

## Instruction Manual

# CVS Series EW Globe-Style Valves

Designs EWD, EWS & EWT

## Introduction

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### Contents

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Contained in this manual are installation instructions, maintenance procedures and parts information for the CVS Series Valve Body designs EWD, EWS and EWT. 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.

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### Applications and Features

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The CVS Series EW valve bodies are single port, globe-style bodies with cage guiding, clamped seat rings and push-down-to-close valve plug action. Providing excellent pressure and flow control on steam, gasses, and various liquid processes.

This series features large end connections and expanded internal flow cavities. The series is available 8 x 6, 10 x 8, 12 x 6 and 12 x 8, 16 x 12, 20 x 16, 24 x 16, and 24 x 20-inch sizes. The first number refers to the line size, and the second refers to the trim and bonnet size.

Sour Service Capability

Optional NACE MRO175/ISO 15156-2009



There are three body configurations in this design series:

1. **Design EWD** is intended for general control applications over a wide variety of temperatures and pressure drops. This design has balanced valve plug with metal-to-metal seating.
2. **Design EWS** is intended for applications requiring better shutoff capabilities than those suitable for the EWD. This valve uses an unbalanced valve plug with metal-to-metal seating, or optional metal-to-TFE seating.
3. **Design EWT** is suitable for applications with stringent shutoff requirements. This valve uses a balanced valve plug with metal-to-TFE seating, or metal-to-metal seating for use in higher temperatures.

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

**Table 1: Specifications**

<b>End Connection Styles</b>	<b>Flanged Ends</b>	All CVS Series EWD, EWS and EWT Valve Bodies are available in Class 150, 300, 600 and 900
		Body sizes 8x6, 10x8, 12x6, 12 x 8, 16x12, 20x16, 24x16, 24x20-inch
		Raised Face, Ring Type Joint, and welded
		Styles are per ANSI B16.5
	<b>Buttwelding Ends</b>	Schedule 40 or 80 for Class 300 and 600
		Schedule 80 or XXS for Class 900
		Styles per ANSI B16.25
<b>Maximum Inlet Pressures, Temperatures, Pressure Drops</b>	<b>All CVS Series EWD, EWS, EWT</b>	Do not exceed conditions specified when valve was ordered. Valve is configured in accordance with Class 300, 600 or 900 pressure temperature ratings per ANSI B16.34-latest
	<b>Class 600</b>	Some flanged Class 600 bodies in 316 SST do not comply with ASME B16.34. Consult CVS Controls Ltd.
	<b>Class 900</b>	Class 900 Size 8 x 6 CVS Series EWD, EWS, EWT Valves are limited to Class 600 pressure drops and temperature limits
<b>Shutoff Classifications</b>		Refer to Table 2
<b>Flow Characteristics</b>		Available in Linear, Quick Opening or Equal Percentage
<b>Flow Directions</b>	<b>Design EWS, Standard Cage</b>	Normally up
	<b>Design EWD or EWT, Standard Cage</b>	Normally down
<b>Approximate Weights</b>		Refer to Table 3
<b>Additional Specifications</b>		Consult the Parts Information section of this manual for specifications on: <ul style="list-style-type: none"> <li>• Materials</li> <li>• Port Diameters</li> <li>• Valve Plug Travels</li> <li>• Yoke Boss Diameters</li> <li>• Stem Diameters</li> </ul>

## Installation

Exceeding the recommended pressure and temperature limits from Table 1, or those indicated on the nameplates of your CVS Controls valve, can result in personal injury and property damage. CVS Controls recommends the installation of a relief valve to protect against overpressure situations.

CVS Series EW valve bodies are designed to meet specific conditions for fluid control, temperature, pressure and pressure drop. The limiting factor on these valves can be the body/trim material combinations. Do not install these valves in any other applications without first consulting with your CVS Controls representative.

During installation, CVS Controls recommends the use of a sling to protect the painted surfaces of the valve. Position the sling to avoid damage to tubing and accessories.

1. Inspect the valves for shipping damage and foreign debris while uncrating.
2. Ensure the pipeline is free of welding slag, chips and other debris by blowing out the line before installation.

3. Position the valve so the arrow on the valve body is in the same direction as the pipeline flow.
4. Specific orientation of the control valve assembly is flexible, unless limited by the seismic criteria. Normal positioning is with the actuator vertical above the valve body. Should a different position be required, be aware that the result may be uneven valve plug and cage wear, and inefficient operation of the control valve system. Also, be aware that the actuator may need additional support. Consult CVS Controls for further information on orientation.
5. Always employ proper piping and welding practices when installing the valve in the line. If welding is required, internal elastomeric parts may remain in place. If the valve has buttwelding ends and composition trim, remove the composition trim prior to welding into the line.
6. For flanged bodies, install an appropriate gasket between the pipeline and valve body flanges.
7. With leak-off bonnet construction, remove the pipe plugs (Figure 2, Keys 14 and 23) to connect the leak-off piping. To avoid an interruption of service during inspection or maintenance, install a three-valve bypass around the control valve assembly.

## Installation Con't

8. Most CVS control valves are shipped with the actuator already installed according to customer specifications. If your actuator has been shipped separately, refer to the appropriate mounting instructions in the actuator manual.

## Maintenance

Internal valve components are subject to normal deterioration and must be inspected and replaced as required. The necessity of inspections and replacement of parts will depend on the severity of service conditions. Inspections and maintenance must be carried out on a regularly scheduled basis.

To ensure the safety of personnel and to protect against property damage, the following steps should be carried out before beginning disassembly.

- 1 To prevent the valve from opening suddenly, disconnect any operating lines to the actuator. This would include air pressure, electrical power or control signal lines.
- 2 Isolate the valve by using the bypass valve or by shutting down the process completely. Relieve the pressure and drain the process fluid from both sides of the valve.
- 3 Relieve the pressure contained in the actuator by venting the actuator loading pressure and relieving any power actuator spring compression.
- 4 Lock-out procedures should be strictly adhered to while the equipment is being serviced.

Also, anytime that a gasket seal is removed or disturbed, a new gasket should be installed during reassembly, ensuring a proper seal.

The following instructions include packing maintenance, trim replacement and lapping of metal seats.

## Packing Maintenance

This section provides instruction for maintenance of TFE V-Ring packing. If your CVS Controls EWD, EWS or EWT Control Valve uses graphite laminate or filament packing, refer to the appropriate manuals. Refer to Figure 2 for appropriate key numbers unless otherwise indicated.

For packing that is spring-loaded single TFE V-ring packing, a sealing force is maintained by the spring (Figure 2, Key 5). If leakage around the packing follower (Figure 2, Key 3) is detected, tighten the packing flange nuts (Figure 2, Key 16). If this does not stop the leakage, refer to the Replacing Packing section of this manual.

With packing that is other than spring-loaded, unwanted leaking can be limited by tightening the packing flange nuts to create a stem seal.

