

FULL BORE RAILROAD BALL VALVES SERIES 9RFT 2" & 3" (DN 50 & 80)

Installation, Maintenance and
Operating Instructions

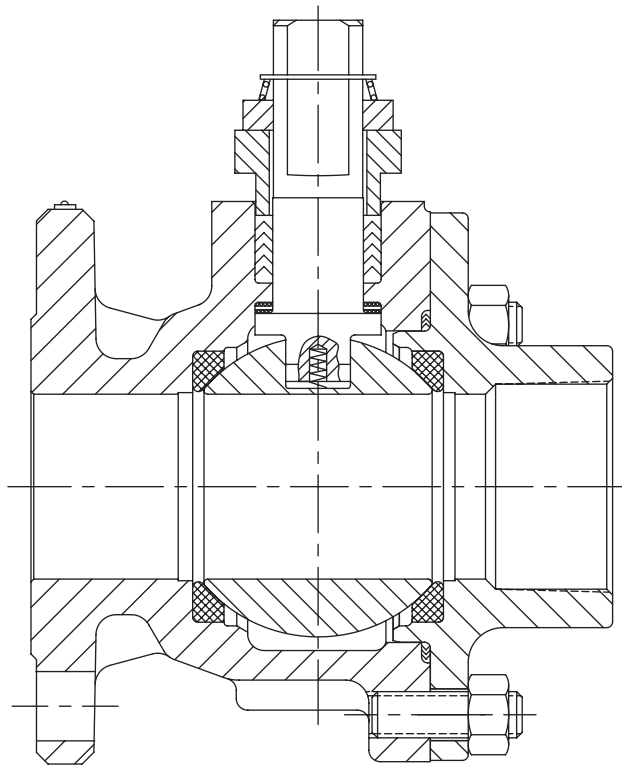


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READ THESE INSTRUCTIONS FIRST!

These instructions provide information about safe handling and operation of the valve.
 If you require additional assistance, please contact the manufacturer or manufacturer's representative.
 Addresses and phone numbers are printed on the back cover.
 See also www.metso.com/products/valves/tank-car-valves/ for the latest documentation.

SAVE THESE INSTRUCTIONS!

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1. GENERAL

1.1 Scope of the Manual

This instruction manual contains important information regarding the installation, operation and maintenance of the Jamesbury® 2" & 3" (DN 50 & 80) Series 9RFT Full Bore Railroad Ball Valves. Please read these instructions carefully and save them for future reference.

WARNING

AS THE USE OF THE VALVE IS APPLICATION SPECIFIC, A NUMBER OF FACTORS SHOULD BE TAKEN INTO ACCOUNT WHEN SELECTING A VALVE FOR A GIVEN APPLICATION. THEREFORE, SOME OF THE SITUATIONS IN WHICH THE VALVES ARE USED ARE OUTSIDE THE SCOPE OF THIS MANUAL.

IF YOU HAVE ANY QUESTIONS CONCERNING THE USE, APPLICATION OR COMPATIBILITY OF THE VALVE WITH THE INTENDED SERVICE, CONTACT METSO FOR MORE INFORMATION.

1.2 Valve Markings

The valve has an identification plate attached to the pipeline flange (see **Figure 1**).

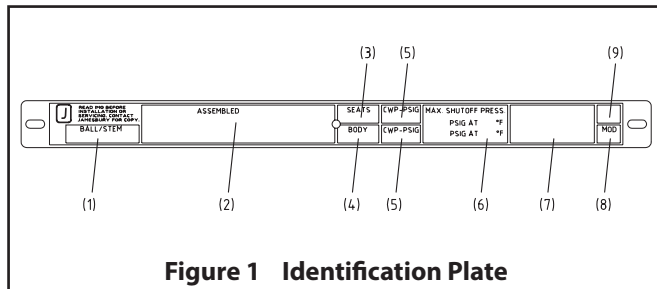


Figure 1 Identification Plate

Identification plate markings:

1. Ball/Stem material
2. Valve catalog code
3. Seat Material
4. Body Material
5. Maximum operating pressure
6. Maximum/minimum shut-off pressure/temperature
7. Approvals/Special Service marking
8. Model
9. Assembly date

1.3 Safety Precautions

WARNING

DO NOT EXCEED THE VALVE PERFORMANCE LIMITATIONS!

