# Instruction Manual

# CVS Series E 8-Inch Globe Valves

## Design “ED” and “ET”

## Introduction

Contained in this manual are installation instructions, maintenance procedures and parts information for the 8-inch designs CVS Series E Valve Body. Refer to the appropriate manuals for the accompanying actuator, positioner 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.

**Figure 1: CVS Series E 8-Inch Control Valve with CVS 667 Diaphragm Actuator**

## Application 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.

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

Available in LCC, WCB, WCC, WC9, C5, Monel, and CF8M SST body materials. Other materials may be available upon request.

Sour Service Capability

Optional NACE MRO175/ISO15156-2009

The approximate shipping weight is 900 lbs (408 kg).

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# Installation

The CVS 8” Series E valve should not be installed in systems that exceed the ANSI specified temperature and pressure ratings.

Inspect the valves for shipping damage and foreign debris when uncrating.

1. Ensure the pipe is free of welding slag, chips, and other debris by cleaning out the lines before installation.
2. Install approved gaskets between the valve body and the pipeline flanges.
3. CVS Controls recommends a standard three-valve maintenance bypass be installed. This allows isolation of the valve body without shutting down the pipeline system.
4. Install the valve so that the flow direction arrow on the body coincides with the actual process flow through the valve.
5. Although the valve can be installed in any position, the typical installation has the actuator vertical above the valve body. Support for the actuator will be necessary if there is vibration in the line or if the valve body is positioned 45 degrees or more below vertical.

# Maintenance

Before beginning any maintenance, it is important to isolate the control valve and release all pressure contained in the valve body and the actuator. Disconnect any operating lines providing air pressure, control signals or electrical power to the actuator.

**Note: Caution must be used in the disassembly. The seating surfaces and surface finish of the cage; seat ring, stem, and plug are critical for proper sealing. Nicks and scratches will affect the ability to seal the valve in the future.**

## Disassembly

1. Disconnect and remove the actuator from the body.
2. Remove the nuts or cap screws from the bonnet flange.
3. Thread one of the actuator stem locknuts onto the stem and continue threading it down to the bottom of the thread run out.
4. Remove the bonnet by lifting it straight up with a hoist. Attach the hoist by either a double cable hoisting sling under the bonnet or by the lifting rings attached to the packing flange stud bolts or on the 5” yoke bosses to two yoke stud bolts 180° apart.
5. Caution must be used when lifting the bonnet to ensure that it clears the body and stud bolts completely. Any damage to the seating surface will compromise future sealing ability
6. To prevent damage to the seating surface, place the bonnet-valve plug assembly on a wooden or cushioned surface.

<u>Replacing the Plug Stem or Load Ring</u>

1. Unscrew the locknuts from the stem.
2. Loosen the packing flange nuts.
3. Lean the bonnet over.
4. Draw the plug and stem out of the bonnet.
5. If valve plug is damaged it will be necessary to replace both the valve plug and stem. If the stem is damaged, a new valve stem can be inserted in the original valve plug.

<u>Replacing the Stem</u>

1. Remove the old groove pin
2. Remove the old stem, and replace with new stem.
3. Tighten the new stem until the thread bottoms out against the plug.
4. Drill through the stem using the hole in the valve plug as guide. Remove any chips or burrs and drive in a new groove pin to lock the assembly. Refer to Table 1 for groove pin drill sizes.

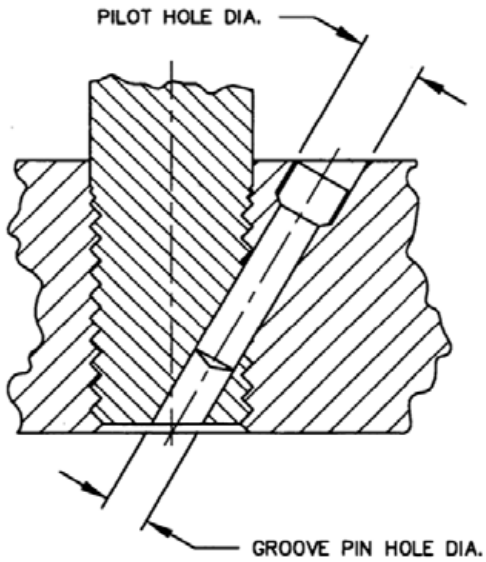



**Figure 2: Groove Pin Pilot Holes**

**Table 1: 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 |
| 3/4 | 19.1 | 237-339 | 175-250 | 3/16 |
| 1 | 25.4 | 420-481 | 310-355 | 1/4 |

**Note:** Use a new groove pin when installing a new stem. Vibration may loosen the stem if using an old groove pin.

## Assembly

1. Ensure all gasket surfaces are clean.
2. Replace the valve plug piston ring or seal ring with a new ring.
3. Assembly for design:
   3.1. "CVS ED" Design Bodies:
   For valve bodies using a carbon filled TFE piston ring, at the split, slightly spread the ring and install it over the stem and into 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 i.e.) edge of a table. Ensure the broken ends are re-matched when the piston ring is installed in the piston ring groove.

   3.2. "CVS ET" Design Bodies:
   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 procedure may make the seal ring seem loose in the groove, however it will contract to its original size after installation of the cage.

4. Replace the seat ring gasket, and install the seat ring. If using a composition seat (TFE), assemble it by placing the TFE disc onto the disc retainer and then sliding this assembly over the disc seat.
5. Place the cage onto the seat ring. Any rotational orientation of the cage with respect to the valve body is acceptable.
6. To ensure a good seal, clean all sealing surfaces and examine surfaces for nicks and scratches. Place the bonnet gasket in position.
7. Slide the valve plug assembly in the cage, and then position the load ring on top of the cage.
8. Place the bonnet on the body ensuring that the pipe plug (or lubricator) is on the downstream side of the body.
9. Using good bolting practices, bolt the bonnet to the body. Lubricate the studs and nuts using good quality lubrication. Tighten the bolts alternately. Correct tightening of the bonnet bolts accomplishes two objectives.
   9.1. To compress the bonnet gasket to form a seal with the body joint.
   9.2. Bolt loads are transmitted to the cage through the load ring, which creates a sealing load for the seat ring gasket.
10. Mount the actuator to the bonnet and make up the stem connection. Refer to "Making Up the Stem Connection" for proper procedure.

