



Alloy Valves and Control

INSTALLATION – MAINTENANCE MANUAL

3-PIECE BALL VALVE

1100

DESIGN:

AVCO Ball Valves have been designed and engineered to provide long lasting and trouble free service when used in accordance with the instructions and specifications herein.

General: The following instructions only refer to **AVCO** STANDARD valves as described in the **AVCO** current catalog.

Keep protective cover in place until moment of installation. Valve performance depends upon prevention of damage to ball surface. Upon removal of cover make sure that the valve is completely open and free of obstruction.

When shipped, valves contain a silicon based lubricant which aids the assembly of the valve; this may be removed with a solvent if found objectionable, alternatively valves can be ordered free of lubricants.

Certain ferrous valves are phosphated and oil dipped during the course of manufacture, but the process used are completely non-toxic and the valves are quite safe to use for edible or potable products.

Screwed Valves

Do not dismantle these valves before fitting, treat as a unit. Taper threaded fittings should not be over tightened.

In some applications screwed valves are “back welded” on site and these valves must be dismantled as per instructions for weld –end valves.

Weld-end Valves

Welding instructions are enclosed with each valve shipped and must be followed. If in doubt, contact **AVCO Alloy Valves and Control**.

1. INSTALLATION:

- 1.1 Prepare clean working area.
- 1.2 With Valve in OPEN position, remove body bolts or screws.
- 1.3 Separate pipe ends from body and remove seat rings and body seals, taking care do not to damage plastic parts, place ball in part-open position to assist removal of seats.

- 1.4 Supporting ball to prevent ball from failing out of body, turn valve to CLOSED position for removal.

PLACE ALL PARTS REMOVED IN A CLEAN SECURE POSITION

- 1.5 Replacing three bolts, re-assemble pipe ends with body in correct alignment.
- 1.6 TACK WELD ONLY. Removed body to protect stem assembly from welding heat, then complete weld. Protect pipe end faces from weld splatter.
- 1.7 When cool, clean pipe end faces, replace ball carefully and turn to open position. Replace seat rings, and using seals from attached packet-where applicable complete re-assembly of valve.
- 1.8 Ease body assembly between pipe ends, being careful neither to score faces nor damage seals.
- 1.9 Replace body bolts and nuts (or screws) and tighten firmly.

2. OPERATION:

- 2.1 **AVCO** valves provide tight shut off when used under normal conditions and in accordance with **AVCO** published pressure/temperature chart.
- 2.2 If these valves are used in partially open (throttled) position seat life may be reduced.
- 2.3 Any media, which might solidify, crystallize or polymerize should not be allowed to stand in the ball valve cavities unless regular maintenance is provided. If minimal maintenance is performed, AVCO offers cavity filled and/or steam jacketed ball valves.

3. MANUAL OPERATION:

- 3.1 The basic type of wrench which if fitted to all sizes of valve is sheet steel with integral stop.
- 3.2 **AVCO** valves have ¼ turn operations closing in a counter-clockwise direction. It is possible to see when the valve is open or closed by the position of the wrench handle. When the wrench is across the pipeline, the valve is closed.

4. REMOTE OPERATION:

- 4.1 Where manual operation is not required valves may be automated for remote operation, instrument control etc. A range of **AVCO** pneumatic and electric actuators is available.
- 4.2 No stop plate is fitted to the valve since the operation is normally part of the actuator.

4.3 Operation will be in accordance with **AVCO** installation, operation and maintenance instructions for relevant actuator.

5. MAINTENANCE:

General: With self-wipe ball/seats and pressure equalizing slots, **AVCO** valves have a long, trouble free life, and maintenance is seldom required. But, when necessary, valves may be refurbished, using a small number of components, none of which required machining. **AVCO** valves are designed for easy service and assembly in the field. The following check should, however, help to extend valve life, or reduce plant problems.

5.1 Stem Leakage ¼" – 2 ½" Valves

5.1.1 Examine the disk springs for damage. If in good condition tighten the gland nut until disk springs are firmly compressed, then back nut off 1/16th of a turn. If damaged, dismantle the stem down to the gland, fit new disk spring with their outer edges touching, and replace using new gland nut. Further maintenance necessitates dismantling of the valve.

5.2 Leakage body at body joint

5.2.1 Check for tightness in the body connector bolts. If loose, tighten body bolts. Standard wrenches should only be used. Excessive force will only stretch or strip the bolts.

5.2.2 If there is still leakage this will be due to damage to body connector seal area and it will be necessary to dismantle the valve.

5.3 In-Line leakage

5.3.1 Check that valve is fully closed. If it is, leakage will be due to damaged seat or ball sealing surfaces and it will be necessary to dismantle the valve.

NOTE: Stem leakage at body joint, if not cured by simple means described above, necessitate dismantling valve. If there is no stem leakage the stem assembly should not be touched.

5.4 Leakage at pipeline joint

5.4.1 **SCREWED VALVES** - Test for tightness of screwed thread. If loose, tighten with standard wrench-excessive force will only split the connector. Normal jointing material should be used in the correct quantity.

5.4.2 **WELD-END VALVES** - Examine welds for leak point. Since these valve joints must be rewelded on site, these valves must be dismantled as per instructions for weld-end valves.

6. REFURBISHING:

6.1 **Fire Safe Valves** - To remove valve from pipeline, extract body connector screws to allow sliding the body out from between the body connectors. However, the body will not slide out unless the pipeline is sprung apart sufficiently to clear body location ring. These location rings fit into machine races in both body and body connectors and will act as shear rings.

6.1.1 To dismantle stem assembly, first remove the wrench nut, identification plate and wrench from stem. Using wrench to prevent the stem from turning, remove the gland nut, disk

spring, and gland packing at this stage. Withdraw stem through body cavity and remove stem thrust seal from stem or body recess, Gland packing may now be removed.