EXCEEDING THE PRESSURE OR TEMPERATURE LIMITATIONS MARKED ON THE VALVE IDENTIFICATION PLATE MAY CAUSE DAMAGE AND LEAD TO UNCONTROLLED PRESSURE RELEASE. DAMAGE OR PERSONAL INJURY MAY RESULT.

WARNING

SEAT AND BODY RATINGS!

THE PRACTICAL AND SAFE USE OF THIS PRODUCT IS DETERMINED BY BOTH THE SEAT AND BODY RATINGS. READ THE IDENTIFICATION PLATE AND CHECK BOTH RATINGS. THIS PRODUCT IS AVAILABLE WITH A VARIETY OF SEAT MATERIALS. SOME OF THE SEAT MATERIALS HAVE PRESSURE RATINGS THAT ARE LESS THAN THE BODY RATINGS. ALL OF THE BODY AND SEAT RATINGS ARE DEPENDENT ON VALVE TYPE AND SIZE, SEAT MATERIAL, AND TEMPERATURE. DO NOT EXCEED THESE RATINGS!

WARNING

BEWARE OF BALL MOVEMENT!

KEEP HANDS, OTHER PARTS OF THE BODY, TOOLS AND OTHER OBJECTS OUT OF THE OPEN FLOW PORT. LEAVE NO FOREIGN OBJECTS INSIDE THE TANK CAR. WHEN THE VALVE IS ACTUATED, THE BALL FUNCTIONS AS A CUTTING DEVICE. FAILURE TO DO THIS MAY RESULT IN DAMAGE OR PERSONAL INJURY!

2. TRANSPORTATION AND STORAGE

Check the valve and the accompanying devices for any damage that may have occurred during transport.

Store the valve carefully. Storage indoors in a dry place is recommended.

Do not remove the flow port protectors until installing the valve.

Move the valve to its intended location just before installation.

The valve is usually delivered in the open position.

If the valve(s) will be stored for a long period, follow the recommendations in IMO-S1 to maintain the valve's integrity.

3. INSTALLATION

3.1 General

Remove the flow port protectors and check that the valve is clean inside. Clean valve if necessary.

Flush the tank car carefully before installing the valve. Foreign objects, such as sand or pieces of welding electrodes, will damage the ball and seats.

3.2 Handles

If the valve handle (15) has to be removed for any reason, the handle must be remounted in the same orientation.

WARNING

FAILURE TO PROPERLY MOUNT THE HANDLE MAY RESULT IN IMPROPER VALVE OPERATION, DAMAGE OR PERSONAL INJURY.

3.3 Installing on the Tank car

WARNING

THE VALVE SHOULD BE TIGHTENED ON FLANGES USING APPROPRIATE GASKETS AND FASTENERS COMPATIBLE WITH THE APPLICATION, AND IN COMPLIANCE WITH APPLICABLE PIPING CODES AND STANDARDS. CENTER THE FLANGE GASKETS CAREFULLY WHEN FITTING THE VALVE ON FLANGES. DO NOT ATTEMPT TO CORRECT MISALIGNMENT BY MEANS OF FLANGE BOLTING!

The valve may be installed in any position and offers tightness in both directions. It is recommended, however, that the valve be installed with the body cap facing upstream.

Refer to the Section 4, **MAINTENANCE** for packing adjustment. If there is weepage past the packing upon installation, it means the valve may have been subject to wide temperature variations in shipment. Leak-tight performance will be restored by a simple packing adjustment described in the **MAINTENANCE** section.

3.4 Commissioning

Ensure that there is no dirt or foreign objects left inside the valve or tank car. Flush the tank car carefully. Make sure that the valve is fully open when flushing.

