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I. INTRODUCTION

Series DF Floating Ball Valves are designed and manufactured in accordance with API 6D specification and are available in a wide variety of materials, suitable for many oil/gas and industrial applications. The valve configuration may be noted on the nameplate and or cast/stamped into the body, which includes valve size, pressure classification, trim/materials, maximum operating pressure, part number and serial number.

Several body, trim, seat and seal materials are available. It is the user's responsibility to specify the materials appropriate to assure chemical/temperature/pressure suitability for their particular application.

II. TRANSPORTATION & STORAGE

While loading or unloading, check for and adhere to any markings or arrows on the box/crate which may be present to indicate upward orientation. Valves should be stored, with protective end caps in place, in a suitably dry, clean environment, protected from the weather. Factory grease and end-cap protectors should be adequate for storage up to six months if properly protected. Longer term storage should include a suitable inspection process to assure valves have not been compromised and are suitably maintained in good condition.

III. INSTALLATION

Before installation, remove the end protectors and clean the

Base Part Numbers

SIZE	Cl. 150	Cl. 300	Cl.600	Cl.900	Cl.1500
1"FP	4100	4300	4600	4900	4500
1.5"FP	4101	4301	4601	4901	4501
2"RP	4102	4302	4602	4902	4502
2"FP	4103	4303	4603	4903	4503
3"RP	4105	4305	4605	4905	
3"FP	4106	4306	4606		
4"RP	4107	4307	4607		
4"FP	4108	4308	4608		
6"RP	4109	4309	4609		
6"FP	4110	4310			
8"RP	4111	4311			
8"FP	4112	4312			

Trim Option Suffix Code

XXXX - X X X X X X XX XX

Base Part No.
See chart above

Options
US • Domestic
99 • None

Pipe Size
99 • Standard

Actuation
1 • Handle
2 • Square Nut
3 • Gear Operator w/Locking Device
4 • Gear Operator
9 • Bare Stem

Seal Material
1 • Buna-N
2 • Viton
3 • Low-Temp Buna-N
4 • HNBR
5 • Aflas
7 • James Walker® Viton
8 • Peroxide-Cured Buna-N
9 • EPDM

Seat Material
1 • Delrin®
2 • PTFE
3 • RTFE
4 • Devlon®
5 • PEEK
6 • HTFM (Hostafion®)
7 • Metal-to-Metal

End Connections
6 • Flanged RF
7 • Flanged RTJ
5 • Butt weld
8 • RF x BW
9 • RTJ x BW

Trim Material (Ball & Stem)
1 • CS / CS (NACE MR0175 compliant)
2 • 316 SS / 316 SS (NACE MR0175 compliant)

Body & Adapter Material
1 • Carbon Steel
2 • Stainless Steel (CF8M)
4 • Low-Temp. Carbon Steel (LCC)
6 • Coated Carbon Steel

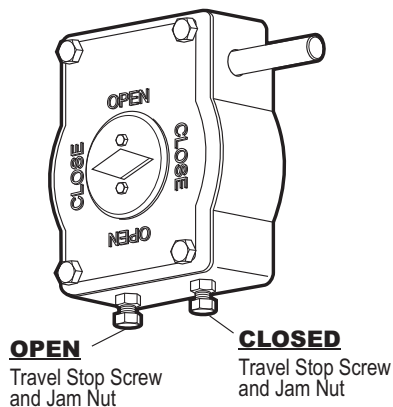
valve ends and bore, using methylene chloride or trichloroethylene, or as per the customer's specification. If valves are to be painted prior to installation, appropriate steps must be taken to prohibit the ingress of blast media, paint, solvents or any other foreign contamination that might cause damage to the valve's internal components. Assuring a properly clean valve bore will help to avoid possible seat damage during operation.

Gear Operator/Actuator Travel Stops

If the valve includes a gear operator or actuator, it is important to check that the travel stops are properly set prior to operation of the valve. Although travel stops are set at the factory, the user should verify that they have not been tampered with, as improper travel stop settings will almost certainly cause premature failure of the valve seats. If the valve includes a third-party actuator or gear operator, consult that manufacturer's documentation to assure proper travel stop setting.

For ViNtrol Gear Operated Valves use the following procedure;

Preferably, the valve should be isolated from system pressure prior to gear operator adjustment. If the valve is already installed inline, and it cannot be isolated from system pressure, assure that operation of valve from full open to full closed will not disrupt current system operation.



