

Instruction Manual

CVS Series E 1 through 6-Inch Globe Valves

Design “ED” and “ET”

Introduction

Contents

Contained in this manual are installation instructions, maintenance procedures and parts information for the 1 through 6-inch CVS Series E, Design ED and ET Globe Valves. Refer to the appropriate manuals for instructions for the accompanying actuator and additional accessories.

Trained or experienced personnel should carry out operation and installation of all pressure equipment. If you have any questions regarding the equipment, contact your CVS Controls representative.

Applications and Features

The CVS Series E is a single port, globe-style body with composition or metal seats and a balanced push-down-to-close valve action plug.

There are two styles of valve available, providing excellent pressure and flow control on steam, gasses and various liquid applications:

1. **Design ED** is intended for general control applications over a wide variety of temperatures and pressure drops. This design has an upper piston ring seal and metal-to-metal seating.
2. **Design ET** is intended for applications requiring low leakage rates with composition seating (TFE) for tight shutoff requirements or metal-to-metal seating for higher temperature capabilities. The valve plug has a two-piece upper seal.



Figure 1: CVS Series E Valve

For standard cages the flow direction is flow-down. The following flow characteristics are available: linear, quick opening and equal percent.

The end connections are ANSI Class 150, 300 and 600 Raised Face, or Ring Type Joint flanges as per ASME B16.34-latest edition.

CVS Series E Globe Valve are available in the following body materials - LCC, WCB, WCC, WC9, C5, Monel, and CF8M SST. Additional materials may be available upon request.

Trim material is available in 316SST, 416SST, 17-4PH, Alloy6-Co.Cr-A, Cobalt and 316SST/Tungsten Carbide.

Sour Service Capability

Optional NACE MRO175/ISO 15156-2009

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Installation

1. Before installing a CVS Series E valve carefully inspect for damage that may have occurred in shipment.
2. Remove all welding slag, pipe scale and any other foreign matter by cleaning out the lines before installation.
3. Install the valve so that the flow direction arrow on the body coincides with the actual process flow through the valve.
4. Use accepted piping practices when installing the valve. Use a suitable gasket between pipeline flanges and valve body.
5. Although the control valve can be installed in any position, the typical installation has the actuator vertical above the body.
6. Installing a conventional 3-valve bypass around the body will allow for continuous operation during maintenance and inspection.
7. CVS Series E valve bodies are rated at 150, 300 and 600 lb. ANSI. Be sure not to install the valve in any system where working pressures are greater than those specified in the standards.

| Valve Size, Inches | Weight | |
|--------------------|--------|-----|
| | Lbs | Kg |
| 1, 1-1/4 | 30 | 14 |
| 1-1/2 | 45 | 20 |
| 2 | 68 | 31 |
| 2-1/2 | 100 | 45 |
| 3 | 125 | 57 |
| 4 | 170 | 78 |
| 6 | 350 | 160 |

Table 1: Approximate Weights

Maintenance

Warning:

To avoid damage to the process system or personal injury, isolate the valve from the system and relieve any pressure contained within prior to disassembly. Disconnect any operating lines providing air pressure, control signals or electrical power to the actuator.

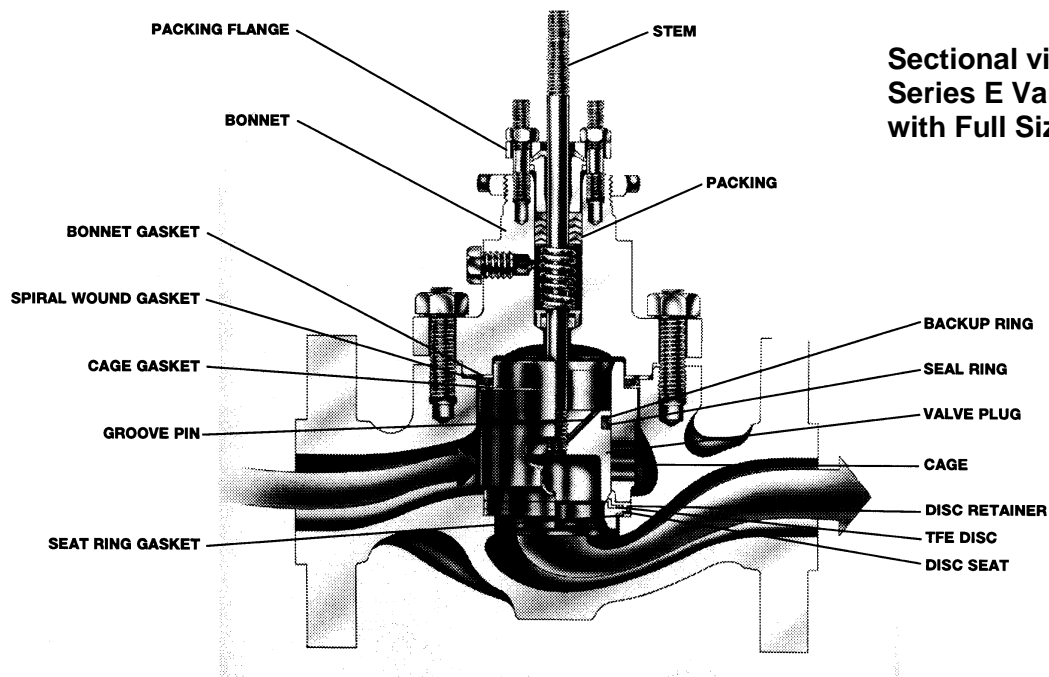


Figure 2:

Sectional view of CVS Series E Valve Body with Full Size Trim

Disassembly

Except where indicated, refer to Figure 2 for part descriptions used in the following procedure.

1. With the actuator disconnected and removed from the body, remove the hex nuts, (key 15, figure 9).
2. Remove the bonnet with the valve plug and stem.
3. Loosen the packing flange nuts (key 5, figure 8) and remove the valve plug and stem from the bonnet. If the valve stem needs replacement, punch out the groove pin and unscrew the stem. If the valve plug needs replacement, a new valve plug and stem assembly is required.

Warning: Do not use an old stem with a new valve plug. Using an old stem requires drilling a new hole for the groove pin and as a result, the integrity of the stem is weakened.

4. If desired you may disassemble the internal parts of the bonnet. To replace the Packing, see instructions titled "Packing Replacement" in this manual.

Warning: The portion of the cage which is exposed provides a guiding surface. Ensure that this surface is not damaged during disassembly or maintenance. If the cage is seized in the body, use a rubber mallet to strike the exposed portion at varying points around its circumference.

5. Remove the cage and gaskets from the valve body. With restricted trim, (figure 11) remove the seat ring adaptor (key 5) and the cage adaptor (key 4).
6. Remove the seat ring and its gasket. With composition seats, remove the disc retainer, disc seat and TFE disc.

Reassembly

Except where indicated refer to Figure 2 for part descriptions used in the following procedure.

