



USER INSTRUCTIONS

Valtek Mark 10 Survivor Control Valves

FCD VLENIM0036-05 – 07/09

*Installation
Operation
Maintenance*



Experience In Motion



Valtek Mark 10 Survivor Control Valves FCD VLENIM0036-05 – 07/09

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1

General Information

1.1. Usage

The following instructions are designed to assist in unpacking, installing and performing maintenance as required on Flowserve products. Product users and maintenance personnel should thoroughly review this bulletin prior to unpacking, installing, operating, or performing any maintenance. In most cases, Flowserve valves, actuators and accessories are designed for specific applications (e.g. with regard to medium, pressure, temperature). For this reason they should not be used in other applications without first contacting the manufacturer. The product Installation, Operation, and Maintenance Instructions provides important additional safety information.

1.2. Applicability

The following instructions are applicable to the maintenance and installation of Mark 10 Survivor control valves. These instructions cannot claim to cover all details of all possible product variations, nor in particular can they provide information for every possible example of installation, operation or maintenance. This means that the instructions normally include only the directions to be followed by qualified personnel where the product is being used for its defined purpose. If there are any uncertainties in this respect particularly in the event of missing product-related information, clarification must be obtained via the appropriate Flowserve sales office. All Flowserve User Manuals are available at www.flowserve.com.

1.3. Terms Concerning Safety

The safety terms DANGER, WARNING, CAUTION and NOTE are used in these instructions to highlight particular dangers and/or to provide additional information on aspects that may not be readily apparent.

- ❖ **DANGER:** indicates that death, severe personal injury and/or substantial property damage will occur if proper precautions are not taken.
- ❖ **WARNING:** indicates that death, severe personal injury and/or substantial property damage can occur if proper precautions are not taken.

▲ **CAUTION:** indicates that minor personal injury and/ or property damage can occur if proper precautions are not taken.

NOTE: indicates and provides additional technical information, which may not be very obvious even to qualified personnel.

Compliance with other, not particularly emphasized notes, with regard to transport, assembly, operation and maintenance and with regard to technical documentation (e.g. in the operating instruction, product documentation or on the product itself) is essential, in order to avoid faults, which in themselves might directly or indirectly cause severe personal injury or property damage.

1.4. Protective Clothing

Flowserve products are often used in problematic applications (e.g. extremely high pressures, dangerous, toxic or corrosive mediums). When performing service, inspection or repair operations always ensure that the valve and actuator are depressurized and that the valve has been cleaned and is free from harmful substances. In such cases pay particular attention to personal protection (protective clothing, gloves, glasses, etc.).

1.5. Qualified Personnel

Qualified personnel are people who, on account of their training, experience and instruction and their knowledge of relevant standards, specifications, accident prevention regulations and operating conditions, have been authorized by those responsible for the safety of the plant to perform the necessary work and who can recognize and avoid possible dangers.

1.6. Spare Parts

Use only Flowserve original spare parts. Flowserve cannot accept responsibility for any damages that occur from using spare parts or fastening materials from other manufacturers. If Flowserve products (especially sealing materials) have been on store for long periods, check for corrosion or deterioration before using these products.

1.7. Service / Repair

To avoid possible injury to personnel or damage to products, safety terms must be strictly adhered to. Modifying this product, substituting non-factory parts, or using maintenance procedures other than outlined in this instruction could drastically affect performance and be hazardous to personnel and equipment, and may void existing warranties. Between actuator and valve there are moving parts.

To avoid injury, Flowserve provides pinch-point-protection in the form of cover plates, especially where side-mounted positioners are fitted. If these plates are removed for inspection, service or repair, special attention is required. After completing work the cover plates must be refitted. Apart from the operating instructions and the obligatory accident prevention directives valid in the country of use, all recognized regulations for safety and good engineering practices must be followed.

※ **WARNING:** Before products are returned to Flowserve for repair or service, Flowserve must be provided with a certificate which confirms that the product has been decontaminated and is clean. Flowserve will not accept deliveries if a certificate has not been provided (a form can be obtained from Flowserve).

