

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.

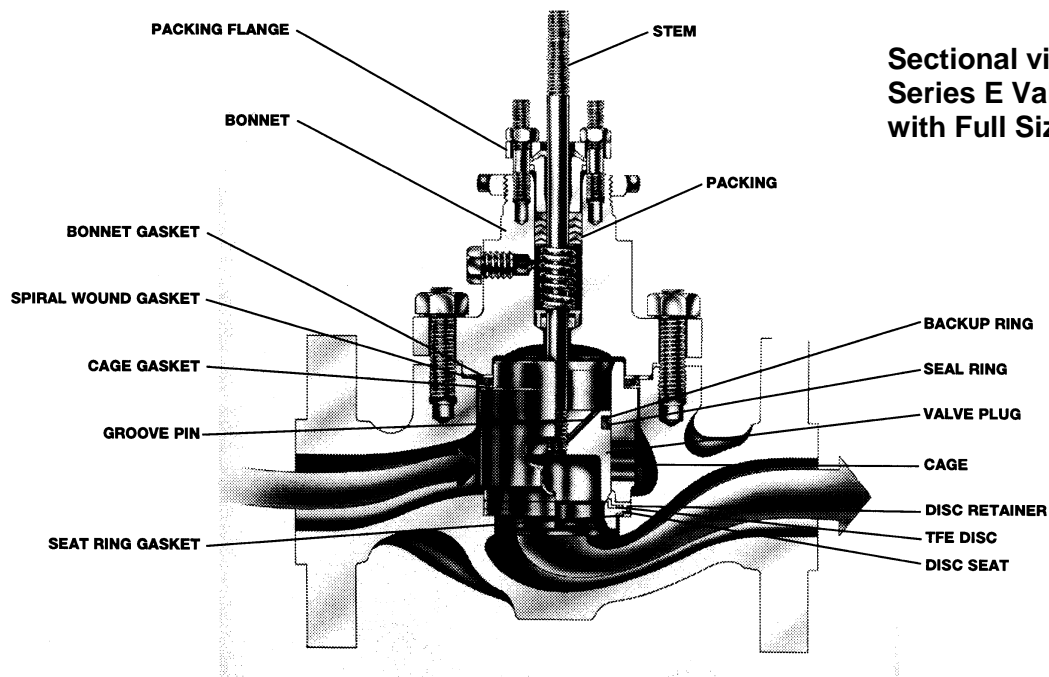


Figure 2:

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.

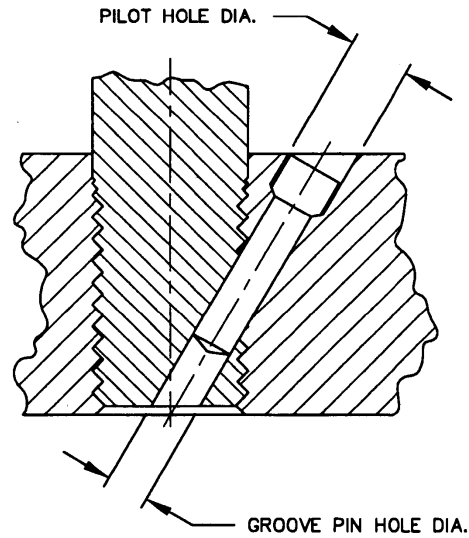


Table 3: Body to Bonnet Bolt Torques

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)

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

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.

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.

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

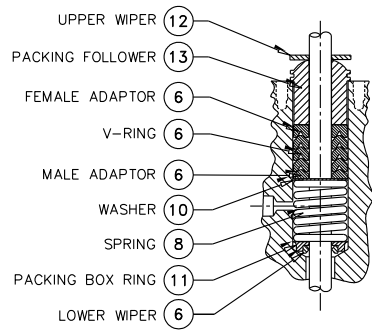
Lapping Metal Seats

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.

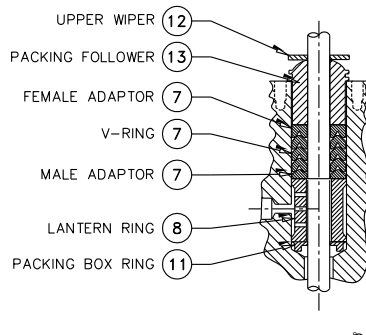
In order to position the cage and seat ring properly and to help align the valve plug with the seat ring, bolt the bonnet to the body with gaskets (the old gaskets can be used) in place during the lapping procedure. A simple handle can be made from a piece of metal secured to the valve stem with nuts. 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.