1. Clean all gasket-seating surfaces. Use new gaskets only for reassembly.
2. With restricted trim (figure 11) install the seat ring adaptor gasket (key 13) and the adaptor (key 5).
3. Replace the seat ring gasket (key 12) and install the seat ring (key 8). If using a composition seat, assemble it by placing the TFE disc (key 20) into the disc retainer (key 18), then sliding this assembly over the disc seat (key 19).



Figure 3: Equal Percentage Cage

4. Place the cage (key 3) onto the seat ring (key 9). Any rotational orientation of the cage with respect to the valve body is acceptable.
5. With full-sized trim, install cage gasket (key 10), spiral wound gasket (key 11) and bonnet gasket (key 9) onto the cage shoulder.
6. With restricted trim, install the cage gasket (key 10), spiral wound gasket (key 11) and an additional cage gasket (key 10) onto the cage shoulder. Install the cage adaptor and place the bonnet gasket onto the adaptor.
7. If installing a new stem in the valve plug, screw the new stem into the valve plug. Refer to Table 2 for appropriate torque values and drill sizes. Drill through the stem, using the hole in the valve plug as a guide. Remove any chips or burrs and drive in a new groove pin to lock the assembly.
8. If the seal ring appears damaged, remove and replace with a new one. Be careful not to scratch the ring groove surfaces. Damage to the ring groove surface may prevent the new ring from sealing properly. The seal ring must either be pried or cut from the groove and therefore cannot be reused.

If possible, lapping of metal seats should be done before seal ring installation. Refer to the "Lapping Metal Seats" procedure in this manual.

- 8a For valve bodies using a carbon-filled TFE piston ring, locate the split and slightly spread the ring. Install the ring over the stem and onto the piston ring groove on the valve plug. Graphite piston rings are supplied as a complete ring and must be broken into two sections. The piston ring can be broken in half by scoring, and then breaking over a hard surface such as the edge of a table. Ensure the broken ends are re-matched when the piston ring is installed in the piston ring groove.

Reassembly cont'd

8b Apply a lubricant to both back-up ring and seal rings. Install the back-up ring over the stem and into the piston ring groove. Place the seal ring over the top edge of the valve plug, so that it slips into the groove on one side of the valve plug.

Cautiously stretch the seal ring to work it over the top edge of the valve plug. Avoid jerking sharply on the seal, as the TFE in the seal ring needs time to cold flow during the stretching procedure. This stretching may make the seal ring seem loose in the groove; however it will contract to its original size after installation of the cage.

9. When placing the valve plug into the cage, ensure that the seal ring is evenly set in the entrance bevel at the top of the cage to avoid ring damage.
10. Mount bonnet to the body.
11. Tighten the bonnet to body bolts. Refer to Table 3 for recommended torques.

Always adhere to accepted bolting practices and lubricate bolts. Correct tightening of the bonnet bolts accomplishes the following:

- a) The spiral wound gasket will compress enough to load and seal the seat ring gasket.
- b) The outer portion of the top gasket will compress so that the bonnet to body connection forms a seal.

Note: Bolt up characteristics for spiral wound gaskets are such that the tightening of one bolt may loosen another. This will occur with the tightening of all the bolts until the bonnet to body seal is made. Several trials on each bolt are required until, at the given torque, the nut does not turn.

12. Mount the actuator to the bonnet and make up the stem connection. Refer to "Making up Stem Connection" instructions in this manual.

Table 2: Stem Torque and Groove Pin Drill Sizes

| Valve Stem Connection (VSC) | | Torque Min/Max Values | | Groove Pin Drill Size |
|-----------------------------|------|-----------------------|---------|-----------------------|
| Inches | Mm | Lbf-Ft | N-m | Inches |
| 3/8 | 9.5 | 40-47 | 25-35 | 3/32 |
| 1/2 | 12.7 | 81-115 | 60-85 | 1/8 |
| 3/4 | 19.1 | 237-339 | 175-25- | 3/16 |
| 1 | 25.4 | 420-481 | 310-355 | 1/4 |
| 1-1/4 | 31.8 | 827-908 | 610-670 | 1/4 |

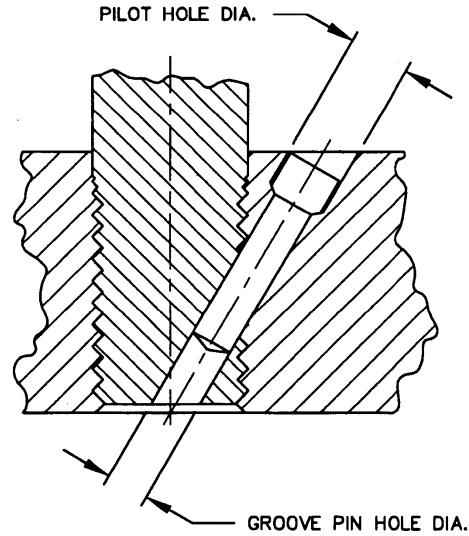


Table 3: Body to Bonnet Bolt Torques

| Valve Size Inches | Bolt Torques SA 193-B7 | |
|-------------------------|------------------------|-----|
| | Lbf-Ft | N-m |
| 1-1/4 or less | 95 | 133 |
| 1-1/2, 1-1/2x1m, 2, 2x1 | 71 | 100 |
| 2-1/2, 2-1/2x1-1/2 | 95 | 133 |
| 3, 3x2, 3x2-1/2 | 125 | 175 |
| 4, 4x2-1/2, 4x3 | 200 | 280 |
| 6 | 405 | 567 |

Packing Maintenance

TFE V-Ring Packing

Except where indicated, refer to Figure 8 for part descriptions used in the following procedure.

1. For spring loaded single TFE V-ring packing, the spring (key 8) maintains the sealing force on the packing. If leakage is detected around the packing follower (key 13), tighten the packing flange nuts (key 5) until the leakage stops. If the shoulder of the packing box is touching the bonnet and leakage cannot be controlled in this manner, see "Packing Replacement".

Packing Replacement

1. Once the actuator and bonnet have been separated from the body (refer to Steps 1-2 of Disassembly procedure), remove the following from the bonnet:
 - a. Packing flange nuts (key 5)
 - b. Packing flange (key 3)
 - c. Felt wiper (key 12)
 - d. Packing follower (key 13)

Packing Replacement cont'd

2. Clean the packing box bore, spring (key 8), washer (key 10), and the packing box ring (key 11).
3. Install the valve plug assembly and mount the bonnet to the body using new gaskets. Use the sequence shown in Figure 4 to install new packing and associated parts. Be sure not to damage the packing during installation. Replace the packing flange (key 3), tighten the packing flange nuts (key 5) until the shoulder of the packing follower (key 13) is approximately 5/8" from the top of the bonnet. If leakage is detected around the packing follower, tighten the packing flange nuts until the leakage stops.
4. For graphite packing, tighten the packing flange nuts to the maximum torque value in Table 4. Then back off the nuts and retighten them to the minimum torque value in Table 4.
5. For other Packing Types, in small equal increments, tighten the flange nuts until one of the nuts reach the minimum torque shown in Table 4. Then, tighten the other nut until the packing flange is level.
6. Mount the actuator and set the stem connector to the required travel. Refer to "Making Up Stem Connection" procedure.

