

Manual No. 1878-DD
Issued: February 22, 2001

INSTRUCTION MANUAL

for

**½" thru 2" 1878 lb. Double Disc Gate Valves
with Manual Handwheels**

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1.0 **PHYSICAL DESCRIPTION AND OPERATION OF EQUIPMENT**

1.1 **Double Disc Gate Valves**

The Flowserve Corporation double disc design is unique in that there are two independent discs. During each closing stroke, immediately prior to the disc seating, each disc rotates a few degrees in the plane of the seats. This rotating feature allows the disc to seat in a different position on each closing stroke, providing for equal wear and preventing small imperfections from being agitated into major leakage problems.

The wedge assembly is designed to impart sufficient thrust to each disc to maintain acceptable low pressure 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 with no measurable leakage:

4.1.1 A 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.

4.1.3 A backseat leakage test at 110% of the 100°F pressure rating.

4.1.4 A packing 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 judgement 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 similar devices.
- 6.2.3 Where possible, install the valves with the stem vertical. When other orientations are used, take care when disassembling the valve so that the internals do not become damaged.
- 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 SHALL TAKE PLACE WITH THE DISC IN THE OPEN POSITION.

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 force on the handwheel rim. If the valve does not close tightly do not apply extra leverage; instead refer to Para. 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 foretell 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 1 set of each type. One disc pack and 1 stem is 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 111 Compound, Dow Corning Molykote P37 paste or equal) when necessary to the threaded area of the stem.
- 7.3.2 The bearing area in the yoke bushing can be lubricated via the grease fitting (340) with the above mentioned lubricants.

8.0 **PERIODIC INSERVICE TESTING RECOMMENDATIONS AND PROCEDURES**

- 8.1 It is recommended 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 gate valve. Typical valve configuration is shown in Figure 1 (see Section 12.0).

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 stem and disc do not separate when removed as one unit, until both are adequately supported. 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 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 MAY PREVENT COMPLETE SHUT-OFF AND NECESSITATE EXTENSIVE REWORK OR REPLACEMENT.

- (a) Remove the Gland Stud Nut (234) from the Gland Bolt (210) which will permit the Gland Bolt to be removed.
- (b) Lift the Gland Flange (133) upward from the stuffing box area, thus exposing the Packing (110 & 112).
- (c) Remove the Packing (110 & 112). This is best accomplished with a packing hook or similar device.
- (d) Remove the Bonnet Studs and Nuts (200 & 230) and remove the Bonnet (002) from the Stem (025) by turning the Handwheel (136) in a clockwise direction. Be careful not to damage the stem threads. The Gland Flange (133) will come off with the removal of the Bonnet. Be careful not to scratch the bonnet's gasket seating surface.
- (e) 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 surfaces.
- (f) The Stem (025) and Disc Package (004, 069, 071 & 269) can now be removed as one unit. Support the Discs (004) so they do not fall off and become damaged. The "T" head of the Stem (025) separates from the "T" slot of the Upper Wedge (069) by sliding.

9.0 **MAINTENANCE INSTRUCTIONS** (Continued)

9.1.1 **Disassembly** (Continued)

- (g) The Lower Wedge (071) can now be separated from the Upper Wedge (069). When separating the two wedges, take care that the Wedge Spring (269) does not fly out and become lost.

9.1.2 **Assembly**

Assembly of the valves is simply the reverse of disassembly. Prior to reassembly, read 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 none are visible. (Reference Para. 9.3.)
- (c) When replacing the Bonnet Studs and Nuts (200 & 230) consult the applicable drawing or Section 11.0 for correct torque to assure tightness of the seal. Prior to tightening, the studs and nuts should be lightly lubricated with a nuclear grade lubricant.
- (d) The nuts should be tightened evenly using a criss-cross pattern as shown in Figure 2. 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.
- (e) Finally, torque all of the nuts to the recommended value following the criss-cross pattern. It is essential that the flange faces remain parallel and all of 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.

9.0 **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) and raise the Gland Flange (133) allowing the Gland Bolts (210) to be removed.
- (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) or a Packing Iron (See Figure 3) should 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) may result; or the Gland Flange might be tilted which could cause binding.)
- (f) Check the packing periodically (6-month intervals) replacing as needed.

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. The following procedure should be followed:

- (a) The disc should be lapped on a flat grooved lapping plate, or if available, a lapping machine may 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.