Ensure that all nuts, fittings, and cables are properly fastened.

WARNING

GOOD PRACTICE DICTATES THAT ONCE INSTALLED, BUT PRIOR TO FIRST USE, THE VALVE IS LEAK TESTED IN PLACE TO ASSURE LEAK TIGHTNESS HAS NOT BEEN COMPROMISED BY THE INSTALLATION PROCESS. INSTALLATION ACTIONS THAT CAN CAUSE LEAKAGE INCLUDE, BUT ARE NOT LIMITED TO; WRENCHING, SOLDERING, WELDING AND/OR HOISTING. **SEE SECTION 4.5.**

4. MAINTENANCE

4.1 General

Although Metso's *Jamesbury* valves are designed to work under severe conditions, proper preventative maintenance can significantly help to prevent unplanned downtime and in real terms reduce the total cost of ownership. Routine maintenance consists of tightening the hex nuts (18) in **(Figure 4)** periodically to compensate for stem seal wear. Stem nut torque should be about 250 in.-lb. The inspection and maintenance frequency depends on the actual application and process condition.

Overhaul maintenance consists of replacing seats and seals. A standard repair kit consisting of these parts may be obtained through your authorized Metso Distributor.

NOTE: Repair kits include thrust bearings (70), secondary stem seal (71), seats (7), body gasket (65) and stem seals (69). Refer to the Repair Kit chart (see **Table 1**).

WARNING

FOR YOUR SAFETY IT IS IMPORTANT THE FOLLOWING PRECAUTIONS BE TAKEN PRIOR TO REMOVAL OF THE VALVE FROM THE TANK CAR OR BEFORE ANY DISASSEMBLY:

1. WEAR ANY PROTECTIVE CLOTHING OR EQUIPMENT NORMALLY REQUIRED WHEN WORKING WITH THE FLUID INVOLVED.
2. DEPRESSURIZE THE TANK CAR AND CYCLE THE VALVE AS FOLLOWS:
 - A. UPON VERIFYING THE TANK CAR IS EMPTY, PLACE THE VALVE IN THE OPEN POSITION.
 - B. CYCLE THE VALVE TO RELIEVE RESIDUAL PRESSURE IN THE BODY CAVITY BEFORE REMOVAL FROM THE TANK CAR.
 - C. AFTER REMOVAL AND BEFORE ANY DISASSEMBLY, CYCLE THE VALVE AGAIN SEVERAL TIMES.
3. THESE VALVES ARE SUITABLE FOR A WIDE VARIETY OF FLUIDS AND GASES. BE CERTAIN THAT THE VALVE MATERIALS SELECTED ARE SUITABLE FOR THE APPLICATION.

4.2 Disassembly

NOTE: If complete disassembly becomes necessary; it is recommended to replace all seats and seals. Refer to the Repair Kit chart (see **Table 1**).

NOTE: Always use original OEM parts to make sure that the valve functions properly.

1. Follow the steps in all the **WARNING** sections above before performing any work on the valve.
2. Open and close the valve and leave in the closed position.
3. Remove handle screw (35), handle (31), and retaining ring (34) from top of stem.
4. Slide off the spring (33) and indicator stop (32).
5. Remove the bonnet stud nuts (18), stop bushings (50) and compression plate (10)
6. Place the valve in the vertical position with the body cap end up.
7. Mark the body joint flanges to assure correct body (1) and body cap (2) orientation during assembly. Remove body stud nuts (16) and remove body cap (2). **BE CAREFUL NOT TO SCRATCH THE BALL.**
8. Remove the body gasket (65) and the seat (7) from the body cap.
9. If the ball (3) does not swing free from the body, with the ball in the fully closed position, use a piece of wood or some other soft material to gently tap the ball (from the end opposite the body cap). This should loosen the ball so that it can be pivoted free of the stem (5). The internal grounding spring (36), located in bottom of the stem (5), may fall out at this time. If the spring does not fall out with the ball, remove it from the stem to prevent it from being lost.
10. Carefully remove the bottom seat (7) out of the body, **BEING CAREFUL NOT TO SCRATCH THE BODY SEALING SURFACE BEHIND THE SEAT.**
11. Press the stem (5) from the top into the valve body and remove it through the body cap end of the body.

