FLOWSERVE

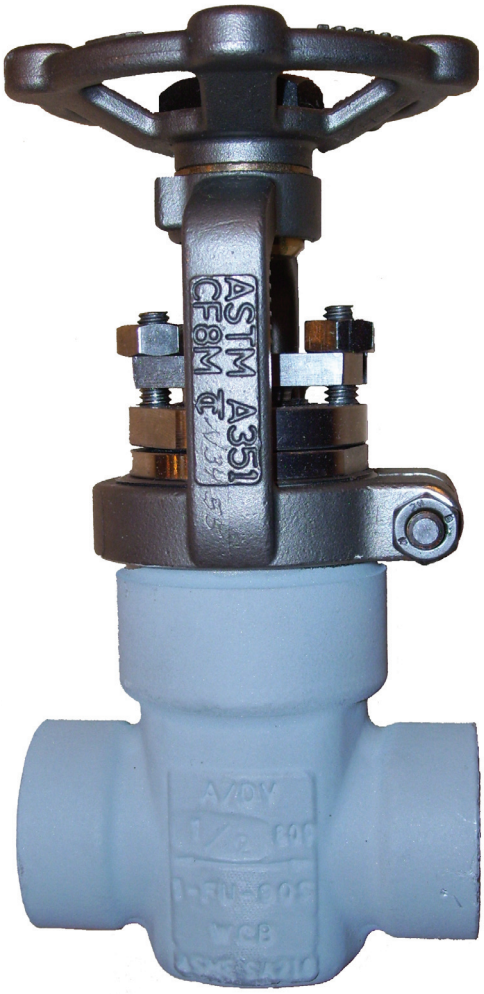
INSTRUCTION MANUAL

Anchor Darling 800-lb. Split-Wedge Gate

½" through 2" Valves with Handwheels

FCD ADENIM0002-00

Installation
Operation
Maintenance



Experience In Motion

Table of Contents

Revision Sheet

Revision	Date	Changes	Description
-	10/17/2003	Original Issue	

1.0 PHYSICAL DESCRIPTION AND OPERATION OF EQUIPMENT

1.1 Split-Wedge Gate Valves

The Flowserve Corporation split-wedge gate valve design is comprised of two independent disc segments, which make up a wedge assembly.

The wedge assembly is designed to impart sufficient thrust to each disc segment to maintain acceptable seat leakage. As the differential pressure across the disc increases, the seating load also increases, thus maintaining acceptable leakage through the entire range of operating differential pressures. Since the discs are completely independent of each other and the design is essentially symmetrical, zero leakage can be maintained in either direction, depending only on the direction of flow. This feature eliminates the necessity of installing a check valve to stop reverse flow.

To operate these manual valves, turn the handwheel in a clockwise direction for closure and counterclockwise for opening.

2.0 DESIGN CONDITIONS

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

3.0 OPERATING CONDITIONS

3.1 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 A shell hydrostatic test at 1.5 times the 100°F pressure rating. No leakage allowed.

4.1.2 A seat leakage and disc closure test at 110% of the 100°F pressure rating. Maximum leakage of 2 cc/hour/inch nominal valve size.

4.1.3 A backseat leakage test at 110% of the 100°F pressure rating. Maximum leakage of 2 cc/hour/inch stem diameter.

4.1.4 A packing test at 110% of the 100°F pressure rating. No leakage allowed.

5.0 OPERATING PRECAUTIONS AND LIMITATIONS

5.1 Maximum hydrostatic test pressure shall not exceed the values imposed by the ASME Code, Section III, or ANSI B16.34 as applicable.

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.

6.2 Installation

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.

In performing this cleaning procedure, the ports should be vertical and the stem horizontal to assure complete removal of all matter that might have accumulated during storage.

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 a similar device.

6.2.3 Where possible, install the valves with the stem vertical. When other orientations are used, take care when disassembling the valve to avoid any internal damage.

6.2.4 Remove the end protectors and clean the socket-weld ends with a solvent such as acetone in preparation for welding the valve into the line. The valves should then be blocked or slung into position with an apparatus that is sufficient to hold the valve assembly weight while the valve is being welded into the line. WELDING MUST TAKE PLACE WITH THE DISC IN THE OPEN POSITION. Welding should be TIG with a maximum interpass temperature of 300°F. These methods will prevent any seat warpage from high-concentrated temperatures.