Table 4: Torque Values for Packing Flange Nuts

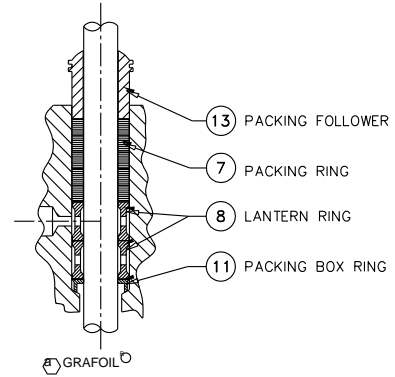
Valve Stem Diameter		ANSI Rating	PTFE Type Packing				Graphite Type Packing			
Inches	Mm		Min. Torque		Max. Torque		Min. Torque		Max. Torque	
			Lbf-in	N-m	Lbf-in	N-m	Lbf-in	N-m	Lbf-in	N-m
3/8	9.5	150	13	1	19	2	27	3	40	5
		300	17	2	26	3	36	4	53	6
		600	23	3	35	4	49	6	73	8
1/2	12.7	150	21	2	31	4	44	5	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

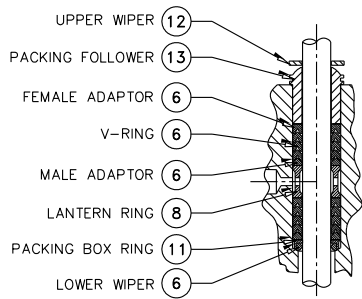


QUICKSET

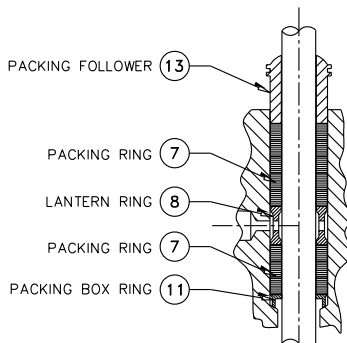


GRAFOIL

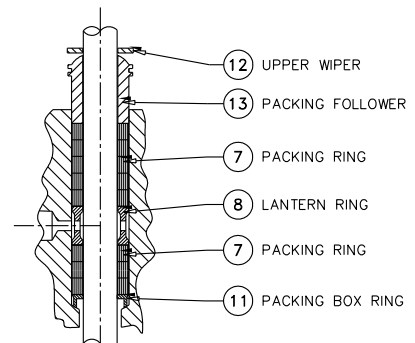
SINGLE PACKING
ALL YOKE SIZES



PTFE V-RING



GRAFOIL



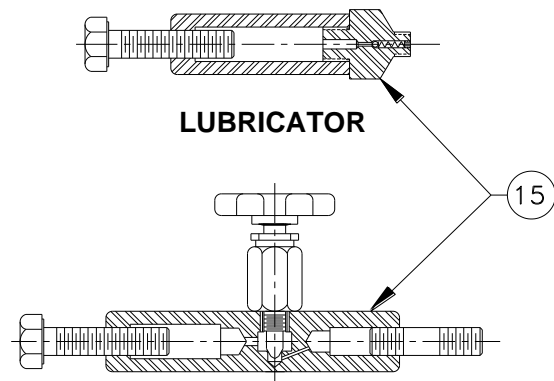
PTFE/COMPOSITION

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

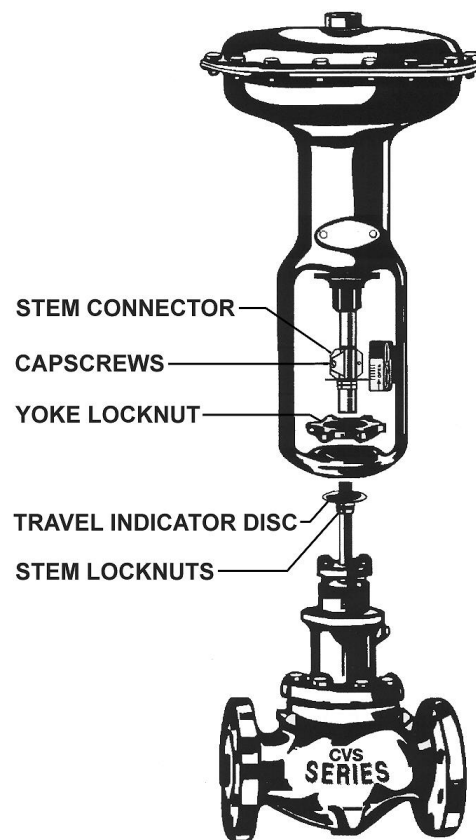


Figure 6: Actuator Mounting

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.

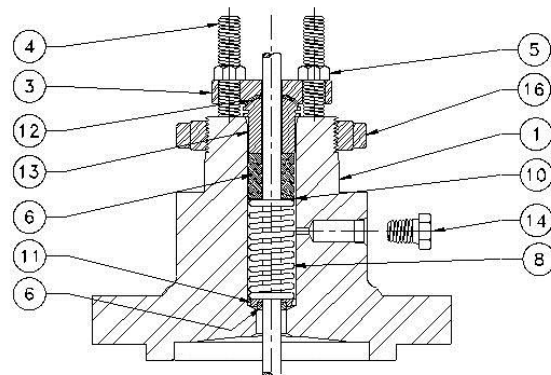
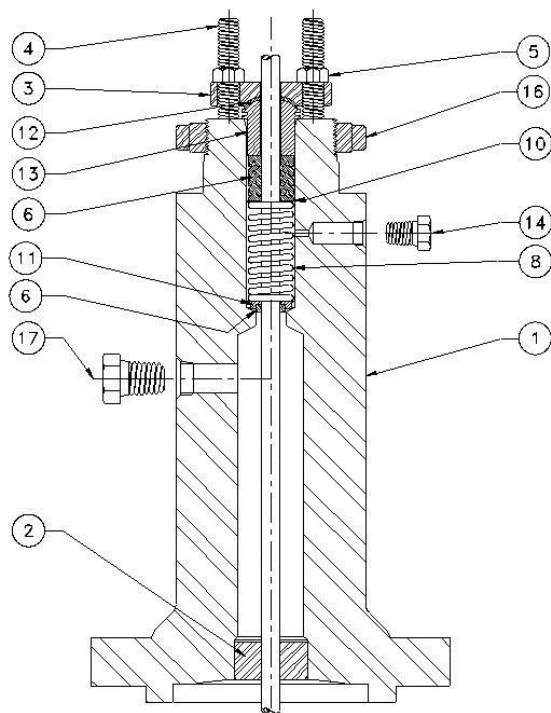