**Table 2: Shutoff Classifications**

Body Design	Seating	Shutoff Class	Max. Leakage
EWD	Metal	II (Optional)	0.5% of valve capacity at full travel
		III (Optional)	0.1% of valve capacity at full travel
		IV (Standard)	0.01% of valve capacity at full travel
EWS	Metal (Standard)	IV (Optional)	0.01% of valve capacity at full travel
		V	0.0005 mL/min. per in. of port diameter per psi (5 x 10 <sup>-12</sup> m <sup>3</sup> per sec. per mm of port diameter per bar) drop
	TFE	VI	Less than 4 bubbles (0.60 mL per min. to 45 bubbles (6.75 mL) per min. depending on port diameter
EWT	TFE (Standard)	V	0.0005 mL/min. per in. of port diameter per psi (5 x 10 <sup>-12</sup> m <sup>3</sup> per sec. per mm of port diameter per bar) drop
	Metal	IV	0.01% of valve capacity at full travel

**Table 3: Approximate Weights**

End Connection		Body Size, Inches							
		8 x 6		10 x 8		12 x 6		12 x 8	
		Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg
Class 300 (Flanged Only)		625	284	1102	500	1102	500	1440	653
Class 600	Flanged	680	308	1590	721	1590	721	1890	857
	Buttwelding	600	272	1160	526	1160	526	3300	1497
Class 900	Flanged	1350	612	---	---	---	---	3000	1361
	Buttwelding	1000	454	---	---	---	---	2850	1293

## Packing Maintenance, cont'd

If leakage occurs from the inside diameter of the packing, and tightening the flange nuts does not stop the leaking, the valve stem may be worn or nicked. If the leakage originates from the outside diameter of the packing, the leakage may be caused by nicks and scratches around the packing box wall. While performing the following procedures, carefully inspect the valve stem and packing box wall for imperfections.

## Adding Packing Rings

If using packing with a lantern ring (Figure 2, Key 5), packing rings may be installed above the lantern ring as a temporary measure, which does not involve removing the actuator from the valve body.

1. Remove the packing flange nuts (Figure 3, Key 16) and lift the packing flange and follower (Figure 3, Keys 20 and 3) away from the valve body.
2. Old packing rings that have been installed on top of the lantern ring may be removed, but use caution to avoid any damage to the valve stem or packing box wall. All metal parts should be cleaned to remove any grit that would prevent the packing from creating a seal.
3. If split-ring packing is being used, spread the rings over the valve stem and slide them into the packing box.
4. If solid-ring packing is used, take off the stem connector and slip the rings over the end of the valve stem.
5. After replacing the packing flange and packing follower, tighten the packing flange nuts (Figure 3, Key 16) just far enough to prevent leakage under operating conditions.
6. If the valve-actuator stem connection was disassembled during this process, refer to the actuator manual for reassembly instructions.

7. While returning the valve to service, monitor for leakage around the packing follower. If required, retighten the packing flange nuts.

## Replacing Packing

**Note:** Prior to performing this procedure, isolate the control valve from all line pressure and release the pressure from both sides of the valve. Drain the process media and release all pressure from the actuator. Practice lockout procedures during the operation.

1. Remove the operating lines from the actuator as well as any leak-off piping from the bonnet.
2. Disconnect the stem connector and unscrew the yoke locknut (Figure 3, Key 17) to remove the actuator from the valve body.
3. Loosen the packing on the valve stem by unscrewing the packing flange nuts (Figure 3, Key 16). Remove all travel indicator parts and stem locknuts from the valve stem threads.

**Note:** When lifting the bonnet (Figure 3, Key 18), it is very important to ensure that the valve plug and stem assembly remain in the valve and on the seat. If the assembly were to drop out after being partially lifted, damage to the seating surfaces would result. Parts are also easier to handle in this way.

4. Remove the hex nuts (Figure 5, Key 39) holding the bonnet and body together, and lift the bonnet off of the valve stem.
5. When lifting the bonnet, if the valve plug and stem assembly begin to lift as well, use a brass or lead hammer and lightly tap on the end of the stem to release them.
6. Place the bonnet on a protective surface to prevent damage to the surface of the bonnet gasket.

7. Remove the bonnet gasket (Figures 4 and 5, Key 33) and cover the valve body opening in order to prevent debris from entering the body cavity and to protect the gasket surface.
8. Remove the following parts (Figure 3):
  - a. packing flange nuts (Key 16)
  - b. packing flange (Key 20)
  - c. upper wiper (Key 2)
  - d. packing follower (Key 3)

**Table 4: Body-to-Bonnet Bolt Torque Guidelines**

Body Size, In.		Bolt Torques			
		Nonlubricated Bolting		Stud Bolt Nuts Factory Lubricated	
		Ft-Lb	N•m	Ft-lb	N•m
8 x 6	Class 300 or 600	400	545	300	407
	Class 900	970	1315	---	---
12 x 6		400	545	300	407
10 x 8		550	745	---	---
12 x 8	Class 300 or 600	540	732	---	---
	Class 900	2000	2712	---	---

**Table 5: Packing Flange Nut Torque Guidelines**

Valve Stem Dia.		ANSI CLASS	PTFE Type Packing				GRAPHITE Type Packing			
			Min. Torque		Max. Torque		Min. Torque		Max. Torque	
Inches	mm		Lb-in	N•m	Lb-in	N•m	Lb-in	N•m	Lb-in	N•m
1/2	12.7	300	28	3	42	5	59	7	88	10
		600	39	4	58	7	81	9	122	14
3/4	19.1	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