6.3 Pre-Operational Checks

6.3.1 After installation, the operation of manual valves should be verified by closing the valve. The valve should seat tightly with less than 60 lbs. of push/pull combined force on the handwheel rim. If the valve does not close tightly, do not apply extra leverage; instead, refer to Paragraph 9.4 A and B.

7.0 MAINTENANCE REQUIREMENTS

7.1 Preventive Maintenance

7.1.1 Check all nuts and bolts periodically to ensure tightness and to forestall possible leaks. Recommended torque values are presented in Section 11.0.

7.1.2 Keep valve stem clean and properly lubricated.

7.1.3 Check conditions of packing and replace as necessary.

7.2 Recommended Spare Parts

7.2.1 Recommended spare parts are gaskets, packing, disc pack and stem. The recommended quantity is one (1) set of packing and gaskets for every two (2) valves of a particular type but not less than one (1) set of each type. One (1) disc pack and one (1) stem are recommended for every ten (10) valves of a particular type.

7.3 Lubrication

7.3.1 Apply a light coating of lubricant (Dow Corning Molykote P37 paste or equal) to the threaded area of the stem when necessary.

7.3.2 Lubricate bolting with Nuclear Grade Never-Seez or castor oil.

8.0 PERIODIC IN-SERVICE TESTING RECOMMENDATIONS AND PROCEDURES

8.1 It is recommenced that the valve be operated from full open to full close at least once every six months.

9.0 MAINTENANCE INSTRUCTIONS

9.1 The following instructions cover the disassembly and reassembly of a split-wedge gate valve. Typical valve configuration is shown in Figure 1 (see Section 12.0).

CAUTION

CHECK ONE 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 stem and disc do not separate when removed as one unit, until both are adequately supported. Failure to do so could cause damage to the disc.

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

(a) Place the valve in the closed position without wedging the discs into position by closing the valve and opening about one-half (1/2) of a revolution of the handwheel.

(b) Remove the handwheel nut (240) from the yoke sleeve (017).

(c) Remove the handwheel (136) and handwheel key (135) and handwheel washer (250) from the yoke sleeve (017) by sliding it up and over the yoke sleeve.

(d) Rotate the yoke (011) in a counterclockwise direction to remove it from the body (001) and slide it up and over the yoke sleeve (017).

(e) Turn the yoke sleeve (017) off the stem (025).

(f) Remove the gland stud nuts (234), allowing removal of the gland studs (205).

(g) Lift the flange gland (133) upward and remove the packing (110, 112) from the stuffing box. Removal of the packing is best accomplished with a packing hook or similar device.

9.0 MAINTENANCE INSTRUCTIONS *(Continued)*

9.1.1 Disassembly (Continued)

(h) Loosen the gland retainer setscrews (220) until they do not make contact with the gasket retainer (033). Then turn the gland retainer (131) counterclockwise off the bonnet (002). Turn the gasket retainer (033) out of the body (001). If the bonnet (002) drops and turns with the gland retainer, grasp the stem (025) and lift to hold the bonnet, thus preventing it from rotating.

(i) Remove the pressure seal gasket (030) by carefully lifting the bonnet (002). It is imperative that the bonnet be lifted over the stem as straight as possible to eliminate the possible scoring of the stem. If the bonnet is wedged into position, carefully lift up on the stem until the gasket and bonnet come free.

(j) The stem (025) and discs (004A and 004B) can now be lifted from the valve body. As the discs rise above the guides in the valve body, they should be retained to reduce the possibility of them becoming damaged by falling on the lapped surfaces.

(k) Remove the discs (004A and 004B) from the stem (025) and place them where they will not be damaged or scratched.

(l) At this time, the discs and seat rings may be lapped, if required. The sealing surfaces should be inspected to determine if scratches or minor imperfections can be corrected by lapping and/or if replacement parts are necessary (refer to Paragraph 9.3 for lapping instructions).

9.0 MAINTENANCE INSTRUCTIONS *(Continued)*

9.1.2 Assembly

Assembly of the valves is simply the reverse of disassembly. Prior to reassembly, note the following special instructions.

(a) All dirt, scale and foreign matter should be removed from inside the valve body and bonnet.

(b) Check the seating surfaces to determine that scratches or minor imperfections do not exist on the discs or seat rings. If any are evident, lap these surfaces until no visible defects remain. (Reference Paragraph 9.3.)

(c) Position the discs (004A and 004B) onto the stem (025). As the stem and disc pack are lowered into the valve body, they should be contained to reduce the possibility of falling and becoming damaged.