Figure 8: Extension Bonnet

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
^1	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	Non Asbestos	*22	Back-up Ring	Viton/EPDM
*10	Cage Gasket	Non Asbestos			
*11	Spiral Wound Gasket	316 SS Non Asbestos			
*12	Seat Gasket	Non Asbestos			

(*) Recommended Spare Parts
 (A)-Consult CVS Controls Representative for Valve Body style, size and material availability

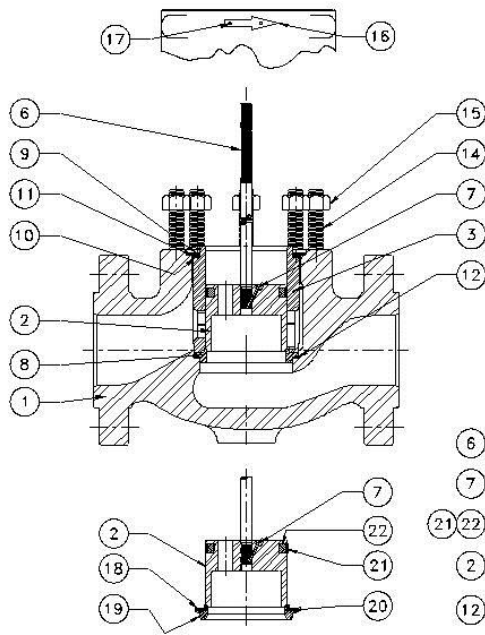


Figure 9: CVS Series E with Full Capacity

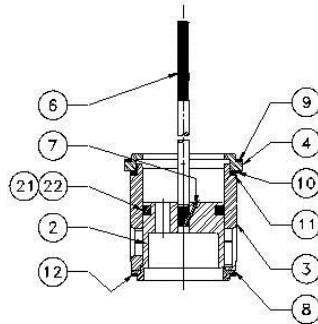


Figure 10: Trim for 1-1/2 x 1 Valve Body

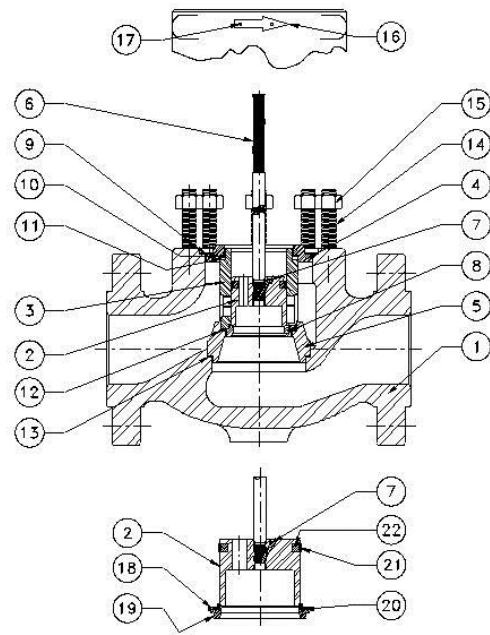


Figure 11: CVS Series E with Restricted Trim

CVS Series E Trim Parts List

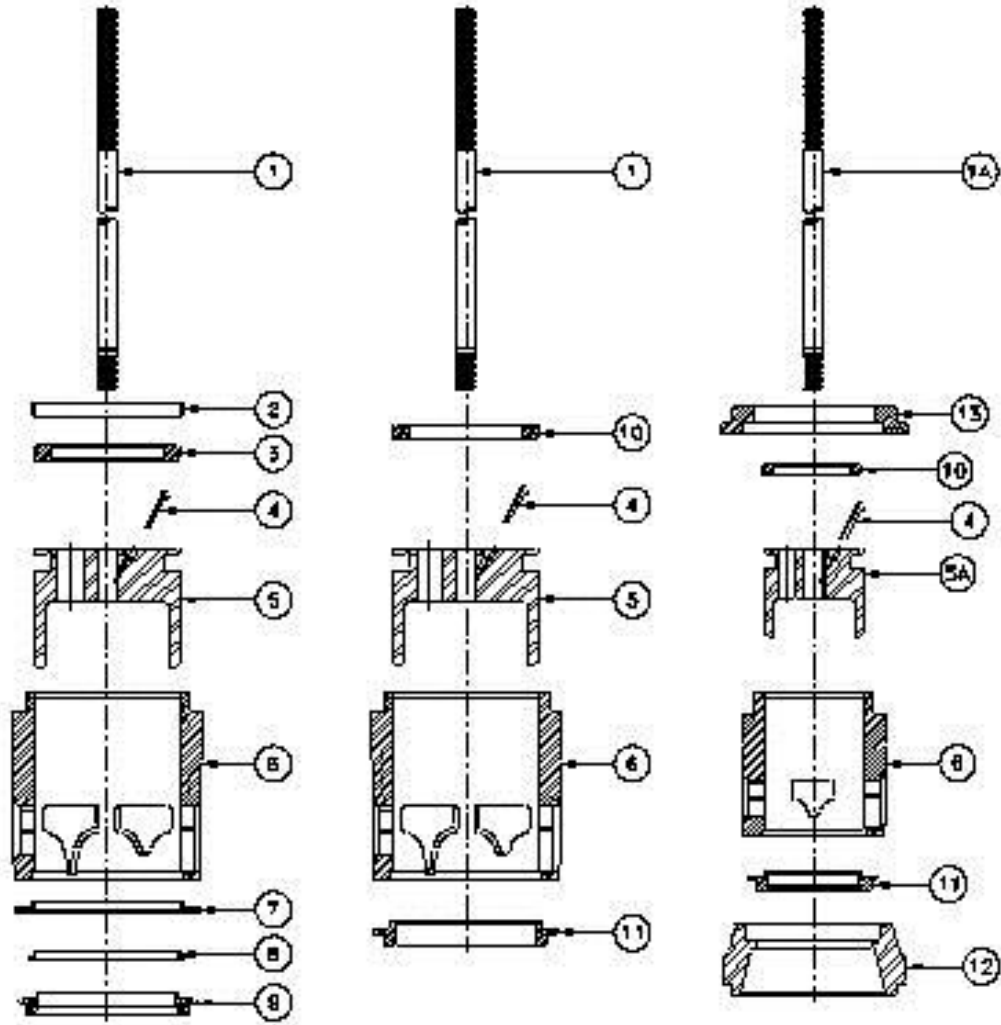


Figure 12: CVS Series E Internal Assemblies – See Following Tables

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
	2-1x2	3/4	CVS1V32603507	CVS1U22653516	CVS1V65763507	CVS1V65764617	4 x 2-1/2	3/4	CVS1V65783507
3		1/2	CVS1V32263507	CVS1U23053516	CVS1V65773507	CVS1V65774617	6 x 4	3/4	CVS1V65823507
	3	3/4	CVS1V32603507	CVS1U23083516	CVS1V65783507	CVS1V65784617	"ET" Body Size (In)	VSC (In)	Key 1A