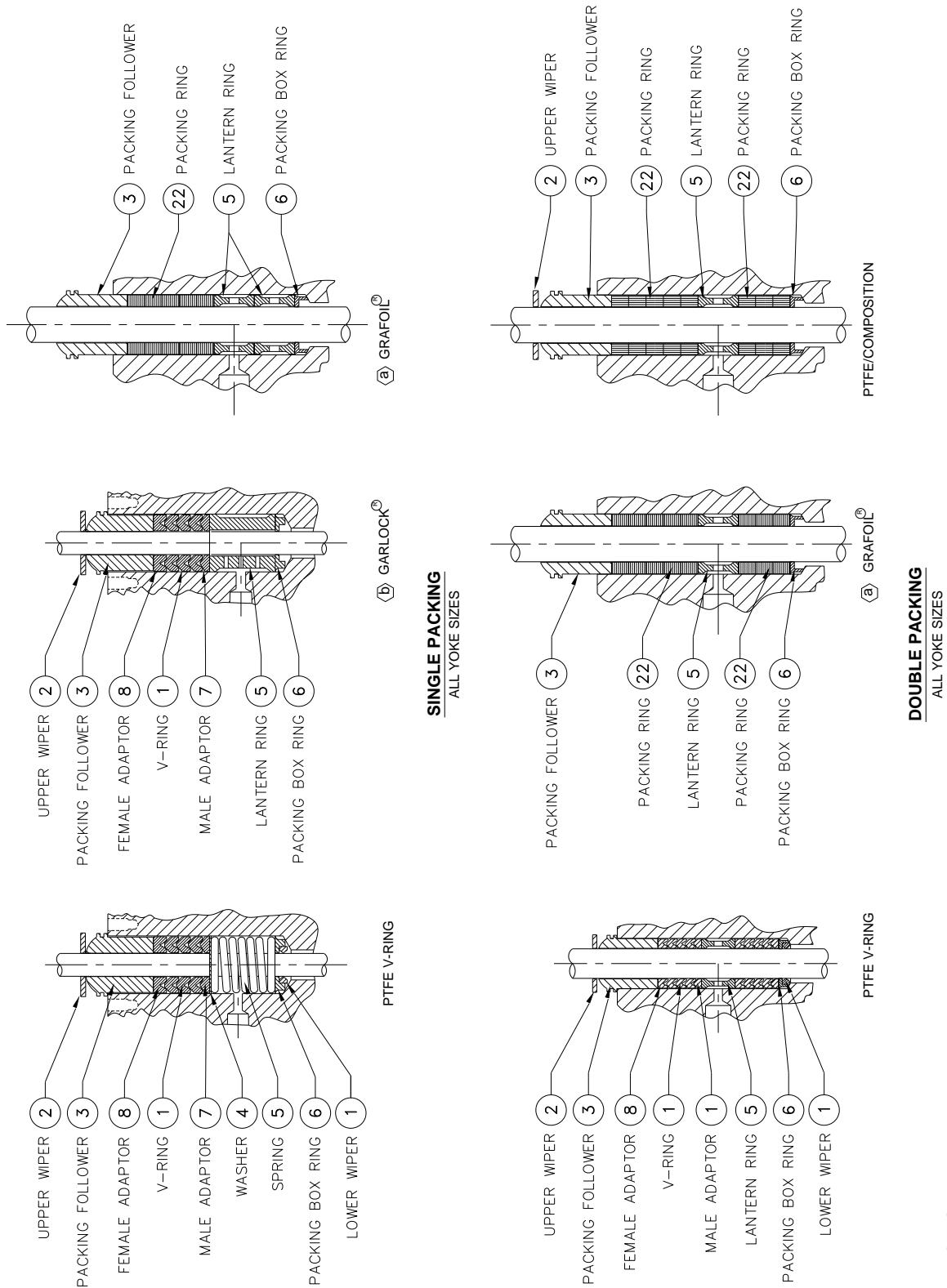


Figure 2: TFE V-Ring Packing Arrangements

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## Replacing Packing cont'd

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9. Use a rounded rod to push out the remaining packing parts from the body side of the bonnet. Be careful not to scratch the packing box wall. Clean the packing box and metal packing parts.
10. Inspect the valve stem threads and packing box surfaces for any edges which might cut the packing. Any defects could create leaking in the packing box and damage to the new packing. If any surface nicks or burrs cannot be improved by light sanding, replace the damaged parts.
11. Remove the covering which protects the body covering and install a new bonnet gasket (Figures 4 and 5, Key 33). Ensure that the gasket seating surfaces are clean and smooth.

**Note:** When the tightening procedures in Step 13 are completed properly, the spiral wound gasket (Figures 4 and 5, Key 35) will be compressed enough to load and seal the seat ring gasket (Figures 4 and 5, Key 36) and compress the edge of the bonnet gasket (Figures 4 and 5, Key 33) and seal the body-to-bonnet joint.

The lubricated stud bolt nuts (Figure 5, Key 39) can be identified by the black film that coats the nut threads.

The bolting procedures in Step 13 will ensure that the bolting threads are clean, and will evenly tighten the nuts onto the studs in a crisscross pattern. Be sure to follow the crisscross pattern since the tightening of one spiral wound gasket may loosen an adjacent nut. Continue repeating the pattern until each nut is tight, creating the body-to-bonnet seal. Repeat this torquing procedure once the operating temperature has been reached.

12. Place the bonnet over the stem and onto the stud bolts (Figure 5, Key 38) and lubricate with an appropriate lubricant. If factory lubricated stud bolt nuts will be used, additional lubrication is unnecessary. Follow standard bolting procedures and install the stud bolt nuts (Figure 5, Key 39), ensuring that the body-to-bonnet joint will withstand test pressures and application service conditions. Refer to Table 4 for bolt torque guidelines, unless accepted bolting procedures demand otherwise.
13. Refer to Figures 2 and 3 and install new packing and metal packing box parts. Using a smooth-edged pipe placed over the pipe stem, gently tap each soft packing part into the packing box. Ensure that air is not trapped between adjacent soft parts.

14. Slide the packing follower, upper wiper and packing flange (Figure 3, Keys 3, 2 and 20) into position. Lubricate the packing flange studs (Figure 3, Key 21) as well as the packing flange nuts (Figure 3, Key 16), and replace the packing flange nuts.
15. If using spring-loaded TFE V-Ring packing, tighten the packing flange nuts using accepted bolting procedures.
16. Install the actuator onto the valve body assembly and refer to the actuator instruction manual for directions on reconnecting the actuator and valve stem.

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## Trim Removal

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Unless otherwise indicated, key numbers in this section reference Figure 4 for Design EWD and Restricted Trim, Figure 5 for Design EWS and Figure 6 for Design EWT constructions, as well as Class 900 12 x 6-inch construction.

1. Remove the actuator and bonnet, referring to Steps 1 through 8 in the Replacing Packing section.

**Note:** When lifting the valve plug stem (Key 30) and the attached valve plug (Key 25) from the valve body, ensure that the cage (Key 26) remains in the body (Key 24). If the cage were to drop out of the body after being lifted partially out, cage damage will result.

Use caution to avoid damage to the gasket sealing surfaces.

The graphite piston ring(s) (Key 29) in a Design EWD body is brittle and in two pieces. Handle with care to avoid dropping or rough handling of the piston ring(s).

The surface finish of the valve stem (Key 30) is critical for creating a good packing seal. Also, the inside surface of the cage (Key 26) is important for smooth valve plug operation and for creating a seal with the piston ring (Key 29) or seal ring (Key 50). Seating surfaces of the valve plug (Key 25) and the seat ring (Key 32) on a metal-seat construction are important for a tight shutoff. Protect these parts and their surfaces, and include them in any inspections.

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## Trim Removal Con't

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2. If packing parts require replacement, remove them at this time according to instructions in the Packing Replacement section of this manual. Remove the cage adaptor (Key 27) for any restricted trim body through 8 x 4-inches. Wrap these parts for protection.
3. Remove the valve plug and stem assembly from the valve body, setting it on a clean surface. If the valve plug is being reused, protect the valve plug seating surface from scratches.
4. Remove the cage (Key 26) and associated gaskets (Keys 33, 34 and 35). If the cage becomes stuck in the valve body, tap the exposed portion of the cage around the circumference, using a rubber mallet.
5. Remove the following parts:
  - a. Seat ring (Key 32)
  - b. Disc seat (Key 44)
  - c. Seat ring gasket (Key 36)
  - d. Seat ring adaptor (Key 28)
  - e. Adaptor gasket (Key 37)
6. Design EWS and EWT TFE-seat construction use a disc (Key 45) placed between the disc seat and disc retainer (Key 43).
7. Inspect all parts for wear or damage that would interfere with operation of the control valve. If replacement or repair of trim parts is necessary, refer to Lapping Metal Seats or Valve Plug Maintenance procedures in this manual.