CHECK OPEN SETTING: The valve should be fully open. If possible, inspect the bore to assure proper alignment of the ball bore with the adjacent valve bore. Otherwise,

remove the indicator cap from the top of the gear operator and observe the position of the stem flats. Loosen the OPEN travel stop jam nut and then turn the travel stop screw counter-clockwise several turns (do not remove). Adjust the gear operator until the ball is in the full open position, as indicated when the stem flats are in perfect alignment with the bore. Once this position is found, screw the OPEN travel stop in (clockwise) until it contacts the segment gear. **DO NOT OVER-TIGHTEN.** While holding the travel stop screw in position, firmly tighten the jam nut to secure the setting, taking care not to disturb the travel stop position.

CHECK CLOSED SETTING: Loosen the CLOSED travel stop jam nut and turn the travel stop screw several turns counter-clockwise (do not remove). Spin handwheel until the valve is in a fully-closed position, as indicated when the stem flats are perpendicular to the line bore. Once this position is achieved, turn the CLOSED travel stop screw clockwise until it contacts the segment gear. **DO NOT OVERTIGHTEN.** While holding the travel stop screw in position, firmly tighten the jam nut to secure the setting, taking care not to disturb the travel stop position.

Re-install the indicator cap on the top of the gear operator. Perform a seat test as described in Section V to assure proper sealing of the seats.

IMPORTANT: Assure that the adjacent pipeline is clean of all debris, scale, weld slag, etc. Completely flushing the system of such debris prior to installation will greatly reduce the possibility of seat compromise at startup. Failure to do so may result in damage to the soft seat, metal seat and/or seals during operation.

CAUTION

The valve end connection necks and lifting lugs (if included) are the proper places to attach lifting slings if necessary. Care should be taken to assure that flange end faces are not damaged during lifting. Never lift the valve by handles, handwheels or other appendages as doing so may result in damage to the valve and/or injury to the installer. End-cap protectors should always be left in place until the valve is actually being installed in the pipeline.

Series DF valves are bi-directional and may be installed with flow from either direction. The valve should preferably be installed in a stem-up or stem-horizontal position. NEVER install the valve in a stem-down condition. When installing vertically, it is preferred that the upstream pressure be above the valve. This allows the weight of the ball to assist in sealing against the downstream seat.

The valve should be adequately supported, especially when heavy actuators are included as this may cause a top-heavy, imbalanced condition. If necessary, support the valve and/or actuator as necessary with straps/brackets/piers to assure a rigid installation. Valve/actuator weight should not cause undue stress to the piping system when properly installed and supported.

Remove the end-cap protectors. When handling the valve without end-cap protectors, keep the ball in the open position to minimize the possibility of damaging an exposed ball surface.

Flanged-End Valves

Utilize properly-specified gaskets/seal rings, studs and nuts (supplied by customer) for the particular valve flange size, securing the valve between appropriate mating flanges. Studs/nuts or bolts should be lubricated and then tightened in a crisscross fashion. After hand-tightening, final wrench torque should follow ASME or gasket manufacturer's specification for the particular size.

Buttweld-End Valves

It is important to minimize heat and weld slag during the installation process to prevent damage to the seats and seals of the valve.

1. Clean all grease from the ball and bore of the valve body/adaptor.
2. Electric welding is preferable. If oxygen-acetylene equipment is used extreme caution must be exercised to avoid excessive temperatures.
3. Orient the valve in the OPEN position. Use Tempil sticks or other suitable methods to assure that the temperature in the seat and seal areas do not exceed 250°F (121°C).

4. Weld with continuous bead, avoiding application of excessive material.
5. IMPORTANT! Thoroughly clean all weld slag from bore before turning the valve to the closed position. Failure to do so may result in damage to the soft seats.

IV. OPERATION

WARNING!

Unless specifically noted otherwise, ViNtrol Series DF Ball Valves are NOT suitable for OXYGEN SERVICE. Using these valves in oxygen service may result in catastrophic failure resulting in equipment damage, as well as operator injury or death.

Series DF Ball Valves are intended for ON-OFF service only. As with any soft-seated ball valve, prolonged throttling or pinching flow will cause premature wear of the soft seat and ultimate failure. The valve operates within a 90° turn from fully open to fully closed. Handle or gear operator should be turned until it is against the stop pin or travel stops. The valve bore position may be noted by the position arrow on the handle or gear operator. Alignment of the handle/arrow with the pipeline indicates an OPEN condition. Alignment of the arrow 90° across the pipeline indicates a CLOSED position. Some gear operators/actuators may have different alignment devices. Consult specific device documentation for proper assessment of position when these devices are employed.