1.8. Storage

In most cases, Flowserve products are manufactured from stainless steel. Products not manufactured from stainless steel are provided with an epoxy resin coating. This means that Flowserve products are well protected from corrosion. Nevertheless, Flowserve products must be stored adequately in a clean, dry environment. Plastic caps are fitted to protect the flange faces by preventing the ingress of foreign materials. These caps should not be removed until the valve is actually mounted into the system.

1.9. Unpacking

While unpacking the valve, check the packing list against the materials received. Lists describing the valve and accessories are in each shipping container.

When lifting the valve from the shipping container, use straps through the yoke legs, or the lifting lugs attached to the yoke bolting. Take care to position lifting straps to avoid damage to the tubing and mounted accessories.

WARNING: When lifting a valve, be aware that the center of gravity may be above the lifting point. Therefore, support must be given to prevent the valve from rotating. Failure to do so can cause serious injury to personnel and damage to the valve or nearby equipment.

Contact your shipper immediately if there is shipping damage.

Should any problem arise, call your Flowserve representative.

2 Installation

● **DANGER:** Before installation check the order number, serial number, and/or the tag number to ensure that the valve and actuator are correct for the intended application.

▲ **CAUTION:** Do not insulate extensions that are provided for hot or cold services.

▲ **CAUTION:** On valves equipped with air filters, the air filter must point down to perform properly.

NOTE: In some rare cases, the air supply must be limited to less than 150 psi (10.3 bar). This is indicated on a sticker found near the upper air port on the actuator cylinder. An air regulator should be installed to ensure the supply pressure does not exceed the line pressure indicated on the sticker.

- 2.1. Pipelines must be correctly aligned to ensure that the valve is not fitted under tension.
- 2.2. Before installing the valve, clean the line of dirt, welding chips, scale, or other foreign material.
- 2.3. Check the flow direction to be sure the valve is installed correctly. Flow for the Survivor is always over the plug for both fail-closed and fail-open valves. Flow direction is indicated by an arrow on the bonnet flange.
- 2.4. Be sure to provide proper overhead clearance for the actuator to allow for disassembly of the plug from the valve body. Refer to the appropriate actuator User Instructions for proper clearances. Actuator User Instructions are available at www.flowserv.com.
- 2.5. Prior to placing valve in the line, check the plug/seat ring adjustment, per the following instructions.

● **WARNING:** Keep hands, hair, clothing, etc. away from all moving parts when operating the valve. Failure to do so can cause serious injury.

2.5.1. Valves with metal plug and seat

- 2.5.1.1. Insert the seat into the bottom of the valve. Stroke the valve by applying air to the top of the actuator. Check for a $\frac{1}{16}$ -inch gap between the seat and body. If the gap is too small or large, loosen the stem clamp bolt and screw the plug in or out of the actuator stem. Repeat this process as needed to obtain a $\frac{1}{16}$ -inch gap. Then retighten the stem clamp.

2.5.2. Valves with ceramic trims and actuator limit stops

- 2.5.2.1. This procedure provides a minimum gap between the piston and the top of the yoke. A minimal gap is essential to avoiding slamming of the plug while operating at low openings.
- 2.5.2.2. Loosen the stem clamp to allow the plug to rotate in the actuator stem.
- 2.5.2.3. Remove the limit stop cap and loosen the jam nuts. Back the jam nuts off to allow the actuator to stroke fully without engaging the limit stop.

⚠ WARNING: With the limit stop cap off, the jam nuts present a pinch hazard. While stroking the actuator, take care not to get hands or clothing caught between the jam nuts and the limit stop hub.
- 2.5.2.4. Using a wrench to keep the actuator stem from rotating, spin the plug into the actuator stem until only one to one and a half threads are still exposed.
- 2.5.2.5. Check to make sure the seat ring and plug are clean of dirt, debris or any other contamination.

NOTE: Flowserve can offer graphite ribbon which can be used to provide a thin pad between the plug head and seat ring surfaces. It is recommended that similar padding be used to lower the risk of ceramic fracture.

- 2.5.2.6. With the seat gaskets removed, place the seat ring into the body and hold in place using hand pressure.
- 2.5.2.7. Stroke the valve open.
- 2.5.2.8. Turn the plug out one quarter turn, or less when fine tuning the plug position.
- 2.5.2.9. Stroke the valve closed. Note if the plug contacts the seat ring. This can be felt as the seat ring moves due to contact with the plug.