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## Lapping Metal Seats

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With metal-seat constructions, lapping of the seating surfaces can improve shutoff. Use a commercial lapping product or a mixture of 600-grit carborundum and solidified vegetable oil and lap the seating surfaces of the valve plug and seat ring (Figures 4, 5 and 6, Keys 25 and 32). Deep nicks should be machined out rather than ground out.

Follow valve assembly procedures until the cage (as well as cage retainer and bonnet spacer if used) is in place, and the bonnet is bolted to the body. Create a simple handle from a piece of strap iron and lock to the valve body with nuts. Rotate the handle in each direction to lap the seats. After rotating directions, remove the bonnet and clean the seat surfaces. Completely reassemble the valve according to directions in the Trim Maintenance section. Test the valve for shutoff and repeat the procedure if leaking is still excessive.

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## Valve Plug Maintenance

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Key numbers in this section refer to the following Figures in the manual:

- Figure 4 for Design EWD Valve Plugs
- Figure 5 for EWS Valve Plugs
- Figure 6 for Design EWT Valve Plugs

**Note:** If the piston ring (Key 29) or seal ring (Key 50) are being replaced, protect the surfaces of the ring groove in the valve plug, or any surfaces of the replacement ring. Scratches in these surfaces may prevent proper seal of the replacement ring.

Remove the valve plug (Key 25) according to instructions in the Disassembly section, and proceed as follows:

### **EWD – Carbon Filled TFE Piston Ring**

- a. The piston ring has a split in one place, and if damage is visible, the ring can be spread slightly and removed from the groove in the valve plug.
- b. When installing a carbon-filled TFE piston ring, spread the ring slightly apart at the split. Install it over the stem and into the valve plug groove. Ensure the open side faces along the stem, depending on the flow direction and as shown in View A, Figure 4.

### **EWD – Graphite Piston Ring**

- a. The EWD graphite piston ring is in two pieces and can be easily removed.
- b. The new graphite piston ring is supplied as a complete ring and must be broken into two equal portions. Do this by placing the ring horizontally in a vise and applying pressure until the ring snaps. Alternately, place the ring on the edge of a smooth hard surface and strike squarely with a hammer.
- c. When installing the ring in the valve plug groove, be sure to match the broken ends of the ring.



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## Valve Plug Maintenance

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### ***EWT Seal Ring – Without Spring Loading***

- a. This is a closed ring which must be pried or cut from the groove and therefore cannot be reused. After the seal ring is removed, the elastomeric back-up ring can be slightly spread and removed.
- b. When installing a seal ring without spring loading, apply lubricant to the back-up ring and the seal ring (Keys 48 and 51). Install the back-up ring over the stem (Key 30) and fit into the groove.
- c. Place the seal ring over the top of the valve plug (Key 25) so it enters the groove on one side of the valve plug. Gently nudge the seal ring over the top of the valve plug. Allow time for the TFE material to cold-flow during the procedure, so avoid jerking on the ring. The seal ring may seem loose when first in the groove, but will contract shortly after placement in the cage.

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### **Design EWT – Spring Loaded Seal Ring**

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- a. When used with valve plugs having a port diameter of 5-3/8-inches (136.5mm) or less, the spring loaded seal ring may be removed without damage by first extracting the retaining ring (Key 47) with a screwdriver. Slowly slide the metal back-up ring (Key 51) and seal ring (Key 48) off of the valve plug (Key 25).
- b. When used with valve plugs having a port diameter of 7-inches (178 mm) or greater, the spring loaded seal ring must be pried or cut from its groove and cannot be reinstalled.
- c. The spring loaded seal ring must be placed so that the open side faces the top or bottom of the valve plug, according to the flow direction (Figure 4, View A).
- d. To install the seal ring on a valve plug with 5-3/8-inches (136.5 mm) port diameter or less, first slide the seal ring (Key 48) onto the valve plug, followed by the metal back-up ring (Key 51). Then install the retaining ring (Key 47), inserting one end into the groove, turning the plug to press the entire ring into the groove. Use caution so as to avoid scratching the ring or plug surfaces.
- e. For installation of the seal ring onto a valve plug with a port diameter of 7-inches (178 mm) or greater, apply lubricant and gently stretch the seal ring over the top edge of the valve plug.

Allow time for the TFE material to cold-flow during the procedure, so avoid jerking on the ring. The seal ring may seem loose when first in the groove, but will contract shortly after placement in the cage.

**Note:** Do not reuse an old stem or connection stud with a new valve plug. If this were to be attempted, a new groove pin hole would need to be drilled into the stem, which weakens the stem and may cause it to fail in service. However, a used valve plug may be reused with a new stem.

- f. When replacing the Design EWD EWS and EWT valve stem (Key 30), drive out the groove pin (Key 31) and unscrew the stem from the valve plug.
- g. Tightly turn in the new valve stem and refer to Table 5 for the correct drill size. Use the hole in the valve plug as a guide and drill through the stem. Remove any chips or burrs and drive in the new groove pin, locking the assembly.

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## Trim Replacement

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Key numbers in this section are referenced in Figures as follows:

- Figure 4 for Design EWD
  - Figure 4 for Restricted Trim Detail
  - Figure 6 for Class 900 8 x 6-inch and Design EWT constructions
1. With a restricted-trim seat ring construction, install the adaptor gasket (Key 37) and seat ring adaptor (Key 28).
  2. Install the seat ring gasket (Key 36), seat ring or liner (Key 32) or disc seat (Key 44).
  3. With TFE-seat construction, install the disc and disc retainer (Keys 43 and 45).
  4. Install the cage assembly (Key 26). The cage can be oriented in any rotation with respect to the valve body.
  5. Slide the valve plug (Key 25) and stem assembly into the cage, ensuring that the piston ring or seal ring (Key 29 or 48) is placed evenly in the entrance chamber at the top of the cage (Key 26) or cage retainer (Key 53). This will avoid damage to the ring.
  6. Place the gaskets (Keys 35, 34 or 37 if used, and 33) and shim (Key 53) on top of the cage or cage retainer. If there is a cage adaptor (Key 27) or a bonnet spacer (Key 54), place an additional flat sheet gasket on the retainer or spacer.

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## Trim Replacement Con't

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**Note:** If reusing the packing, and if it has not been removed from the bonnet, use caution when installing the bonnet to avoid damage to the packing from the valve stem threads.

7. Mount the bonnet onto the valve body and complete assembly procedures according to Steps 13 through 17 of the Replacing Packing section. If new packing is not being installed, omit Steps 14 and 15. Be sure to review the "Note" prior to step 13.