## Packing Lubrication

The use of semi-metallic packing requires the use of a lubricator or lubricator/isolating valve (Figure 3). The lubricator or lubricator/isolating valve is mounted in place of pipe plug (Figure 3, Key 15). For standard service up to 450°F, use Dow Corning lubricant or equivalent. Do not lubricate packing used in oxygen service.

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

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

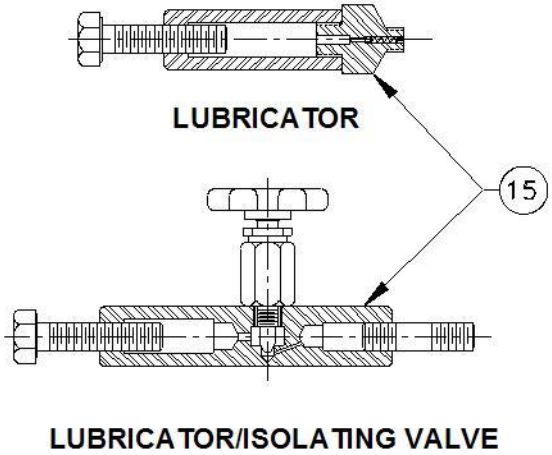



**Figure 3: Lubricator and Lubricator/Isolating Valve**

## Replacing TFE V-Ring Packing

1. After the stem and valve plug have been detached from the bonnet, the following parts can be removed:
   1.1. Packing nuts
   1.2. Packing flange
   1.3. Wiper ring
   1.4. Packing follower
2. The old packing can be removed by one of two methods:
   2.1. Remove the packing by pushing it out using a rod inserted through bottom of the bonnet.
   2.2. Use a packing hook to remove the packing. **Note:** To avoid damaging the packing box walls use caution.
3. Clean the packing box bore, and all metal parts. Complete all required maintenance.
4. Slide the valve plug into the cage already in the valve body, install the load ring on the cage, and use a new bonnet gasket. Mount the bonnet to the valve body.
5. Complete the installation of the packing as illustrated in Figure 4.

   **Note: Extra caution should be taken not to damage the packing during the installation process.**

6. Replace the packing flange (Key 27); tighten the packing flange nuts (Key 29) until shoulder of packing follower (Key 30) is approximately 5/8" from the top of the bonnet. If leakage is detected around the packing follower, tighten the packing flange nuts until leakage stops.
7. For graphite packing, tighten the packing flange nuts to the maximum torque value in Table 3. Then back off the nuts and retighten them to the minimum torque value in Table 3.
8. For other Packing Types, in small equal increments tighten the flange nuts until one of the nuts reach the minimum torque shown in Table 3. Then tighten the other nut until the packing flange is level.
9. Mount the actuator and set the stem connector to the required travel. Refer to "Making Up the Stem Connection" procedure.

**Table 2: Body to Bonnet Torque**

| Valve Size | Bolt Torques | | | |
|---|---|---|---|---|
| | SA 193-B7, B8M[a] | | SA-193-B8M[b] | |
| | N•m | Lbf•ft | N•m | Lbf•ft |
| 8 | 746 | 550 | 529 | 390 |

a – Strain Hardened
b - Annealed

**Table 3: Torque Values for Packing Flange Nuts**

| Valve Stem Diameter | | ANSI Rating | PTFE Type Packing | | | | Graphite Type Packing | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Min. Torque | | Max. Torque | | Min. Torque | | Max. Torque | |
| Inches | Mm | | Lbf-in | N•m | Lbf-in | N•m | Lbf-in | N•m | Lbf-in | N•m |
| 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 |

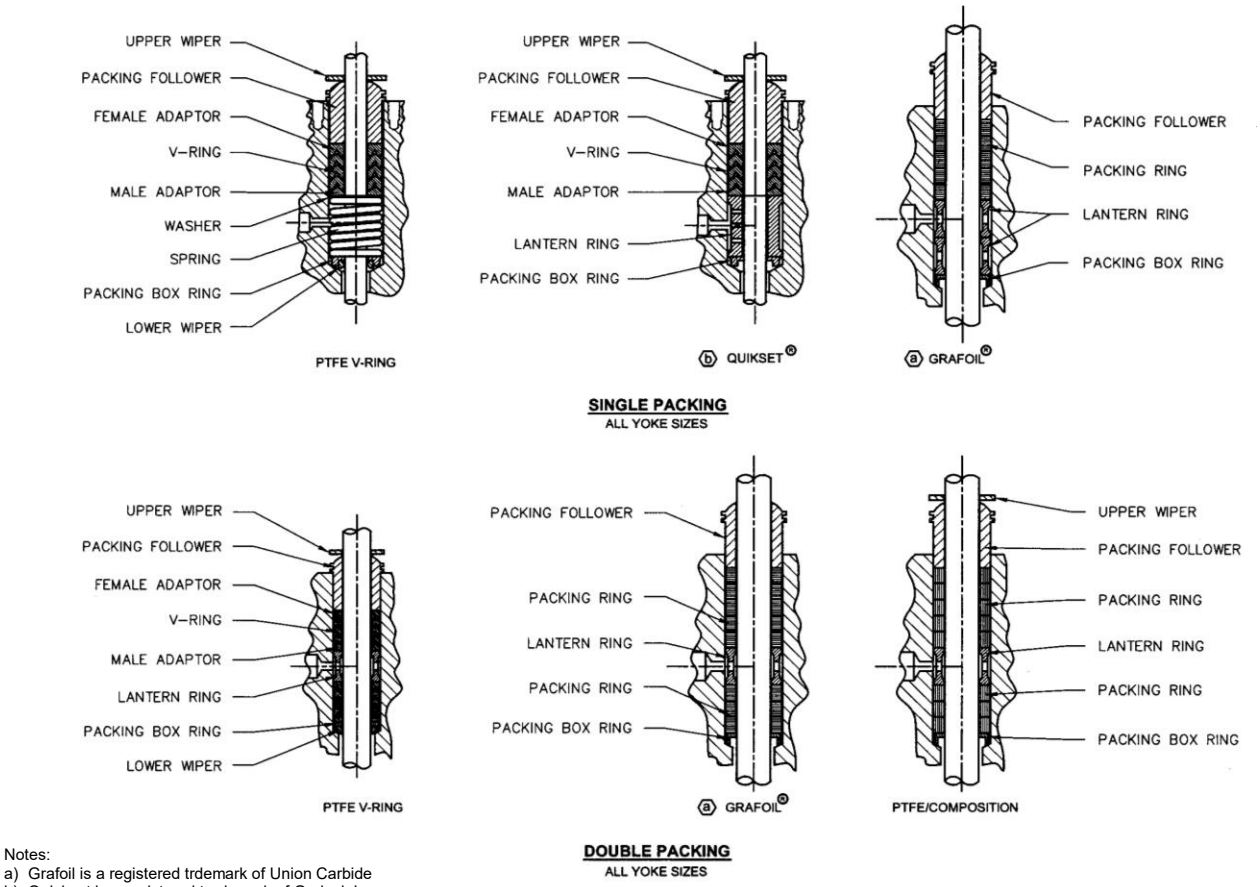
## Lapping Metal Seats

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 surfaces 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 bottom of 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 bonnet, clean the seating surfaces, reassemble, and then test for shutoff. If leakage is still excessive, repeat lapping procedure.




