

Apollo Full Port Three Piece, Enclosed Fastener Ball Valves

Installation, Operation, & Maintenance Manual

Introduction

This manual presents guidelines for the Installation, Operation and Maintenance of manual and automated Apollo Full Port 3-Piece, enclosed fastener ball valves.

References contained in this document to the "PED" are in regard to the European Pressure Equipment Directive 97/23/EC.

Storage & Protection

Valve should be stored in its original shipping container until just prior to installation with any protection means in place and protected from the environment or any other potentially damaging effects. Valve should be properly supported and secured before moving to prevent possible damage to valve, property or harm to personnel.

Limitations

- Conditions supporting no greater than Category III valves (Reference the PED). Valves are not to be used in safety functions such as safety loops or separating incompatible fluids.
- For gases and liquids in Groups 1 & 2 (Ref. PED).
- In-line service only, not recommended for end of line service.
- Service to be compatible with the materials of construction. Prior to selection it is the user's responsibility to determine that the valve is appropriate for the intended application. Application not to allow corrosion $>.002"/\text{year}$ ($.05\text{mm}/\text{year}$).
- The possibility of material deterioration in service and need for periodic inspections is the responsibility of the user.
- Mechanical supports are not to be welded directly to the valve, however may be fitted to the associated piping.
- It is the piping system designer's responsibility to implement appropriate protection measures to minimize reaction forces and moments, which result from supports, attachments, piping, etc.
- Laws of the state must be observed as they apply.
- Some National/Local authorities may require periodic hydrostatic testing and inspections.
- Only use Conbraco replacement parts.
- On-off service only (not to be used for throttling).
- Valves are primarily intended for industrial use.
- Level of training, experience or ability of users should be at least that of trained and skilled maintenance personnel or technicians.

Cautions

Reference Form No. I437800.D

Installation

Proper valve selection is the first step in any successful installation. Refer to an "Apollo Ball Valve Binder", where applicable for application guidance or contact your distributor or the factory for more detailed assistance.

WARNING: All installations shall be provided with pressure relief devices in accordance with the requirements of the Pressure Equipment Directive 97/23/EC. Proper installation prior to initial operation is the user's responsibility. Furthermore where an additional hazard can occur due to valve exposure to fire or other unexpected external heat source, a supplemental pressure relief device shall be installed to protect against excessive pressure. This device shall prevent the pressure from rising more than 21% above the maximum allowable working pressure.

Pre-Installation Inspection

Inspect the piping system prior to valve installation whenever possible, to insure that it has been properly flushed and cleared of construction and fabrication debris. The seating surfaces in soft-seated valves are particularly susceptible to weld slag and sand blasting grit. Pipe scale, metal chips and other foreign materials should be avoided.

Just prior to installation, remove each valve from its packing, install handle and other parts if shipped loose (see figure 1) and remove any end covers. Examine the flow bore for debris. All Apollo ball valves are shipped in the open position to prevent damage to the ball surface. Any grit or foreign matter must be removed. Do not install a damaged valve.

It is also important to check for valve operation clearances. Valves can be installed at angles other than upright or vertical.

Threaded end Valves

Conventional pipe fitting practices apply.

Weld End Valves; Butt-weld and Socket-welding

- 1) Only personnel qualified per ASME BPVC Section IX should weld pressure-containing components. Only qualified weld procedures should be employed.
- 2) Place the valves in fully open position and remove handles, operator or actuators.
- 3) Align in the piping system. For socket-weld valves, slip into the piping system retracting the pipe approximately $1/16"$ (1.5mm) from the bottom of socket weld connections.
- 4) Wrap the center section of valve with wet rags to minimize heat transfer to the seats and seals. Do not allow the valve center section temperature to exceed 400F (204C) as monitored by either a Tempil® Stick or other suitable method.

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- 5) Use multiply passes with a bead size of 1/8" (3mm) or less. Stop after each pass and allow the valve to cool so as not to exceed the body temperature limit noted above. Maintain wet rags.
- 6) After the valve has fully cooled, reinstall the handle, operator or actuator.
- 7) Alternately: The valve may be partially disassembled for welding
- 8) Place the valve in the open position.
- 9) Tack-weld the valve in place in the piping.
- 10) Remove all four body bolts and slide the center section subassembly out of line. Protect the seats and seals from damage. Protect the exposed face of the end pieces from weld splatter.
- 11) Complete the welds using personnel qualified per ASME BPVC Section IX utilizing qualified weld procedures.
- 12) Seats and gaskets are intended to be reused. If damaged, contact the factory for replacements.
- 13) Reinstall the body sub-assembly. Replace the body bolting and hand-tighten all four hex nuts. Using a criss-cross pattern, in three approximately equal steps, torque the body bolts to the value given in Table 2. Cycle the valve open and closed between each step to assure continued smooth operation. Complete the fastener torquing sequence with one final check going around the bolt pattern clockwise at the specified torque level.
- 14) Reinstall the operator. Check for smooth operation.