⚠ CAUTION: Contacting the seat ring and plug with ceramic trimmed valves could cause the seat ring or plug to fracture. Take great care in allowing these two surfaces to contact. The seat ring should be allowed to slide out of the body smoothly, with only light hand pressure to hold it in place. If the seat begins to bind, immediately stroke the valve open. Remove the seat and check for dings or dirt. Stroke the valve slowly to avoid slamming the plug into the seat ring.

NOTE: By stroking the valve closed, the gap between the piston and yoke is closed.

- 2.5.2.10. Repeat steps 2.5.2.7 through 2.5.2.9 until the plug just contacts the seat. Stop as soon as the two are in contact.
- 2.5.2.11. Stroke the valve open. Turn the plug back into the actuator stem one quarter turn. This will ensure that the plug will not contact the seat during operation.
- 2.5.2.12. Remove the seat ring from the body. Set and tighten the stem clamp.
- 2.5.2.13. Stroke the valve closed and move the lower jam nut down until it contacts the limit stop hub.
- 2.5.2.14. Stroke the valve open and lower the jam nut one eighth a turn. Lower the upper jam nut and tighten the two together.
- 2.5.2.15. Stroke the valve closed to verify the jam nuts are set correctly.
- 2.5.2.16. Replace the limit stop cap.

2.5.2.17. Replace the seat ring and seat ring gasket.

2.5.3. Valves with ceramic trims without actuator limit stops, or non-standard actuators

2.5.3.1. This procedure uses the adjustment of the plug stem and the actuator stem to limit the travel of the plug. Any actuator limit stops should be set before proceeding.

2.5.3.2. Loosen the stem clamp to allow the plug to rotate in the actuator stem.

2.5.3.3. Using a wrench to keep the actuator stem from rotating, spin the plug into the actuator stem until only one to one and a half threads are still exposed.

2.5.3.4. Check to make sure the seat ring and plug are clean of dirt, debris or any other contamination.

NOTE: Flowserve can offer graphite ribbon which can be used to provide a thin pad between the plug head and seat ring surfaces. It is recommended that similar padding be used to lower the risk of ceramic fracture.

2.5.3.5. With all the seat gaskets removed, place the seat ring into the body and hold in place using hand pressure.

2.5.3.6. Stroke the valve open.

2.5.3.7. Turn the plug out one quarter turn, or less when fine tuning the plug position.

2.5.3.8. Stroke the valve closed. Note if the plug contacts the seat ring. This can be felt as the seat ring moves due to contact with the plug.

▲ CAUTION: Contacting the seat ring and plug with ceramic trimmed valves could cause the seat ring or plug to fracture. Take great care in allowing these two surfaces to contact. The seat ring should be allowed to slide out of the body smoothly, with only light hand pressure to hold it in place. If the seat begins to bind, immediately stroke the valve open. Remove the seat and check for dings or dirt. Stroke the valve slowly to avoid slamming the plug into the seat ring.

2.5.3.9. Repeat steps 2.5.3.6 through 2.5.3.8 until the plug just contacts the seat. Stop as soon as the two are in contact.

2.5.3.10. Stroke the valve open. Turn the plug back into the actuator stem one quarter turn. This will ensure that the plug will not contact the seat during operation.

2.5.3.11. Remove the seat ring from the body. Set and tighten the stem clamp.

2.6. Remove all seat ring bolts and transport to installation location. For valves installed horizontally, only remove the bolts holding the seat into the body.

2.7. Place seat ring and seat ring gasket into the downstream pipe.

2.7.1. When installing two piece seats, install the lower seat, with gaskets, then the upper seat. After installing the upper seat, spin the upper seat a little to assure a proper fit.

2.8. Check all gaskets, including seat and line gaskets.

2.9. Verify that the plug is in the up position.

2.10. Lower the valve onto the seat ring, taking care not to cock. Install the bolting, finger tight.

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NOTE: If the valve has separable end flanges, the half rings must be installed on the valve body before bolting the valve into the line to insure a tight connection.