Notes:
a) Grafoil is a registered trdemark of Union Carbide
b) Quickset is a registered trademark of Garlock Inc.

**Figure 4: Packing Arrangements**

## Making Up the Stem Connection

**Direct-Acting Actuators**

1. Move the valve plug to the closed position.
2. Thread the actuator stem locknuts to the bottom of the plug stem threads. Position the travel indicator disc, cupped edge downward, over the stem. Apply enough spring force to the actuator stem to ensure the actuator is in the “full up” position.
3. Move the actuator stem to the full downward position by applying full loading pressure to the diaphragm case. Measure the distance between the lower end of the actuator stem and the travel indicator disc on the stem locknuts.
4. Slowly decrease the load on the actuator, allowing the stem to rise up approximately by 1/8”. Using the two-piece stem connector and cap screws, secure the actuator stem and valve plug stem together.
5. Place the travel indicator disc against the bottom of the stem connector. Secure the disc in place with the upper locknut. Adjust the travel indicator scale so it reads “closed.”
6. Relieve the diaphragm loading pressure and check for sufficient travel. i.e.) Movement of valve plug to the fully “Open” position. Tighten the lower stem locknut against the upper locknut. The connection is now complete.

To increase desired length of travel:

a. Loosen both stem locknuts away from the stem connector by approximately 1/4” and then tighten them together.
b. This adjustment will allow a wrench to be used on the locknuts to screw the valve plug stem to the desired position.
c. *Caution:* ensure that the valve plug is not seated while being rotated. Do not exceed the 1/8” adjustment made in Step 4.
d. Retighten the stem connector and locknuts after adjustment.
e. Reposition the travel indicator scale to reflect the change.

## Making Up the Stem Connection

**Reverse-Acting Actuators**

1. Close the valve plug ensuring the valve plug is on the seat.
2. Supply enough spring force to the actuator stem to ensure the actuator is in full “Down” position. Increase the loading pressure to the diaphragm case to allow the actuator stem to rise sufficiently so the locknuts can be screwed onto the valve plug stem. Thread the locknuts down on the valve plug stem as far as possible. Set the travel indicator on the locknuts, “cupped” edge downward.
3. Slowly release the pressure in the diaphragm case, allowing the actuator to return to the full down position. Measure the distance between the lower end of the actuator stem and the travel indicator disc.
4. Increase the load on the actuator, causing the stem to rise up by approximately 1/8”. Using the two-piece stem connector and cap screws, secure the actuator stem and valve plug stem together.
5. Move the travel indicator disc against the bottom of the stem connector.
6. Secure the disc with the upper locknut. Change the travel indicator scale so that it reads closed.
7. Open the valve plug by increasing the diaphragm loading pressure. Secure the lower stem locknut against the upper locknut. The connection is now complete.
8. To increase travel see “To increase desired length of travel” instructions.

# 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.

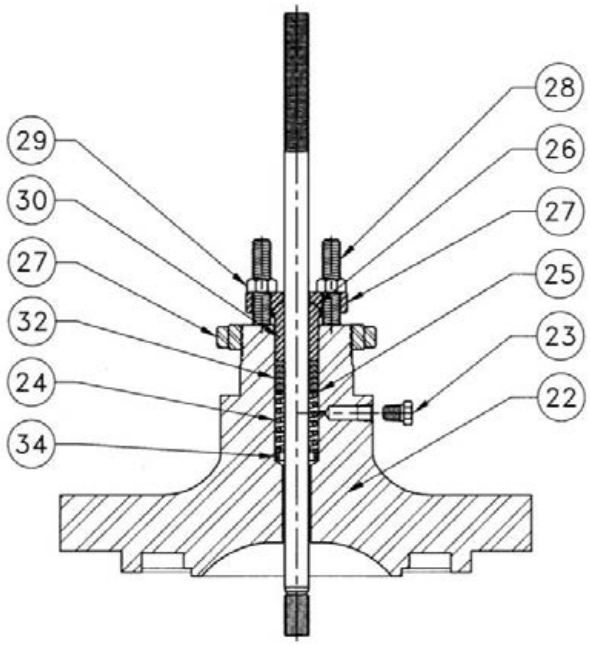
# CVS Series E 8-inch Globe Valves

## Parts Reference

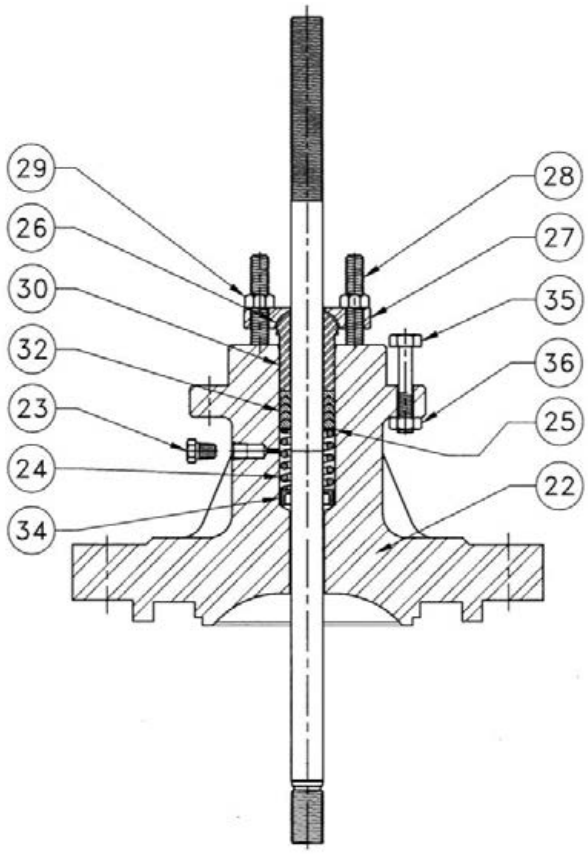
| Key | Part Name |
|---|---|
| 1 | Valve Plug Stem |
| 2 | Body |
| 3 | Bonnet Gasket |
| 4 | Load Ring |
| 5 | Groove Pin |
| 6 | Valve Plug |
| 7 | Seat Ring |
| 8 | Flow Arrow |
| 9 | Hex Nut |
| 10 | Stud Bolt or Cap Screw |
| 11 | Piston Ring (Design ED Only) |
| 13 | Cage |