Operation

Apollo valves are shipped with a nameplate securely fastened to the valve body and an attached warning tag. Information included on each is documented on the last page of this manual. Although each valve is thoroughly tested and inspected before it leaves the factory, nameplate and/or warning tag could be lost or destroyed during shipment or while in storage. If either is missing or not legible, contact your distributor or the factory for assistance before operating valve.

WARNING: *Provide means to monitor filling valve to prevent over pressurization and instability.*

Ball valves are intended to be on-off devices operating through 90° rotation of the stem. Operation is clockwise to close.

The most common service failures not related to the installation and start-up processes are:

- * Exceeding the operating temperature or pressure limits of the valve due to a process upset condition.
- * A chemical attack on valve components due to either misapplication or changes in the service.

Violating temperature and pressure limits can result in immediate valve failure where chemical attack or corrosion generally occurs gradually.

Maintenance

Preventive Maintenance Schedule

Automated valves generally see high cyclic duty. A regularly scheduled and documented preventive maintenance program needs to be established for this type of valve.

Initially, it is recommended that valves be inspected every 5,000 cycles for smooth operation and leak free performance. Thereafter, every 20,000 cycles should be sufficient.

Problems if they occur most frequently appear immediately following initial start-up or following a re- start after a shutdown period. Particular attention needs to be paid to valves and other critical equipment during these times. Once the system has stabilized and is in operation, fewer problems tend to occur.

Valve Adjustments

At some point in the service life of the valve, leakage may occur. This should be noted in the maintenance history log of the valve. The stem packing was adjusted at the factory to provide a leak tight seal when the valve was new, but compaction can occur within these seals that may make re-adjustment necessary. Stem leakage should be stopped as soon as it is detected. On actuated valves, most mounting hardware allows access to the packing adjustment screws. If this is not the case, it may be necessary to remove the actuator to gain adequate access to make the packing adjustment.

Packing adjustment can be accomplished by turning the stem packing adjustment screws clockwise to the maximum torque shown in Table 1.

CAUTION: *Never back off the stem packing adjustment screws when the valve is under pressure.*

Table 1: Stem Packing Adjustment Screw Torque

Nominal Valve Size		Torque ⁽¹⁾	
mm	(in)	N·m	(in-lb)
10	(3/8)	2,26	(20)
15	(1/2)	2,26	(20)
20	(3/4)	5,42	(48)
25	(1)	5,42	(48)
32	(1-1/4)	10,84	(96)
40	(1-1/2)	10,84	(96)
50	(2)	16,26	(144)

(1) Increase adjustment screw torque's by 25% for valves with graphoil packing (-24 option)

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Do not over tighten the adjustment screws. Over-tightening will result in excessive operating torque and shorten the packing's service life. If stem leakage continues, or operating torque becomes excessive, de-pressurize the valve and replace the stem seals.

Valves with high operating torque not resulting from stem seal over-tightening or valves which have leakage by the seats, may have damaged seats or ball surfaces. These valves should be de-pressurized, disassembled, and inspected for damage.

Valve Overhaul

As part of planned maintenance or as a result of a problem that cannot be adjusted away, a valve may require a complete overhaul. Due to the uncomplicated design of the Apollo ball valves this can easily be accomplished.

The first step is to contact your distributor to acquire an appropriate rebuild kit. These kits typically contain a complete set of seats, seals, and gaskets. If ball or stem damage is suspected, it is wise to order these parts when the seal kit is purchased. Most of these items will be in stock on your distributor's shelves or at the factory. To properly order spare parts, you will need the valve model number as shown on the nameplate.

Disassembly

- 1) Once the spare parts are on hand, the first step in the valve disassembly is to isolate the valve from line pressure.

WARNING: do not attempt to work on any valve under pressure, and depending on the service, valve surface temperature may be hot, use proper protective gear to protect against burns. Also provide safe means for uncontrolled release of fluid.

- 2) Using an adjustable wrench, valve lever, or properly sized open end wrench, rotate the stem until the valve is in the one half open, one half closed position. Be careful not to damage the stem. This will allow any cavity pressure to be released into the pipeline. Place the valve in the open position after this is done.
- 3) Loosen each of the body joint nuts approximately one turn only initially. This will allow a second chance for any cavity pressure stored within the valve to be released. Leakage may occur outside of the pipeline.
- 4) Before removing the valve body bolting, take precautions to assure the safety of maintenance personnel. Make sure the valve and piping system are properly stabilized.
- 5) Carefully remove the valve body bolting. Verify the valve is in the open position. Remove the valve body center section from the piping system. It may be

- necessary to spread the endcaps slightly to overcome compressive loads imparted by the piping system.
- 6) If only seat or ball damage is suspected, one body fastener may be left loosely assembled between the endcaps and body and the valve "swung out of line" for service. In this case, proceed to step 9.
- 7) Set the body center section on a suitable clean solid work surface.
- 8) Remove the lockplate, lever, external grounding spring, stem packing adjustment screws and the packing gland. Do not attempt to remove the stem packing at this time.
- 9) The gaskets can now be removed from the recesses in the ends of the body.
- 10) Using the stem, rotate the ball to the closed position. Pressing either by hand or with a non-marring soft face tool on the spherical surface of the ball, remove one seat.
- 11) Press in the opposite direction to remove the other seat.
- 12) The ball can now be easily removed from the body cavity.
- 13) Once the ball is removed, the stem can be pressed down into the body and removed.
- 14) Finally, remove the stem packing using care not to scratch or scar the stem packing box.