⚠ WARNING: Failure to install half rings on the valve body can cause serious personal injury.

- 2.11. Slowly lower the plug to the limit stop for seat centering.
- 2.12. Lift the plug to the up position.
- 2.13. Torque line bolting as per plant specification.
- 2.14. Connect the air supply and instrument signal. Throttling control valves are equipped with a valve positioner. Two connections are marked: one for the air supply and the other for the instrument signal. An air regulator is typically not required unless the air supply exceeds the maximum allowed by the actuator User Manual. An air filter should be installed before the positioner unless supply air is unusually clean and dry. All connections must be free of leaks.

NOTE: In some rare cases, the air supply must be limited to less than 150 psi. In this case, a sticker found near the upper air port on the actuator cylinder will indicate this and an air regulator should be installed to insure the supply pressure does not exceed the line pressure indicated on the sticker.

3 Quick-check

- 3.1. Stroke the valve and observe the plug position indicator on the stem clamp compared to the stroke indicator plate. The plug should move through its stroke in a smooth, linear fashion.

 **WARNING:** Keep hands, hair, clothing, etc. away from all moving parts when operating the valve. Failure to do so can cause serious injury.

- 3.2. Check for full stroke by making the appropriate instrument signal change (such as 3-15, 3-9, 9-15 psi or associated split ranges for pneumatic positioners, 4-20 or 10-50 mA for electro-pneumatic positioners).
- 3.3. Check all air connections for leaks.
- 3.4. Make sure the valve strokes in the correct direction in case of air failure. This is done by shutting off the air supply to the valve and observing the direction of plug stem travel.

 **CAUTION:** Most ceramic surfaces can be damaged by turning the plug while the plug is in contact with the seat. Ensure the plug is raised off the seat before adjusting the plug.

- 3.5. After process temperature excursion has occurred, bonnet flange bolting should be retightened to ensure bonnet gaskets do not leak. See Table II.

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Valve Maintenance

At least once every six months, check for proper operation by following the preventive maintenance steps outlined below. These steps can be performed while the valve is in-line and, in some cases, without interrupting service. If an internal problem is suspected, refer to the "Valve Disassembly and Reassembly" section.

- 4.1. Look for signs of gasket leakage through the end flanges and bonnet. Tighten flange and bonnet bolting (if required). See Table II.
- 4.2. Examine the valve for damage caused by corrosive fumes or process drippings.
- 4.3. Clean valve and repaint areas of severe oxidation.
- 4.4. Check packing box bolting for proper tightness. Tighten only as necessary to prevent stem leakage. Use caution to not overtighten the packing. If leakage cannot be stopped, consult factory.

▲ CAUTION: Do not overtighten packing. This can cause excessive packing wear and high stem friction that may impede stem movement.

- 4.5. If the valve is supplied with a lubricator, check the lubricant supply and add lubricant if necessary. See Table I for suggested lubricants.
- 4.6. If possible, stroke the valve and check for smooth, full-stroke operation. Unsteady stem movement could indicate an internal valve problem.

NOTE: Smooth operation can be best maintained using packing lubrication and high performance positioners. Contact the factory for special instructions if stroking the valve produces jerky motion.

※ WARNING: Keep hands, hair, clothing, etc. away from all moving parts when operating the valve. Failure to do so can cause serious injury.

- 4.7. Make sure positioner linkage and stem clamp are securely fastened. If the stem clamp is loose, check plug thread engagement (refer to the "Reassembling the Actuator" section for the correct procedure on aligning the plug with the seat).

- 4.8. Ensure all accessories, brackets and bolting are securely fastened.
- 4.9. If possible, remove the air supply and observe the actuator for correct fail-safe action.
- 4.10. Spray a soap solution around the cylinder actuator retaining ring, adjusting screw and actuator stem guide to check for air leaks through the O-rings.
- 4.11. Clean any dirt or foreign material from the plug stem.
- 4.12. If an air filter is supplied, check and replace the cartridge if necessary.

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Valve Disassembly and Reassembly

5.1. Disassembling the Valve Body

To disassemble the valve body, refer to Figure 1 and proceed as follows:

✖ **WARNING:** Depressurize line to atmospheric pressure and drain all fluids before working on the valve. Failure to do so can cause serious injury.