| Key | |
|---|---|
| 14 | Seat Ring Gasket |
| 15 | Pipe Plug |
| 16 | Drive Screw |
| 17 | Disc Retainer (Soft Seat Only) |
| 18 | Disc Seat (Soft Seat Only) |
| 19 | Seal Ring (Design ET Only) |
| 20 | Disc (Soft Seat Only) |
| 21 | Packing Ring |
| 22 | Bonnet |
| 23 | Pipe Plug |
| 24 | Packing Spring / Lantern Ring |
| 25 | Special Washer |

| Key | Part Name |
|---|---|
| 26 | Upper Wiper |
| 27 | Packing Flange |
| 28 | Stud |
| 29 | Nut |
| 30 | Packing Follower |
| 31 | Locknut (3-9/16” Yoke Boss Only) |
| 32 | Packing Set |
| 33 | Pipe Plug |
| 34 | Packing Box Ring |
| 35 | Cap Screw (5” Yoke Boss Only) |
| 36 | Nut (5” Yoke Boss Only) |

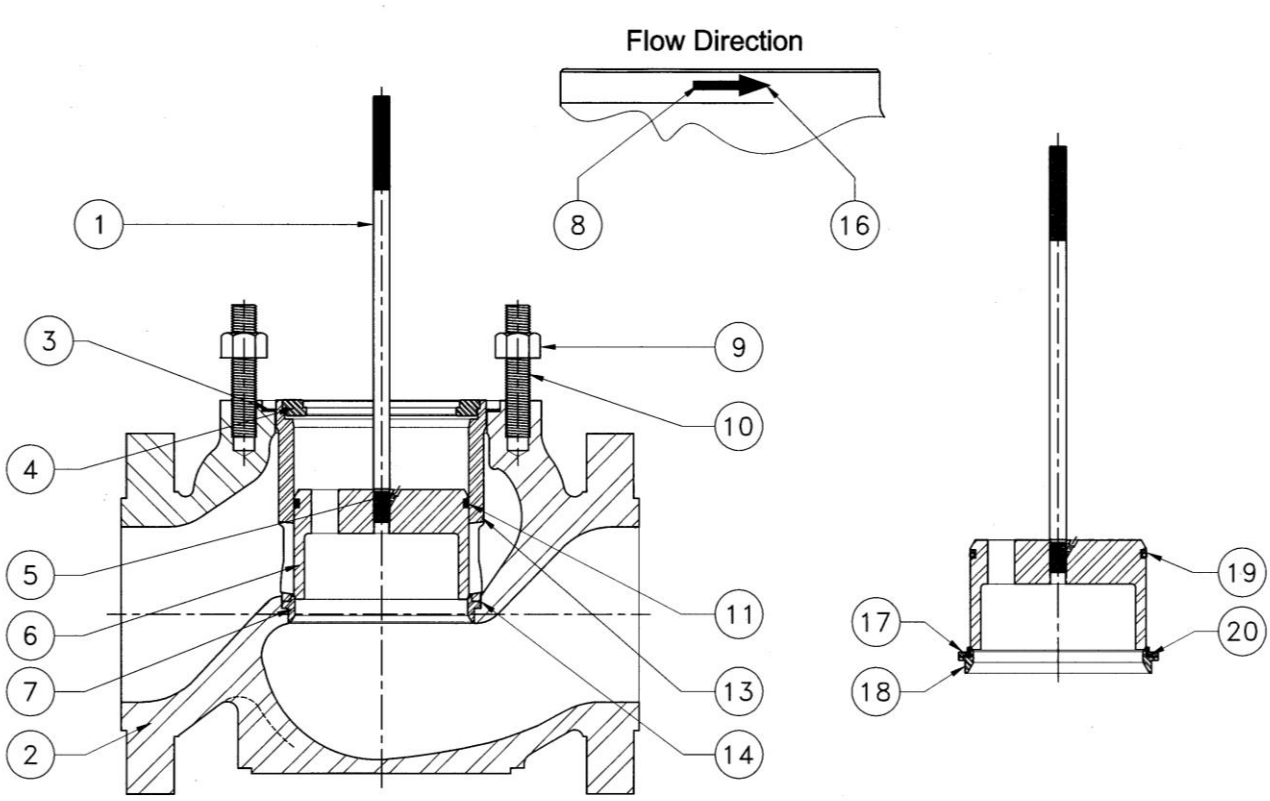



Standard Bonnet
3-9/16” Yoke Boss, 3/4” Stem




Extension Bonnet
5” Yoke Boss, 1” Stem

**Figure 5: Bonnet Assemblies, CVS Series E 8” Globe Valves,**




CVS Design "ED" Construction
Metal Seat Ring

CVS Design "ET" Construction
Soft Seat Ring

**Figure 6: Body Assemblies, CVS Series E 8" Globe Valves,**

# CVS Series E 8-inch Globe Valves

## Parts Reference

| Key | Description | | | Part Number |
|---|---|---|---|---|
| 1 | Valve Plug Stem, 316 SST | | | See Following Table |
| 2 | Valve Body | | | See Following Table |
| 3 | Bonnet Gasket | Metal Seat | -425ºF to 800ºF (-254ºC to 427ºC), material | CVS10A3265X012 |
| | | | Over 800ºF (427ºC), Laminated Graphite | CVS10A3265X022 |
| | | Composition Seat, Nitrile | | CVS10A3265X032 |
| 4 | Load Ring | -150ºF to 600ºF (-101ºC to 316ºC), 17-4PH SST | | CVS20A3267X012 |
| | | -425ºF to 1100ºF (-254ºC to 593ºC), Inconel 718 | | CVS20A3267X022 |
| | | -400ºF to 500ºF (-240ºC to 260ºC), Corrosive Service, K Monel | | CVS20A3268X012 |
| 5 | Groove Pin, 316 SST | 3/4" VSC (19.1 mm) | | CVS1V326035072 |
| | | 1" VSC (25.4 mm) | | CVS1V334035072 |
| 6 | Valve Plug | | | See Following Table |
| 7 | Seat Ring | 416 SST | | CVS20A3260X012 |
| | | Alloy 6 | | CVS20A3260X152 |
| 8 | Flow Arrow, SST | | | CVS1V106038982 |
| 9 | Hex Nut, Steel (16 req'd), Steel Bodies Only | | | CVS1A445224072 |
| 10 | Stud Bolt, Steel (16 req'd) | | | CVS1D945231012 |