Lubricator/Isolating Valve: Open the isolating valve, turn the cap screw in a clockwise direction, then close the isolating valve.

Lapping Metal Seats

In any valve body, a certain amount of leakage should be expected with metal-to-metal seating. However, if the leakage becomes excessive, lapping can enhance the condition of the seating surfaces of the valve plug and seat ring. Deep nicks in the seating surface should be removed by machining rather than lapping. There are many lapping compounds available commercially. Be sure to use one of high quality. Apply lapping compound to the bottom of the plug.

In order to position the cage and seat ring properly and to help align the valve plug with the seat ring, bolt the bonnet to the body with gaskets (the old gaskets can be used) in place during the lapping procedure. A simple handle can be made from a piece of metal secured to the valve stem with nuts. Rotate the handle in opposite directions to lap the seating surfaces. Once lapping is complete, disconnect the bonnet, clean the seating surfaces, reassemble and then test for shutoff. If leakage is still excessive, repeat the lapping procedure.

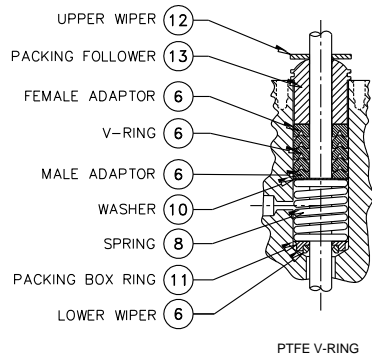
Packing Lubrication

The use of semi-metallic packing requires the use of a lubricator or lubricator/isolating valve (figure 5). The lubricator or lubricator/isolating valve is mounted in place of a pipe plug (key 14, figure 7, 8). For standard service up to 450°F, use Dow Corning lubricant or equivalent.

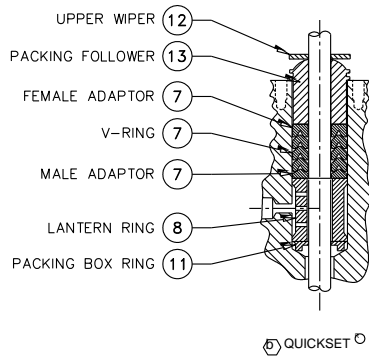
Lubricator: To add lubricant to the packing box, turn the cap screw in a clockwise direction.

Table 4: Torque Values for Packing Flange Nuts

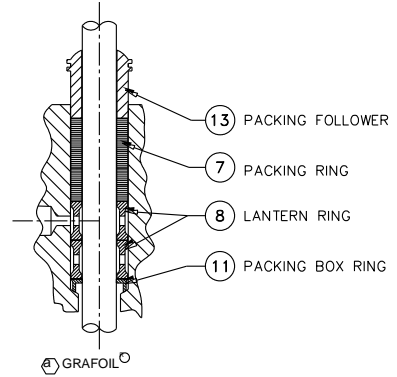
| Valve Stem Diameter | | ANSI Rating | PTFE Type Packing | | | | Graphite Type Packing | | | |
|---------------------|------|-------------|-------------------|-----|-------------|-----|-----------------------|-----|-------------|-----|
| Inches | Mm | | Min. Torque | | Max. Torque | | Min. Torque | | Max. Torque | |
| | | | Lbf-in | N-m | Lbf-in | N-m | Lbf-in | N-m | Lbf-in | N-m |
| 3/8 | 9.5 | 150 | 13 | 1 | 19 | 2 | 27 | 3 | 40 | 5 |
| | | 300 | 17 | 2 | 26 | 3 | 36 | 4 | 53 | 6 |
| | | 600 | 23 | 3 | 35 | 4 | 49 | 6 | 73 | 8 |
| 1/2 | 12.7 | 150 | 21 | 2 | 31 | 4 | 44 | 5 | 66 | 8 |
| | | 300 | 28 | 3 | 42 | 5 | 59 | 7 | 88 | 10 |
| | | 600 | 39 | 4 | 58 | 7 | 81 | 9 | 122 | 14 |
| 3/4 | 19.1 | 150 | 47 | 5 | 70 | 8 | 99 | 11 | 149 | 17 |
| | | 300 | 64 | 7 | 95 | 11 | 133 | 15 | 199 | 23 |
| | | 600 | 87 | 10 | 131 | 15 | 182 | 21 | 274 | 31 |
| 1 | 25.4 | 300 | 108 | 12 | 162 | 18 | 226 | 26 | 339 | 38 |
| | | 600 | 149 | 17 | 223 | 25 | 310 | 35 | 466 | 53 |
| 1-1/4 | 31.8 | 300 | 152 | 17 | 228 | 26 | 318 | 36 | 477 | 54 |
| | | 600 | 209 | 24 | 314 | 36 | 437 | 49 | 655 | 74 |



PTFE V-RING

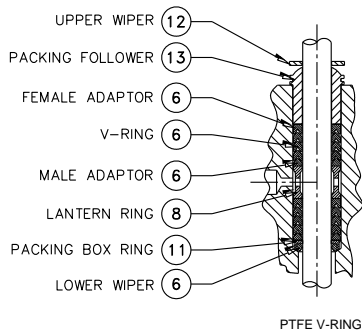


QUICKSET

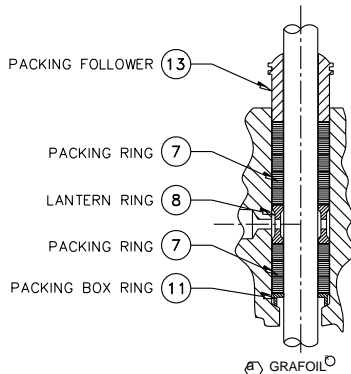


GRAFOIL

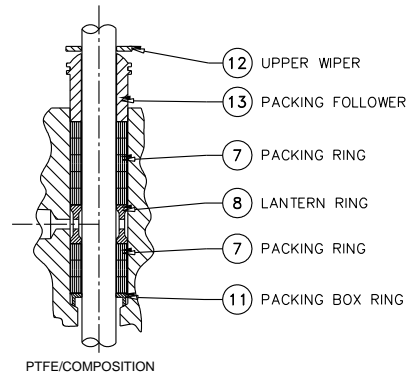
SINGLE PACKING
ALL YOKE SIZES



PTFE V-RING



GRAFOIL



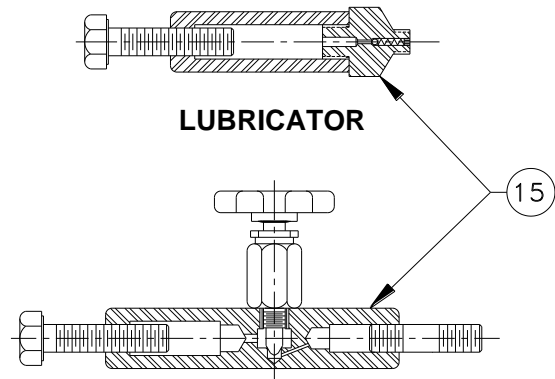
PTFE/COMPOSITION

DOUBLE PACKING
ALL YOKE SIZES

NOTES:

- GRAFOIL IS A REGISTERED TRADEMARK OF UNION CARBIDE
- QUICKSET IS A REGISTERED TRADEMARK OF GARLOCK INC.

