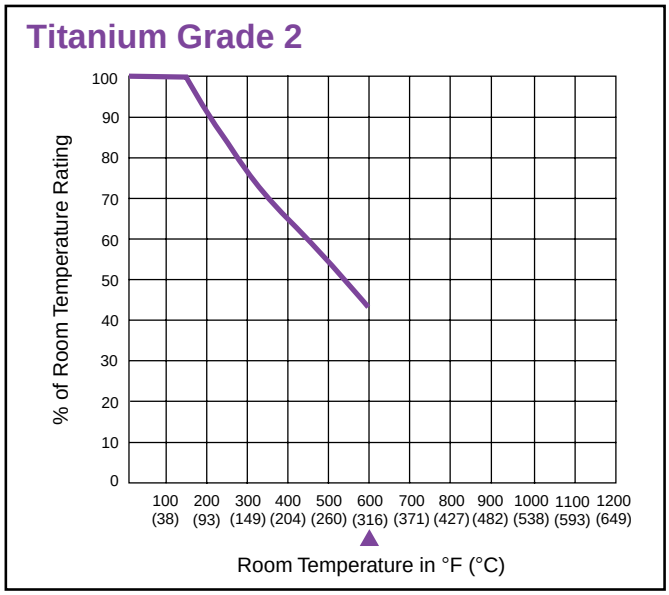
See page 5 for further packing temperature limitations.

## Nickel 200



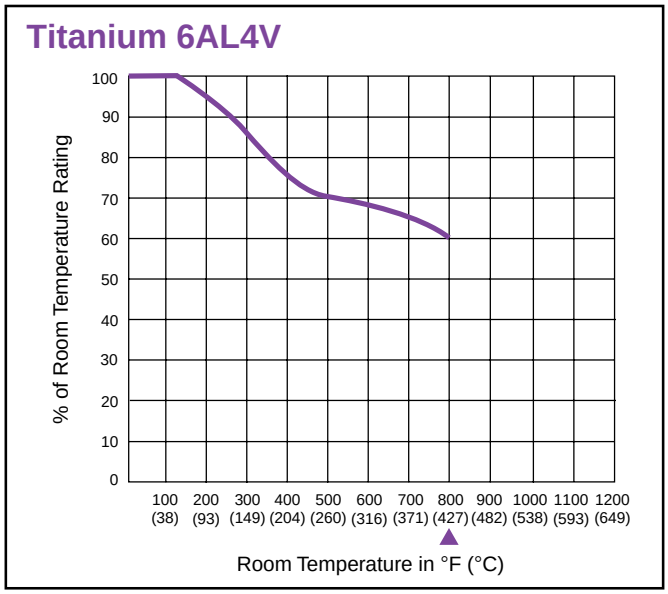

▲ Maximum Coincident Metal Temperature

## Titanium Grade 2




▲ Maximum Coincident Metal Temperature

## Titanium 6AL4V




▲ Maximum Coincident Metal Temperature

Curves and ratings presented here are average values for reference only and can be significantly affected by pressure and temperature characteristics of trim materials, stem packing materials (or o-rings), and connection type. Other options such as an extended stuffing box will be required to achieve the maximum temperature rating. See pages 5 and 6 for further temperature limitations. For unusual pressure/temperature requirements, please consult factory for recommended body, trim and packing specifications.

To obtain the maximum pressure rating at an elevated temperature, multiply the maximum pressure rating of the item (in special material) at room temperature, by the elevated temperature factor (% of RT).

***Example:*** What would be the pressure rating of a 30VM 1/4 inch valve constructed of Titanium Grade 2 at 600°F (316°C)?

From the Material vs. Pressure rating chart on pages 7 & 8 for valves and fittings, the maximum pressure rating for a 30VM 1/4 inch valve constructed of Titanium Grade 2 would be
15,200 psi (1048 bar).

To determine the approximate pressure rating at 600°F (316°C), the Pressure vs. Temperature Rating Curves will be used. A vertical line on the x-axis (Temperature) is traced at 600°F (316°C) [on the Titanium Grade 2 graph], until it intersects the curve. A horizontal line is then drawn to the y-axis (% of rated pressure @ RT) and read as 44%. The room temperature rating of the Titanium Grade 2 valve is multiplied by the temperature reduction factor (.44) (15,200 psi (1048 bar) to approximate the temperature corrected pressure of 6,688 psi (461 bar).