| Key | Description | | | Part Number |
|---|---|---|---|---|
| 11 | Piston Ring, Graphite, Design ED Only | Non-Oxidizing Service | | CVS10A3262X012 |
| | | Oxidizing Service | | CVS10A3262X022 |
| 13 | Cage | Equal Percentage | 17-PH SST | CVS20A3245X012 |
| | | | 316 SST Ni Coated | CVS20A5467X012 |
| | | | 316 SST CR PL | CVS20A4348X012 |
| | | Linear | 17-PH SST | CVS20A3247X012 |
| | | | 316 SST Ni Coated | CVS20A5468X012 |
| | | | 316 SST CR PL | CVS20A4349X012 |
| | | Quick Opening | 17-PH SST | CVS20A3249X012 |
| | | | 316 SST Ni Coated | CVS20A5469X012 |
| | | | 316 SST CR PL | CVS20A4350X012 |
| 14 | Seat Ring, Gasket, Metal Seat | Metal Seat | -425ºF to 800ºF (-254ºC to 427ºC), material | CVS10A3266X012 |
| | | | Over 800ºF (427ºC), Laminated Graphite | CVS10A3266X022 |
| | | Composition Seat, Nitrile | | CVS10A3266X032 |
| 15 | Pipe Plug | Steel (LCC & WCB Bodies) | | CVS1A771528992 |
| | | 316 SST (316 SST Bodies) | | CVS1A771535072 |
| 16 | Drive Screw (2 req'd), CD PL Steel | | | CVS1A368228982 |
| 17 | Disc Retainer, 316 SST, Composition Seats Only | | | CVS10A4466X012 |
| 18 | Disc Seat, 316, Composition Seats Only | | | CVS20A4467X012 |
| 19 | Seal Ring, TFE, Spring Loaded, -100ºF to 450ºF (-73ºC to 232ºC), Design ET Only | | | CVS10A3261X012 |
| 20 | Disc, TFE, -70ºF to 400ºF (-57ºC to 204ºC), Composition Seats Only | | | CVS20A4468X012 |
| 21 | Packing Ring | Graphite (2 req'd) | 3/4" Stem (19.1 mm) | CVS1D749001052 |
| | | | 1" Stem (25.4 mm) | CVS1D751801052 |
| | | TFE (8 req'd) | 3/4" Stem (19.1 mm) | CVS1E319101042 |
| | | | 1" Stem (25.4 mm) | CVS1D7518X0012 |
| | | Laminated Graphite (4 req'd) | 3/4" Stem (19.1 mm) | CVS1V239601652 |
| | | | 1" Stem (25.4 mm) | CVS1U676801652 |
| 22 | Bonnet | | | See Following Table |
| 23 | Pipe Plug (Tapped Extension Bonnets Only) | | Steel (Steel Bonnets) | CVS1A767524662 |
| | | | 316 SST (316 SST Bonnets) | CVS1A767535072 |
| 24 | Spring, 316 SST (TFE V-Ring Packing Only) | | 3/4" Stem (19.1 mm) | CVS1F125637012 |
| | | | 1" Stem (25.4 mm) | CVS1D582937012 |
| | Lantern Ring, 316 SST (Laminated Graphite Packing, 2 req'd, Other Packing, 1 req'd) | | 3/4" Stem (19.1 mm) | CVS0N028435072 |
| | | | 1" Stem (25.4 mm) | CVS0U099735072 |
| 25 | Special Washer, 316 SST (TFE V-Ring Packing Only) | | 3/4" Stem (19.1 mm) | CVS1F125036042 |
| | | | 1" Stem (25.4 mm) | CVS1H982236042 |
| 26 | Upper Wiper, Felt (Not req'd for Laminated Graphite Packing) | | 3/4" Stem (19.1 mm) | CVS1J872806332 |
| | | | 1" Stem (25.4 mm) | CVS1J872906332 |
| 27 | Packing Flange, Steel | | 3/4" Stem (19.1 mm) | CVS1E944823072 |
| | | | 1" Stem (25.4 mm) | CVS0V002425052 |
| 28 | Stud, Steel (2 req'd) | | 3/4" Stem (19.1 mm) | CVS1E944931032 |
| | | | 1" Stem (25.4 mm) | CVS0V002531032 |
| 29 | Nut, Steel (2 req'd) | | 3/4" Stem (19.1 mm) | CVS1E944624112 |
| | | | 1" Stem (25.4 mm) | CVS1L692124112 |
| 30 | Packing Follower, 316 SST | | 3/4" Stem (19.1 mm) | CVS1E944735072 |
| | | | 1" Stem (25.4 mm) | CVS1H982335072 |
| 31 | Locknut, Steel (3-9/16" Yoke Boss Only) | | | CVS1E832723062 |
| 32 | Packing Set, TFE V-Ring (Includes male adaptor, female adaptor, lower wiper and three packing rings) | | 3/4" Stem (19.1 mm) | CVS1R290401012 |
| | | | 1" Stem (25.4 mm) | CVS1R290601012 |
| 33 | Pipe Plug | | Steel (Steel Bonnets) | CVS1A767524662 |
| | | | 316 SST (316 SST Bonnets) | CVS1A767535072 |
| 34 | Packing Box Ring, 17-4PH SST | | 3/4" Stem (19.1 mm) | CVS1J873335012 |
| | | | 1" Stem (25.4 mm) | CVS1J873435012 |
| 35 | Cap Screw, Steel (8 req'd) (5" Yoke Boss only) | | | CVS1A936224052 |
| 36 | Nut, Steel (8 req'd) (5" Yoke Boss only) | | | CVS1A343324122 |