5.1.1. If valve is air-to-close, proceed to step 5.1.3. If valve is air-to-open, put air under the piston to lift the plug off the seat before taking the valve apart.

5.1.2. Remove the bonnet flange bolting and lift the actuator, bonnet and plug out of the valve.

✖ **WARNING:** When lifting an actuator be aware that the center of gravity may be above the lifting point. Therefore, support must be given to prevent the valve from rotating. Failure to do so can cause serious injury to personnel and damage to the valve or nearby equipment.

⚠ **CAUTION:** Care should be taken to lift the actuator and plug straight out of the body to avoid damage to the plug and seat.

NOTE: Some Survivor valve designs require that the plug be removed by pulling through the bottom of the valve. In these cases remove the bonnet, leaving the plug sitting on the seat ring while still inside the body.

5.1.3. At this point, the plug and seat sealing surfaces can be visually inspected for damage. If the seat needs to be removed, install lifting lugs in the bonnet bolting holes and attach a hoist to the body. Unbolt the end flanges and carefully lift the valve from the line.

✖ **WARNING:** When removing a two piece seat, the upper seat may remain in the valve body and subsequently drop, causing harm to personnel, the seat ring, or nearby equipment. Care must be taken to prevent the seat ring from dropping accidentally. If the seat ring sticks, pry the seat out as the body lifts to prevent it from falling unexpectedly.

5.1.4. If the seat ring is still in the valve body, remove it and inspect gasket surfaces on the seat ring, bonnet and body, making sure they are clean and undamaged.

5.1.5. To inspect the plug, remove it by loosening stem clamp and gland flange and screw it out of actuator stem. Pull the plug carefully through the packing box.

▲ **CAUTION:** To avoid scoring the guides and plug stem, follow the above procedure exactly.

NOTE: With air-to-close, fail-open valves, it may be necessary to apply a small amount of air to the top of the actuator to move the plug away from the bonnet. Otherwise some galling on the plug may occur.

5.1.6. If seat surfaces are metal and need re-machining, both surfaces on the plug and seat ring must be reworked. The seat angle on the plug is 30 degrees; seat ring, 33 degrees. Lapping will not be necessary if proper assembly procedures are followed.

▲ **CAUTION:** If re-machining metal surfaces, protect stem during turning. Insure concentricity of the seat surface with the plug stem (or outside diameter of seat ring, if machining seat).

5.1.7. Remove the actuator from the bonnet subassembly, by first removing the gland flange and then removing the yoke bolting/clamp. Finally disconnect the bonnet from the actuator.

5.1.8. Remove the wiper set assembly, if supplied. The packing can also now be removed from the packing box using an appropriate sized dowel to push it out.

▲ **CAUTION:** Do not score or gall the packing box bore or stem guides.

✖ **WARNING:** For valves equipped with separable end flanges, use extreme care to not over machine body gasket surfaces. Removing excessive body material could cause failure of the separable flange lip, causing end gasket leakage and failure of the valve.

▲ **CAUTION:** When using separable end flanges and spiral wound gaskets, use gaskets with outer backup rings. Failure to do so could result in excess stress in some applications.

NOTE: To prevent flanges from dropping off during shipping, a tack weld or stainless steel rivet has been installed behind the end flanges.

5.2. Reassembling the Valve Body

Survivor valves are specifically engineered for each application. Before reassembling, consult the factory for packing and wiper set configuration.

5.2.1. Reinstall the packing, guides and packing spacers per factory instructions. If wiper rings are provided, install per the factory drawings. Lubrication of the packing is recommended. See Table I for suggested lubricants. Applying lubrication to the packing at this stage will ease reassembly.

5.2.2. Insert the plug into the bonnet, being careful to not score or gall either. Be careful to not pinch or score the wiper set. Clamp the bonnet vertically into a vise with the plug supported on a soft surface.

▲ **CAUTION:** Be careful to not strike the plug head against any object.