See page 5 for further packing temperature limitations.

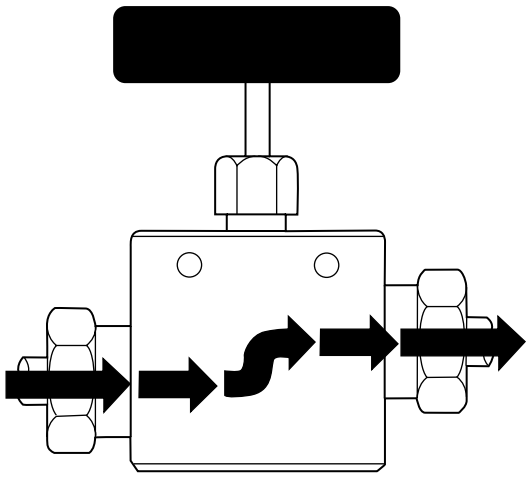
# Technical Information - Flow Calculations

## Liquids & Gases

Coefficient of flow ($C_v$)for a valve is the volume of water, in U.S gallons per minute at room temperature, which will flow through the valve with the stem fully open with a pressure drop of 1 psi (.069 bar) across the valve. $C_v$ is the valve sizing factor that permits selection of the appropriate valve to meet flow requirements of a given fluid system

The flow capacity curves presented in the ordering pages for each series of Autoclave valves show the $C_v$ for all series, sizes and stem types per number of turns of the stem. These curves also illustrate the relative flow patterns for a vee on-off stem and a regulating stem.

The $C_v$ values shown on the valve ordering pages represent the full-open $C_v$ for that valve. In determining estimated capacity, this $C_v$ value should be used in the formulas which follow.



For 2 way angle patterns, increase Cv value 50%

Specific Gravity (Sg)
Typical Gases

| Gas | $S_G$@RT Relative to Air |
|---|---|
| Acetylene | 0.897 |
| Air | 1.000 |
| Ammonia | 0.587 |
| Argon | 1.377 |
| Butane | 2.070 |
| Carbon Dioxide | 1.516 |
| Ethylene | 0.967 |
| Helium | 0.138 |
| Hydrogen | 0.0695 |
| Methane | 0.553 |
| Nitrogen | 0.966 |
| Oxygen | 1.103 |
| Propane | 1.562 |
| Sulphur Dioxide | 2.208 |

Specific Gravity (Sgf)
Typical Gases

| Liquid | $S_{GF}$@RT Relative to Water |
|---|---|
| Acetone | 0.792 |
| Alcohol | 0.792 |
| Benzine | 0.902 |
| Gasoline | 0.751 |
| Gasoline, nat. | 0.680 |
| Kerosene | 0.815 |
| Pentane | 0.624 |
| Water | 1.000 |

## Flow Formulas

### Liquids

☐ Flow, U.S. gal./min.

$$V = \frac{C_V \sqrt{P_1 - P_2}}{\sqrt{S_{GF}}}$$

☐ Flow, lb./hr.

$$V = 500\ C_V \sqrt{(P_1 - P_2)\ /S_{GF}}$$

### Gases

☐ Flow, SCFH

$$Q = \frac{42.2\ C_V \sqrt{(P_1 - P_2)\ (P_1 + P_2)}}{\sqrt{S_{GF}}}\ *\dagger$$

☐ Flow, SCFH (temperature corrected)

$$Q = \frac{963\ C_V \sqrt{(P_1 - P_2)\ (P_1 + P_2)}}{\sqrt{S_G\ T_F}}\ \dagger$$

☐ Flow, lb./hr.

$$W = 3.22\ C_V \sqrt{(P_1 - P_2)\ (P_1 + P_2)/\ S_G}\ \dagger$$

### Saturated Steam

☐ Flow, lb./hr.

$$W = 2.1\ C_V \sqrt{(P_1 - P_2)\ (P_1 + P_2)}\ \dagger$$

### Super Heated Steam

☐ Flow, lb./hr.

$$W = \frac{2.1\ C_V \sqrt{(P_1 - P_2)\ (P_1 + P_2)}}{(1 + 0.0007\ T_S)}\ \dagger$$