(d) Once the stem/disc pack assembly is positioned into place, the bonnet (002) can be lowered into the body neck. Care must be taken in lowering the bonnet onto the stem to prevent possible scoring.

(e) With the bonnet resting inside the body neck, a new pressure seal gasket (030) can be inserted. Because the tolerances are close and the gasket could cock, the seal gasket must be inserted with care.

(f) Thread the gasket retainer (033) into the body; tighten to the bottom of the threads and back out enough to align the packing gland bolts onto the valve body. With the gasket retainer in the proper position, the gland retainer (131) can be lowered over the stem and threaded onto the bonnet (002). The bonnet will be raised squarely until it is firmly in contact with the pressure seal gasket.

9.0 MAINTENANCE INSTRUCTIONS *(Continued)*

9.1.2 Assembly (Continued)

(g) Note that it is not necessary to torque the gland retainer (131). The bonnet is truly sealed by pressure. The only function of the retainer is to hold the bonnet in contact with the gasket until it is deformed by pressure, locking the joint together and ensuring a tight seal. Since the bonnet is sealed by pressure, constant cycling could compress the gasket and necessitate tightening of the gland retainer setscrews (220).

(h) Once the bonnet is in the proper position, the gland retainer might require backing off to align the slots for the gland bolts. Once this has been accomplished, the gland retainer setscrews (220) should be installed and tightened (see Section 11.0 for recommended torque values).

(i) Install the packing into the bonnet in accordance with Section 9.2.

(j) Place the gland studs (205) into the slots and through the flange gland (133) and tighten the gland stud nuts (234) (see Section 11.0).

(k) Replacement of the yoke (011), yoke sleeve (017), handwheel washer (250), hand wheel (136) handwheel key (135) and handwheel nut (240) can be accomplished by reversing the procedure specified in Paragraph 9.1.1 (a), (b), (c), (d), (e) and (f).

9.0 MAINTENANCE INSTRUCTIONS *(Continued)*

9.2 Replacement of Packing (Reference Figure 1)

If the valve is in service, backseat it. If the valve is not backseated, be sure that line is depressurized.

(Refer to Figure 1 for referenced part designations.)

(a) Remove the two (2) gland stud nuts (234), loosen the two (2) gland retainer setscrews (220) and raise the gland flange (133).

(b) Lift the gland flange (133) upward and away from the stuffing box area.

(c) Use a packing hook or similar device to remove the old packing.

(d) Install the packing (110, 112) one ring at a time, carefully placing the joint of each ring approximately 180° from the preceding piece to prevent a leakage path. It might be necessary to slightly flatten each packing ring prior to installation to allow easy insertion within the stuffing box. Do not use a pointed instrument to push the rings into position. The gland flange (133) can be used to seat the packing in position once a ring has been slipped within the box.

(e) Upon completely filling the stuffing box, replace the nuts and bolts and very carefully draw the packing to assure that the gland flange (133) is even and that the bore of the gland flange is concentric with the valve stem. If the gland flange (133) is drawn unevenly, scoring of the stem (025) could result; or the gland flange could be tilted, which could cause binding. Recommended torque values can be found in Section 11.0.

(f) Check the packing periodically (six-month intervals), replacing as needed.

9.0 MAINTENANCE INSTRUCTIONS *(Continued)*

9.3 Lapping Procedure

After the valve has been disassembled, a visual inspection of the seating surfaces of the discs (004) and seat rings (013) can be made to determine if lapping is necessary to remove any minor scratches on these parts prior to assembling the valve. Adhere to the following procedure:

(a) The disc should be lapped on a flat, grooved lapping plate or, if available, a lapping machine can be used. A “medium” grade lapping compound should be used for the first and successive applications and a ‘fine” grade compound similar to “Clover A Grit No. 280” should be used for the final lapping process.

(b) If it is necessary to lap the face of the seat ring, a standard lapping plate can be used of approximately the same diameter as the disc.

9.4 Troubleshooting

A. EXCESSIVE HANDWHEEL (136) EFFORT OR BINDING

Excessive tee handle effort or binding would indicate that the stem (025) either needs to be lubricated or the gland flange (133) is too tight as a result of the gland stud nuts (234) being tightened unevenly. Lubrication (Paragraph 7.3) should be checked at regular intervals of six months. To evenly tighten the gland stud nuts, they should be loosened and retightened in an alternating fashion.