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## Parts Ordering

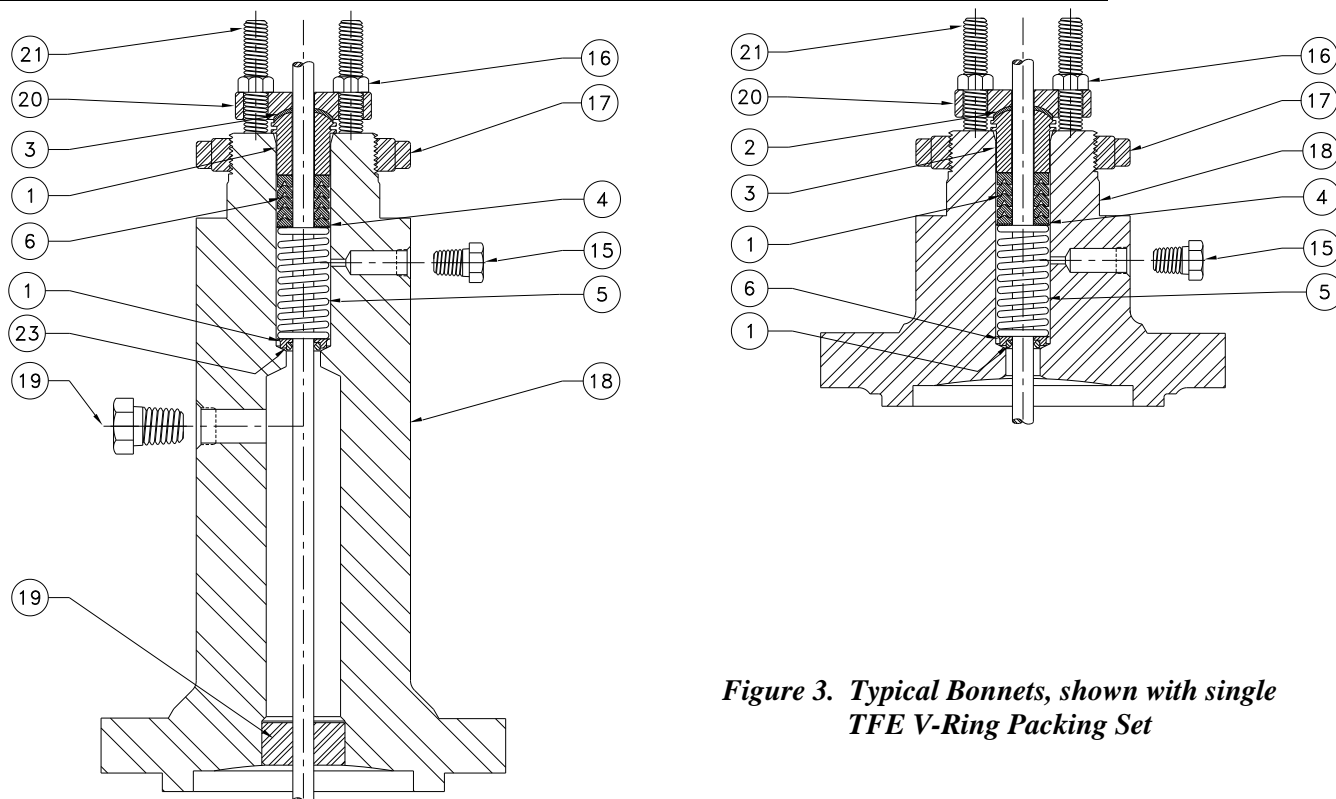
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Each CVS Controls body-bonnet assembly has a serial number which can be found on the valve body. The same number will appear on the nameplate when the body assembly is shipped from the CVS Controls manufacturing facility as part of a control valve assembly. Refer to this serial number when contacting your CVS Controls representative.

When ordering replacement parts, refer to the part number for each part required, according to the following parts list.

**Table 6: Groove Pin Replacement and Valve Stem to Plug Torque**

Valve Stem Connection (VSC)		Drill Size, In	Stem Torque Minimum to Maximum	
In	mm		Ft-Lb	N-m
3/4	19.1	3/16	175-250	238-340
1	25.4	1/4	310-355	420-481
1-1/4	31.8	1/4	610-670	830-910

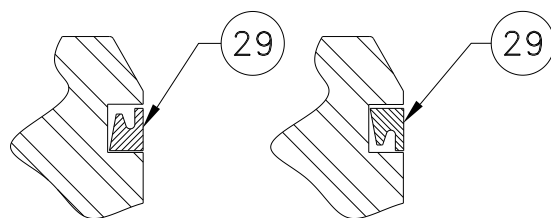


*Figure 3. Typical Bonnets, shown with single TFE V-Ring Packing Set*

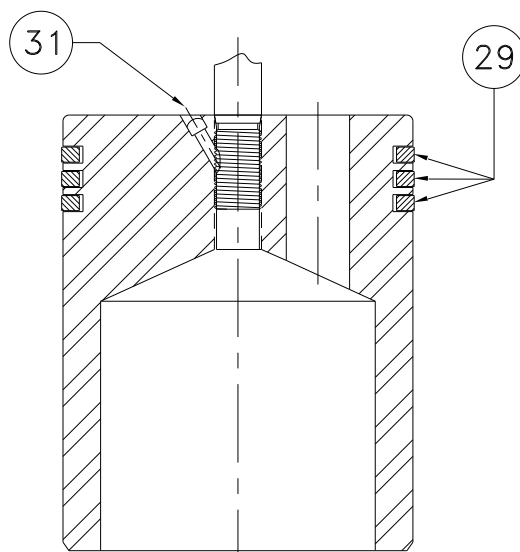
## Parts Reference

Key	Description
1	Single TFE V-Ring Packing Set
2	Upper Wiper
3	Packing Follower
4	Special Washer for TFE V-Ring Packing
5	Packing Box Spring / Lantern Ring
6	Packing Box Ring
7	Male Adaptor (Part of Gasket Set)
8	Female Adaptor (Part of Gasket Set)
10	Packing Ring
14	Cap Screw
15	Pipe Plug
16	Packing Flange Nuts
17	Yoke Locknut
18	Bonnet
19	Extension Bonnet Bushing
20	Packing Flange
21	Packing Flange Studs
22	Individual Packing Ring
23	Pipe Plug for Double Tapped Bonnet
24	Valve Body

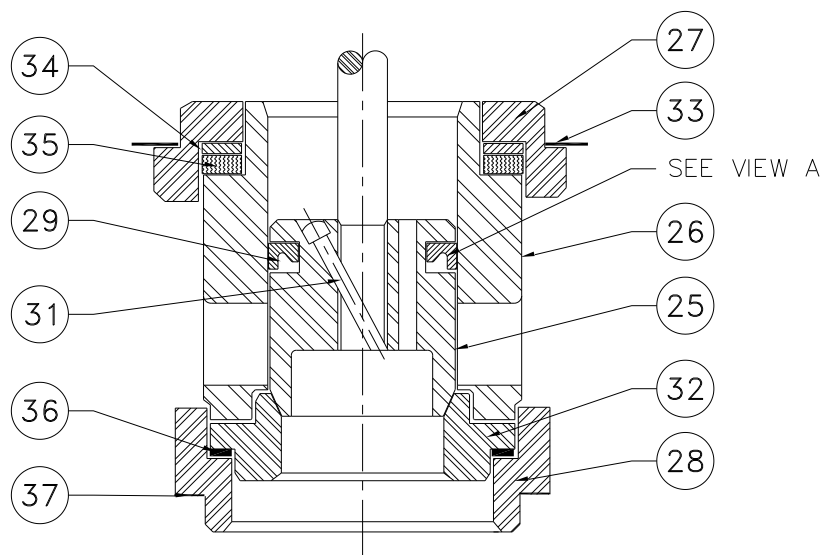
Key	Description
25	Valve Plug
26	Cage
27	Cage Adaptor
28	Seat Ring Adaptor
29	Piston Ring, Design EWD
30	Valve Plug Stem
31	Groove Pin
32	Seat Ring
33 to 37	Gasket Sets
38	Stud Bolt
39	Stud Bolt Nut
40	Pipe Plug
41	Flow Arrow
42	Drive Screw
43	Disc Retainer for TFE Seat
44	Disc Seat for TFE Seat
45	Disc, TFE
48	Seal Ring
51	Back-Up Ring
52	Hex Nut, Stud