***Formula Nomenclature***

**V** = Flow, U.S. gallons per minute (GPM)
**Q** = Flow, standard cu.ft. per hr. (SCFH)
**W** = Flow, pounds per hour (lb./hr.)
**P1** = Inlet pressure, psia (14.7 + psig)
**P2** = Outlet pressure, psia (14.7 + psig)
**Sgf** = Liquid specific gravity (water = 1.0)
**Sg** = Gas specific gravity (air = 1.0)
**Tf** = Flowing temp., °R absolute (460 + °F)
**Ts** = Superheat in °F
**Cv** = Valve coefficient of flow, full open

** Effect of flowing temperatures on gas flow are minimal for temperatures between 30°F (-1.1°C) and 150°F (66°C). Correction should be included if temperatures are higher or lower.*

*† Where outlet pressure $P_2$ is less than 1/2 inlet pressure $P_1$, the term:*

$\sqrt{(P_1 - P_2)\ (P_1 + P_2)}$ *becomes 0.87* $P_1$

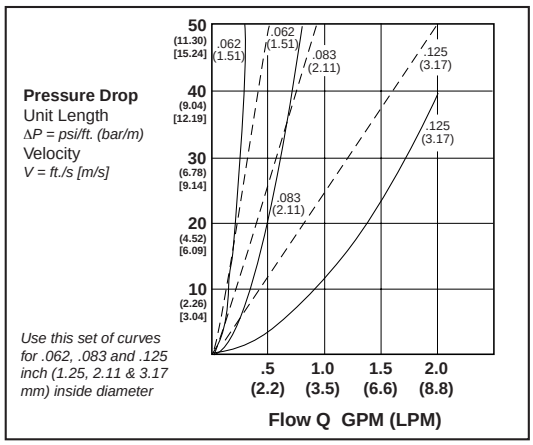
*Note: Maximum Cv values in this catalog have been determined in accordance with the Fluid Controls Institute report FCI58-2. "Recommended Voluntary Standards for Measurement Procedure for Determining Control Valve Flow Capacity," including procedure, design of the test stand and evaluation of the data.*

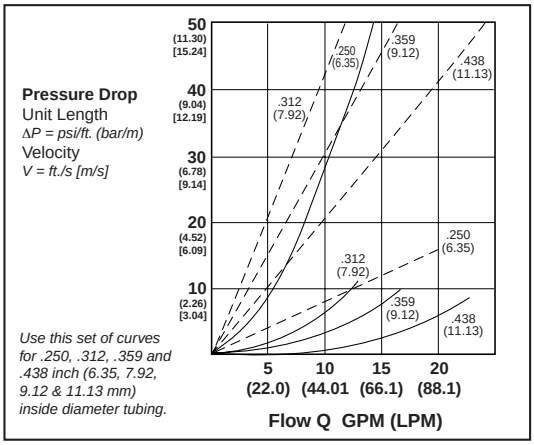
## Tubing

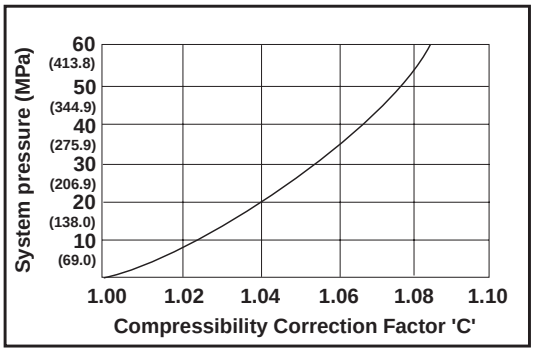
Theoretical Pressure Drop & Fluid Velocity vs. Flow, Autoclave Engineers Medium and High Pressure Tubing. (Based on water @ RT)

**Legend**

——— Pressure drop ΔP = psi/ft. (bar/m)
— — — Velocity V = Ft./s (m/s)