9.0 **MAINTENANCE INSTRUCTIONS** (Continued)

9.4 **Trouble Shooting**

A. **EXCESSIVE HANDWHEEL (136) EFFORT OR BINDING**

Excessive handwheel 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 (Para. 7.3) should be checked at regular intervals of 6-months. To tighten the Gland Stud Nuts evenly, they should be loosened and retightened in an alternating fashion.

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

This could be an indication that there is foreign matter 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 AS THIS MAY 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 Para. 9.3)

C. **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.

D. **LEAKAGE AROUND STEM (025) AND THRU THE STUFFING BOX**

Worn Packing (110, 112). Replace the packing following the instructions set forth in Para. 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 bonnet and gland 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, 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) A check-off tag should be affixed to each unit and should be dated and signed off by the inspector witnessing the inspection that is recommended at 6-month intervals.
- (d) The shelf life for grafoil and graphite filament packing and spiral wound gaskets is indefinite when stored under the proper conditions.

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:

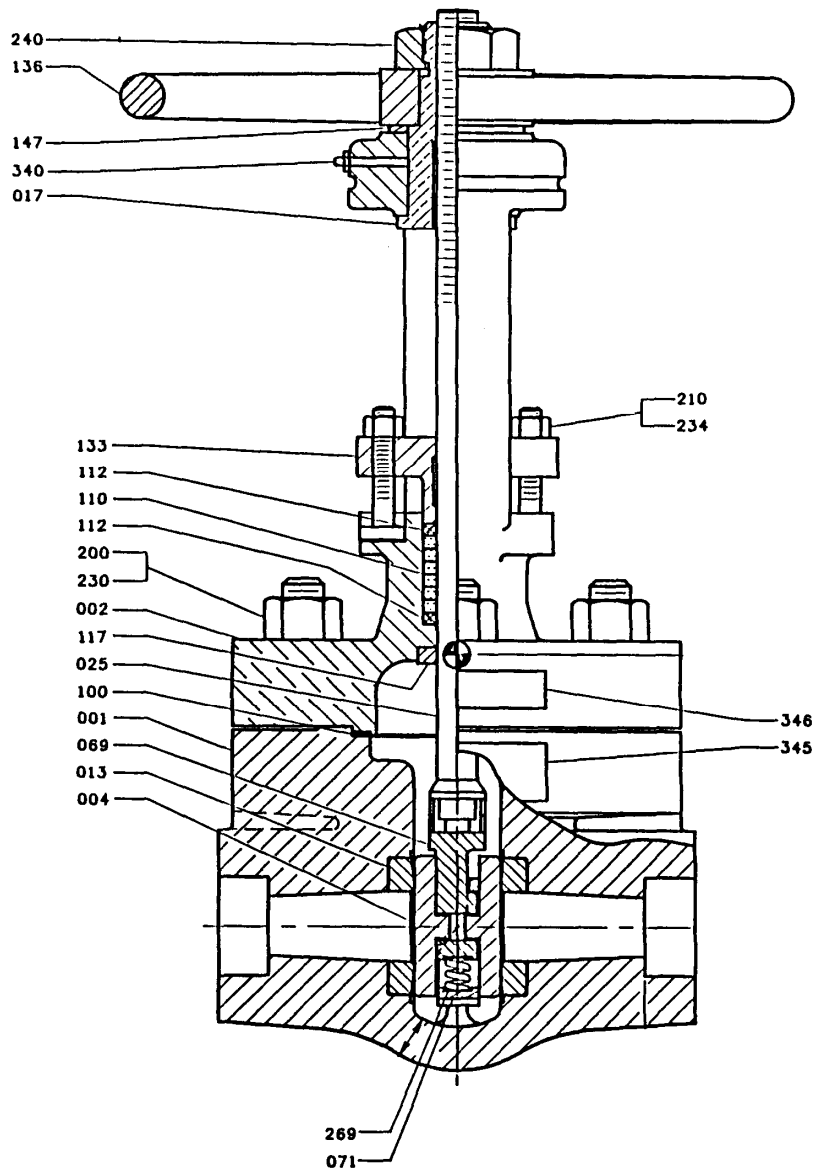
STUD SIZE	Torque (ft-lb)			
	SA193-B7		SA453-660	
	Nominal	Maximum	Nominal	Maximum
5/8-11	59	90	50	100
3/4-10	104	165	88	175

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.

All torque values listed shall be measured in foot-pounds.