6.1.2 Clean all components thoroughly and examine all seating/sealing surfaces.

6.1.3 If there is a build-up of solid which cleaning fluids will not remove, use a board, flat, or blunt tool. (Do not scratch the machined surfaces).

6.1.4 No eroded or corroded leak paths are permissible. If any are found, the part must be replaced. The ball must have no scratches across its seating surfaces and any damage to the port lip will destroy the new seats a damaged ball must not be re-used-install a new ball.

6.2 **Rebuilding** - Before rebuilding, check that all the correct components are available and that they are fit for re-assembly. When rebuilding, cleanliness is essential to allow long valve life and provide cost effective maintenance.

6.2.1 Fit inner seat ring before stem assembly.

6.2.2 Fit stem thrust seal to stem and insert stem through body cavity into stem hole and fully up into body recess. Fit gland packing, gland and disk springs. Disk springs are concave. Using wrench to prevent stem from turning, fit gland and nut and screw down until disk springs are firmly compressed. Back off 1/16th of a turn. Operate stem several times and readjust. Over tightening will only reduce the life of the stem assembly. Now fit wrench stop plate and wrench nut to stem assembly and remove stem into closed position wrench across the pipeline.

6.2.3 With the stem still in the closed position, the ball may be inserted into the body cavity by sliding the ball slot over the stem tang. Open the valve.

NOTE: The ball must be in the open position since a closed ball protrudes beyond the body cavity and ball will be damaged against body connectors when body is removed or rotated. Also, with the valve in the open position, the ball is retained by the stem tang and cannot fall out of the body cavity.

6.2.4 The second seat ring and body connector seals may now be fitted.

NOTE: A trace of silicon based lubricant or clean grease (such as petroleum jelly), if compatible with the future pipeline media, will ease the rebuilding by holding the seat rings and body connector seals in place. Use no grease with abrasive additives.

6.2.5 These valves, after initial installation, have body connector, which form an integral part of the pipeline, and cannot be rebuilt without replacing them pack into the pipeline.

6.2.6 The valve may be installed back into the pipeline by sliding the body in between the body connectors. The pipeline should, however, be sprung apart sufficiently to clear valve body and avoid damage to seat rings, body connector seals and body connector sealing face.

6.2.7 Locate body on center line of pipe work, fit body connector bolts and nuts, and by tightening, pull together body and

connectors. Connector flanges will be metal to metal, standard wrenches should only be used –excessive force will only stretch or strip the bolts.

7. TEST:

- 7.1 If practical, leak tightness and body torque should be checked.
- 7.2 Maintenance kits are available from **AVCO** and consist of the following:
 - (A) 2 seat rings, 2 body connector seals for ½" – 4" valves.
 - (B) 1 stem thrust seal, 1 packing gland for ¼" – 2" valves, 1 Belleville washers
 - (C) 1 stem thrust seal, 3 gland packing rings for 3" and 4" valves.
- 7.3 When ordering maintenance kits, please be sure to specify type and size of valve and seating material required.
- 7.4 Where a valve needs repairing, rather than maintenance, it must be noted that only **AVCO** authorizes spare parts should be used and these include basic components such as bolts, screw and nuts, etc. In addition to maintenance kits, spare parts available from **AVCO** are balls, stems, glands. If additional parts are required, it is normally recommended that the complete valve be replaced.
- 7.5 Parts from different valve series should not be interchanged.
- 7.6 This is to ensure, so far as is reasonably practicable, that the valve remains capable of being used for the purpose for which it was designed and constructed, without risk to health and safety of plant personnel.
- 7.7 However, if the valve is altered in any way, no liability can be accepted by **AVCO Alloy Valves and Control**.

8. SAFETY PRECAUTIONS:

- 8.1 Before removing valve from pipeline: Media flowing through a valve may be corrosive, toxic, flammable, or of a contaminant nature. Where there is evidence of harmful fluids having flowed through the valve, the utmost care must be taken. It is suggested that the following safety precautions should be taken when handling valves.
- 8.2 Always wear eye shields
- 8.3 Always wear gloves and overalls.
- 8.4 Wear protective footwear.
- 8.5 Wear protective headgear.
- 8.6 Ensure that running water is easily available.
- 8.7 Have suitable fire extinguisher ready if media is flammable.
- 8.8 By checking line gauges ensure that no pressure exists on either the upstream or downstream sides of the valves.
- 8.9 Ensure that any media is released by operating valve slowly to half open position.
- 8.10 Ideally, the valve should be decontaminated when the ball is in the half open position. Leave valve in fully open position.
- 8.11 These valves, when installed, have body connectors which form an integral part of the pipeline and the valve cannot be removed from the pipeline without being dismantled-see DISMANTLING

9. TOOLS:

- 9.1 No special tools are required for maintenance of **AVCO** valves.

10. DISMANTELING:

- 10.1 If the valve is closed and not in fully open position as suggested, refer to Safety Precautions before proceeding further.
- 10.2 During dismantling, do not assume that the valve is totally decontaminated-harmful fluid, etc., may still be trapped in crevices.
- 10.3 To remove valve from pipeline, extract body connector bolts and slide the body out from between the body connectors. It is in most cases unnecessary to remove the body completely away from the pipeline. Remove all but one of the body connector bolts, and with this remaining bolt slackened, the body may be rotated out from the line using the remaining bolt as a hinge.

Torque Requirements

Valve Size	Bolt Size	Torque SS
½" - ¾"	M6	80"#
1" - 1¼"	M8	170"#
1½" - 2"	M10	350"#
2½"	M10	350"#
3" - 4"	M12	570"#