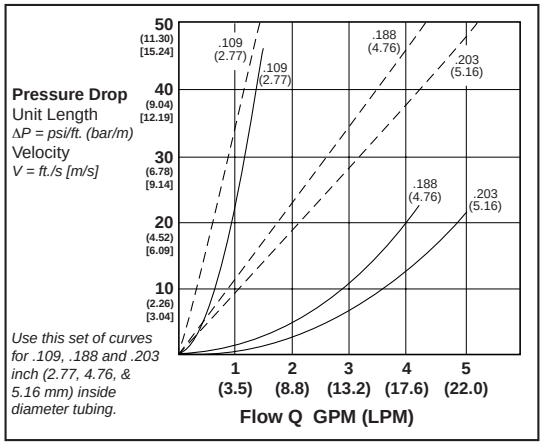


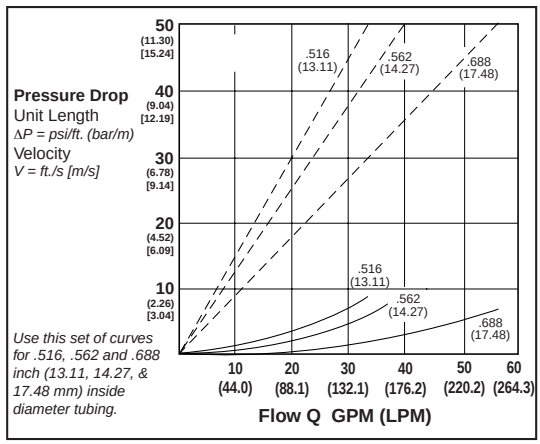




**Note:** Multiply pressure drop (ΔP/ft) from graph above by factor 'C' to correct for system pressure above atmospheric. Higher system pressure increases the fluid density resulting in higher system pressure loss.

Instructions: To determine the expected pressure drop, per foot of tube length, select the appropriate curves based on tube Inside Diameter. Follow the graph vertically at the design flow rate (X-axis) until it intersects the solid line, then move horizontally to read the expected pressure drop per foot (Y-axis). Multiply this by the total tube length to obtain the total pressure loss. See note below to correct for system pressures above atmospheric. To determine the average fluid velocity, repeat the above procedure, but use the dashed line. The pressure drop is for straight lengths of tube only.




**Example:** What would be the expected pressure drop and average fluid velocity at 1 gallon (4.4 liter) per minute of water through 100 feet (30.48 meters) of 3/8 outside diameter x .125 inside diameter tubing at 30,000 psi (2068 bar) will be used. This curve lists .125 inch (.317mm) inside diameter data.

From the x-axis (Flow "Q" GPM (LPM) at 1 GPM (3.5 LPM) a vertical line is drawn until it intersects the solid line labeled ".125 (3.17mm)". A horizontal line is then traced to the y-axis )Pressure Drop/Unit Length) and is read 12 psi/ft. (2.71 bar/m).

Since the system pressure is 30,000 psi (2068 bar), a correction must be made to this value 12 psi/ft. (2.71 bar/m). The small graph in the lower left corner is used to determine this correction factor. A horizontal line on this graph is drawn from the y-axis System Pressure KSI (MPa) until it intersects the curve. It is then traced vertically to the x-axis (Compressibility Correction Factor 'C') and is read as 1.054.

To determine the total pressure drop, multiply the total tube length by the expected pressure drop per foot and by the correction factor 'C' (100) (12) (1.054) = 1,265 psi [(30.48m)(2.71 bar/m) (1.054)=87.10 bar].

The average fluid velocity is determined in a similar way except that on the original graph, the dashed line is used instead of the solid line. the average fluid velocity at 1 GPM (4.4 LPM) would be 25 ft/s (7.62 m/s). No correction needs to be made for elevated system pressures.

## Temperature Equivalents

| Fahrenheit °F | Celcius °C | Rankine°R | Kelvin°K |
|---|---|---|---|
| 0 | -18 | 460 | 255 |
| 32 | 0 | 492 | 273 |
| -460 | -273 | 0 | 0 |

Degrees Fahrenheit = °F

Degrees Celcius = 5/9 (°F - 32)