12. Remove and discard the thrust bearings (70), and secondary stem seal (71), **BEING CAREFUL NOT TO SCRATCH ANY SEALING SURFACES IN THE BODY.**
13. Remove the stem seals (69), **BEING CAREFUL NOT TO SCRATCH ANY SEALING SURFACE INSIDE THE STEM BORE.**

4.3 Checking Parts

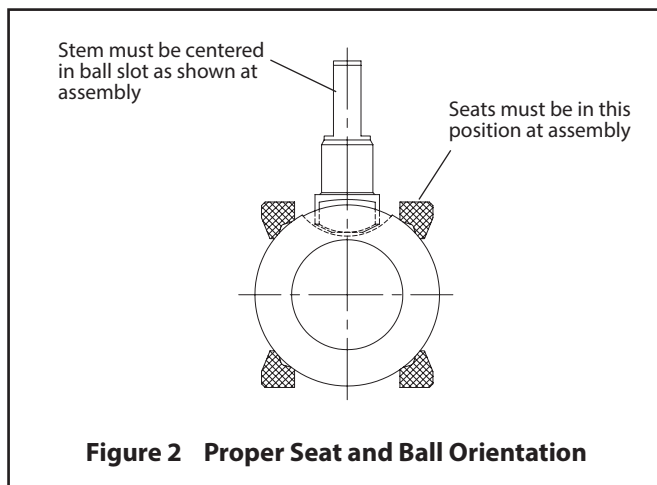
NOTE: For detailed instructions on visual inspection of critical components, refer to IMO-R26.

1. Clean all disassembled parts.
2. Check the stem (5) and ball (3) for damage. Pay particular attention to the sealing areas.
3. Check all sealing and gasket surfaces of the body (1) and body cap (2).
4. Replace any damaged parts.

4.4 Assembly

It is advisable to replace seats and seals if complete disassembly and reassembly become necessary. Refer to the Repair Kit chart (see **Table 1**).

1. Clean all valve components if not done previously.
2. Re-inspect all components for damage before reassembling the valve. Look for damage to the sealing areas of the stem, body and body cap; and look for wear in the bearing areas. Replace any damaged parts.
3. Carefully clean and polish the ball (3) sealing surface: It should be free of all scratches and grooves.
4. If the ball is slightly damaged, it may be possible to smooth the sealing surface with crocus cloth or equivalent. If deep scratches are present, replace the ball.
5. With the body cap side facing up, slide one valve seat (7) sideways into the body (1) to below the stem bore, and tilt it into place so that the proper surface (see **Figure 2**) will be adjacent to the ball (3), being careful not to cut or scratch the seat.