## Key 1: Valve Plug Stem

| Stem Size | | Valve Stem Connection | | Specifications | | | Part Number |
|---|---|---|---|---|---|---|---|
| In | mm | In | mm | | | | |
| 3/4 | 19.1 | 3/4 | 19.1 | Plain Bonnet, 19-3/8" Stem | | | CVS1K588035162 |
| | | | | Style 1 Extension Bonnet, 21" Stem | | | CVS1U928235162 |
| 1 | 25.4 | 1 | 25.4 | Style 1 Extension Bonnet | 657 Actuator | 2" Travel, 24-3/16" Stem | CVS1K7891X0012 |
| | | | | | | 3" Travel, 23-3/16" Stem | CVS10A3282X012 |
| | | | | | 667 Actuator, 2" – 3" Travel, 23-3/16" Stem | | CVS10A3282X012 |

## Key 2: Valve Body

| End Connection | | Steel (LCC) | Steel (WCB) | 316 SST |
|---|---|---|---|---|
| **Without Drain Plug Tapping** | | | | |
| RF Flg | 150 lb | CVS30A3224LX012 | CVS30A3224WX012 | CVS30A3224X062 |
| | 300 lb | CVS30A3225LX012 | CVS30A3225WX012 | CVS30A3225X062 |
| | 600 lb | CVS30A3226LX012 | CVS30A3226WX012 | CVS30A3226X062 |
| RTJ Flg | 150 lb | CVS30A3227LX012 | CVS30A3227WX012 | CVS30A3227X062 |
| | 300 lb | CVS30A3228LX012 | CVS30A3228WX012 | CVS30A3228X062 |
| | 600 lb | CVS30A3229LX012 | CVS30A3229WX012 | CVS30A3229X062 |
| Butt Weld | Sch 40 | CVS30A3222LX012 | CVS30A3222WX012 | CVS30A3222X062 |
| | Sch 80 | CVS30A3223LX012 | CVS30A3223WX012 | CVS30A3223X062 |
| **With Drain Plug Tapping** | | | | |
| RF Flg | 150 lb | CVS30A3232LX012 | CVS30A3232WX012 | CVS30A3232X062 |
| | 300 lb | CVS30A3233LX012 | CVS30A3233WX012 | CVS30A3233X062 |
| | 600 lb | CVS30A3234LX012 | CVS30A3234WX012 | CVS30A3234X062 |
| RTJ Flg | 150 lb | CVS30A3235LX012 | CVS30A3235WX012 | CVS30A3235X062 |
| | 300 lb | CVS30A3236LX012 | CVS30A3236WX012 | CVS30A3236X062 |
| | 600 lb | CVS30A3237LX012 | CVS30A3237WX012 | CVS30A3237X062 |
| Butt Weld | Sch 40 | CVS30A3230LX012 | CVS30A3230WX012 | CVS30A3230X062 |
| | Sch 80 | CVS30A3231LX012 | CVS30A3231WX012 | CVS30A3231X062 |

## Key 6: Valve Plug

| Stem Size | | Valve Stem Connection | | Material | | |
|---|---|---|---|---|---|---|
| In | mm | In | mm | 416 SST Hardened | 316 SST | 316 SST Hard Faced Seat & Guide |
| 3/4 | 19.1 | 3/4 | 19.1 | CVS21A5356X012 | CVS21A5356X022 | CVS21A5362X012 |
| 1 | 25.4 | 1 | 25.4 | CVS21A5356X012 | CVS21A5357X022 | CVS21A5363X012 |

## Key 22 Bonnet, Same material as body

| Material | Style | | 3-9/16" Yoke Boss 3/4" Stem | 5" Yoke Boss 1" Stem |
|---|---|---|---|---|
| Steel | Plain | | CVS30A5471X012 | --- |
| | Style 1 Extension | Tapped | CVS30A3279X012 | CVS30A3280X012 |
| | | Untapped | CVS30A3270X012 | CVS30A3274X012 |
| 316 SST | Style 1 Extension | Tapped | CVS30A3279X062 | CVS30A3280X062 |
| | | Untapped | CVS30A3270X062 | CVS30A3274X062 |