Degrees Kelvin = °C + 273.15

Degrees Rankine = °F + 459.67

## Linear Equivalents

| foot | inch | meter | centimeter | millimeter | micron | angstrom |
|---|---|---|---|---|---|---|
| 1 | 12 | 0.3048 | 30.48 | 304.800 | $3.048x10^{5}$ | $3.048x10^{9}$ |
| 0.08333 | 1 | 0.0254 | 2.54 | 25.4 | $2.54x10^{4}$ | $2.54x10^{8}$ |
| 3.28083 | 39.37 | 1 | 100 | 1000 | $1x10^{6}$ | $1x10^{10}$ |
| 0.03281 | 0.3937 | 0.01 | 1 | 10 | $1x10^{4}$ | $1x10^{8}$ |
| $3.281x10^{-3}$ | 0.03937 | 0.001 | 0.1 | 1 | 1000 | $1x10^{7}$ |
| $3.281x10^{-6}$ | $3.937x10^{-5}$ | $1x10^{-6}$ | $1x10^{-4}$ | $1x10^{-3}$ | 1 | $1x10^{4}$ |
| $3.281x10^{-10}$ | $3.937x10^{-9}$ | $1x10^{-10}$ | $1x10^{-8}$ | $1x10^{-7}$ | $1x10^{-4}$ | 1 |

## Pressure Equivalents

| Pa | MPa | atm | bar | kg/cm² | psi | inches Hg | Microns Hg |
|---|---|---|---|---|---|---|---|
| 1 | $1x10^{-6}$ | $9.8692x10^{-6}$ | $1x10^{-5}$ | $1.0197x10^{-5}$ | $1.4504x10^{-4}$ | $2.9530x10^{-4}$ | 7.50059 |
| $1x10^{-6}$ | 1 | 9.8692 | 10 | 10.1971 | 145.04 | 295.30 | $7.5006x10^{6}$ |
| 101325 | 0.101325 | 1 | 1.01325 | 1.0332 | 14.696 | 29.921 | $760x10^{3}$ |
| 100000 | 0.1 | 0.98692 | 1 | 1.01971 | 14.504 | 29.53 | $750.059x10^{3}$ |
| 98066.5 | 0.098067 | 0.96784 | 0.98067 | 1 | 14.223 | 28.959 | 735.56x103 |
| 6894.757 | $6.8948x10^{-3}$ | 0.06805 | 0.06895 | 0.07031 | 1 | 2.036 | $51.715x10^{6}$ |
| 3386.389 | $3.3864x10^{-3}$ | 0.03342 | 0.03386 | 0.03453 | 0.49116 | 1 | $2.54x10^{4}$ |
| 0.133322 | $1.3332x10^{-7}$ | $1.3158x10^{-6}$ | $1.3332x10^{-6}$ | $1.3595x10^{-6}$ | $19.337x10^{-6}$ | $39.37x10^{-6}$ | 1 |

PSIG = lb./in.² Gage

PSIG = lb./in.² absolute

PSIA = PSIG plus atmospheric pressure

1Torr = 133.322Pa

## Volume Equivalents

| meter³ | foot³ | gallon* | liter | quart | inch³ | cc |
|---|---|---|---|---|---|---|
| 1 | 35.31 | 264.2 | 1000 | 1056.8 | 61023 | $1x10^{6}$ |
| $28.317x10^{-3}$ | 1 | 7.4822 | 28.317 | 29.92 | 1728 | $28.317x10^{3}$ |
| $3.785x10^{-3}$ | 0.1337 | 1 | 3.785 | 4 | 231 | 3785 |
| $1x10^{-3}$ | 0.03531 | 0.2642 | 1 | 1.057 | 61.023 | 1000 |
| $9.463x10^{-4}$ | 0.03342 | 0.25 | 0.9463 | 1 | 57.75 | 946.25 |
| $1.638x10^{-5}$ | $5.787x10^{-4}$ | $43.29x10^{-4}$ | 0.01639 | 0.01732 | 1 | 16.387 |
| $1x10^{-6}$ | $35.31x10^{-6}$ | $2.642x10^{-4}$ | $1x10^{-3}$ | $10.568x10^{-4}$ | 0.06102 | 1 |

**U.S. Gallons*

US. gallon = 0.833 British Imperial gallon

British Imperial gallon = 1.201 US. gallon

US. gallon water = 8.345 pounds

British Imperial gallon water= 10.022 pounds

US. fluid ounce = 29.573 centimeters³

British Imperial fluid ounce = 28.413 centimeters³

## Density Equivalents

| pound/inch³ | pound/ft³ | pound/gallon³ | kg/meter* | gram/cm³ |
|---|---|---|---|---|
| 1 | 1728 | 231 | $27.68x10^{3}$ | 27.6797 |
| $5.787x10^{-4}$ | 1 | 0.1337 | 16.018 | 0.01602 |
| $4.33x10^{-3}$ | 7.48 | 1 | 119.8257 | 0.11983 |
| $3.613x10^{-5}$ | 0.06243 | $8.3445x10^{-3}$ | 1 | .001 |
| 0.03613 | 62.43 | 8.3445 | 1000 | 1 |

