



INSTRUCTION MANUAL

Anchor Darling 1878 Swing Check Valves

Sizes 1/2" through 2"

FCD ADENIM0006-00

*Installation
Operation
Maintenance*



Table of Contents

1.0	Physical Description and Operation of Equipment
2.0	Design Conditions
3.0	Operating Conditions
4.0	Test Conditions
5.0	Operating Precautions and Limitations
6.0	Installation Instructions
7.0	Maintenance Requirements
8.0	Periodic In-service Testing Recommendations and Procedures
9.0	Maintenance Instructions
10.0	Storage Requirements
11.0	Bolting Torque Values
12.0	Reference Drawings
13.0	Customer Certified Assembly Drawing(s)



Revision Sheet

<u>Revision</u>	<u>Date</u>	<u>Changes</u>	<u>Description</u>
-	03/31/2004	Original Issue	

1.0 Physical Description And Operation Of Equipment

1.1 Swing Check Valve

The swing check valve is designed for use in a system where protection against reversal of flow in the line is desired. The force of the upstream fluid swings the disc out of the waterway, allowing the fluid to pass through the valve with minimal pressure drop. However, should the direction of flow completely reverse, the disc weight will cause the disc to swing into the waterway and, along with the force of the reversed flow, force it to seal against the seat.

A dual seat may be supplied which provides a hard surface for high differential pressure sealing and a resilient seat for sealing during low differential pressure.

2.0 Design Conditions

Refer to the applicable drawing in Section 13 of this manual.

3.0 Operating Conditions

Refer to the applicable drawing in Section 13 of this manual.

4.0 Test Conditions

4.1 Each valve covered by this manual has received the following hydrostatic tests:

4.1.1 Shell hydrostatic test at 1.5 times the 100°F pressure rating.

4.1.2 A seat leakage and disc closure test at 110% of the 100°F pressure rating.

5.0 Operating Precautions And Limitations

5.1 Maximum hydrostatic test pressure shall not exceed the values imposed by the ASME Code, Section III.

6.0 Installation Instructions

6.1 Lifting and Handling Requirements and Limitations

6.1.1 Good judgment should be exercised in selecting a lifting device that will safely support the unit's weight.

6.0 **Installation Instructions** (Continued)

6.1.2 Remove the end covers.

6.1.3 Remove blocks or heavy paper used to hold check valve discs open during shipping.

6.2 Assembly Instructions

6.2.1 Although the valves have been shipped in a clean condition, prior to installing the valves, examine the lines and the valve ports for foreign matter and clean them thoroughly if they have been exposed to the elements. (BEFORE CLEANING IN THIS FASHION, CHECK AT THE SITE TO SEE IF A SPECIFIC CLEANING PROCEDURE SHOULD BE FOLLOWED.) Open the valves fully and flush them out with water if possible; otherwise blow them out with air or steam.

6.2.2 Ensure that there is no line sag at the point of installation. Eliminate any pipeline deviation by the proper use of pipeline hangers or similar device.

6.2.3 Extreme caution should be taken when installing check valves. The arrow on the valve body indicates flow direction. Note that the disc swing is upward and away from the inlet end of the valve. Therefore, when installing a check valve, place it so that the flow of the incoming fluid will open the valve and return flow will close it. Check valves installed in reverse position will stop the flow in the normal flow direction. Check valves installed in horizontal piping shall have the hinge pin in a horizontal plane with the bonnet on top. Check valves installed in vertical piping shall have the hinge pin in a horizontal plane with flow upward.

6.2.4 The valves should then be blocked or slung into position with apparatus that is sufficient to hold the valve assembly weight while the valve is being welded into the line. Care should be taken during welding that foreign material or dirt does not enter the valve and cause interference with subsequent operation. **For valves with resilient seats** - caution should be exercised so that the resilient seat material is not subjected to temperatures greater than 400°F.

7.0 **Maintenance Requirements**

7.1 Preventative Maintenance

7.1.1 Check all nuts and bolts periodically to ensure tightness and to forestall possible leaks. Refer to section 11.0 for bolting torque values.

7.0 **Maintenance Requirements** (Continued)

7.2 Recommended Spare Parts

- 7.2.1 Recommended spare parts are gaskets, machine screws and resilient seats. The recommended quantity is 1 gasket, 4 machine screws and 1 resilient seat for every 2 valves of a particular type but not less than 1 set of each type.

8.0 **Periodic In-service Testing Recommendations And Procedures**

- 8.1 This is not required for swing check valves without external operators.