4		1-2	CVS1V32263507	CVS1U23053516	CVS1V65793507	CVS1V65794617			Stem
	4	3/4	CVS1V32273507	CVS1U23053516	CVS1V65803507	CVS1V65804617	1-1/2 x 1	1/2	
4		1/2	CVS1V32263507	CVS1U23053516	CVS1V65813507	CVS1V65814617	2 x 1	1/2	CVS1U38903516
	4	3/4	CVS1V32603507	CVS1K58773516	CVS1V65823507	CVS1V65824617	2-1/2 x 1-1/2	1/2	CVS1U38903516
6		1	CVS1V33403507	CVS1K75903516	CVS1V65833507	CVS1V65834617			3 x 2
	6	3/4	CVS1V32603507	CVS1L99643516	CVS1V65843507	CVS1V65844617	4 x 2-1/2	3/4	CVS1U23083516
6		1	CVS1V33403507	CVS1N70473516	CVS1V65853507	CVS1V65854617	6 x 4	3/4	CVS1L99643516
	1-1/4	CVS1K41543516		CVS1V65863507	CVS1V65864617				

(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

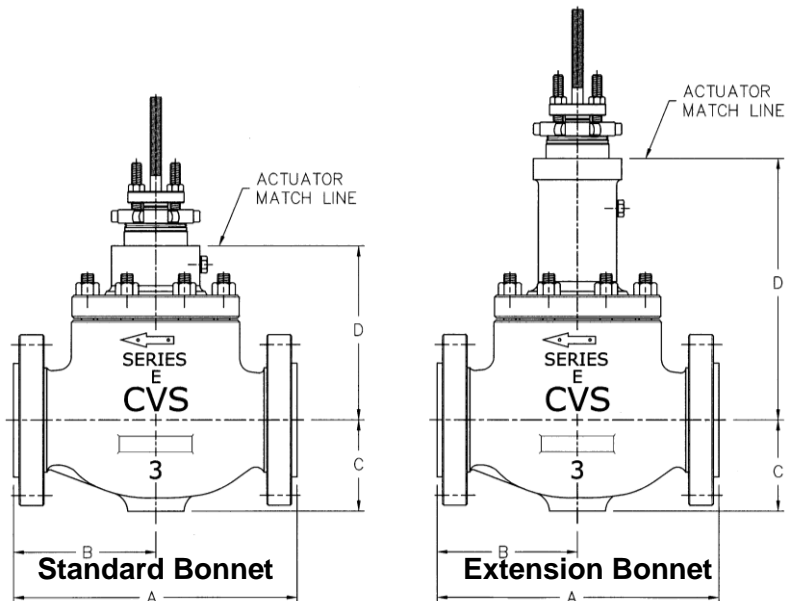
Steel Bodies through 600lb Rating

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	333.6	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											
		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	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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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.