5.2.3. Insert the packing assembly according to configuration specified by the factory. Make sure at least 1/8-inch is left at the top of the packing box for the top stem guide to enter. Different spacer lengths permit a wide variety of packing configurations, such as twin seal and vacuum-pressure packing. Where Grafoil guides are used, the Grafoil liners should be replaced each time the valve packing is replaced. Under no circumstances should the valve be rebuilt without Grafoil liners in the guides.

- 5.2.4. Turn actuator back onto the plug, without turning the plug inside the bonnet. Make sure the gland flange and bonnet flange are in place before engaging the plug stem and actuator stem threads.

NOTE: Do not allow the gland flange to contact and gall the polished plug stem.

- 5.2.5. Leave approximately four to five plug stem threads exposed. Install the yoke bolting (clamp) and tighten firmly. Tighten gland flange to approximately 12 foot-pounds. Use caution to not overtighten the packing.

▲ CAUTION: Do not overtighten packing. This can cause excessive packing wear and high stem friction that may impede stem movement.

- 5.2.6. Install new bonnet gasket and lower bonnet/actuator assembly into the valve body. Install the bonnet flange bolting and tighten it per Table II.

5.2.7. Valves with metal plug and seat

Insert the seat into the bottom of the valve. Stroke the valve by applying air to the top of the actuator. Check for a $1/16$ -inch gap between the seat and body. If the gap is too small or large, loosen the stem clamp bolt and screw the plug in or out of the actuator stem. Repeat this process as needed to obtain a $1/16$ -inch gap. Then retighten the stem clamp.

5.2.8. Valves with ceramic trims and actuator limit stops

- 5.2.8.1. This procedure provides a minimum gap between the piston and the bottom of the yoke. A minimal gap is essential to avoiding slamming of the plug while operating at low openings.

- 5.2.8.2. Loosen the stem clamp to allow the plug to rotate in the actuator stem.

- 5.2.8.3. Remove the limit stop cap and loosen the jam nuts. Back the jam nuts off to allow the actuator to stroke fully without engaging the limit stop.

✖ WARNING: With the limit stop cap off, the jam nuts present a pinch hazard. While stroking the actuator, take care not to get hands or clothing caught between the jam nuts and the limit stop hub.

- 5.2.8.4. Using a wrench to keep the actuator stem from rotating, spin the plug into the actuator stem until only one to one and a half threads are still exposed.

- 5.2.8.5. Check to make sure the seat ring and plug are clean of dirt, debris or any other contamination.

NOTE: Flowserve can offer graphite ribbon which can be used to provide a thin pad between the plug head and seat ring surfaces. It is recommended that similar padding be used to lower the risk of ceramic fracture.

- 5.2.8.6. With the seat gaskets removed, place the seat ring into the body and hold in place using hand pressure.

- 5.2.8.7. Stroke the valve open.

- 5.2.8.8. Turn the plug out one quarter turn, or less when fine tuning the plug position.

- 5.2.8.9. Stroke the valve closed. Note if the plug contacts the seat ring. This can be felt as the seat ring moves due to contact with the plug.

▲ CAUTION: Contacting the seat ring and plug with ceramic trimmed valves could cause the seat ring or plug to fracture. Take great care in allowing these two surfaces to contact. The seat

ring should be allowed to slide out of the body smoothly, with only light hand pressure to hold it in place. If the seat begins to bind, immediately stroke the valve open. Remove the seat and check for dings or dirt. Stroke the valve slowly to avoid slamming the plug into the seat ring.

NOTE: By stroking the valve closed, the gap between the piston and yoke is closed.

- 5.2.8.10. Repeat steps 5.2.8.7 through 2.5.8.9 until the plug just contacts the seat. Stop as soon as the two are in contact.
- 5.2.8.11. Stroke the valve open. Turn the plug back into the actuator stem one quarter turn. This will ensure that the plug will not contact the seat during operation.
- 5.2.8.12. Remove the seat ring from the body. Set and tighten the stem clamp.
- 5.2.8.13. Stroke the valve closed and move the lower jam nut down until it contacts the limit stop hub.
- 5.2.8.14. Stroke the valve open and lower the jam nut one eighth a turn. Lower the upper jam nut and tighten the two together.
- 5.2.8.15. Stroke the valve closed to verify the jam nuts are set correctly.
- 5.2.8.16. Replace the limit stop cap.
- 5.2.8.17. Replace the seat ring and seat ring gasket.