9.0 **Maintenance Instructions**

- 9.1 The following instructions cover the disassembly and reassembly of a swing check valve.

CAUTION

**CHECK LINE PRESSURE: IF LINE IS STILL UNDER PRESSURE,
VENT BEFORE VALVE DISASSEMBLY IS STARTED.**

9.1.1 Disassembly

Extreme care should be taken to ensure that the hinge pin, hinge and disc do not separate when removed as one unit. Failure to do so may cause damage to the disc.

After removal from the valve, care should be taken to protect the seating surface of the disc from damage. The disc should be placed in a clean area until ready to replace in the valve. THE SLIGHTEST NICK OR SCRATCH ON A SEATING SURFACE MAY PREVENT COMPLETE SHUT-OFF AND NECESSITATE EXTENSIVE REWORK OR REPLACEMENT.

- (1) Remove the Bonnet Nuts (230) from the Bonnet Studs (200).
- (2) Remove the Bonnet (002) from the Body (001). Be careful not to scratch the gasket seating surface.
- (3) Remove the Gasket (100) from its groove. This operation may require the use of a screwdriver or similar tool to pry the gasket from the groove. Be careful not to scratch the gasket seating surface.

9.0 **Maintenance Instructions** (Continued)

9.1.1 Disassembly (Continued)

- (4) Remove the 2 Locating Pins (257). Take care to ensure the Hinge Pin/Hinge/Disc Assembly (041, 006, 004) do not drop into the body when the second Locating Pin (257) is removed.
- (5) Remove the Hinge Pin/Hinge/Disc Assembly (041, 006, 004) from the Body (001).
- (6) Remove the Hinge Pin (041) from the Hinge (006).
- (7) Remove the Disc Nut Pin (265) from the Disc Nut (239).
- (8) Remove the Disc Nuts (239) and the Disc Washer (248) from the Disc (004) and remove the Disc (004) from the Hinge (006).
- (9) Remove the Resilient Seat (306) (if so equipped) from the Disc (004) by first grinding loose the lock weld between the Retaining Ring (015) and the Machine Screws (224). Unscrew the Machine Screws (224) from the disc/retaining ring assembly and then the Retaining Ring (015) can be lifted off the Disc (004) and the Resilient Seat (306) removed.

9.1.2 Reassembly

REASSEMBLY OF THE VALVES is simply the reverse of 9.1.1, read the following special instructions.

First, all dirt, scale and foreign matter should be removed from inside the valve body and bonnet.

Before reassembling the valve, check the seating surfaces to determine that no scratches or minor imperfections are on the disc or seat ring. If any are evident - lap these surfaces until none are visible. (Reference Para. 9.2)

Remember to lock weld the Machine Screws (224) to the Retaining Ring (015) after installing a new resilient seat (if equipped).

When replacing the Bonnet Studs and Nuts (200 & 230) consult the applicable drawing or Section 11 for correct torque to assure tightness of seal.

9.0 **Maintenance Instructions** (Continued)

9.1.2 Reassembly (Continued)

The nut should be tightened evenly using a criss-cross pattern as shown in Figure 1. Tighten all of the nuts to 1/3 of the recommended value initially. Then repeat the sequence raising the torque to 2/3 of the full torque. Finally, torque all the nuts to the recommended value following the criss-cross pattern. It is essential that the flange faces remain parallel and all the bolting has uniform tension. Failure to achieve this may cause gasket weepage when the joint is subjected to operating pressures and temperatures.

NOTE: As an extra aid to ensure proper bolt tightening, the valve bonnets have been permanently marked with sequence numbers for bolt tightening.

9.2 Lapping Procedure

After the valve has been disassembled, a visual inspection of the seating surfaces of the Discs (004) and Seat Ring (013) can be made to determine if lapping is necessary to remove any minor scratches on these parts prior to assembling the valve. IF lapping is necessary, it may be accomplished in the following manner:

- (1) Remove the Resilient Seat (306) (if equipped). Never lap the disc with the resilient seat in place.
- (2) Place lapping compound between the Disc (004) and the Seat Ring (013) and, by hand, rotate the Disc (004) in a circular motion against the Seat Ring. Check periodically for signs of defects. Repeat this process until the defect is removed.
- (3) A "medium" grade lapping compound should be used for the first and successive applications. A "fine" grade compound similar to "Clover A Grit No. 280" should be used for the final lapping process.