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.



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

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.

Replacing the Plug Stem or Load Ring

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.

Replacing the Stem

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.

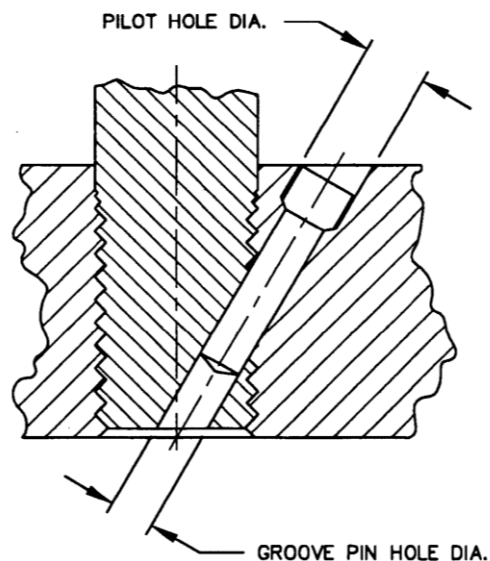


Figure 2: Groove Pin Pilot Holes

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.

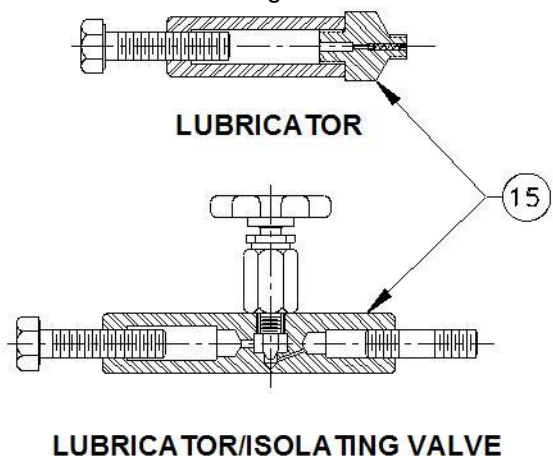


Figure 3: Lubricator and Lubricator/Isolating Valve

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.

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.