5.2.9. Valves with ceramic trims without actuator limit stops, or non-standard actuators

- 5.2.9.1. This procedure uses the adjustment of the plug stem the actuator stem to limit the travel of the plug. Any actuator limit stops should be set before proceeding.
- 5.2.9.2. Loosen the stem clamp to allow the plug to rotate in the actuator stem.
- 5.2.9.3. Using a wrench to keep the actuator stem from rotating, spin the plug into the actuator stem until only one to one and a half threads are still exposed.
- 5.2.9.4. Check to make sure the seat ring and plug are clean of dirt, debris or any other contamination.

NOTE: Flowserve can offer graphite ribbon which can be used to provide a thin pad between the plug head and seat ring surfaces. It is recommended that similar padding be used to lower the risk of ceramic fracture.

- 5.2.9.5. With the seat gaskets removed, place the seat ring into the body and hold in place using hand pressure.
- 5.2.9.6. Stroke the valve open.
- 5.2.9.7. Turn the plug out one quarter turn, or less when fine tuning the plug position.
- 5.2.9.8. Stroke the valve closed. Note if the plug contacts the seat ring. This can be felt as the seat ring moves due to contact with the plug.

▲ CAUTION: Contacting the seat ring and plug with ceramic trimmed valves could cause the seat ring or plug to fracture. Take great care in allowing these two surfaces to contact. The seat ring should be allowed to slide out of the body smoothly, with only light hand pressure to hold it in place. If the seat begins to bind, immediately stroke the valve open. Remove the seat and check for dings or dirt. Stroke the valve slowly to avoid slamming the plug into the seat ring.

- 5.2.9.9. Repeat steps 5.2.9.6 through 5.2.9.8 until the plug just contacts the seat. Stop as soon as the two are in contact.

5.2.9.10. Stroke the valve open. Turn the plug back into the actuator stem one quarter turn. This will ensure that the plug will not contact the seat during operation.

5.2.9.11. Remove the seat ring from the body. Set and tighten the stem clamp.

5.2.10. Valves with separate seats (and no seat ring bolts)

5.2.10.1. Place a flange gasket, seat ring and finally seat ring gasket onto the downstream pipeline.

5.2.10.2. Retract the valve plug and carefully lower the body/actuator assembly onto the seat ring and gasket.

▲ **CAUTION:** Be careful to not strike the plug head against any object during this process.

5.2.10.3. Insert the upstream flange gasket, flange and piping. Slowly stroke the valve to its closed position to center seat ring in pipe line. Install the flange bolting and tighten per industry standards.

5.2.11. Valves with bolt on seats

Just before installing the valve in line follow these steps to center the seat ring:

5.2.11.1. Place the valve in an upright position. Place the seat ring and seat gaskets into the valve body.

5.2.11.2. Slowly stroke the valve to its closed position. Stroke the valve several times to center the seat ring. Retract the plug and tighten the seat ring bolting.

5.2.11.3. Take care not to bump or move the seat ring during assembly into the line. If the seat ring is moved during installation, remove the valve and repeat steps 5.2.12.1 to 5.2.12.1.2.

Table I: Common Packing Lubricants

Lubricant	Manufacturer	Temperature Range		Description / Applications
		°F	°C	
Krytox	E.I. DuPont	-5 to 550	-20 to 287	Fluorinated general purpose grease; handles common liquids and gases; good lubricity in harsh mediums; nonflammable, chemically inert; won't harm plastic or metal parts
GP-460	Acheson	32 to 1000	0 to 537	Anti-seize lubricant containing high purity graphite in petrolatum.