Figure 4 - Packing Arrangements-See Table 4 for recommended torque values.



LUBRICATOR/ISOLATING VALVE

Figure 5 - LUBRICATOR AND LUBRICATOR/ISOLATING VALVE

Making Up Stem Connection

Direct Acting Actuator

Refer to Figure 6 for part descriptions used in the following procedure.

1. Move the valve plug to the closed position.
2. Thread stem locknuts onto the stem and set the travel indicator disc on these nuts. The cupped portion of the indicator disc should face downward.
3. Move the valve plug stem up the required travel and attach the stem connector. Make sure there is full engagement of the actuator stem threads. Place the two cap screws in the stem connector and tighten only slightly at this time. Position the travel indicator disc against the bottom of the stem connector by tightening the stem lock nuts slightly.
4. The travel indicator should indicate the valve to be wide open with no pressure on the diaphragm. If it does not, loosen the screws that hold the travel indicator scale and move the scale to the position required.
5. Apply varying pressures to the diaphragm case and observe the valve travel. Make certain that the valve plug seats on the seat ring.

Note: If the travel is not correct on units with plain or extension bonnets, the travel can be corrected by screwing the valve plug stem either into or out of the stem connector. Always use a wrench on the lock nuts to turn the stem. Do not use pliers or a pipe wrench directly on the stem itself. Make sure not to turn the valve plug while it is on the seat.

Reverse Acting Actuator

Refer to Figure 6 for part descriptions used in the following procedure.

1. Move the valve plug to closed position.
2. Thread stem locknuts onto stem then set the travel indicator disc on these nuts. The cupped portion of the indicator disc should face downward.
3. Move the valve plug stem up the required travel and attach the stem connector. Make sure there is full engagement of the actuator stem threads. Place the two cap screws in the stem connector and tighten only slightly at this time. Position the travel indicator disc against the bottom of the stem connector by tightening the stem lock nuts slightly.
4. The travel indicator should indicate the valve to be wide open with non pressure on the

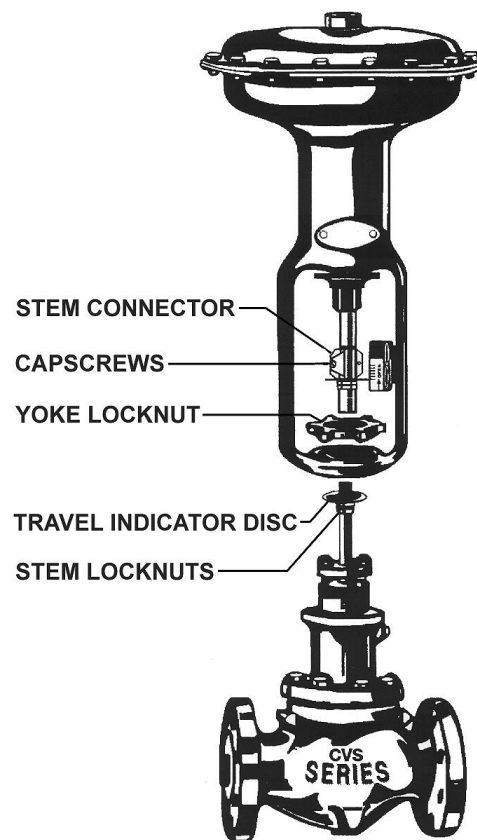


Figure 6: Actuator Mounting

diaphragm. If it does not, loosen the screws that hold the travel indicator scale and move the scale to the required position.

5. Apply varying pressures to the diaphragm case and observe the valve travel. Make certain that the valve plug seats on the seat ring.

Note: If the travel is not correct on units with plain or extension bonnets, the travel can be corrected by screwing the valve plug stem either into or out of the stem connector. Always use a wrench on the lock nuts to turn the stem. Do not use pliers or a pipe wrench directly on the stem itself. Make sure not to turn the valve plug while it is on the seat.

Parts Ordering

A serial number identifies every CVS Series E valve body-bonnet assembly, which can be found on the front of the valve. Please refer to this number when contacting your CVS Controls representative.

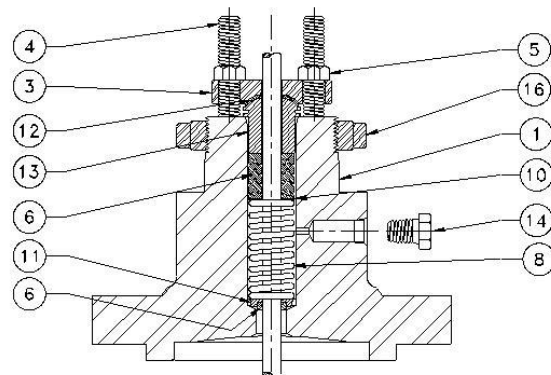
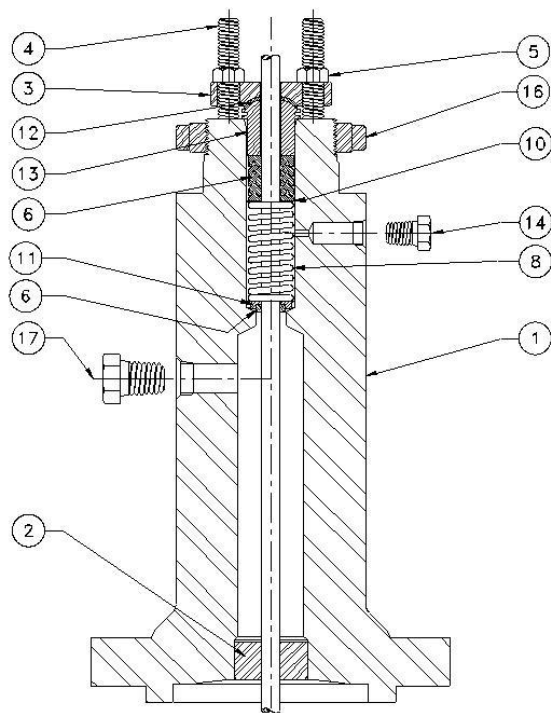


Figure 8: Extension Bonnet

| Key | Part Name | Key | Part Name |
|-----------------|---|---|---|
| 1 | Bonnet | 10 | Special Washer (TFE Packing Only) |
| 2 | Bushing (Extension bonnets only) | 11 | Packing Box Ring |
| 3 | Packing Flange | *12 | Upper Wiper |
| 4 | Packing Flange Stud | 13 | Packing Follower |
| 5 | Packing Flange Nut | 14 | Pipe Plug |
| *6 | Packing (TFE V-Ring Packing Only) | 15 ¹ | Lubricator or Lubricator/Isolating Valve ² |
| *7 ¹ | Packing Ring (Not req'd with TFE Packing) | 16 | Yoke Locknut (2-1/8, 2-13/16, 3-9/16 Yoke Bosses) |
| 8 | Spring / Lantern Ring | 17 | Pipe Plug |
| *9 ¹ | Packing Ring (Not req'd with TFE Packing) | ^(*) Recommended Spare Part ⁽¹⁾ Not Shown ⁽²⁾ See Packing Lubrication | |

