

# INSTALLATION, OPERATION AND MAINTENANCE MANUAL

## Figure 250-DOC Drawing C-1448 42”-60” Oil-Cushioned Lever & Weight Swing Check Valves

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# INSTALLATION, OPERATION and MAINTENANCE

## 42"-60" Figure 250-DOC Oil-Cushioned Lever & Weight Swing Check

### INTRODUCTION

This manual will provide the information to properly install, operate and maintain the valve to ensure a long service life. The Figure 250-DOC Swing Check Valve is ruggedly constructed to provide years of trouble-free operation with minimal maintenance.

#### CAUTION

The valve is NOT recommended for use with toxic or highly corrosive fluids, fuels or fluids containing hazardous gases

The Shop Order (SO) Number, Figure Number, size and pressure rating are stamped on a nameplate attached to the valve. Please refer to the SO number when ordering parts.

### DESCRIPTION OF OPERATION

The Figure 250-DOC Swing Check Valve is an oil-cushioned, counter-weighted rubber-to-metal seated check valve designed to permit flow in one direction and close to prevent reverse flow. The valve opens when the inlet pressure exceeds the outlet pressure. The degree of opening depends on the fluid velocity through the valve. The valve will swing closed as fluid velocity decreases and be fully seated before flow reversal precluding slam and bang.

### RECEIVING AND STORAGE

Inspect the valve upon receipt for damage during shipment. Carefully unload all valves to the ground without dropping.

The valves should remain in a clean, dry and weather protected area until installed. For long term storage (greater than 6 months) the rubber surfaces of the seat should be coated with a non-toxic lubricant such as "SuperLube" made by Synco Chemical. Do not expose the rubber parts to sunlight or ozone.

### INSTALLATION

Figure Numbers suffixed with "D" indicated the valve has ANSI Class 125 flanged connections. An "A" in the Figure Number (e.g., 250-DAOC) indicates the valve is configured for installation in a vertical pipe with upward flow.

Consult the drawings of record to verify the configuration supplied and installed.

Prior to installation ensure all debris, packing material or other foreign material has been removed from both ports.

The valve can be installed in a horizontal or vertical (upward flow direction) pipe. In either case the counterweight arm must be horizontal when the valve is closed. Ensure all external fasteners and set screws are tight.

Note the "INLET" tag and/or flow arrow and install the valve in the proper flow direction. Forward flow should tend to open the valve.

If installed outdoors, below ground in a vault or in an unheated area, adequate freeze protection must be provided.

Adequate isolating valves should be installed between the valve and the pipeline or system to facilitate maintenance.

The valve is supplied with (4) legs to facilitate mounting on a pier to support its weight and to minimize valve movement caused by pipeline vibration. The valve flanges are not designed to support adjacent equipment, piping loads should not be imposed on the valve and large valves should be properly supported. Ensure mating flanges are square and parallel to the valve flanges before tightening flange bolts.

Flat-faced flanged valves should be mated with flat-faced flanges and full-face gaskets. If ring gaskets are used the bolt material shall be ASTM A307 Grade B (or equivalent). Higher strength bolting should only be used with full-face gaskets.

Lower heavy valves using slings or chains around the valve body and/or the lifting eye. Lubricate the bolts or studs and insert around flange. Lightly tighten bolts until gaps are eliminated. Torque bolts in an alternating pattern in graduated steps. If leakage occurs wait 24 hours and re-torque the bolts but do not compress the gasket more than 50% or exceed bolt maximum torque rating.

## VALVE CONSTRUCTION

The standard Figure 250-DOC Swing Check Valve has a cast iron or ductile iron body, bolted steel cover, stainless steel body seat, stainless steel hinge shaft and cast iron disc with a rubber disc seat. Refer to the List of Materials submitted for the order if non-standard materials were provided.

Refer to Page 5 for details of construction and parts location.

## START-UP

The valve generally does not require any calibration or adjustment prior to start-up. The counterweights supplied with the valve are designed to pull the valve closed before flow reversal occurs and their position along the counterweight arm is not adjustable.

The striker plates (47) should both be equally adjusted so there is a 1/8" gap between it and the counterweights (31). Lock the striker plate with the jam nut (48).

The valve should smoothly swing open as flow through the valve increases. The amount of opening depends on the flow velocity through the valve and can be observed by watching the external counterweight arm. The valve is "full ported" at about 25 degrees of swing but can swing open as much as 60 degrees.