Table II: Suggested Bonnet Bolting Torque Values

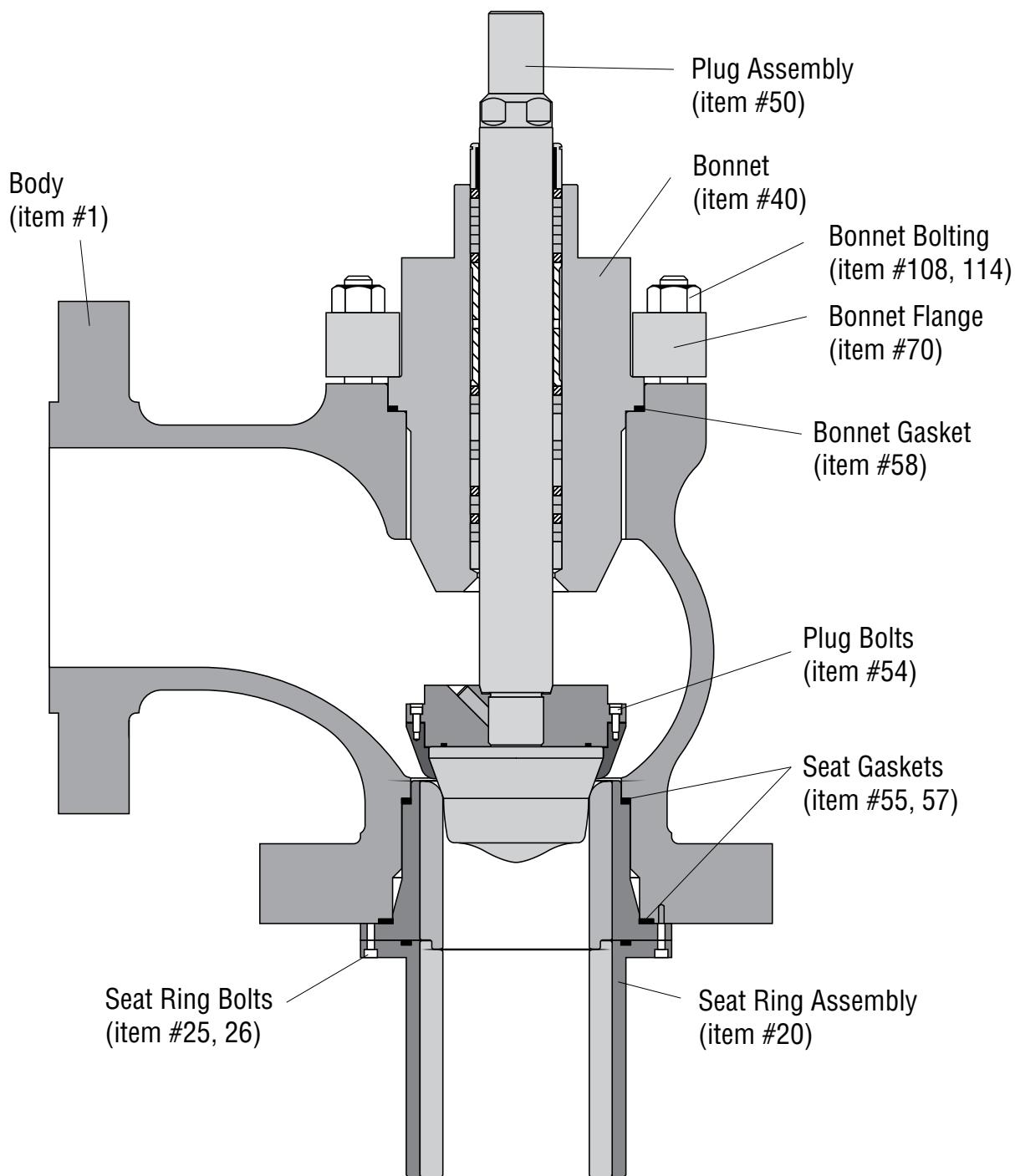
Bolt Size (in.)	Nut/Stud Material			
	Carbon Steel		Stainless Steel	
	ft-lb, ±10%	N m, ±10%	ft-lb, ±10%	N m, ±10%
5/8	80	108	50	68
3/4	140	190	90	122
7/8	230	312	150	203
1	350	475	220	298
1 1/8	510	691	330	447
1 1/4	730	990	460	624
1 3/8	990	1342	630	854
1 1/2	1320	1790	840	1139

Figure 1: Valtek Mark 10 Survivor Control Valves Body Subassembly

Not Shown:

Gland Flange (item #80)

Gland Flange Bolting (item #109, 117)



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