B. LEAKAGE BETWEEN THE DISC (004) AND SEAT RING (013)

Leakage between the disc (004) and seat ring (013) could be an indication that foreign matter is on the seating surfaces, in which case the valve should be opened and closed ONE TIME in an attempt to dislodge any matter that may have inadvertently lodged there. DO NOT OPEN AND CLOSE THE VALVE MORE THAN ONCE, SINCE THIS COULD CAUSE PERMANENT DAMAGE TO THE SEATING SURFACES IF THE FOREIGN MATTER IS SECURELY LODGED IN PLACE. Instead, disassemble the valve and remove the sources 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 Paragraph 9.3).

C. LEAKAGE AROUND STEM (025) AND THROUGH THE STUFFING BOX

Worn packing (110, 112). Replace the packing following the instructions set forth in Paragraph 9.2.

10.0 STORAGE REQUIREMENTS

The valves have been shipped in the closed position. Upon receipt of the valves at their destination, the crates should be examined thoroughly for signs of mishandling or damage during shipment. With the valves strapped to the shipping skids, all yoke cap and gland bolting should be checked to ensure that the joints are secure. On occasion, bolting could become loosened during shipment and handling.

The valves should 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) The valves should be stored in an upright position, stem vertical and where there is minimal temperature variation 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) The shelf life for grafoil and graphite filament packing and spiral-wound gaskets is indefinite when stored under the proper conditions.

SECTION 11.0

BOLTING TORQUE VALUES

Refer to the applicable Customer-Certified Assembly Drawing(s)
(Section 13.0)
for any specific torque requirements

11.0 BOLTING TORQUE VALUES

At intervals of not more than six months, check the tightness of all bolting. The recommended torque values for all bolting are shown below:

VALVE SIZE ½", ¾"

				Torque (ft-lb)	
Part #	**Size**	**Description**	**Material**	**Nominal**	**Maximum**
231	¼"-20	Yoke Nut	A194-2H	10	15
234	¼"-20	Gland Stud Nut	A564-630-1150	1	4
240	5/8"-18	Handwheel Nut	Carbon Steel	15	20

VALVE SIZE: 1"

				Torque (ft-lb)	
Part #	**Size**	**Description**	**Material**	**Nominal**	**Maximum**
231	¼"-20	Yoke Nut	A194-2H	10	15
234	5/16"-18	Gland Stud Nut	A564-630-1150	2	6
240	3/4"-16	Handwheel Nut	Carbon Steel	25	30

VALVE SIZE: 1½"

				Torque (ft-lb)	
Part #	**Size**	**Description**	**Material**	**Nominal**	**Maximum**
231	5/16"-18	Yoke Nut	A194-2H	20	25
234	3/8"-16	Gland Stud Nut	A564-630-1150	4	12
240	1"-14	Handwheel Nut	Carbon Steel	50	60

VALVE SIZE: 2"

				Torque (ft-lb)	
Part #	**Size**	**Description**	**Material**	**Nominal**	**Maximum**
231	3/8"-16	Yoke Nut	A194-2H	35	40
234	3/8"-16	Gland Stud Nut	A564-630-1150	5	15
240	1"-14	Handwheel Nut	Carbon Steel	25	30

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.