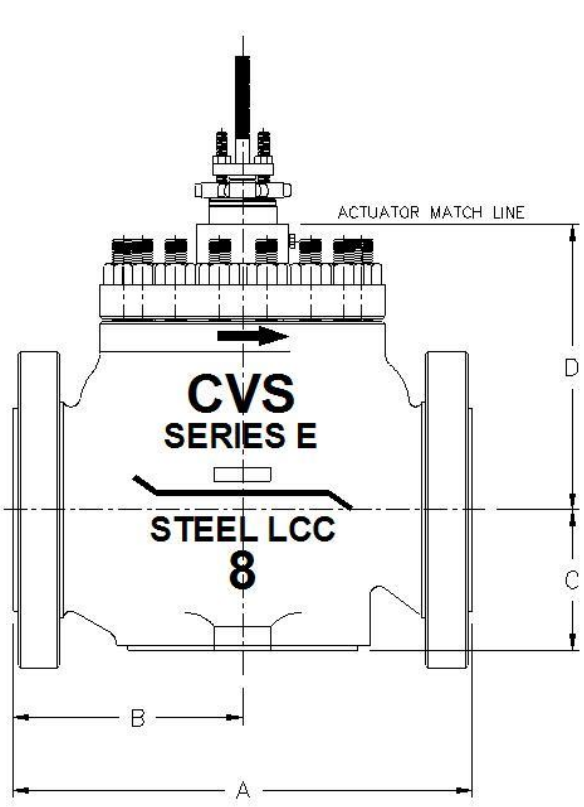
# CVS Series E 8-inch Globe Valves

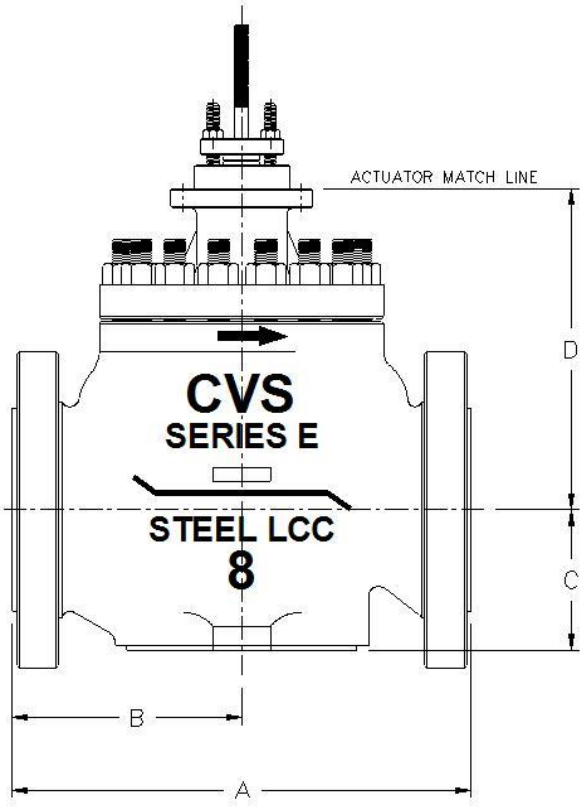
## Dimensional Data

### End Connection Style

| VALVE SIZE | | DIMENSION "A*" | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 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 |
| **8** | **203** | 21.38 | 543 | 21.88 | 556 | 22.38 | 568 | 23.00 | 584 | 24.00 | 610 | 24.12 | 613 |
| * – Dimension B=DimA/2 | | | | | | | | | | | | | |

| VALVE SIZE | | DIMENSION "D" STANDARD BONNET | | DIMENSION "D" EXTENSION BONNET | | DIMENSION "C" Max | |
|---|---|---|---|---|---|---|---|
| | | STEM DIAMETER | | STEM DIAMETER | | | |
| In | mm | 3/4 | 19.1 | 3/4 | 19.1 | Inch | mm |
| | | Inch | mm | Inch | mm | | |
| 8 | 203 | 14.75 | 375 | 16.56 | 421 | 7.50 | 191 |




**Approximate shipping weight: 408kg (900lbs)**

## Flow Coefficients

### Quick Opening - CVS Design ED

| Valve Size, NPS | Port Diameter | | Maximum Travel | | Flow Coefficient | $C_V$ for .25 Inch (6mm) Travel | Valve Opening–Percent of Total Travel | | | | | | | | | | FL(1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inches | mm | Inches | mm | | | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | |
| 8 | 8 | 203.2 | 2 | 51 | Cv | 108 | 80.3 | 188 | 290 | 389 | 480 | 554 | 615 | 658 | 705 | 744 | 0.87 |
| | | | | | Kv | 93.4 | 69.5 | 163 | 251 | 336 | 415 | 479 | 532 | 569 | 610 | 644 | --- |
| | | | | | Xt | 0.653 | 0.670 | 0.628 | 0.679 | 0.731 | 0.766 | 0.806 | 0.829 | 0.859 | 0.863 | 0.866 | --- |
| 8 | 8 | 203.2 | 3 | 76 | Cv | 108 | 135 | 291 | 434 | 551 | 639 | 706 | 759 | 807 | 841 | 863 | 0.85 |
| | | | | | Kv | 93.4 | 117 | 252 | 375 | 477 | 553 | 611 | 657 | 698 | 727 | 746 | --- |
| | | | | | Xt | 0.653 | 0.643 | 0.699 | 0.757 | 0.807 | 0.838 | 0.861 | 0.857 | 0.841 | 0.838 | 0.827 | --- |
| | | | | | Fd | --- | 0.19 | 0.24 | 0.26 | 0.27 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.27 | --- |

1. At 100% travel

### Linear – CVS Design ED

| Valve Size, NPS | Port Diameter | | Maximum Travel | | Flow Coefficient | Valve Opening–Percent of Total Travel | | | | | | | | | | FL(1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inches | mm | Inches | mm | | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | |
| 8 | 8 | 203.2 | 2 | 51 | Cv | 60.2 | 129 | 206 | 285 | 363 | 444 | 526 | 581 | 640 | 688 | 0.87 |
| | | | | | Kv | 52.1 | 112 | 178 | 247 | 314 | 384 | 455 | 503 | 554 | 595 | --- |
| | | | | | Xt | 0.7404 | 0.721 | 0.657 | 0.651 | 0.683 | 0.713 | 0.740 | 0.801 | 0.821 | 0.839 | --- |
| 8 | 8 | 203.2 | 3 | 76 | Cv | 91.4 | 207 | 325 | 440 | 550 | 639 | 711 | 760 | 795 | 846 | 0.87 |
| | | | | | Kv | 79.1 | 179 | 281 | 381 | 476 | 553 | 615 | 657 | 688 | 732 | --- |
| | | | | | Xt | 0.651 | 0.624 | 0.677 | 0.746 | 0.786 | 0.803 | 0.823 | 0.836 | 0.843 | 0.807 | --- |
| | | | | | Fd | 0.23 | 0.28 | 0.30 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 | --- |

1. At 100% travel.

## Flow Coefficients

### Equal Percent – CVS Design ED, Flow Down

| Valve Size, NPS | Port Diameter | | Maximum Travel | | Flow Coefficient | Valve Opening–Percent of Total Travel | | | | | | | | | | FL[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inches | mm | Inches | mm | | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | |
| **8** | 8 | 203.2 | 2 | 51 | Cv | 18.5 | 38.0 | 58.4 | 86.7 | 130 | 189 | 268 | 371 | 476 | 567 | 0.85 |
| | | | | | Kv | 16.0 | 32.9 | 50.5 | 75.0 | 112 | 163 | 232 | 321 | 412 | 490 | --- |
| | | | | | Xt | 0.727 | 0.623 | 0.600 | 0.588 | 0.580 | 0.587 | 0.599 | 0.611 | 0.671 | 0.725 | --- |
| **8** | 8 | 203.2 | 3 | 76 | Cv | 27.0 | 58.1 | 105 | 188 | 307 | 478 | 605 | 695 | 761 | 818 | 0.86 |
| | | | | | Kv | 23.4 | 50.3 | 90.8 | 163 | 266 | 413 | 523 | 601 | 658 | 708 | --- |
| | | | | | Xt | 0.644 | 0.654 | 0.636 | 0.611 | 0.643 | 0.15 | 0.725 | 0.809 | 0.804 | 0.807 | --- |
| | | | | | Fd | 0.28 | 0.26 | 0.23 | 0.20 | 0.17 | 0.22 | 0.24 | 0.25 | 0.25 | 0.26 | --- |