V. HYDROSTATIC TESTING

When Series DF Valves are installed in a system requiring hydrostatic testing, user should use the following procedure to minimize possibility of damage to the valve:

1. Open the valve fully prior to introducing test fluid to allow flushing of any debris through valve bore and from the system.
2. Once the system is completely filled, the valve should be positioned in a partially-open condition (at least 20°) to allow the body cavity to completely fill with fluid.
3. Hydrostatically shell test to a maximum pressure not exceeding 1.5 times the rated working pressure of the valve.
4. Bleed pressure from the system.

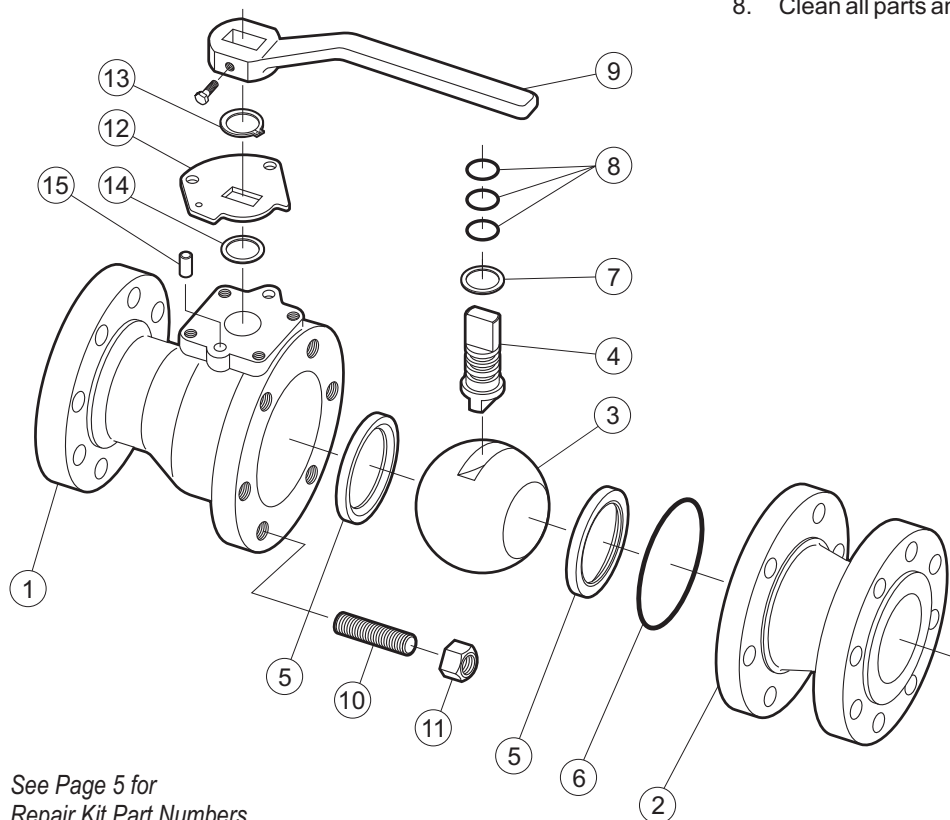
5. Close the valve completely.
6. The valve seats may be tested by introducing pressure, first from one side, and then from the other. **During seat testing, pressure should not exceed the working pressure of the valve.** NEVER attempt to test both seats at the same time with pressure from both sides.
7. Upon completion of testing, purge the valve of all test fluid and open valve fully.

VI. MAINTENANCE

WARNING!

Prior to removing valve from line, system pressure must be bled completely. Valve should be partially opened to assure no residual pressure is trapped in the body cavity. Failure to adhere to this warning may result in catastrophic leakage or damage to valve/surrounding equipment and/or injury or death.

The Series DF Valve is designed for long, continuous operation with minimal maintenance required.



See Page 5 for
Repair Kit Part Numbers

Disassembly

Should the valve components need to be inspected/replaced, the valve can be disassembled as follows:

1. Rest the valve in the vertical position on a clean surface, preferably wooden or plastic, making sure not to damage the flange face, with the adapter (2) positioned on top.
2. Remove the handle (9) or gear operator.
3. Loosen and remove the nuts (11) in a crisscross manner, thereby allowing removal of the adapter.
4. Remove the body seal (6) from the adapter.
5. Rotate the stem (4) until the ball (3) is in the closed position. Remove the ball and then remove the seat (5) from the seat pocket in the body. Remove the remaining seat from its pocket in the adapter.
6. Remove the stem by first removing the retaining ring (13) and lifting the stop plate (12) (if included) and spacer (14) off the top of the stem.
7. Remove the stem, with stem seals (8) and thrust washer (7) intact, by pushing the stem into the body cavity and out of the body. Remove the stems seals and thrust washer from the stem.
8. Clean all parts and inspect them for wear.