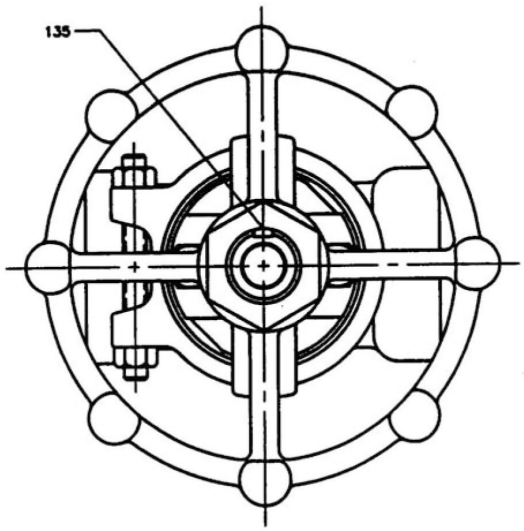
SECTION 12.0

REFERENCE DRAWINGS

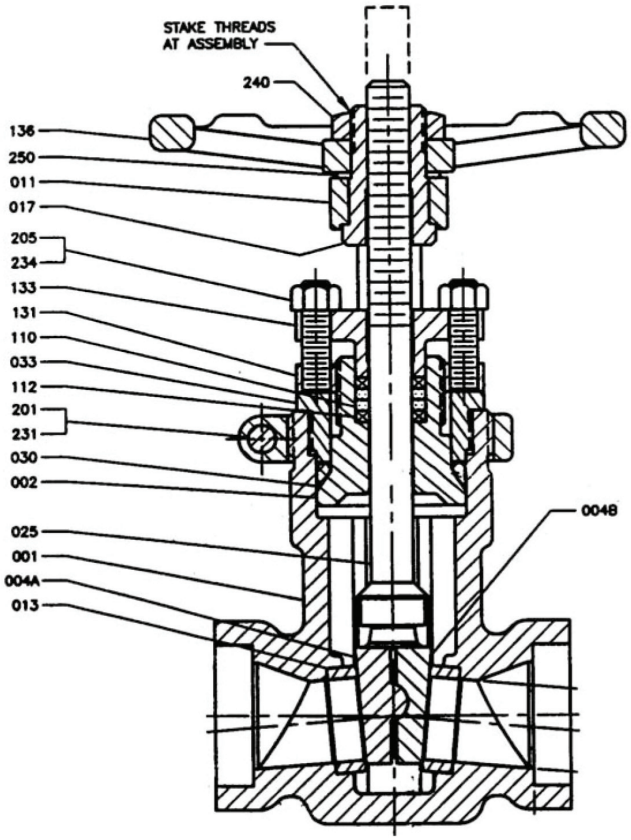
SECTION 13.0

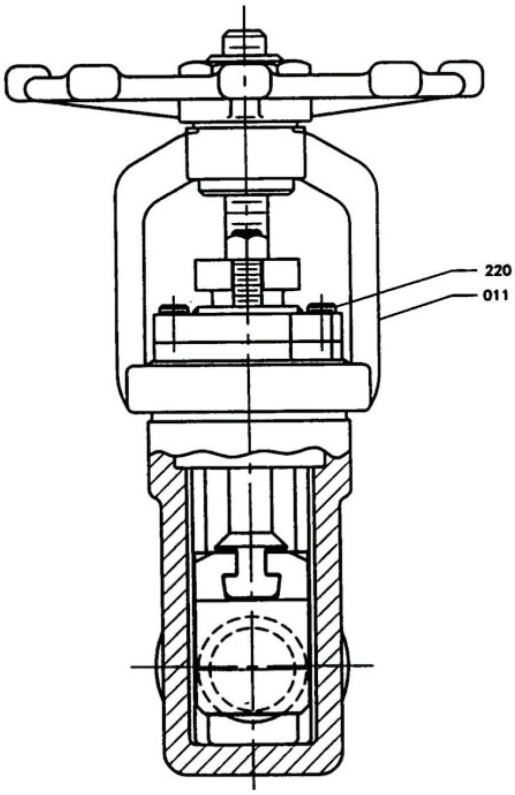
CUSTOMER-CERTIFIED ASSEMBLY DRAWING(S)

Figure 1



PART NO	QTY	DESCRIPTION
001	1	BODY
002	1	BONNET
004A	1	DISC SEGMENT (MALE)
004B	1	DISC SEGMENT (FEMALE)
011	1	YOKE
013	2	SEAT RINGS
017	1	YOKE SLEEVE
025	1	STEM
030	1	PRESSURE SEAL GASKET
033	1	GASKET RETAINER
110	2	PACKING RINGS
112	2	PACKING RINGS (END)
131	1	GLAND RETAINER
133	1	FLANGE – GLAND
135	1	HANDWHEEL KEY
136	1	HANDWHEEL
201	1	YOKE STUD
205	2	GLAND STUDS (SETSCREWS)
220	2	SETSCREWS (GLAND RETAINER)
231	2	YOKE NUTS
234	2	GLAND STUD NUTS
240	1	HANDWHEEL NUT
250	1	HANDWHEEL WASHER
260	1	WIRE
345	1	NAMEPLATE
346	1	IDENTIFICATION PLATE





United States
Flowserve Corporation
Flow Control Division
1900 S. Saunders Street
Raleigh, NC 27603
Phone: (919) 832-0525
Fax: (919) 831-3369

FCD ADENIM0002-00 Printed in USA.

To find your local Flowserve representative:

For more information about Flowserve Corporation,
visit www.flowserve.com or call USA 1 800 225 6989