SECTION 12.0
REFERENCE DRAWINGS

FIGURE 1

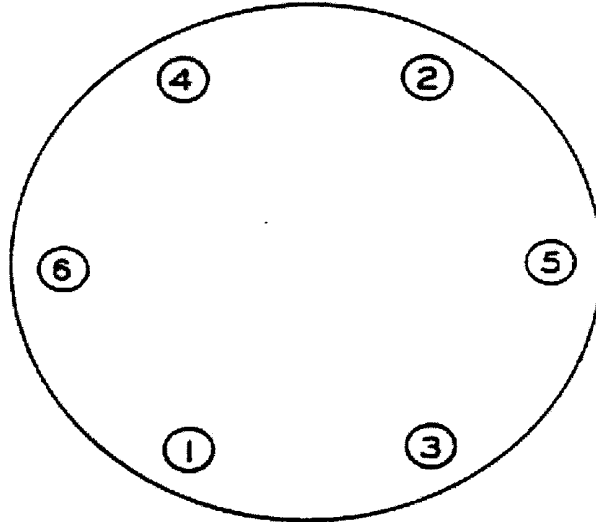


PART NO	QTY	DESCRIPTION
001	1	BODY
002	1	BONNET
004	2	DISCS
013	2	SEAT RINGS
017	1	YOKE SLEEVE
025	1	STEM
069	1	UPPER WEDGE
071	1	LOWER WEDGE
100	1	GASKET (BONNET)
110	6	PACKING RINGS
112	2	PACKING RINGS (END)
117	1	BACKSEAT
133	1	FLANGE-GLAND
136	1	HANDWHEEL
147	1	THRUST WASHER
200	6	BONNET STUDS
210	2	GLAND BOLTS
230	6	BONNET NUTS
234	2	GLAND STUD NUTS
240	1	HANDWHEEL NUT
269	1	WEDGE SPRING
340	1	GREASE FITTING
345	1	NAMEPLATE
346	1	IDENTIFICATION PLATE

FIGURE 2

Bolt Tightening Sequence

Six Bolt Bonnet



Eight Bolt Bonnet

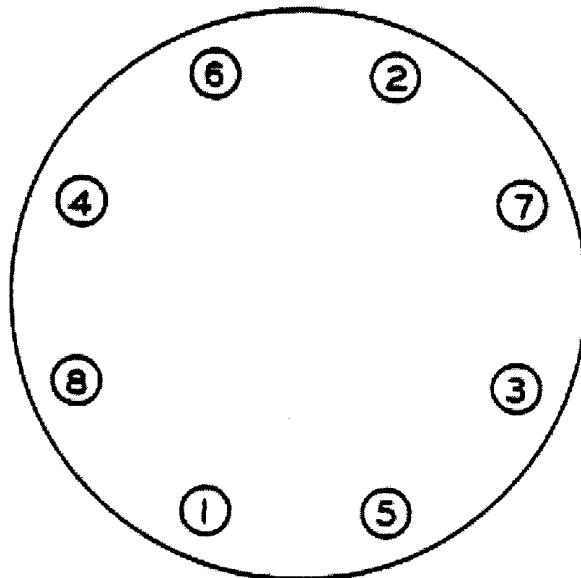
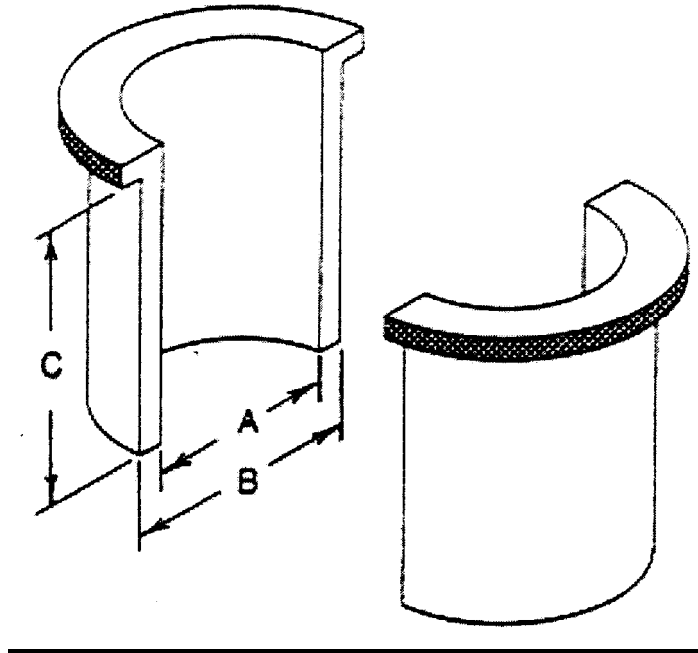