CVS Series E Parts Reference List

Body

| Key | Part Name | Material | Key | Part Name | Material |
|-----|--|--------------------|--|-------------------------------------|----------------------|
| A1 | Valve Body | --- | 14 | Stud | Steel |
| *2 | Plug | 316 SS | 15 | Hex Nut | Steel |
| 3 | Cage | | 16 | Flow Direction Arrow | 316 SS |
| 4 | Cage Adaptor (Except 6/4 Restricted Trim) | 17-4 DHT | 17 | Drive Screw | 316 SS |
| 5 | Seat Ring Adaptor | 316 SS | *18 | Disc Retainer (Composition Seat) | 316 SS |
| *6 | Stem | 316 SS | *19 | Disc Seat (Composition Seat) | 316 SS |
| *7 | Groove Pin | 316 SS | *20 | TFE Disc | TFE |
| *8 | Seat Ring (Metal Seat Only) | 316 SS | *21 | Seal Ring | Carbon Filled TFE |
| *9 | Bonnet Gasket | Graphoil | *22 | Back-up Ring | Viton/EPDM |
| *10 | Shim | 316 SS | (*) Recommended Spare Parts (A)-Consult CVS Controls Representative for Valve Body style, size and material availability | | |
| *11 | Spiral Wound Gasket | 316 SS Graphoil | | | |
| *12 | Seat Gasket | Graphoil | | | |

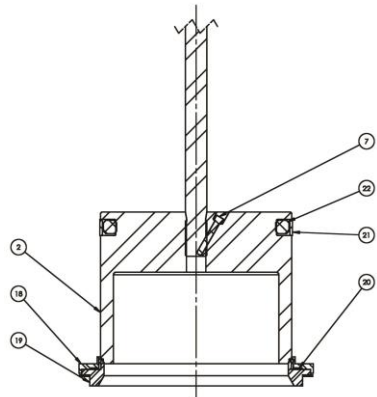
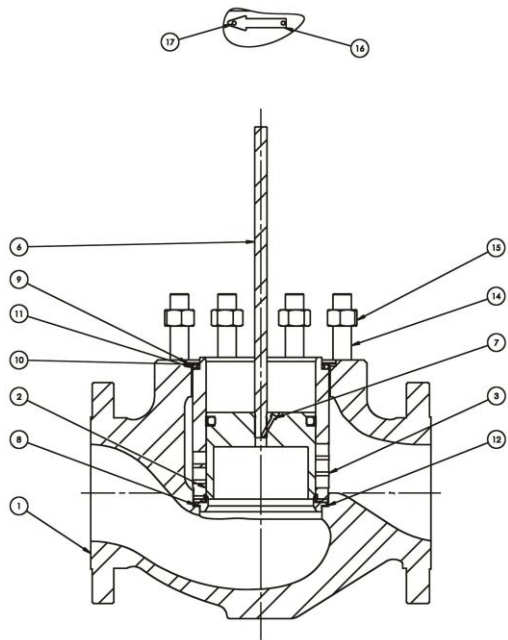