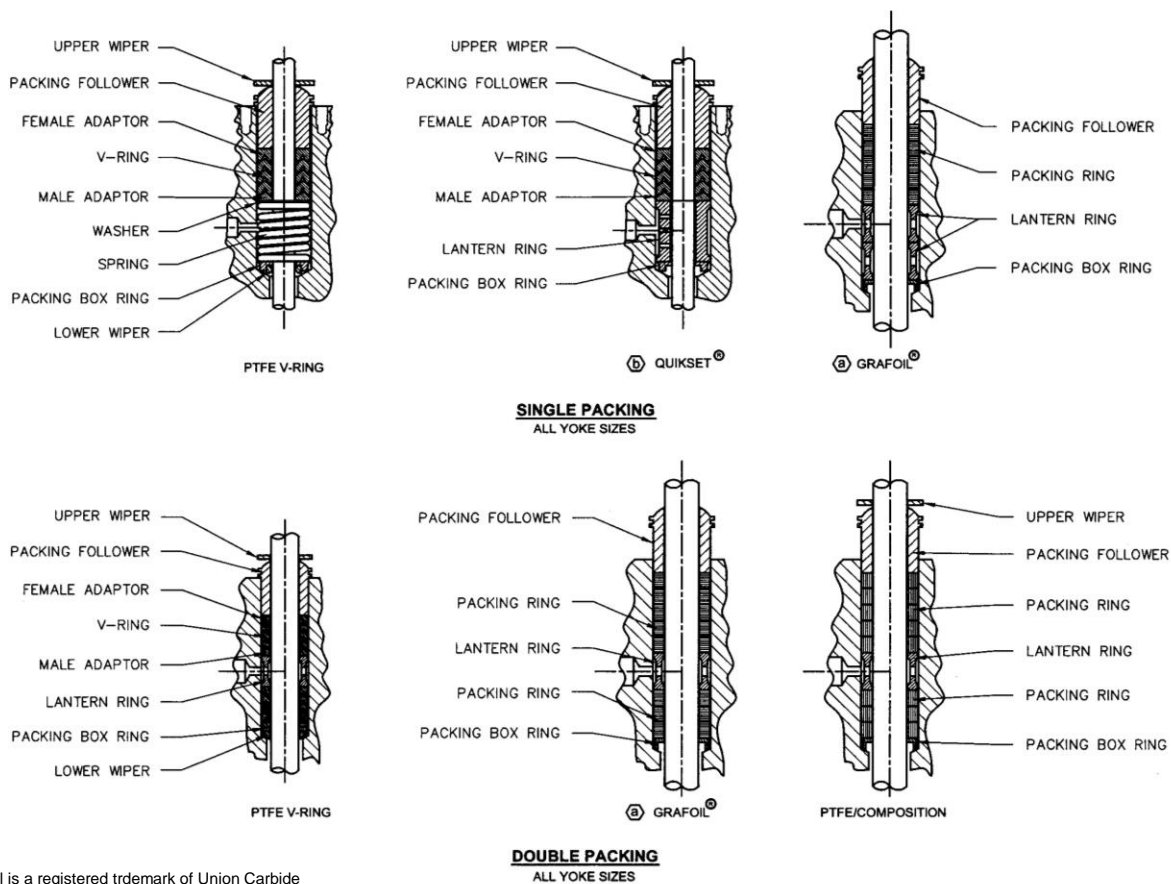
Table 2: Body to Bonnet Torque

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			
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
3/4	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



Notes:

- a) Grafoil is a registered trademark of Union Carbide
- b) Quikset 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.

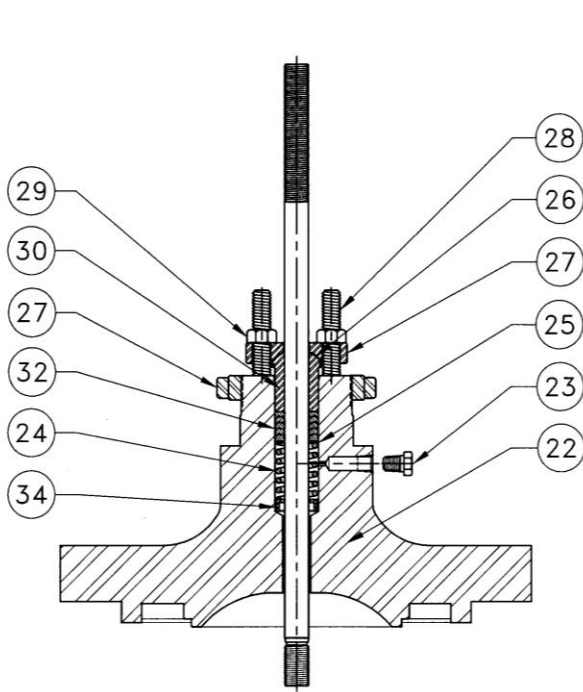
CVS Series E 8-inch Globe Valves

Parts Reference

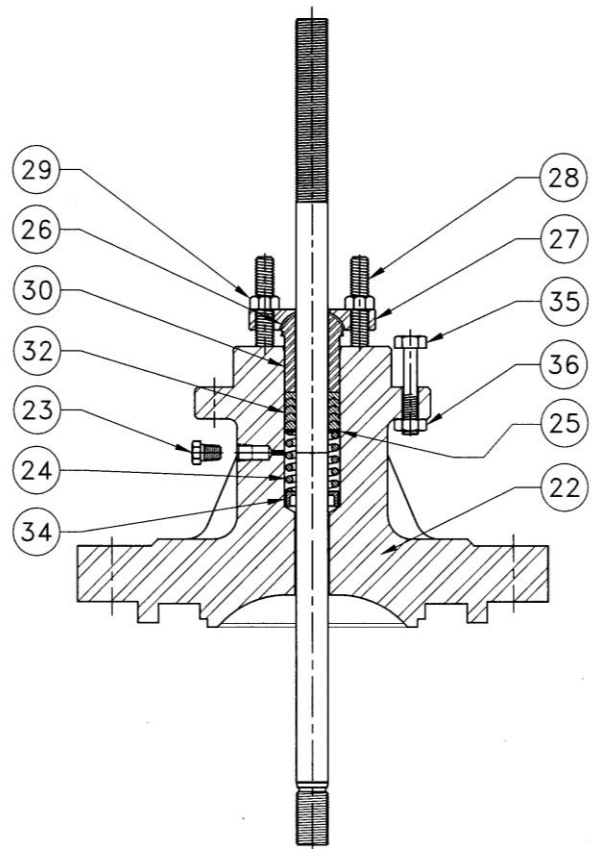
Key	Part Name
1	Valve Plug Stem
2	Body
3	Bonnet Gasket
4	Load Ring
5	Groove Pin
6	Valve Plug
7	Seat Ring
8	Flow Arrow
9	Hex Nut
10	Stud Bolt or Cap Screw
11	Piston Ring (Design ED Only)
13	Cage

Key	Part Name
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)