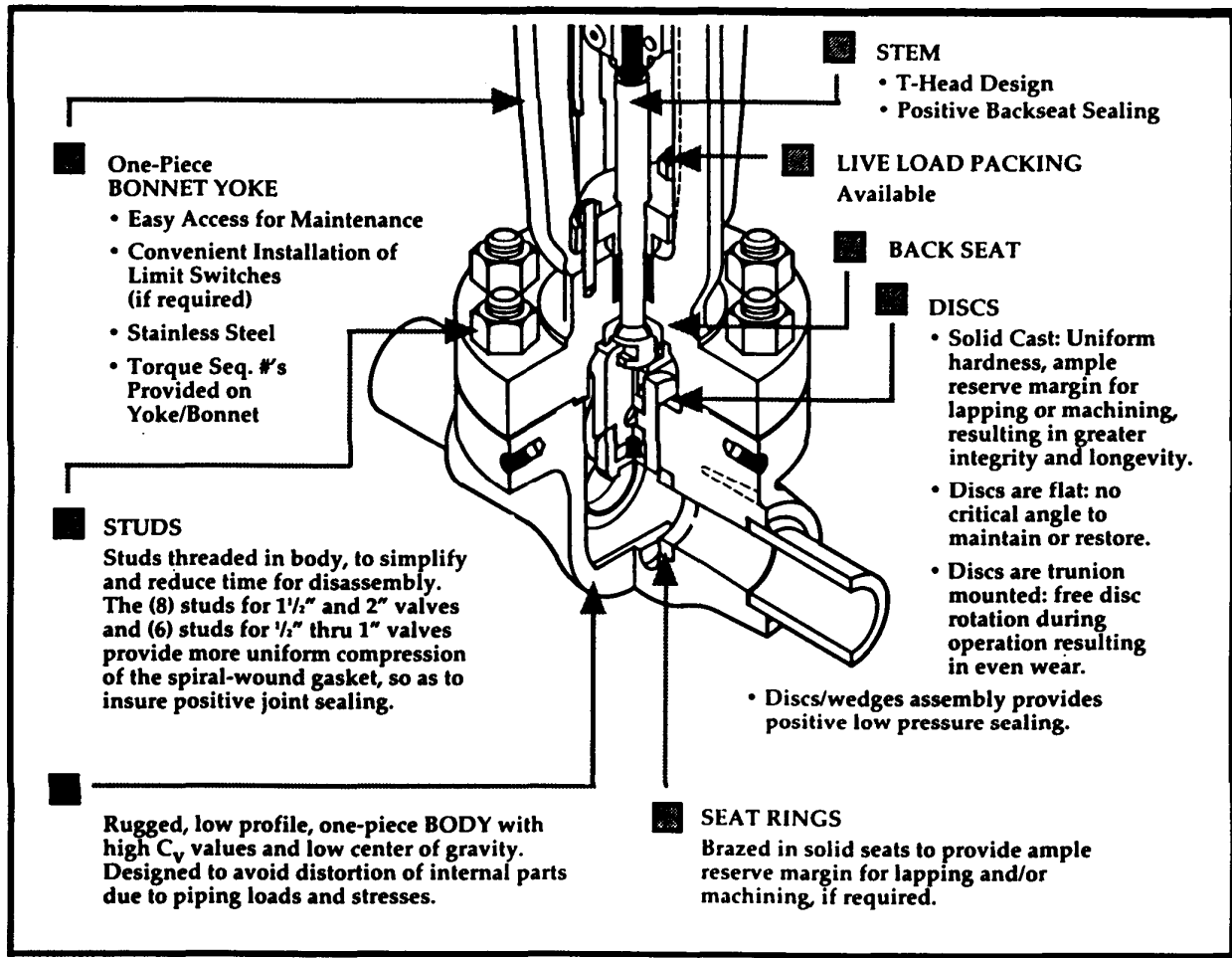
FIGURE 3



VALVE SIZE	A	B	C
1/2, 3/4, 1"-1878-DD	.656	.969	1-3/8
1-1/2, 2"-1878-DD	.781	1.218	1-13/16

FIGURE 4

3-D VIEW OF DISC PACK



SECTION 13.0

CUSTOMER CERTIFIED ASSEMBLY DRAWING(S)