9.3 Trouble Shooting

A. Leakage Between the Disc (004) and Seat Ring (013)

This could be an indication that there is foreign matter on the seating surfaces. Disassemble the valve and remove the source of the trouble. If no foreign matter is found, inspect the seating surfaces of the valve for signs of a scarred or damaged seat - in which case the seating surfaces of the Disc (004) and Seat Ring (013) should be lapped until no visible defects remain. (Refer to Para. 9.2)

B. Leakage Between the Body (001) and Bonnet (002)

This would be a good indication that the Gasket (100) is worn out or damaged. Replacement of gaskets is set forth in Para. 9.1. Another source of the trouble might be that the bonnet studs and nuts are loose - if this should be the case - tighten them securely.

10.0 Storage Requirements

The valves have been shipped in the partially open position. Upon receipt of the valves at destination, the crates should be examined thoroughly for signs of mishandling or damage during shipment. With the valves strapped to the shipping skids, all bonnet bolting should be checked to ensure that the joints are secure. Bolting on occasion, may become loosened during shipment and handling.

The valves should then be stored in a sheltered area to protect them from the elements, dirt and foreign material. They should not be exposed to the atmosphere, uncrated or removed from the shipping skids except in a clean area just prior to installation.

If the valves are not to be installed within a short period of time after receipt, and will require long-term storage, the following should be adhered to:

- (a) They should be stored in an upright position and where there is minimal temperature variations and the temperature does not drop below 50°F.
- (b) In their storage condition, the valves should be wrapped in polyethylene to prevent accumulation of dust or foreign matter.
- (c) A check-off tag should be affixed to each unit and should be dated and signed off by the inspector witnessing the inspection which is recommended at 6-month intervals.

The shelf life for resilient seat materials is 5 years.

The shelf life for gaskets is indefinite.

11.0 Bolting Torque Values

At intervals of not more than six months, check the tightness of all bolting. Bolted bonnet valves should have the body-bonnet bolting torqued to the values shown below:

STUD SIZE	SA193-B7		SA453-660	
	Nominal	Maximum	Nominal	Maximum
5/8-11	59	90	50	100
3/4-10	104	165	88	175

All torque values are in ft-lbs.

NOTE: The above table provides nominal design torque values and maximum torque values using an assumed friction coefficient of 0.2. The maximum torque values provide for material conditions such as rust and oxides that exist after equipment is in service.



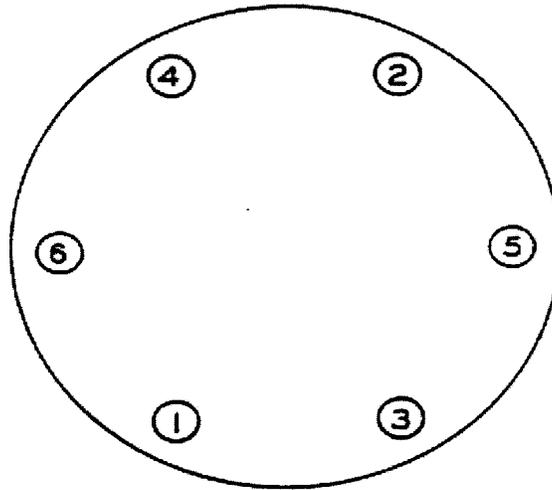
Section 12.0

REFERENCE DRAWINGS

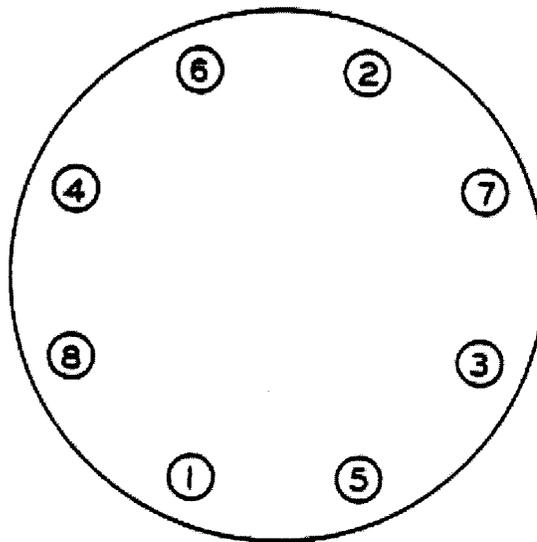
Figure 1

Bolt Tightening Sequence

Six Bolt Bonnet



Eight Bolt Bonnet





Section 13.0

CUSTOMER CERTIFIED ASSEMBLY DRAWING(S)



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