1. At 100% travel.

### Noise Abatement 1 – Flow Up, CVS Design ED — Linear Characteristic

| Valve Size, NPS | Port Diameter | | Maximum Travel | | Flow Coefficient | Valve Opening–Percent of Total Travel | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inches | mm | Inches | mm | | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| **8** | 8 | 203.2 | 3[1] | 76[1] | Cv | 100 | 226 | 337 | 436 | 502 | 581 | 641 | 655 | 659 | 681 |
| | | | | | Kv | 86.5 | 195 | 292 | 377 | 434 | 503 | 554 | 567 | 570 | 589 |
| | | | | | Xt | 0.456 | 0.490 | 0.470 | 0.427 | 0.452 | 0.468 | 0.521 | 0.624 | 0.703 | 0.701 |
| **8** | 8 | 203.2 | 4 | 102 | Cv | 142 | 303 | 428 | 542 | 611 | 652 | 669 | 689 | 700 | 726 |
| | | | | | Kv | 123 | 262 | 370 | 469 | 529 | 564 | 579 | 596 | 606 | 628 |
| | | | | | Xt | 0.549 | 0.450 | 0.436 | 0.441 | 0.513 | 0.624 | 0.707 | 0.709 | 0.729 | 0.718 |

1. Travel is limited to 2.75 in with a Class IV CVS ED valve plug.

## Flow Coefficients

### Quick Opening - CVS Design ET

| Valve Size, NPS | Port Diameter | | Maximum Travel | | Flow Coefficient | $C_V$ for .25 Inch (6mm) Travel | Valve Opening–Percent of Total Travel | | | | | | | | | | FL[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inches | mm | Inches | mm | | | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | |
| **8** | 8 | 203.2 | 2 | 51 | Cv | 108 | 80.3 | 188 | 290 | 389 | 480 | 554 | 615 | 658 | 705 | 744 | 0.87 |
| | | | | | Kv | 93.4 | 69.5 | 163 | 251 | 336 | 415 | 479 | 532 | 469 | 610 | 644 | --- |
| | | | | | Xt | 0.653 | 0.670 | 0.628 | 0.679 | 0.731 | 0.766 | 0.806 | 0.829 | 0.859 | 0.863 | 0.866 | --- |
| **8** | 8 | 203.2 | 3 | 76 | Cv | 108 | 135 | 291 | 434 | 551 | 639 | 706 | 759 | 807 | 841 | 863 | 0.85 |
| | | | | | Kv | 93.4 | 117 | 252 | 375 | 477 | 553 | 611 | 657 | 698 | 727 | 746 | --- |
| | | | | | Xt | 0.653 | 0.643 | 0.699 | 0.757 | 0.807 | 0.838 | 0.861 | 0.857 | 0.841 | 0.838 | 0.827 | --- |
| | | | | | Fd | --- | 0.19 | 0.24 | 0.26 | 0.27 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.27 | --- |

1. At 100% travel

### Linear – CVS Design ET

| Valve Size, NPS | Port Diameter | | Maximum Travel | | Flow Coefficient | Valve Opening–Percent of Total Travel | | | | | | | | | | FL[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inches | mm | Inches | mm | | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | |
| **8** | 8 | 203.2 | 2 | 51 | Cv | 60.2 | 129 | 206 | 285 | 363 | 444 | 526 | 581 | 640 | 688 | 0.87 |
| | | | | | Kv | 52.1 | 112 | 178 | 247 | 314 | 384 | 455 | 503 | 554 | 595 | --- |
| | | | | | Xt | 0.704 | 0.721 | 0.657 | 0.651 | 0.683 | 0.713 | 0.740 | 0.801 | 0.821 | 0.839 | --- |
| **8** | 8 | 203.2 | 3 | 76 | Cv | 91.4 | 207 | 325 | 440 | 550 | 639 | 711 | 760 | 795 | 846 | 0.87 |
| | | | | | Kv | 79.1 | 179 | 281 | 381 | 476 | 553 | 615 | 657 | 688 | 732 | --- |
| | | | | | Xt | 0.651 | 0.624 | 0.677 | 0.746 | 0.786 | 0.803 | 0.823 | 0.836 | 0.843 | 0.807 | --- |
| | | | | | Fd | 0.23 | 0.28 | 0.30 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 | --- |

1. At 100% travel.

## Flow Coefficients

### Equal Percent – CVS Design ET

| Valve Size, NPS | Port Diameter | | Maximum Travel | | Flow Coefficient | Valve Opening–Percent of Total Travel | | | | | | | | | | FL(1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inches | mm | Inches | mm | | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | |
| 8 | 8 | 203.2 | 2 | 51 | Cv | 18.5 | 38.0 | 58.4 | 86.7 | 130 | 189 | 268 | 371 | 476 | 567 | 0.85 |
| | | | | | Kv | 16.0 | 32.9 | 50.5 | 75.0 | 112 | 163 | 232 | 321 | 412 | 490 | --- |
| | | | | | Xt | .0727 | 0.623 | 0.600 | 0.588 | 0.580 | 0.587 | 0.599 | 0.611 | 0.671 | 0.724 | --- |
| 8 | 8 | 203.2 | 3 | 76 | Cv | 27.0 | 58.1 | 105 | 188 | 307 | 478 | 605 | 695 | 761 | 818 | 0.86 |
| | | | | | Kv | 23.4 | 50.3 | 90.8 | 163 | 266 | 413 | 523 | 601 | 658 | 708 | --- |
| | | | | | Xt | 0.644 | 0.654 | 0.636 | 0.611 | 0.643 | 0.615 | 0.725 | 0.809 | 0.804 | 0.807 | --- |
| | | | | | Fd | 0.28 | 0.26 | 0.23 | 0.20 | 0.17 | 0.22 | 0.24 | 0.25 | 0.25 | 0.26 | --- |

1. At 100% travel.

## Shutoff Classifications

| Series ET | | | Series ED | |
|---|---|---|---|---|
| Valve Design | Seating | Shutoff Class | Standard | Optional |
| All valve designs with the **exception** of Anti-Cav III cages | PTFE (standard) | IV Standard | Class II | Class III, Valves with Graphite |
| | | V (optional) | | |
| | Metal | IV | | |
| | | V (optional) | | |
| ET with Anti-Cav III Single Stage cage | Metal | IV Standard | | |
| | | V (optional) | | |
| ET with Anti-Cav III two stage cage | Metal | V | | |

**Flow Charcteristics**

- Linear, Quick Opening or Equal Percent

**Flow Directions**

- **Normally Down,** Linear, Quick Opening, Equal Percent
- **Always Up,** Noise Abatement
- **Always Down,** Anti-Cav

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May 2019
Printed in Canada