Parts List

Item No.	Description
1	Body
2	Adapter
3	Ball
4	Stem
5 *	Seat
6 *	Body Seal
7	Thrust Bearing
8 *	Stem Seal
9	Handle
10	Stud
11	Nut
12	Locking Plate
13	Retainer Ring
14	Spacer
15	Stop Pin

* Recommended Spare Parts

Reassembly

Inspect the body and body adapter for damage/wear. Visible wear of the metal surface in the seat pockets, stem journal or valve bore will likely cause continued leakage, a possible unsafe condition and is grounds for disposal and replacement of the valve. Clean and inspect all other components, replacing them as necessary with ViNtrol factory-new parts.

1. Position the body and the adapter with the flanges down on a clean surface, preferably wooden or plastic, assuring not to damage the flange faces.
2. Apply a thin coating of grease to the cleaned or new seats and install them into the cleaned seat pockets in the body and the adapter.
3. Lightly grease new thrust washer and stem seals and install them in place on the stem. Apply a liberal amount of grease to the stem between the three seal grooves. Reach into the body opening, gently installing the stem/seal assembly into the cleaned stem journal, taking care not to cut the stem seals as the assembly is pushed into place. Continue pressing the stem into position, protruding out of the top pad of the body.
4. Place the spacer over the stem, followed by the stop plate (if included) and finally, reinstall the retainer ring in its groove on the stem, holding all parts in place. If the retainer ring groove is not visible, the stem is not fully pressed into place inside the body.
5. Rotate the stem assembly to the closed position with the ball-engaging key aligned with the bore of the body.
6. Apply a light coat of grease to a cleaned or new ball and slide it into the body, engaging the stem key with the ball's keyway as the ball drops into place, resting on the seat (ball will be in closed position).

7. Apply a light coat of grease to the body seal and install it in place in the appropriate groove on the adapter. Apply a liberal coating of grease to the pilot diameter of the adapter where the body seal is located.
8. Lubricate the studs/bolts and gently lower the adapter (with seat and body seal installed) down on the body, aligning the holes with the studs (or threaded holes) and engaging the adapter pilot diameter into the body. Exercise care to assure that the body seal is not pinched or cut during this reassembly. Install the nuts or bolts and hand-tighten. Finally, fully tighten in a crisscross method.
9. Reattach the handle or gear operator and cycle the valve from open to closed several times to assure smooth operation. If valve is gear-operated, recheck the travel stop settings as described above to assure proper setting.

Ordering Repair Kits

Repair Kits are available for Series DF Ball Valves. The Kit Assembly Part Number may be configured as shown below to include the desired combination of ball, stem, seats and seals.

EXAMPLE:

Part No: **REPAIR-4103-211-D** • Includes Stainless Steel Ball & Stem, Buna-N Seals, Delrin® Seats for a 2"FP Class 150 Valve.

REPAIR - Base No. - X X X - D

Trim Material (Ball / Stem)

None • X
CS / CS (NACE compliant) • 1
316 SS / 316 SS (NACE compliant) • 2

Seal Material

X • None
1 • Buna-N
2 • Viton
3 • Low-Temp Buna-N
4 • HNBR
5 • Aflas
7 • James Walker® Viton
8 • Peroxide-Cured Buna-N
9 • EPDM

Seat Material

X • None
1 • Delrin®
2 • PTFE
3 • RTFE
4 • Devlon®
5 • PEEK
6 • HTFM (Hostafion®)
7 • Metal-to-Metal

Base Part Numbers

SIZE	Cl. 150	Cl. 300	Cl. 600	Cl. 900	Cl. 1500
1"FP	4100	4300	4600	4900	4500
1.5"FP	4101	4301	4601	4901	4501
2"RP	4102	4302	4602	4902	4502
2"FP	4103	4303	4603	4903	4503
3"RP	4105	4305	4605	4905	
3"FP	4106	4306	4606		
4"RP	4107	4307	4607		
4"FP	4108	4308	4608		
6"RP	4109	4309	4609		
6"FP	4110	4310			
8"RP	4111	4311			
8"FP	4112	4312			

VI. Technical Information & Troubleshooting

Operating Torque at Full Rated Pressure (in-lbs)