Figure 9: CVS Series E with Full Capacity

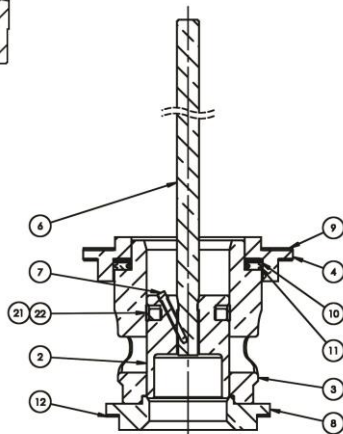


Figure 10: Trim for 1-1/2 x 1 Valve Body

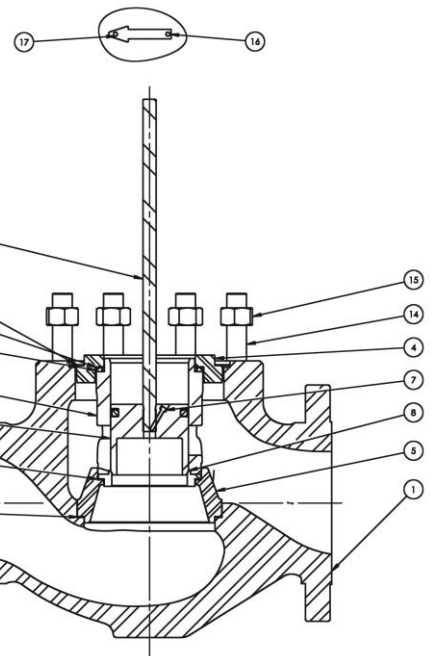


Figure 11: CVS Series E with Restricted Trim

CVS Series E Trim Parts List

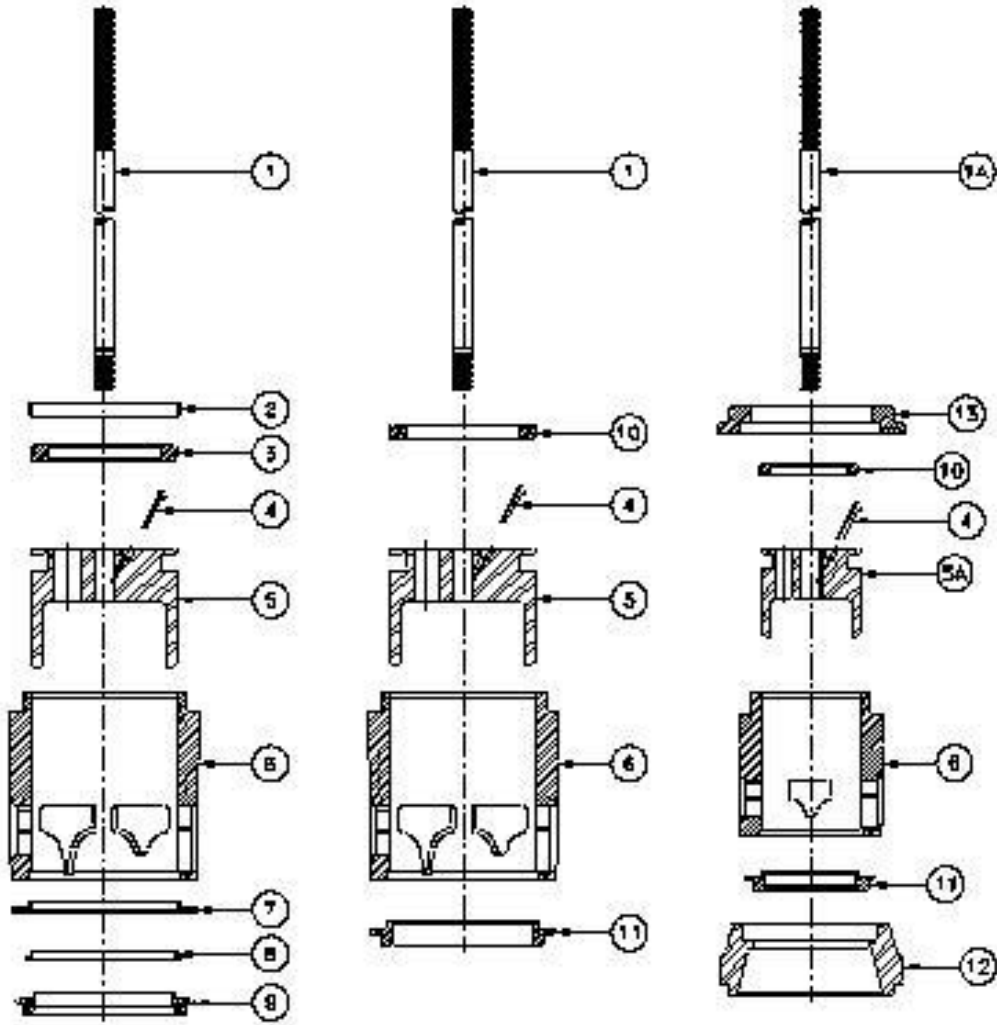


Figure 12: CVS Series E Internal Assemblies – See Following Tables

CVS Series E Trim Parts List

Key 1, 1A, 5 and 5A (Optional Materials Available upon Request*)

| "ED" & "ET" Body Size (In) | VSC (In) | Key 4 | Key 1 | Key 5-Plug | | "ET" Body Size (In) | VSC (In) | Key 5A-Plug | | |
|----------------------------|----------|---------------|---------------|---------------------|---------------|---------------------|---------------------|---------------------|---------------|---------------|
| | | Groove Pin | Stem | 316 SS ^A | 416 SS | | | 316 SS ^A | 416 SS | |
| 1 | 3/8 | CVS1V32263507 | CVS1U38883516 | CVS1V65713507 | CVS1V65714617 | 1-1/2 x 1 | 3/8 | CVS1V65713507 | CVS1V65714617 | |
| | 1/2 | CVS1V32273507 | CVS1U38903516 | CVS1V65723507 | CVS1V65724617 | 2 x 1 | 1/2 | CVS1V65723507 | CVS1V65724617 | |
| 1-1/2 | 3/8 | CVS1V32253507 | CVS1U38883516 | CVS1V63733507 | CVS1V63734617 | 2-1/2 x 1-1/2 | 1/2 | CVS1V65743507 | CVS1V65744617 | |
| | 1/2 | CVS1V32273507 | CVS1U38903516 | CVS1V65743507 | CVS1V65744617 | 3 x 2 | 1/2 | CVS1V65753507 | CVS1V65754617 | |
| 2 | 1/2 | CVS1V32263507 | CVS1K58693516 | CVS1V65753507 | CVS1V65754617 | | 3/4 | 3/4 | CVS1V65763507 | CVS1V65764617 |
| | 2-1x2 | 3/4 | CVS1V32603507 | CVS1U22653516 | CVS1V65763507 | CVS1V65764617 | 4 x 2-1/2 | 3/4 | CVS1V65783507 | CVS1V65784617 |
| 3 | | 1/2 | CVS1V32263507 | CVS1U23053516 | CVS1V65773507 | CVS1V65774617 | 6 x 4 | 3/4 | CVS1V65823507 | CVS1V65824617 |
| | 4 | 3/4 | CVS1V32603507 | CVS1U23083516 | CVS1V65783507 | CVS1V65784617 | "ET" Body Size (In) | VSC (In) | Key 1A | |
| 6 | | 1-2 | CVS1V32263507 | CVS1U23053516 | CVS1V65793507 | CVS1V65794617 | | | Stem | |
| | 3 | 3/4 | CVS1V32273507 | CVS1U23053516 | CVS1V65803507 | CVS1V65804617 | 1-1/2 x 1 | 3/8 | CVS1U22363516 | |
| 4 | | 1/2 | CVS1V32263507 | CVS1U23053516 | CVS1V65813507 | CVS1V65814617 | | | 1/2 | 1/2 |
| | 4 | 3/4 | CVS1V32603507 | CVS1K58773516 | CVS1V65823507 | CVS1V65824617 | 2 x 1 | 1/2 | CVS1U38903516 | |
| 1 | | 1 | CVS1V33403507 | CVS1K75903516 | CVS1V65833507 | CVS1V65834617 | 2-1/2 x 1-1/2 | 1/2 | CVS1U38903516 | |
| | 6 | 3/4 | CVS1V32603507 | CVS1L99643516 | CVS1V65843507 | CVS1V65844617 | | | 3 x 2 | 3/4 |
| 1 | | 1 | CVS1V33403507 | CVS1N70473516 | CVS1V65853507 | CVS1V65854617 | 4 x 2-1/2 | 3/4 | CVS1U23053516 | |
| | 6 | 1-1/4 | | CVS1K41543516 | CVS1V65863507 | CVS1V65864617 | | | 3/4 | 3/4 |
| | | | | | | | | 6 x 4 | 3/4 | CVS1L99643516 |

(A) - Not for use with 17-4PH SS Cages above 410°F (210°C); use High Temp Plugs for these applications

* Tungsten Carbide and Cobalt Trim available upon request. Contact a CVS Controls Representative for more information.

Key 2 & 3 Seal Ring and Back-Up Ring

| "ET" Body Size (In) | Key 2 Seal Ring | Key 3 Back-Up Ring | |
|---------------------|-------------------|--------------------------|---------------------|
| | TFE Carbon Filled | 0°F to 400°F Viton (Std) | -65°F to 300°F EPDM |
| 1, 1-1/2x1, 2x1 | CVS1V65910509 | CVS1V65900529 | CVS1V65900042 |
| 1-1/2, 2-1/2x1-1/2 | CVS1V65930509 | CVS1V65920529 | CVS1V65920032 |
| 2, 3x2 | CVS1V55080509 | CVS1V55070529 | CVS1V55070042 |
| 2-1/2, 4x2-1/2 | CVS1V65950509 | CVS1V65940529 | CVS1V65940032 |
| 3 | CVS1V65970509 | CVS1V65960529 | CVS1V65960032 |
| 4, 6x4 | CVS1V65990509 | CVS1V65980509 | CVS1V65980022 |
| 6 | CVS1V66010509 | CVS1V66000529 | CVS1V66000022 |

Key 6 Cage

| "ET" and "ED" Body Size (In) | Equal Percentage | | | |
|------------------------------|---------------------|---------------|----------------|---------------|
| | 17-4 PH SS Hardened | 316 SS | | Alloy 6 |
| | | Nickel Coated | Chrome Plated | |
| 1, 1-1/2x1, 2x1 | CVS2U21533327 | CVS2U74084893 | CVS2U69134610 | CVS2U21533910 |
| 1-1/2, 2-1/2x1-1/2 | CVS2U21953327 | CVS2U74094893 | CVS2U69194610 | CVS2U21953910 |
| 2, 3x2 | CVSA2U22373327 | CVS2U74104893 | CVS2U269224610 | CVS2U22373910 |
| 2-1/2, 4x2-1/2 | CVS2U22793327 | CVS2U74114893 | CVS2U69254610 | CVS2U22793910 |
| 3 | CVS1U13213327 | CVS2U74124893 | CVS2U69284610 | CVS2U23213910 |
| 4 | CVS2U23633327 | CVS2U74134893 | CVS2U69314610 | CVS2U23633910 |
| 6 | CVS2U50593327 | CVS2U80674893 | CVS2U69374610 | CVS2U50593910 |
| 6x4 | CVS2V37233327 | CVS2V37134893 | CVS2V37164610 | CVS2V37233910 |

