

CRANE

**INSTRUCTION MANUAL
FOR
INSTALLATION, OPERATION AND MAINTENANCE
OF CRANE
BOLTED BONNET/CAP, GATE, GLOBE
AND SWING CHECK VALVES
CAST IRON ASTM A126**

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**INSTRUCTION MANUAL
FOR
INSTALLATION, OPERATION AND MAINTENANCE OF CRANE BOLTED
BONNET/CAP GATE, GLOBE & SWING CHECK VALVES**

I. INTRODUCTION

These instructions are furnished for use in installation, operation and maintenance of cast iron bolted bonnet/cap, wedge gate, globe and swing check valves. These valves are designed and manufactured in conformance with MSS-SP70 (Gate), MSS-SP71 (Swing Check), MSS-SP85 (Globe) and ASTM A126, Class B.

II. RECEIVING INSPECTION

- A. Upon receipt of the valves at the destination, the valves should be examined thoroughly for signs of mishandling or damage during shipment.
- B. The valves should be stored, if necessary, in a sheltered area to protect them from weather, dirt and foreign material. The valves should not be uncrated, or removed from their protective covering, or exposed to the atmosphere except in a clean area just prior to installation.
- C. The valve identification is stamped on metal plates attached to a yoke arm or cap of each valve.

III. HANDLING AND PREPARATION FOR INSTALLATION

- A. Lift the valve using slings around the body under the bonnet flange and rotate the bonnet end to the upright position.

IV. INSTALLATION

- A. The valve identification is stamped on metal plates attached to a yoke arm or cap of each valve.
- B. The valve should be blocked or slung into position with apparatus that will support the valve weight.
- C. Bolt the valve into the piping system in desired position in accordance with applicable codes and requirements.
- D. Valve is now ready for service and system test.

V. OPERATION

Gate and Globe Valves are opened by turning the handwheel counter-clockwise; clockwise to close.

Swing Check Valves are opened and closed by line pressure or backpressure.

VI. TECHNICAL DATA

A. INSTALLATION ADJUSTMENT AND TEST OF CRANE GATE, GLOBE AND SWING CHECK VALVES

1. Installation

Before installing the valve check to assure that valve being installed is specified for location, examine lines for foreign matter and clean them thoroughly. Make sure no foreign material is in the ports of the valve. Locate the valve in place and bolt in place.

2. Adjustment and Test

After installation, operate Gate and Globe Valves from full closed to full open position, and back to full closed position. Check all joints for leaks. In the event of leakage, repair as required, and repeat the above.

B. LUBRICATION AND MAINTENANCE OF CRANE GATE AND GLOBE VALVES

1. Lubrication

Valves need no internal lubrication. Lubrication may be required; however, for the valve stem threads and for the operator (if valve is equipped with an operator).

2. Maintenance (Packing Gland Type)

Gate and Globe Valves should be operated through approximately 80% of travel at intervals of approximately one month depending on convenience. If not operated at intervals of one month or less, it is recommended that regular inspection of the stuffing box should be made to verify tightness. In adjusting the stuffing box, great care should be taken that the packing is not tighter than necessary to control leakage and that the packing nuts are adjusted equally. Uneven adjustment can cause damage to the stem and operating failure. If leakage is detected and cannot be stopped by tightening the packing nuts, the leakage may be attributed to one of more of the following reasons:

1. Incorrect packing used; replace with proper packing.
2. Packing may have become hard; replace with new packing.
3. Stem may be scored or deeply scratched; stem must be replaced.
4. Packing may have been improperly installed; packing ring splits should be staggered so that the splits are not positioned one over the other.
5. Stuffing box gland may be binding against either the stem or the stuffing box, due to uneven bolt pull-up. Stuffing box parts should be repositioned to assure even compression of the packing.

3. Maintenance (Injection Type)

When put into service, a clockwise turn of the Hex Head Adjustment Screw may be required to compress additional packing from the reservoir into the sealing area. Adjustment can be made under FULL line pressure with the disc of ANY position. There is no need to backseat the disc; the specially designed Ball Check Valve eliminates the possibility of packing extrusion. Additional adjustment turns may be made, as necessary, until adjustment screw “bottoms” in the injector fitting. In the event the screw “bottoms”, the packing reservoir must be replenished. Remove screw and insert new packing sticks. Replace adjustment screw.