Inspection

- 1) Thoroughly clean all the components in preparation for inspection.
- 2) Inspect the sealing face of endcaps left on the piping system for scratches and pits. If either of these is apparent and can be removed with #120 or finer grit emery cloth, replacement will not be necessary. If replacement of the endcaps becomes necessary then replacement of the entire valve is recommended.
- 3) Inspect stem packing contact surfaces for scratches and pits. If either of these is apparent and can be removed with #120 or finer grit emery cloth, body replacement will not be necessary. Deep scratches running down the side of the stuffing box or excessive pitting will necessitate the replacement of the valve body.
- 4) Inspect the ball in the same manner. Replace the ball if necessary.
- 5) Inspect remainder of body interior for pitting or corrosion and replace either if excessive.
- 6) Inspect all parts for wear due to erosion or abrasion and replace if excessive.

Note: Many carbon steel component parts are Melonite treated and oil dipped to improve fatigue properties and increase wear and corrosion resistance.

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Reassembly

- 1) Begin the re-assembly process by cleaning each of the component parts with a clean towel or cloth.
- 2) Place the stem bearing on the stem, and insert the stem into the valve body stem bore. Place the flats on top of the stem perpendicular to the centerline of the body.
- 3) Install the stem packing, packing gland, gland plate, and stem packing adjustment screws in the order given. Install the screws finger tight at this time.
- 4) Place the internal grounding spring on the stem and carefully insert the ball into the body. Using the stem rotate it to the open position.
- 5) Apply a small amount of service compatible lubricant to the new seats and install them in the valve body. Seats may be installed dry however some assembly lubricant is desirable and acts to hold the seats in place during the assembly process.
- 6) Apply a small amount of compatible grease to the body side of the gasket. Again this acts to hold the gasket in place for the assemble process but is optional.
- 7) Slip the body subassembly into the endcaps in the pipeline. Lubricate and install the body bolts and nuts finger tight at this time.
- 8) Cycle the valve open and closed several times to assure all components are properly aligned.
- 9) Using a criss-cross pattern, in three approximately equal steps, torque the body bolts to the value given in Table 2. Cycle the valve open and closed between each step to assure continued smooth operation.
- 10) Complete the fastener torquing sequence with one final check going around the bolt pattern clockwise at the specified torque level.
- 11) Tighten the stem packing adjustment screws to the values shown in Table 1 under the Maintenance Section. Do not over-tighten the stem packing adjustment screws.
- 12) Complete the re-assembly by installing the lever, lock plate and stops or actuator as applicable.

Table 2: Body Bolting Torque

Valve Size		Torque	
mm	(in)	(+ or - 10%)	
		N·m	(ft-lb)
10	(3/8)	0,90	(8)
15	(1/2)	0,90	(8)
20	(3/4)	1,81	(16)
25	(1)	2,71	(24)
32	(1-1/4)	6,78	(60)
40	(1-1/2)	6,78	(60)
50	(2)	22,60	(200)

Final Adjustments

Cycle the valve from open to close several times to verify free operation. Occasionally, after testing or initial start up, a minor body joint or stem packing leak may occur. Re-adjust the body bolt torque or stem packing torque as necessary.

Name Plate/Hand Tag Information

One of three possible identifications tags may be attached to the valve. Non- ASME/ANSI valves feature a yellow mylar hang tag secured about the valve stem. ASME/ANSI qualified valves feature a stainless nameplate secured to the side of the body by drive rivets. On qualified designs 1-1/4" and larger the stainless tag features the CE logo.

ASME/ANSI NAMEPLATE
MODEL
MANUFACTURING DATE
DESIGN CODE
BALL/STEM
SEAT/PACKING
DN – SIZE
PS – MAXIMUM ALLOWABLE PRESSURE @ 38°C
CWP @ 100°F
CONBRACO IND., INC. Made In U.S.A.

CE NAMEPLATE
CE MARK
NOBO NO.
MODEL
MANUFACTURING DATE
DESIGN CODE
BALL/STEM
SEAT/PACKING
DN – SIZE
PS – MAXIMUM ALLOWABLE PRESSURE @ 38°C
CWP @ 100°F
CONBRACO IND., INC. Made In U.S.A.

WARNING TAG
Carefully read the applicable Installation, Operation, & Maintenance Manual in its entirety before removing valve from shipping container. To obtain manual, download from http://www.conbraco.com/iom . DO NOT REMOVE TAG.