TFE V-Ring Packing (Not Shown) (Optional materials available upon request)

| Part | Stem Size (In) | | | | |
|---------|----------------|---------------|---------------|---------------|---------------|
| | 3/8 | 1/2 | 3/4 | 1 | 1-1/4 |
| Packing | CVS1R29000101 | CVS1R29020101 | CVS1R29040101 | CVS1429060101 | CVS1R29080101 |

CVS Series E Trim Parts List

Key 7, 8, 9 Disc Seat Retainer

| "ET" Body Size (In) | Key 7 | Key 8 | Key 9 |
|-----------------------|-------------------------|-------------------------------|---------------------|
| | Composition Seat | | |
| | Disc Retainer 316 SS | Disc (TFE) -70°F to -350°F | Disc Seat 316 SS |
| 1, 2x1 | CVS1V71003507 | CVS1V71710624 | CVS1V71023507 |
| 1-1/2, 2-1/2x1-1/2 | CVS1V71033507 | CVS1V71040624 | CVS1V71053507 |
| 2, 3x2 | CVS1V71083507 | CVS1V71070624 | CVS1V71063507 |
| 2-1/2, 4x2-1/2 | CVS1V71093507 | CVS1V71100624 | CVS1V71133507 |
| 3 | CVS1V71123507 | CVS1C71130624 | CVS1V71143507 |
| 4 | CVS1V71153507 | CVS1V71160624 | CVS1V71173309 |
| 6 | CVS1V71183507 | CVS1V71190624 | CVS1V71203309 |
| 6x4 | CVS1V71233507 | CVS1V71160624 | CVS1V71243507 |

Key 10 Piston Ring

| "ED" Body Size (In) | TFE Carbon Filled |
|-----------------------|-------------------|
| 1, 1-1/2x1, 2x1 | CVS1U2173050 9 |
| 1-1/2, 2-1/2x1-1/2 | CVS1U2215050 9 |
| 2, 3x2 | CVS1U2257050 9 |
| 2-1/2, 4x2-1/2 | CVS1U2299050 9 |
| 3 | CVS1U2341050 9 |
| 4, 6x4 | CVS1U2391050 9 |
| 6 | CVS1U5068050 9 |

Key 11 Seat Ring

| "ED" Body Size (In) | Key 11 Metal Seat | | |
|-------------------------|-------------------|---------------|---------------|
| | 316 SS | 416 SS | ALLOY 6 |
| 1, 2x1 | CVS1U22253507 | CVS1U22254617 | CVS1U22253910 |
| 1-1/2 x 1 | CVS1U22203507 | CVS1U22204617 | CVS1U22203910 |
| 1-1/2, 2-1/2 x 1-1/2 | CVS1U22193507 | CVS1U22194617 | CVS1U22193910 |
| 2, 3 x 2 | CVS1U22263507 | CVS1U22264617 | CVS1U22263910 |
| 2-1/2, 4 x 2-1/2 | CVS1U22273507 | CVS1U22274617 | CVS1U22273910 |
| 3 | CVS1U22283507 | CVS1U22284617 | CVS1U22283910 |
| 4 | CVS1U22293507 | CVS1U22294617 | CVS1U22293910 |
| 6 | CVS1U50803507 | CVS1U50804617 | CVS1U50803910 |
| 6 x 4 | CVS2V37193507 | CVS2V37194617 | CVS2V37204605 |

Key 12 Seat Ring Adaptor and Key 13 Cage Adaptor

| "ED" Body Size (In) | Key 12 Seat Ring Adaptor | | | "ED" Body Size (In) | Key 13 Cage Adaptor | | |
|---------------------|-----------------------------|---------------|--------------------|---------------------|------------------------|---------------|--------------------|
| | Iron & Steel | 316 SS | C-5 Chrome Moly | | Iron & Steel | 316 SS | C-5 Chrome Moly |
| 1-1/2 x 1 | Not Req'd | Not Req'd | Not Req'd | 1-1/2 x 1 | CVS1U22182440 | CVS1U22183507 | CVS1U22183507 |
| 2 X 1 | CVS1U22622449 | CVS1U22623507 | CVS1U22623507 | 2 x 1 | CVS1U12072449 | CVS1U12073507 | CVS1U12073507 |
| 2-1/2 x 1 | CVS1U23042449 | CVS1U23043507 | CVS1U23043507 | 2-1/2 x 1 | CVS1U23022449 | CVS1U23023507 | CVS1U23023507 |
| 3 x 2 | CVS1U23462449 | CVS1U23463507 | CVS1U23463507 | 3 x 2 | CVS1U12462201 | CVS1U12463309 | CVS1U12462902 |
| 4 x 2-1/2 | CVS1U23962449 | CVS1U23963507 | CVS1U23963507 | 4 x 2-1/2 | CVS1U12512201 | CVS1U12513309 | CVS1U12512902 |

Gaskets (Not Shown) Temperature to 800°F

| "ET" Body Size (In) | Gaskets | | | | |
|---------------------|---------------|-----------|-----------|--------------|-----------|
| | Gasket Set | Bonnet | Cage | Spiral Wound | Seat Ring |
| 1 | CVS1R2860X001 | CVS1R2859 | CVS142861 | CVS1R2860 | CVS1R2862 |
| 1-1/2 | CVS1R3099X001 | CVS1R3101 | CVS1R3100 | CVS1R3099 | CVS1R3098 |
| 2 | CVS1R3297X001 | CVS1R3299 | CVS1R3298 | CVS1R3297 | CVS1R3296 |
| 2-1/2 | CVS1R3845X001 | CVS1R3847 | CVS1R3846 | CVS1R3845 | CVS1R3844 |
| 3 | CVS1R3482X003 | CVS1R3484 | CVS1R3483 | CVS1R3482 | CVS1R3481 |
| 4 | CVS1R3722X001 | CVS1R3724 | CVS1R3723 | CVS1R3722 | CVS1J5047 |
| 6 | CVS1U5085X001 | CVS1U5081 | CVS1U5083 | CVS1U5085 | CVS1U5086 |
| 6 x 4 | CVS1U5085X001 | CVS1U5081 | CVS1U5081 | CVS1U5081 | CVS1U5081 |

Optional materials available. Consult CVS Controls.