**U.S. Gallons*

## Fluid Flow Equivalents

| *gal/hr | *gal/min | cu ft/hr | cu ft/min | liters/hr | liters/min | cc/min |
|---|---|---|---|---|---|---|
| 1 | 0.01667 | 0.1337 | $2.228x10^{-3}$ | 3.7848 | 0.06308 | 63.08 |
| 60 | 1 | 8.022 | 0.1337 | 227.1 | 3.7848 | 3784.8 |
| 7.48 | 0.1247 | 1 | 0.01667 | 28.32 | 0.472 | 472 |
| 448.8 | 7.48 | 60 | 1 | 1698.6 | 28.32 | $28.32x10^{3}$ |
| 0.26418 | $4.403x10^{-3}$ | 0.03531 | $5.886x10^{-4}$ | 1 | 0.01667 | 16.67 |
| 15.8502 | $264.18x10^{-3}$ | 2.11887 | 0.03531 | 60 | 1 | 1000 |
| .01585 | $264.2x10^{-6}$ | $2.1187x10^{-3}$ | $35.3145x10^{-6}$ | .06 | 0.001 | 1 |

**U.S. Gallons*

# Technical Information - Conversion Tables

## Area Equivalents

| $ft^2$ | $in^2$ | $m^2$ | $cm^2$ | $mm^2$ |
|---|---|---|---|---|
| 1 | 144 | 0.09291 | 929.034 | $9.29x10^{4}$ |
| $6.944x10^{-3}$ | 1 | $6.451x10^{-4}$ | 6.4516 | 645.1625 |
| 10.7639 | 1550 | 1 | $1x10^{-4}$ | $1x10^{6}$ |
| $1.0764x10^{-3}$ | 0.155 | $1x10^{-4}$ | 1 | 100 |
| $1.076x10^{-5}$ | $1.55x10^{-3}$ | $1x10^{-6}$ | .01 | 1 |

## Weight Equivalents

| pound | ounce | kilogram | gram | grain |
|---|---|---|---|---|
| 1 | 16 | .45351 | 453.592 | 7000 |
| 0.0625 | 1 | .02836 | 28.345 | 437.5 |
| 2.205 | 35.27 | 1 | 1000 | $15.435x10^{3}$ |
| $2.205x10^{-3}$ | 0.03527 | 0.001 | 1 | 15.435 |
| $1.428x10^{-4}$ | 0.002285 | $64.8x10^{-6}$ | 0.0648 | 1 |

## Power Equivalents

| kilowatt | horsepower* | ft lbs/sec | ft lbs/min | ft lbs/hr | Btu/sec | Btu/min | Btu/hr |
|---|---|---|---|---|---|---|---|
| 1 | 1.341 | 738 | 44.280 | $2.653x10^{6}$ | 0.948 | 56.9 | 3413 |
| .7457 | 1 | 550 | $33x10^{3}$ | $1.99x10^{6}$ | 0.707 | 42.41 | 25.44 |
| $13.55x10^{-4}$ | $18.18x10^{-4}$ | 1 | 60 | 3600 | $12.84x10^{-4}$ | 0.0771 | 4.62 |
| $22.59x10^{-6}$ | $0.303x10^{-4}$ | 0.01667 | 1 | 60 | $21.41x10^{-6}$ | $12.84x10^{-4}$ | 0.0771 |
| $0.376x10^{-6}$ | $0.505x10^{-6}$ | $2.78x10^{-4}$ | 0.01667 | 1 | $0.357x10^{-6}$ | $21.41x10^{-6}$ | $12.84x10^{-4}$ |
| 1.055 | 1.416 | 778 | $46.7x10^{3}$ | $2.802x10^{-6}$ | 1 | 60 | 3600 |
| 0.01759 | 0.02359 | 12.98 | 778 | $46.7x10^{3}$ | 0.01667 | 1 | 60 |
| $2.925x10^{-4}$ | $3.933x10^{-4}$ | 0.2163 | 12.98 | 778 | $2.778x10^{-4}$ | 0.01667 | 1 |