CAUTION: Do not remove packing injector unit while under pressure.

C. REPAIR OF GATE VALVES

1. Valve Disassembly

Have replacement gasket available. Shut off line pressure and remove valve from line. Unwedge the disc. Remove bonnet bolting and carefully lift bonnet assembly with disc from body.

2. Procedure for Lapping Disc

Apply Grade 80 or 120 emery cloth to flat surface. Lay disc face on abrasive and use oscillating motion for lapping until face is polished. In extreme cases, first use a soft grade of carborundum stone.

3. **Procedure for Lapping Body Seat Ring**

Apply Grade 80 or 120 emery cloth to a convenient size block. Hand lap by applying abrasive to face of body seat ring, use oscillating motion all around until face is polished. In extreme cases, first use a soft grade of carborundum stone.

After lapping, clean body seat and disc to remove residue from the abrasives. Apply Prussian Blue to faces of disc and insert into seat, tap lightly to record seat bearing. If bearing periphery does not record a complete circle on disc face, repeat lapping operation to remove high spots until a complete circle is obtained.

4. **Procedure for Making Up Bonnet Joint**

Before reassembly of bonnet to body, inspect bonnet flange and body-bonnet flange gasket surfaces for damage and/or any foreign material that will obstruct a good sealing surface. Such matter must be removed with an emery cloth (Grade 80 or 120). Clean off all residue from gasket surface before reassembly.

5. **Reassembly**

Apply high temperature thread lubricant to gasket (on non-critical service application only), spotface surfaces and bonnet bolting. Place gasket on body. During bonnet assembly raise stem to full open position. Insert bonnet with disc to body in proper position. Tighten bonnet bolting alternately (crossover method) with even pressure, up to a bolt stress of 15,000 lbs/in². Should there be any leakage at bonnet joint after valve is put into service, tighten nuts up to a maximum of 30,000 lbs./In.² bolt stress.

D. **REPAIR OF GLOBE VALVE**

1. **Valve Disassembly**

Have replacement gasket available. Shut off line pressure and remove valve from line. Remove bonnet bolting and carefully lift bonnet assembly with disc from body.

2. **Procedure for Lapping Disc and Body Seat Ring**

Apply a small amount of valve grinding compound all around the seat-bearing surface then place disc into port and lap with alternate rotary motion. Lift disc at intervals and turn 180 ° and continue lapping. Remove compound occasionally while lapping, clean body seat and disc to remove compound residue. Apply Prussian Blue to disc and insert into seat. Applying normal pressure to disc, rotate 5° (approx.) to record seat bearing. If bearing periphery does not record a complete circle on disc face, repeat operation to remove high spots until a complete circle is obtained.

3. **Procedure for Making Up Bonnet Joint**

Before reassembly of bonnet to body inspect bonnet flange and gasket surfaces for damage and/or any foreign material that will obstruct a good sealing surface. Such matter must be removed with emery cloth (Grade 80 or 120). Clean off all residue from gasket and gasket surface before reassembly.

4. **Reassembly**

Place gasket on body. Apply high temperature thread lubricant to gasket, (on non-critical service applications only), bonnet bolting and spot face surfaces. Before bonnet assembly, raise stem to full open position. Install bonnet to body in proper position. Tighten bonnet bolting alternately (crossover method) with even pressure, up to a bolt load of 15,000 lbs/in². Should there be leakage at bonnet after valve is put into service, tighten nuts up to a maximum of 30,000 lbs./In.² bolt stress.

E. REPAIR OF SWING CHECK VALVES

1. Valve Disassembly

Have replacement gasket available. Shut off line pressure. Remove cap bolting and carefully lift cap from body. Do not damage gasket-seating surface. Remove external pipe plugs. Hold disc-hinge sub-assembly in place and remove hinge pin. The sub-assembly can now be removed from the body. For disassembly of the disc-hinge assembly, remove the disc lock nut and washer. Note: some valves use a disc nut locking pin in place of a disc lock nut.