CVS Series E Dimensional Data

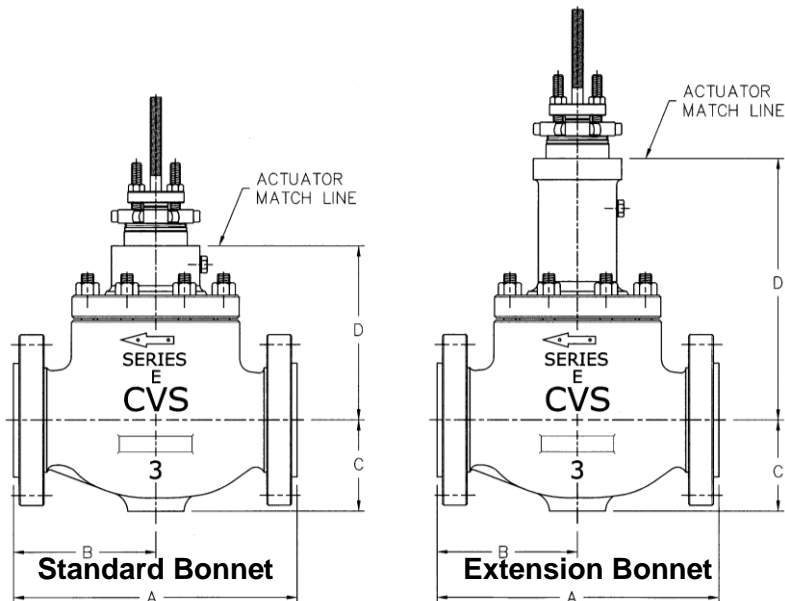
Steel Bodies through 600lb Rating

| Size | | Dimension A ¹ | | | | | | | | | | | |
|-------|-------|--------------------------|-------|---------|-------|--------|-------|---------|-------|--------|--------|---------|-------|
| | | 150 RF | | 150 RTJ | | 300 RF | | 300 RTJ | | 600 RF | | 600 RTJ | |
| In | Mm | In | Mm | In | Mm | In | Mm | In | Mm | In | Mm | In | Mm |
| 1 | 25.4 | 7.25 | 184.2 | 7.75 | 196.9 | 7.75 | 196.9 | 8.25 | 209.6 | 8.25 | 209.6 | 8.25 | 209.6 |
| 1-1/2 | 38.1 | 8.75 | 222.3 | 9.25 | 235.0 | 9.25 | 235.0 | 9.75 | 247.7 | 9.88 | 251.0 | 9.88 | 251.0 |
| 2 | 50.8 | 10.00 | 254.0 | 10.50 | 266.7 | 10.50 | 266.7 | 11.13 | 282.7 | 11.25 | 285.8 | 11.38 | 289.1 |
| 2-1/2 | 63.5 | 10.88 | 276.4 | 11.38 | 289.1 | 11.50 | 292.1 | 12.13 | 308.1 | 12.25 | 311.2 | 12.38 | 314.5 |
| 3 | 76.2 | 11.75 | 298.5 | 12.25 | 311.2 | 12.5 | 317.5 | 13.13 | 333.5 | 13.25 | 336.55 | 13.38 | 339.9 |
| 4 | 101.6 | 13.88 | 352.6 | 14.38 | 365.3 | 14.51 | 368.3 | 15.13 | 384.3 | 15.50 | 393.7 | 15.63 | 397.0 |
| 6 | 152.4 | 17.75 | 450.9 | 18.25 | 463.6 | 18.63 | 473.2 | 19.25 | 489.0 | 20.00 | 508.0 | 20.13 | 511.3 |

| Size | | Dimension C | | | | | | | | | | | |
|-------|-------|-------------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|
| | | In | Mm | In | Mm | In | Mm | In | Mm | In | Mm | In | Mm |
| 1 | 25.4 | 2.13 | 54.1 | 2.13 | 54.1 | 2.13 | 54.1 | 2.13 | 54.1 | 2.13 | 54.1 | 2.13 | 54.1 |
| 1-1/2 | 38.1 | 2.44 | 6.19 | 2.44 | 6.19 | 2.44 | 6.19 | 2.44 | 6.19 | 2.44 | 6.19 | 2.44 | 6.19 |
| 2 | 50.8 | 2.88 | 73.2 | 2.88 | 73.2 | 2.88 | 73.2 | 2.88 | 73.2 | 2.88 | 73.2 | 2.88 | 73.2 |
| 2-1/2 | 63.5 | 3.44 | 87.4 | 3.44 | 87.4 | 3.44 | 87.4 | 3.44 | 87.4 | 3.44 | 87.4 | 3.44 | 87.4 |
| 3 | 76.2 | 3.56 | 90.4 | 3.56 | 90.4 | 3.56 | 90.4 | 3.56 | 90.4 | 3.56 | 90.4 | 3.56 | 90.4 |
| 4 | 101.6 | 4.69 | 119.1 | 4.69 | 119.1 | 4.81 | 119.1 | 4.81 | 119.1 | 4.94 | 125.5 | 4.94 | 125.5 |
| 6 | 152.4 | 5.19 | 131.8 | 5.31 | 134.9 | 5.31 | 134.9 | 5.50 | 139.7 | 5.50 | 139.7 | 5.50 | 139.7 |

| Size | | Dimension D | | | | | | | | | | | |
|-------|-------|-----------------|-------|------|-------|------|-------|------------------|-------|-------|-------|-------|-------|
| | | Standard Bonnet | | | | | | Extension Bonnet | | | | | |
| | | Stem Size | | | | | | Stem Size | | | | | |
| In | mm | 3/8 | 9.5 | 1/2 | 12.7 | 3.4 | 19.1 | 3/8 | 9.5 | 1/2 | 12.7 | 3.4 | 19.1 |
| | | In | Mm | In | Mm | In | Mm | In | Mm | In | Mm | In | Mm |
| 1 | 25.4 | 5 | 127.0 | 5.88 | 150 | --- | --- | 8.38 | 212.8 | 9.88 | 251.0 | --- | --- |
| 1-1/2 | 38.1 | 4.88 | 123.8 | 5.75 | 146.1 | --- | --- | 8.25 | 209.6 | 9.75 | 247.7 | --- | --- |
| 2 | 50.8 | --- | --- | 6.50 | 165.1 | 6.38 | 162.1 | --- | --- | 10.50 | 266.7 | 10.50 | 266.7 |
| 2-1/2 | 63.5 | --- | --- | 7.38 | 187.5 | 7.25 | 184.2 | --- | --- | 11.38 | 289.1 | 11.56 | 293.6 |
| 3 | 76.2 | --- | --- | 7.50 | 190.5 | 7.38 | 187.5 | --- | --- | 11.50 | 292.1 | 11.69 | 296.9 |
| 4 | 101.6 | --- | --- | 8.69 | 221.0 | 8.56 | 217.4 | --- | --- | 12.69 | 322.3 | 12.88 | 327.2 |
| 6 | 152.4 | --- | --- | --- | --- | 9.88 | 251.0 | --- | --- | --- | --- | 14.06 | 357.1 |

1. Dimension B = A divided by 2
 RF=Raised Face RTJ=Ring Type Joint
 Flange Specification ASME/ANSIB16.5 - 1996



Notes

Notes

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