**View A**  
***Orientation of Carbon-Filled TFE Piston Ring***

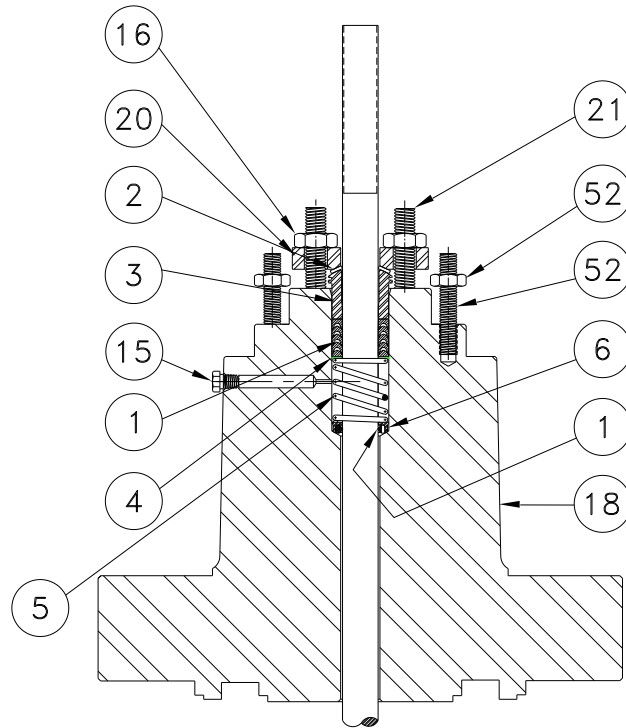


***Detail View of Multiple Piston Ring for Class IV Shutoff***

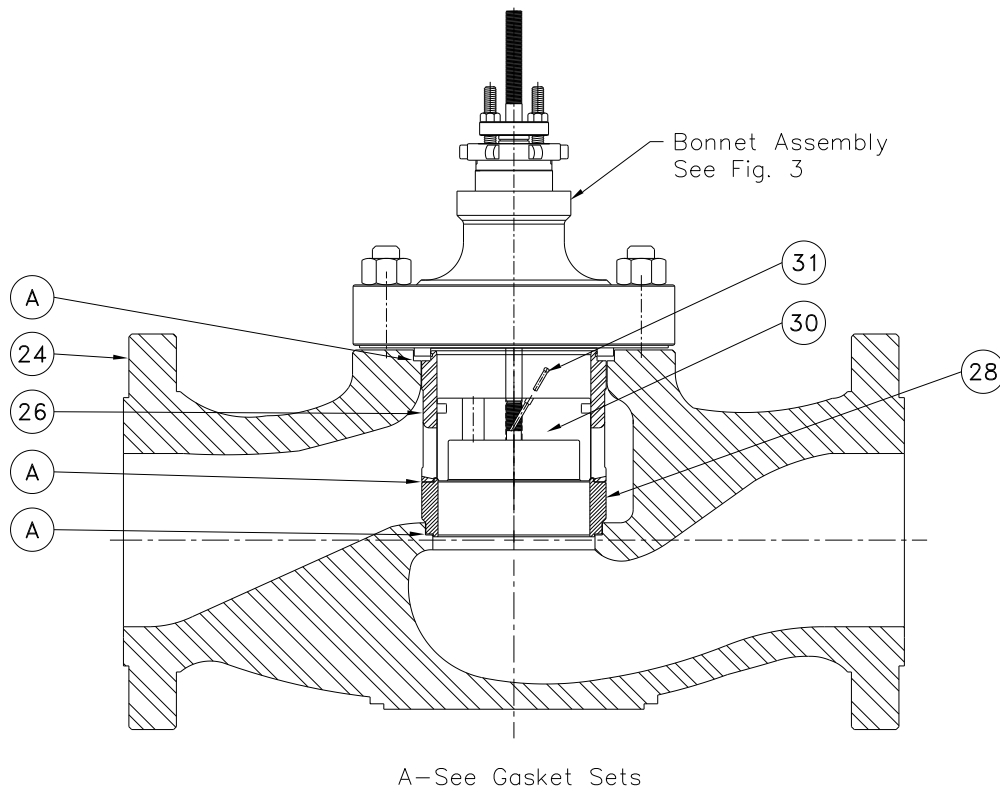


***Restricted Trim Detail***

***Figure 4. CVS Series EWD through 12X6***



**Fig 5. 12x8 Class 900 Bonnet - 5" yoke boss bolting detail**



**Fig 6. Typical 8x6 Valve Body**

## Parts List

Key	Description				Part Number	
1	Single TFE V-Ring Packing Set Includes Female Adaptor, Male Adaptor, 3 Packing Rings and Lower Wiper		3/4-inch (19.1 mm) Stem		CVS1R290401012	
			1-inch (25.4 mm) Stem		CVS1R290601012	
			1-1/4-inch (31.8 mm) Stem		CVS1R290801012	
2	Upper Wiper, Felt		3/4-inch (19.1 mm) Stem		CVS1J872806332	
			1-inch (25.4 mm) Stem		CVS1J872906332	
			1-1/4-inch (31.8 mm) Stem		CVS1J873006332	
3	Packing Follower, 316 SST		3/4-inch (19.1 mm) Stem		CVS1E944735072	
			1-inch (25.4 mm) Stem		CVS1H982335072	
			1-1/4-inch (31.8 mm) Stem		CVS1H998435072	
4	Special Washer, 316 SST For TFE V-Ring Packing		3/4-inch (19.1 mm) Stem		CVS1F125036042	
			1-inch (25.4 mm) Stem		CVS1H982236042	
			1-1/4-inch (31.8 mm) Stem		CVS1H995936042	
5	Packing Box Spring, SST For TFE V-Ring Packing		3/4-inch (19.1 mm) Stem		CVS1F125637012	
			1-inch (25.4 mm) Stem		CVS1D582937012	
			1-1/4-inch (31.8 mm) Stem		CVS1D387437012	
	Lantern Ring, 316 SST		3/4-inch (19.1 mm) Stem		CVS0N028435072	
			1-inch (25.4 mm) Stem		CVS0U099735072	
			1-1/4-inch (31.8 mm) Stem		CVS0W087135072	
6	Packing Box Ring, 316 SST		3/4-inch (19.1 mm) Stem		CVS1J873335072	
			1-inch (25.4 mm) Stem		CVS1J873435012	
			1-1/4-inch (31.8 mm) Stem		CVS1J873525012	
7	Male Adaptor				Included in Gasket Set	
8	Female Adaptor				Included in Gasket Set	
10	Packing Ring, Graphite		3/4-inch (19.1 mm) Stem (2 req'd)		CVS1D749101052	
			1-inch (25.4 mm) Stem (3 req'd)		CVS1D749601052	
			1-1/4-inch (31.8 mm) Stem (3 req'd)		CVS1D751901052	
14	Cap Screw, Steel		5-inch Yoke Only, 8 req'd)		CVS1A936224052	
15	Pipe Plug, Steel		1/4-inch NPT		CVS1A767524662	
16	Packing Flange Nuts, 2 req'd		3/4-inch (19.1 mm) Stem		CVS1E944624112	
			1-inch (25.4 mm) Stem		CVS1A343324112	
			1-1/4-inch (31.8 mm) Stem		CVS1A368224112	
17	Yoke Locknut, Steel		2-13/16-inch Yoke		CVS1E807423062	
			3-9/16-inch Yoke		CVS1E832723062	
18	Bonnet				See Following Tables	
19	Extension Bonnet Bushing, Steel	3/4-inch Stem	Style 1	All Sizes	CVS1R351824492	
			Style 2	8 x 6 and 12 x 6	CVS1U763224492	
		1-inch Stem	Style 1	8 x 6 and 12 x 6	CVS1U567624492	
		1-1/4-inch Stem	Style 1	8 x 6 and 12 x 6	CVS1U527824492	
20	Packing Flange, Steel		3/4-inch (19.1 mm) Stem		CVS1E944823072	
			1-inch (25.4 mm) Stem		CVS0V002425052	
			1-1/4-inch (31.8 mm) Stem		CVS0W085625052	
21	Packing Flange Studs, (2 req'd)		3/4-inch (19.1 mm) Stem		CVS1E944931032	
			1-inch (25.4 mm) Stem		CVS0V002531032	
			1-1/4-inch (31.8 mm) Stem		CVS0W086931032	
22	Individual Packing Ring		TFE	3/4-inch (19.1 mm) Stem (8 req'd)		CVS1E319101042
				1-inch (25.4 mm) Stem (8 req'd)		CVS1D7518X0012
				1-1/4-inch (31.8 mm) Stem (8 req'd)		CVS1D7520X0012
			Graphite	3/4-inch (19.1 mm) Stem (2 req'd)		CVS1D749001052