Observe the counterweight arm when the pump is at full speed. Oscillation of more than a few degrees up and down can contribute to premature shaft bearing wear.

Before making any corrections, shut down the pump and observe the valve's closure. If closure was smooth and quiet, then remove one of the weights and re-start the pump. Observe if the oscillation is diminished and shut down the pump. Repeat these steps to the point where the valve opens to the extent possible but still closes quietly.

In extreme cases, it may be necessary to install additional counterweight(s) to effect non-slam closure.

## OIL-CUSHION CHAMBER (Shock Absorber)

The oil-cushion chamber cannot retard the valve's closure or prevent the valve from being slammed shut due to the tremendous forces of the reversing water. Non-slam operation is achieved when the counterweights quickly pull the valve disc through the decelerating forward flow and fully close the valve prior to flow reversal.

The oil cushion chamber is installed directly beneath the counterweights. When the valve is closed there should be a slight gap (approximately 1/8") between the counterweight and the shock absorber striker plate.

During gradual valve closure, the counterweights may not engage the oil cushion as there would be no need

for cushioning. This may occur when a VFD ramps down or the pump/motor has high inertia with a prolonged coast down.

However, when there is a rapid check valve closure, the inertia of the falling heavy counterweight will cause the counterweight arm to deflect when the disc engages the valve seat. The counterweight arm is specially designed to deflect a controlled amount allowing the shock absorber to "catch" and decelerate the rapid downward movement of the counterweight arm after the valve has quietly closed.

## PREVENTIVE MAINTENANCE

Figure 250-DOC Swing Check Valves require no scheduled lubrication, adjustment or preventive maintenance.

A monthly inspection should be performed for the first 6 months of operation to ensure the valve is functioning properly and there is no external fluid leakage or audible evidence of water leaking backwards through the closed valve.

Thereafter, a quarterly visual inspection should be performed.

## TROUBLESHOOTING

- Shaft packing leakage  
Tighten packing gland nuts equally just enough to stop leakage, no more than 1/2 turn at a time. DO NOT OVER-TIGHTEN!  
Replace packing if necessary.
- Leakage past seat when closed  
Inspect valve for debris, clean  
Inspect seating surfaces for damage, replace as necessary
- Leakage past cover or flange gaskets  
Tighten cover or flange bolts
- Disc oscillating when open  
See Start-up Procedure
- Valve slams upon closing  
See Start-up Procedure  
Ensure shaft packing is not too tight

### WARNING

Removing the valve from the line or disassembling the valve while there is pressure in the valve body may result in injury or damage to the valve

### WARNING

Follow all applicable safety regulations and codes and read and understand all instructions before undertaking disassembly.

## DISASSEMBLY

All Figure 250-DOC valves can be serviced while the body remains connected to the pipeline. A skilled technician should perform all work. No special tools are required.

First ensure there is no pressure within the valve and operating equipment is tagged and locked out. Refer to pages 4 & 5 4 for parts identification.

It is not necessary to disassemble the entire valve to replace the shaft packing, follow steps 1 to 3 and 5a.

1. Ensure there is no pressure within the valve and operating equipment is locked out.
2. Remove the counterweight retainer cotter pins (54) and the counterweight pin (52) from each counterweight arm. Slide the counterweight retainer ring (51) and counterweights (31) off the counterweight arm (19). Loosen or remove the counterweight arm set screws (53) from each arm and slide them off the shaft (11) being careful not to lose the keys (50).
3. Remove the cover bolts and nuts (10) and lift off the cover (9). If necessary, carefully pry the cover off using a cold chisel between the body and cover. Be careful not to damage or lose the cover O-ring (8) unless it is to be replaced.
4. Loosen and remove the gland stud nuts (16), slide off the glands (15) and remove the shaft packing (17) from each side.
5. With the disc and disc arm properly supported, loosen the disc arm set screws (12), remove the gib head keys (49) and pull the shaft (11) out of the valve. It may be necessary to drive out the shaft from the opposite end with a sledgehammer and a block of wood to prevent damaging the end of the shaft.  
NOTE: The bushing (13) on the opposite side should come out with the shaft. After the shaft is out, remove the other bushing (13) from the opposite side. There are two threaded holes in the bushing to facilitate removal.
6. Carefully lift the disc arm assembly out of the body. Remove the cotter pins (41), washers (42) and disc center pin (3A) to separate the disc (3) from the disc arm (4).
7. If necessary, remove the disc clevis bolts (36) and disc clevis (35) from the disc (3).
8. Remove the seat follower screws (5B), follower ring (5A) and resilient seat (5) from the disc.
9. In the unlikely event it's necessary to remove the body seat (2), remove the seat screws (5C) and body seat (2).