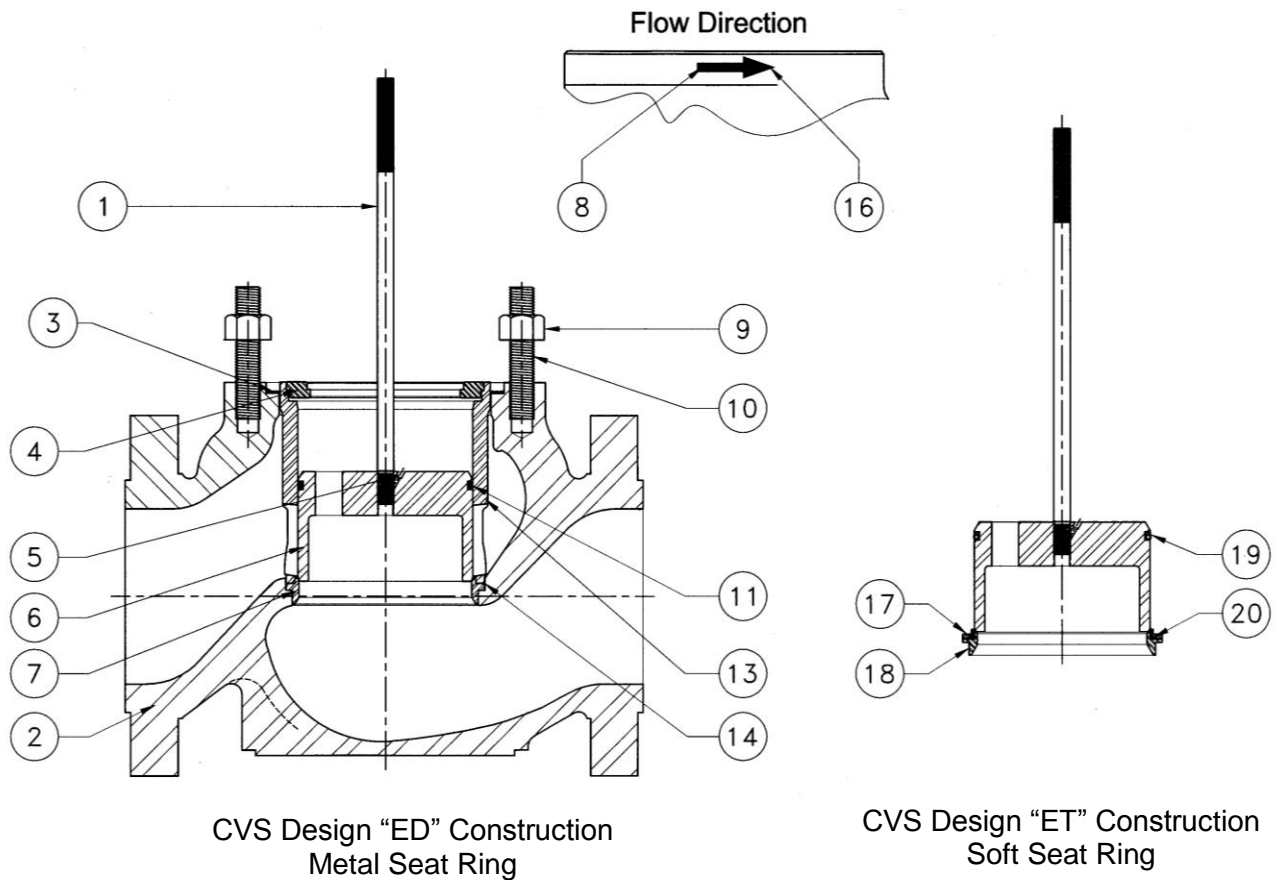


Standard Bonnet
3-9/16" Yoke Boss, 3/4" Stem



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 -425°F to 800°F (-254°C to 427°C), material Over 800°F (427°C), Laminated Graphite	CVS10A3265X012
		Composition Seat, Nitrile	CVS10A3265X032
4	Load Ring	-150°F to 600°F (-101°C to 316°C), 17-4PH SST	CVS20A3267X012
		-425°F to 1100°F (-254°C to 593°C), Inconel 718	CVS20A3267X022
		-400°F to 500°F (-240°C to 260°C), 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
			17-PH SST	CVS20A3247X012
		Linear	316 SST Ni Coated	CVS20A5468X012
			316 SST CR PL	CVS20A4349X012
		Quick Opening	17-PH SST	CVS20A3249X012
			316 SST Ni Coated	CVS20A5469X012
14	Seat Ring, Gasket, Metal Seat	Metal Seat	-425°F to 800°F (-254°C to 427°C), material Over 800°F (427°C), Laminated Graphite	
		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, -100°F to 450°F (-73°C to 232°C), Design ET Only		CVS10A3261X012	
20	Disc, TFE, -70°F to 400°F (-57°C to 204°C), 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
25	Special Washer, 316 SST (TFE V-Ring Packing Only)	1" Stem (25.4 mm)	CVS0U099735072	
		3/4" Stem (19.1 mm)	CVS1F125036042	
26	Upper Wiper, Felt (Not req'd for Laminated Graphite Packing)	3/4" Stem (19.1 mm)	CVS1H982236042	
		1" Stem (25.4 mm)	CVS1J872806332	
27	Packing Flange, Steel	3/4" Stem (19.1 mm)	CVS1J872906332	
		1" Stem (25.4 mm)	CVS1E944823072	
28	Stud, Steel (2 req'd)	3/4" Stem (19.1 mm)	CVS0V002425052	
		1" Stem (25.4 mm)	CVS1E944931032	
29	Nut, Steel (2 req'd)	3/4" Stem (19.1 mm)	CVS0V002531032	
		1" Stem (25.4 mm)	CVS1E944624112	
30	Packing Follower, 316 SST	3/4" Stem (19.1 mm)	CVS1L692124112	
		1" Stem (25.4 mm)	CVS1E944735072	
31	Locknut, Steel (3-9/16" Yoke Boss Only)	3/4" Stem (19.1 mm)	CVS1H982335072	
		1" Stem (25.4 mm)	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