				1-inch (25.4 mm) Stem (2 req'd)		CVS1D751801052
			1-1/4-inch (31.8 mm) Stem (2 req'd)		CVS1D752001052	
23	Pipe Plug for Double-Tapped Bonnet	8 x 6-inch through 12 x 8-inch body	Steel for WCB Steel Bonnet		CVS1A369224092	
			316 SST for 316 SST Bonnet		CVS1A369235072	
24	Valve Body				See Following Tables	
25	Valve Plug				See Following Tables	
26	Cage				See Following Tables	
27	Cage Adaptor for Restricted-Capacity 6 x 4 x 2-1/2-inch Body		WCB Steel for WCB Steel Body		CVS1V705722012	
			410 SST HT for C5 or WC9 Steel Body		CVS1V7057X0012	
			316 SST for 316 SST Body		CVS1V705733092	
28	Seat Ring Adaptor for Restricted-Capacity 6 x 4 x 2-1/2-inch Body		WCB Steel for WCB Steel Body		CVS1U239622012	
			410 SST HT for C5 or WC9 Steel Body		CVS1U2396X0032	
			316 SST for 316 SST Body		CVS1U239633092	
29	Design EWD Piston Ring				See Following Tables	

## Parts List, cont'd

Key	Description			Part Number
30	Valve Plug Stem			See Following Tables
31	Groove Pin 316 SST	Design EWD or EWT	3/4" (19.1 mm) stem diameter	CVS1V326035072
			1" (25.4 mm) or 1-1/4 (31.8 mm) stem diameter	CVS1V334035072
			3/4" (19.1 mm) stem diameter	CVS1F723635072
			1" (25.4 mm) or 1-1/4 (31.8 mm) stem diameter	CVS1D269735072
32	Seat Ring			See Following Tables
33 to 37	Gasket Sets			See Following Tables
38	Stud Bolt, Steel			Contact CVS Sales Rep
39	Stud Bolt Nut, Steel			Contact CVS Sales Rep
40	Pipe Plug for Drain-Tapped Body		Steel for WCB Steel Body	CVS1A771528992
			316 SST for C5 or WC9 Steel or 316 SST Body	CVS1A771535072
41	Flow Arrow, SST			CVS1V106038983
42	Drive Screw, SST (2 req'd)			CVS1A368228982
43	Disc Retainer for TFE-Seat (Design EWS or EWT)			Contact CVS Sales Rep
44	Disc Seat for TFE-Seat (Design EWS or EWT)			Contact CVS Sales Rep
45	Disc, TFE (-70°F to 400°F)	8 x 6, 12 x 6		CVS1V711906242
		10 x 8		
		12 x 8		
48	Seal Ring, Carbon Filled TFE EWT Only	8 x 6, 12 x 6		CVS10A2643X012
		10 x 8		
		12 x 8		
51	Back-Up Ring, EWT only	Viton 0-400°F	8 x 6, 12 x 6	CVS1V660005292
		Ethylene-Propylene (water or steam) -40°F to 300°F	8 x 6, 12 x 6	CVS1V660005392
52	Hex Nut, Stud		12 x 8	Contact CVS Sales Rep
53	Load Ring		8 x 6, 12 x 8	CVS20A3267X012

## Key 18 Bonnet, Steel

Body Size Inches	Boss Size Inches	Plain Bonnet, Tapped
8 x 6	3-9/16	CVS3U509423022
12 x 6	5	CVS2U509822012
12 x 8	5	CVS45A9272X012

## Key 24 Valve Body, Steel

End Connections		Body Size, Inches		
		8 x 6	12 x 6	12 x 8
RF Flange	300 lb	CVS2V720922012	CVS32A0559X012	CVS45A8259X012
RTJ Flange		CVS2V721122012	CVS32A0565X012	CVS45A8261X012
RF Flange	600 lb	CVS2V721022012	CVS32A0562X012	CVS45A8258X012
RTJ Flange		CVS2V721222012	CVS32A0566X012	CVS458260X012
RF Flange	900 lb	CVS31A8283X012		CVS45A9274X012
RTJ Flange		CVS31A9339X012		CVS45A9275X012

## Key 25 Valve Plug

Body Size In	VSC In	EWS		EWD/EWT	
		316 SST	316 SST #6 <sup>1</sup>	316 SST	316 SST #6 <sup>1</sup>
8 x 6 and 12 x 6	3/4	CVS11A5250X012	CVS11A5256X012	CVS1V658435072	CVS21A5351X012
	1	CVS11A5251X012	CVS11A5257X012	CVS1V658535072	CVS20A0103X012
12 x 6	1-1/4	CVS11A5252X012	CVS11A5258X012	CVS1V658635072	CVS20A4608X012
	1-1/4	CVS21A21A5283	CVS21A5267X012	CVS21A5358X022	CVS21A5361X012