US. horsepower = 1.014 metric horsepower

Metric. horsepower = 0.986 US. horsepower

**U.S. Horseposer*

## Work or Energy Equivalents

| kilowatt-hours | horsepower* hours | foot-pounds | inch-pounds | Btu | kilogram-meters | kilogram-calories | joules Newton meters |
|---|---|---|---|---|---|---|---|
| 1 | 1.342 | $2.655x10^{6}$ | $31.86x10^{6}$ | 3415 | $367.1x10^{3}$ | 860.238 | $3.6x10^{6}$ |
| .7457 | 1 | $1.98x10^{6}$ | $23.76x10^{6}$ | 2546.5 | $273.546x10^{3}$ | 641.477 | $2.685x10^{6}$ |
| $0.376x10^{-6}$ | $0.505x10^{-6}$ | 1 | 12 | $1.286x10^{-3}$ | 0.13826 | $3.239x10^{-4}$ | 1.3562 |
| $0.313x10^{-7}$ | $0.458x10^{-7}$ | 0.08333 | 1 | $0.107x10^{-3}$ | $11.522x10^{-3}$ | $0.27x10^{-4}$ | 0.11302 |
| $2.928x10^{-4}$ | $3.929x10^{-4}$ | 778 | 9336 | 1 | 107.5 | 0.2519 | 1054.8 |
| $2.717x10^{-6}$ | $3.653x10^{-6}$ | 7.233 | 86.796 | $9.302x10^{-3}$ | 1 | $23.43x10^{-4}$ | 9.804 |
| $1.161x10^{-3}$ | $1.558x10^{-3}$ | 3088.26 | 37059.12 | 3.9683 | 427.32 | 1 | 4189.48 |
| $2.774x10^{-7}$ | $3.7229x10^{-7}$ | 0.7373 | 8.8476 | $9.478x10^{-4}$ | 0.10194 | $2.39x10^{-4}$ | 1 |

**U.S. Horseposer*

## Velocity Equivalents

| cm/sec | meter/sec | meter/min | kilometer/hr | feet/sec | feet/min | mile/hr |
|---|---|---|---|---|---|---|
| 1 | 0.01 | 0.6 | 0.036 | 0.03281 | 1.9685 | 0.02237 |
| 100 | 1 | 60 | 3.6 | 3.281 | 196.85 | 2.2369 |
| 1.667 | 0.01667 | 1 | 0.06 | 0.05468 | 3.281 | .03728 |
| 27.78 | 0.2778 | 16.67 | 1 | 0.91134 | 54.681 | 0.62137 |
| 30.48 | 0.3048 | 18.29 | 1.0973 | 1 | 60 | 0.68182 |
| 0.508 | $508x10^{-3}$ | 0.3048 | 0.01829 | 0.01667 | 1 | 0.01136 |
| 44.704 | 0.44704 | 26.82 | 1.6093 | 1.4667 | 88 | 1 |