Inspect all parts for wear and damage. Replace damaged parts.

#### **ASSEMBLY**

The valve is reassembled by reversing the disassembly sequence with consideration of the following:

- 1a. Clean and polish all machined bearing and sealing surfaces, especially the shaft (11)

surfaces on which the gland packing (17) seals. Apply a light coat of lubricant to assist in the assembly.

- 2a. Ensure the disc/disc arm assembly is properly supported while installing the shaft. Install the bushings on both ends. The gland (15) can be used to retain the bushing on the opposite side as the shaft is installed. It may be necessary to drive the shaft through the disc arm and bushings.
- 3a. Install the gib head keys (49) and lift the disc assembly several times to ensure free closure with no metal-to-metal contact.
- 4a. Packing (17) is a set of 4-V-rings plus male and female end pieces. Lubricate all pieces and install the male end piece first, then the V-rings with the open end facing inward, being careful not to cut or damage them, followed by the female end piece.
- 5a. Install gland (15) and gland nuts (16). Tighten nuts evenly until packing is slightly compressed. After pressure has been introduced into the valve, re-tighten evenly until leakage stops. Do not over-compress!

#### **REPLACEMENT PARTS**

Genuine replacement parts are available from your local VAG/GA Industries representative or from the factory:

VAG USA, LLC  
234 Clay Avenue  
Mars, PA 16046 USA  
Telephone: 724-776-1020  
Fax: 724-776-1254  
E-mail: [quotes-ga@vag-group.com](mailto:quotes-ga@vag-group.com)

Please have the nameplate data available when ordering parts. Identify needed part(s) by Shop Order (SO) Number, Figure Number, valve size and individual part number.

#### **WARRANTY**

The Warranty for GA Industries valves is included in our Terms and Conditions which can be found here: <https://gaindustries.com/terms>

<b>Part No.</b>	<b>Part Name</b>	<b>Std. Material</b>
1	Body	Ductile Iron
2	Body Seat	316SS**
3	Disc	Ductile Iron
3A	Disc Clevis Pin	303SS
4	Disc Arm	Ductile Iron
5	Renewable Seat	Neoprene
5A	Seat Follower	316SS**
5B	Seat Follower Screws	304SS
5C	Seat Screws	304SS
8	Cover O-Ring	Buna-N Rubber
9/9A	Cover	Steel
10	Cover Bolts/Nuts	Zinc Plated Steel
11	Shaft	303SS
12	Disc Arm Set Screw	304SS
13	Bushing	Lead-Free Bronze
15	Gland	Steel
16	Gland Stud & Nut	Zinc Plated Steel
17	Packing Set	Neoprene & Cotton
19	Counterweight Arm	Steel
31	Counterweights	Steel
35	Disc Clevis	Steel
35A	Disc Clevis Pin	303SS
36	Disc Clevis Bolts	Steel
38	Lower Disc Guide	Steel
39	Upper Disc Guide	Steel

<b>Part No.</b>	<b>Part Name</b>	<b>Std. Material</b>
40	Disc Guide Screws	Zinc Plated Steel
41	Disc Arm Cotter Pin	Stainless Steel
42	Disc Arm Washer	Stainless Steel
43	Shock Absorber	EGD SS22-41
44	Mounting Bracket	Steel
45	Bracket Mounting Bolt	Zinc Plated Steel
46	Mounting Bolt	Zinc Plated Steel
47	Striker Plate	Steel
48	Striker Plate Jam Nut	Zinc Plated Steel
49	Gib Head Key	Steel
51	C'weight Retainer	Steel
52	C'weight Retainer Pin	Steel
53	C'weight Arm Set Screw	Steel
54	C'weight Retainer Cotter Pin	Stainless Steel
30	Counterweight Arm	Ductile Iron/Steel
30A	C'weight Arm Set Screw	Stainless Steel
30B	Counterweight Arm Key	Stainless Steel
31	Counterweight(s)	Cast Iron
31A	Counterweight Set Screw	Stainless Steel
32	Check Valve	Brass/Bronze
33	Cover Plug (18" & 20" only)	Steel
34	Shaft End Plate	Steel
35	Shaft End Plate Screws	Steel
36	Shaft End Plate Seal	Buna-N

\*\* These parts may be bronze in older valves