1. Alloy #6 on valve plug seat and guide

## Key 26 Cage

Body Size In	Material	Equal Percentage	Quick Opening	Linear
8 x 6 and 12 x 6	17-4PH SST (Hard)	CVS2U505933272	CVS2U506333272	CVS2U506133272
	316 SST ENC	CVS2U806748932	CVS2U806948932	CVS2U806848932
	316 SST	CVS2U693746102	CVS2U693546102	CVS2U693846102
12 x 8	17-4PH SST (Hard)	CVS20A3245X012	CVS20A2349X012	CVS20A3247X012
	316 SST ENC	CVS 20A3245X012	CVS20A5469X012	CVS20A5468X012
	316 SST	CVS20A4348X012	CVS20A4350X012	CVS20A4349X012

1. For Whisper Cage Contact A CVS Sales Representative

## Key 30 Valve Plug Stem (316 SST)

Body Size In	Stem Diameter In	Plain Bonnet
		Part Number
8 x 6 and 12 x 6	3/4	CVS1L996435162
	1	CVS1N704735162
		CVS1K759135162 <sup>1</sup>
	1-1/4	CVS1K415435162
		CS1K775335162 <sup>1</sup>
12 x 8	1-1/4	CVS11A3430X622

1 For Type 667 Only

## Key 32 Seat Ring

Body Size In	416 SST	316 SST with Alloy 6 Seat
8 x 6	CVS2V721546172	CVS1V721646062
12 x 6	CVS2V643946172	CVS2V644046062
12 x 8	CVS20A3260X012	CVS20A3260X152

## Keys 33-37 Gasket Sets

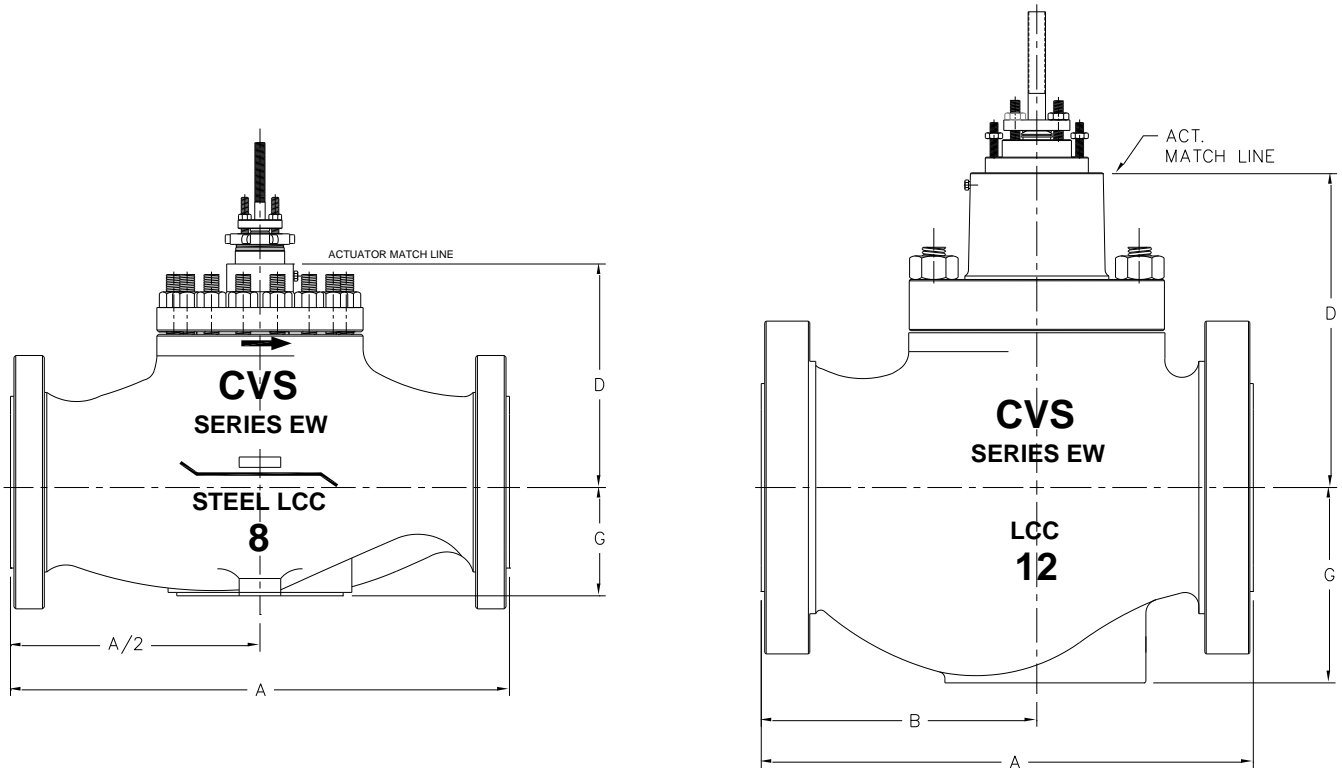
Body Size In	Metal Seat			TFE Seat
	-425°F to 450°F	450°F to 800°F	Over 800°F	-70°F to 400°F
8 x 6 and 12 x 6	CVS1U5085X0092	CVS1U5085X0062	CVS5085X0072	CVS1U5085X0082
12 x 8	CVS10A3265X012	-----	CVS10A3265X022	CVS10A3265X032



**Table 7: Dimensional Data**

Dim	ANSI Class		8x6		12x6		12x8	
			Inch	mm	Inch	mm	Inch	mm
A	300	RF	22.38	568	30.50	775	30.50	775
		RTJ	23.00	584	31.12	791	31.12	791
	600	RF	24.00	610	32.25	819	32.25	819
		RTJ	24.12	613	32.38	822	32.38	822
	900	RF	36.00	914	----	----	35.50	902
		RTJ	36.12	917	----	----	39.62	1006
B	300	RF	----	----	----	----	18.25	164
		RTJ	----	----	----	----	18.56	471
	600	RF	----	----	----	----	19.12	486
		RTJ	----	----	----	----	19.19	487
	900	RF	----	----	----	----	19.88	505
		RTJ	----	----	----	----	19.94	506
D	300	----	13.00 <sup>A</sup>	330 <sup>A</sup>	15.69	399	----	----
		----	----	----	----	----	----	----
	600	----	----	----	----	----	----	----
		----	----	----	----	----	----	----
	900	----	18.25 <sup>A</sup>	464 <sup>A</sup>	----	----	23.63 <sup>A</sup>	600 <sup>A</sup>
		----	(16.13) <sup>B</sup>	(410) <sup>B</sup>	----	----	(22.94) <sup>B</sup>	(583) <sup>B</sup>
G	300/600		7.20	183	10.00	254	14.00	530
	900		7.80	198	----	----		

A – 1 OR 1-1/4" VSC, PLAIN BONNET  
B – 3/4" VSC, PLAIN BONNET  
C – FOR OTHER TRIM COMBINATIONS CONTACT A CVS SALES REP.



**Fig 7. Typical Dimension for EWD Valve Bodies**

***Notes:***

***Notes:***

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