Statute mile/hour = .8684 knot

Knot = 1.1516 mile/hour = 1.689 feet/second

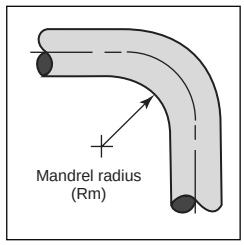
1 Statue Mile = 5280 feet

1 Nautical Mile = 6076 feet

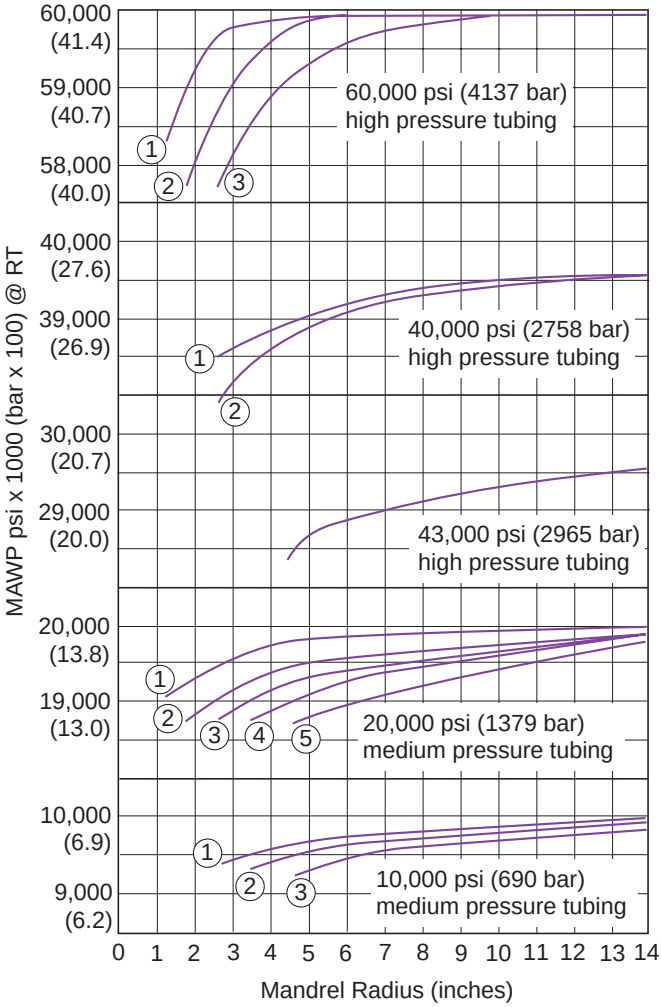
# Technical Information - Pressure vs. Bend Radius

## Tubing

### Allowable Pressure vs. Bend (Mandrel) Radius




### Autoclave Engineers Medium & High Pressure tubing (316 & 304 SS)




**60,000 and 95,000 psi (4137 & 6205 bar)**
**High Pressure Tubing**

| | Size Inches | Rm (min.) inches (mm) |
|---|---|---|
| ① | 1/4 x .083 | 1.25 (31.8) |
| ② | 3/8 x .125 | 1.75 (44.5) |
| ③ | 9/16 x .188 | 2.625 (66.7) |

**40,000 psi (2758 bar)**
**High Pressure Tubing**

| | Size Inches | Rm (min.) inches (mm) |
|---|---|---|
| ① | 9/16 x .250 | 2.625 (66.7) |
| ② | 9/16 x .312 | |

**43,000 psi (2965 bar)**
**High Pressure Tubing**

| Size Inches | Rm (min.) inches (mm) |
|---|---|
| 1 x .438 | 4.625 (117.5) |

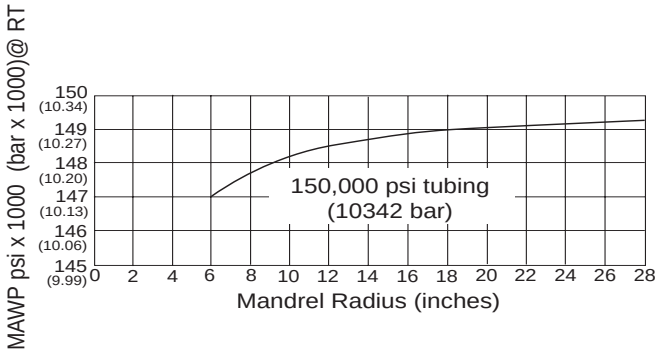
**20,000 psi (1379 bar)**
**Medium Pressure Tubing**

| | Size Inches | Rm (min.) inches (mm) |
|---|---|---|
| ① | 1/4 x .109 | 1.25 (31.8) |
| ② | 3/8 x .203 | 1.75 (44.5) |
| ③ | 9/16 x .312 | 2.625 (66.7) |
| ④ | 3/4 x .438 | 3.5 (89.9) |
| ⑤ | 1 x .562 | 4.625 (117.5) |

**10,000 psi (690 bar)**
**Medium Pressure Tubing**

| | Size Inches | Rm (min.) inches (mm) |
|---|---|---|
| ① | 9/16 x .359 | 2.625 (66.7) |
| ② | 3/4 x .516 | 3.5 (89.9) |
| ③ | 1 x .688 | 4.625 (117.5) |

### Autoclave Engineers Ultra High Pressure tubing (316SS)




**150,000 psi (10342 bar)**
**Ultra High Pressure Tubing**

| Size Inches | Rm (min.) inches (mm) |
|---|---|
| 5/16 x 1/16 | 6 (152.4) |

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