SIZE	Cl. 150	Cl. 300	Cl.600	Cl.900	Cl.1500
1"FP	280	345	585	770	1180
1.5"FP	530	710	880	1150	2000
2"RP	530	710	880	1150	2000
2"FP	590	945	1180	1670	2700
3"RP	590	945	1180	1670	
3"FP	1300	2155	2685		
4"RP	1300	2155	2685		
4"FP	2140	3550	4423		
6"RP	2140	3550	4423		
6"FP	3540	5319			
8"RP	3540	5319			
8"FP	7965	11505			

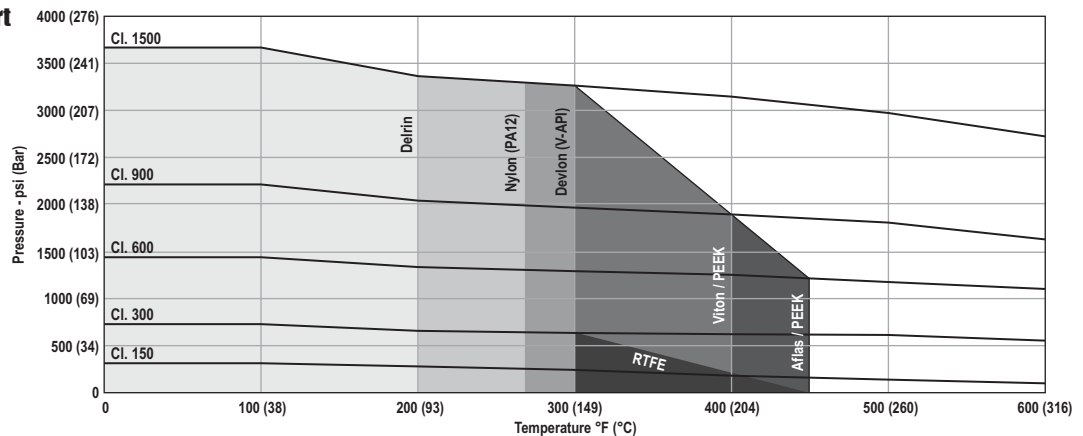
Flow Efficiency • Cv Ratings

SIZE	Cl. 150	Cl. 300	Cl.600	Cl.900	Cl.1500
1"FP	89	79	68	70	70
1.5"FP	308	265	231	229	229
2"RP	137	128	117	119	119
2"FP	490	422	368	365	365
3"RP	238	216	203	175	
3"FP	1380	1055	1000		
4"RP	635	610	580		
4"FP	2560	2100	1850		
6"RP	925	905	895		
6"FP	5350	5300			
8"RP	2500	2400			
8"FP	10750	10500			

Torque values are based on clean lubricating fluids. A service factor should be applied for all other conditions.

Pressure/Temperature Chart

Pressures and temperatures are based on ANSI B16.34 and the trim material of the valve.



Troubleshooting

Symptom	Probable Cause	Solution
Valve will not operate (open or close)	<ol style="list-style-type: none"> Foreign matter in line/valve Iced up due to pressure drop or low temperatures 	<ol style="list-style-type: none"> Flush line to remove debris. Valve may have to be removed from line to facilitate cleaning. Flush line with warm liquid.
Valve is difficult to operate	<ol style="list-style-type: none"> Debris in valve Stem seized Seats/seals swollen 	<ol style="list-style-type: none"> Flush valve to remove debris. Valve may have to be removed from line to facilitate cleaning. Remove valve from line and disassemble. Clean stem and stem journal. Inspect stem seals and thrust bearing, replacing worn parts as necessary. Trim is incompatible with flow media. Reevaluate trim choice and replace with compatible seats/seals.
Leakage through valve when closed	<ol style="list-style-type: none"> Downstream seat is damaged or trapped debris inhibiting seal Travel stops on gear operator are not set properly 	<ol style="list-style-type: none"> Clean/inspect and/or replace seat. Inspect ball for wear and replace if necessary. NOTE: It is possible that the upstream seat is still functional. If inspection shows the upstream seat and ball surface to be good, then switching the components to the downstream side will facilitate a quick-fix if spare parts are not readily available. Check travel stops and adjust as described in Section III.
Leakage from stem	<ol style="list-style-type: none"> Stem seals damaged 	<ol style="list-style-type: none"> Remove valve from line and disassemble. Clean stem and stem journal. Inspect stem seals and thrust bearing, replacing worn parts as necessary.
Leakage from body/adaptor seal	<ol style="list-style-type: none"> Body Seal damaged 	<ol style="list-style-type: none"> Remove valve from line and disassemble. Remove body seal, clean o-ring groove in adapter. Install new body seal.