2. Procedure for Lapping Disc and Body Seat Ring

For lapping disc and body seat ring, apply Grade 80 or 120 emery cloth to a flat plate. Lay the abrasive side of the plate on seat face and use rotary motion for lapping until face is polished. If the disc face is damaged such that grinding is required, a minimum of stock should be removed.

After lapping, clean body seat ring and disc to remove residue from the abrasives. Apply light film of Prussian Blue to face of disc and reassemble to body. Apply pressure on disc and tap lightly with rawhide mallet to record bearing. If the bearing does not record a complete circle on disc and body ring faces, repeat lapping operation to remove high spots until a complete circle is obtained. (The hinge assembly must be free on the disc, with no binding, when the disc face is flat on the seat ring face).

3. Procedure for Making Up Cap Joint

Before reassembly of cover flange to body, inspect flange gasket surfaces for damage and any foreign material that will obstruct a good sealing surface. Such matter must be removed with emery cloth (Grade 80 or 120). Clean off all residue from gasket and gasket surface before reassembly.

4. Reassembly

Assemble disc-hinge subassembly in reverse order from disassembly by placing the hinge onto the disc hub. Install washer and disc nut taking care to realign hole in disc for locking pin. Carefully position subassembly disc face onto body-seat and align hinge pin hole with body plug holes and install hinge pin. Install body pipe plugs. Place gasket onto body. Apply high temperature thread lubricant to gasket, (on no-critical service applications only), cap bolting and spot-face surfaces. Insert cap on to the body with flow arrow pointing in proper direction. Tighten cap bolting alternately (crossover method) with even pressure, up to a bolt load of 15,000 lbs/in². Should there be leakage at the cap joint after valve is put in service, tighten nuts up to a maximum of 30,000 lbs./In.² bolt stress.

VII PROCEDURE FOR REPLACING SPLIT RING PACKING IN VALVE STUFFING BOX

The following procedure should be used to replace packing in assembled valves whether or not installed in the system. During the packing replacement, the valve should be isolated and depressurized.

1. Remove nuts from packing gland bolting.
2. Raise packing gland and gland flange to allow access to stuffing box.
3. Remove the old packing using a suitable packing removal tool.

Caution: Extreme care shall be taken to prevent damage to surfaces of the stem and stuffing box bore.

4. Clean the stem stuffing box and packing gland.
5. Inspect surfaces of the stem and stuffing box for damage such as nicks and scratches that may cause an inadequate packing seal. Damaged parts shall be repaired or replaced.
6. Lubricate packing gland studs.
7. Install new packing into stuffing box. One packing ring shall be installed at a time as follows:
 - a) Carefully install the ring on the stem, opening the split rings with a twisting motion.
 - b) Position on stem locating the split approximately 120 degrees from the split of the previously installed ring.
 - c) Press ring into stuffing box with care to prevent cutting the packing on edges of the stuffing box and carefully tamp ring in place.
 - d) Compress the ring using packing gland, flange and nuts, tightening with reasonable torque for gland bolting.

Note: A split collar extension of soft metal, or hard wood, should be used with the packing gland, until the ring stack is high enough to be reached by the gland, to ensure compression of the lower rings.

- e) The minimum number of packing rings to be installed shall be in accordance with design requirements. If the specified minimum number of rings cannot be installed, it should be ascertained that the rings have been installed and compressed properly.
- f) Installation of additional packing ring may be necessary to ensure that sufficient clearance exists between the gland collar and the bonnet to permit future packing adjustment.

Note: The maximum number of packing rings installed shall permit the gland to be retained within the stuffing box bore.

Back off packing gland stud nuts and retighten with torque of approximately one half of that used to originally compress packing. If possible, pressurize the valve and packing for several minutes, then depressurize. Valve shall not be backseated at this time. Cycle the valve several times. Adjust torque if required for tightness. If valve is to be stored, loosen the packing gland until it just contacts the packing with no loading or bolting. Tag the valve to indicate that the gland has been loosened.

VIII RECOMMENDED SPARE PARTS

Upon completion of installation and testing of the piping and valve system, it is recommended that one (1) bonnet/cap gasket and one (1) set of stuffing box packing be stocked as spares for each valve. When ordering spares, reference valve size, catalog number, assembly drawing number and piece numbers shown on the bill of materials in the assembly drawing section of this manual.