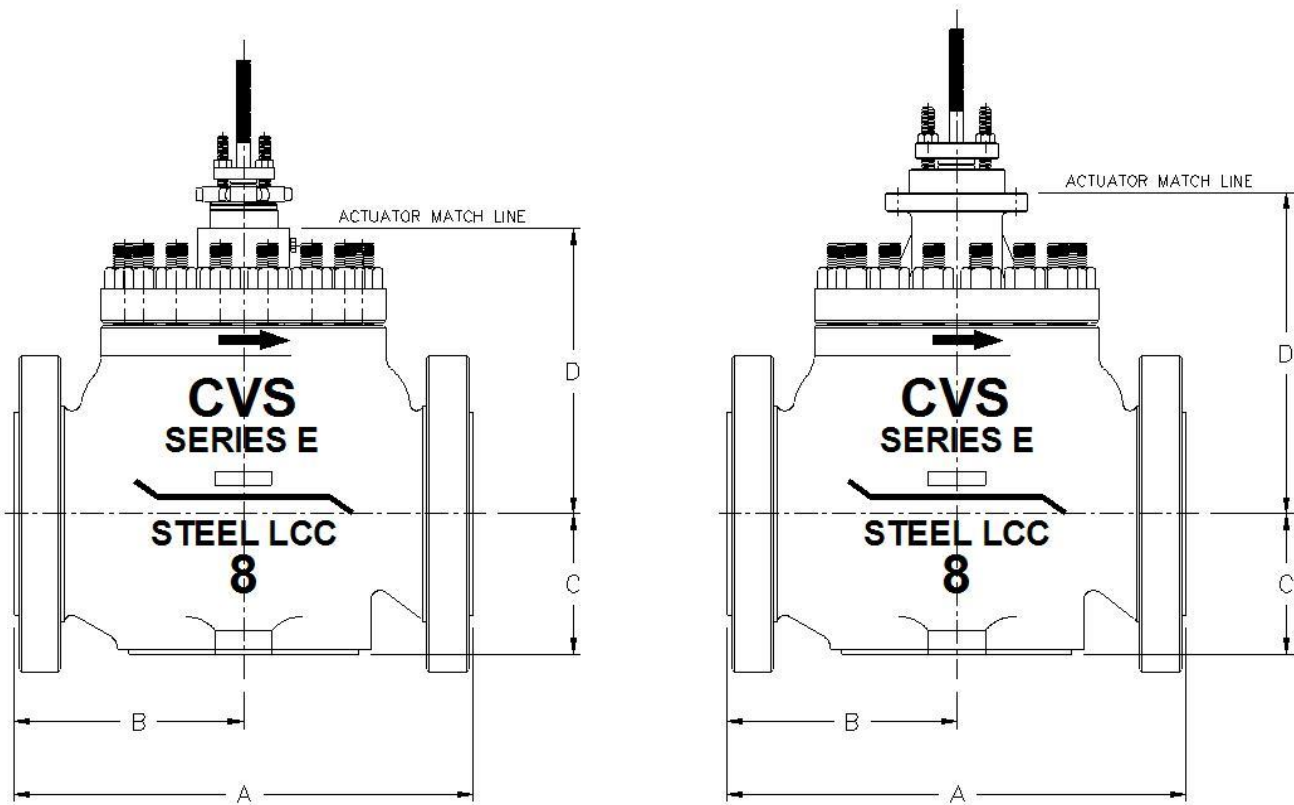
Dimensional Data

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 Inch	19.1 mm	3/4 Inch	19.1 mm	Inch	mm
8	203	14.75	375	16.56	421	7.50	191



Approximate shipping weight: 408kg (900lbs)

CVS Series E, 8 Inch, Design ED and Design ET – Product Bulletin

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	0.28	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	0.31

1. At 100% travel.

CVS Series E, 8 Inch, Design ED and Design ET – Product Bulletin

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.

CVS Series E, 8 Inch, Design ED and Design ET – Product Bulletin

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	0.28	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	0.31

1. At 100% travel.

CVS Series E, 8 Inch, Design ED and Design ET – Product Bulletin

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

Valve Design	Series ET		Series ED	
	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)		
ET with Anti-Cav III Single Stage cage	Metal	IV		
		V (optional)		
ET with Anti-Cav III two stage cage	Metal	IV Standard		
		V (optional)		
		V		

Flow Characteristics

- Linear, Quick Opening or Equal Percent

Flow Directions

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

CVS

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