6. From inside the body (1), insert the one thrust bearing (70), the secondary stem seal (71), and the second thrust bearings (70) into the stem bore (see **Figure 4**).
7. Insert the stem (5) through the body cap end of the body (1), being careful not to scratch the stem sealing surface; and press it gently up into the stem bore until resistance is felt from the thrust bearing.
8. Hold the stem in place from the bottom and insert the stem seals (69) (see **Figure 4** for proper v-ring orientation), over the stem (5). If the valve is to grounded, remove one middle V-ring and place graphite grounding washer (see **Table 2**) on top of stack (see **Figure 4**).
9. With a wire brush, clean bonnet studs (14) and bonnet stud nuts (18) of foreign material, such as paint, thread locker, grime and commodity. Inspect the threads for damage or defects with appropriate ring or plug gauge. Repair any out-of-tolerance threads, or replace in-kind. Check that nut can be run up and down entire usable portion of the threads. See **Figure 4**.
10. Place compression plate (10) over stem (5), bonnet studs (14). Place stop bushings (50) over each bonnet stud (see **Figure 4** for proper orientation).
11. Place a bonnet stud nut (18) on each bonnet stud (14) and tighten nuts alternately so that the compression plate (20) remains parallel with the body bonnet. Tighten the bonnet stud nuts "finger-tight", then tighten an additional ¼ turn.
12. Insert internal grounding spring (36) into hole at the bottom of the stem (5). Insert the ball (3) rotating it onto the stem (5) in the closed position. If necessary, turn the stem blade to align with the ball slot. Make certain that the stem blade is in the middle of the ball slot; i.e. equal distance from the ends of the slot. Rotate the ball if necessary (see **Figure 2**).
13. Gently place the body gasket (65) into the machined recess of the body (1).
14. Place the second seat (7) on top of the ball (3) with the proper surface adjacent to the ball.
15. With a wire brush, clean body studs (12) and body stud nuts (16) of foreign material, such as paint, thread locker, grime and commodity. Inspect the threads for damage or defects with appropriate ring or plug gauge. Repair any out-of-tolerance threads, or replace in-kind. Check that nut can be run up and down entire usable portion of the threads. See **Figure 4**.
16. Place the body cap (2) over body studs (12) being careful to properly orient body cap and body as originally assembled by matching orientation marks made prior to disassembly. Take care not to damage body gasket (65) or seat (7) during this operation.
17. Lubricate the threads and face of nuts (16) with NeverSeez® or equivalent. Install nuts (16) on body studs (12) so that material identification marks will be visible after tightening. Tighten sequentially as shown in the diagram (**Figure 3**), to the recommended torques as shown in the torque chart (**Table 3**).

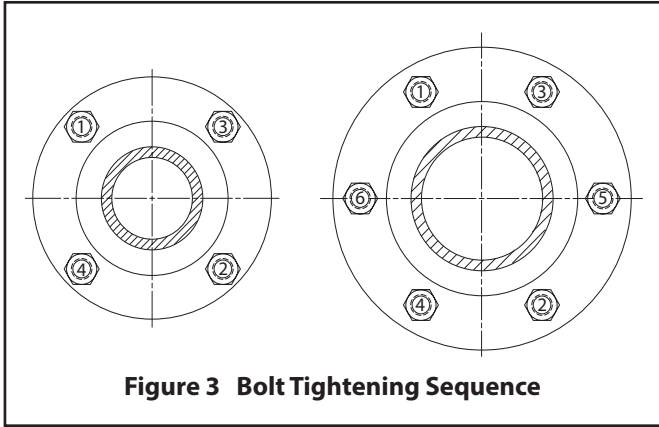


Figure 3 Bolt Tightening Sequence

18. Place the indicator stop (32) with "bottom" facing down over the stem so that the longer part is over the body.
19. Place the spring (33) over the stem (5) with the larger diameter contacting the indicator stop (32).
20. Compress the spring (33) and hold down by putting the retaining ring (34) in the groove on the stem (5).
21. Aligning the slot in the handle with drive on the stem, lower handle (31) straight down in line with the valve stem until it is completely engaged. Place handle screw (35) through hole in handle and thread into stem (5).
22. Cycle the valve slowly with a gentle back and forth motion building gradually to the full quarter turn. By cycling slowly, the seat lips will seat against the ball. Take care to avoid scratching the ball O.D.
23. If the valve is grounded, test as follows:
 - a. Use an ohmmeter accurate to within +/- 5%
 - b. Check continuity between top of stem and body base metal, also check between ball and body base metal. Precaution should be taken to prevent scratching the ball O.D.
 - c. Resistance in either the open or closed position shall not exceed 5 ohms using source not exceeding 12 volts.

4.5 Pressure Testing the Valve

WARNING

WHEN PRESSURE TESTING, EXERCISE CAUTION AND MAKE SURE ALL EQUIPMENT USED IS IN GOOD WORKING CONDITION AND APPROPRIATE FOR THE INTENDED PRESSURE.

If the valve is to be tested prior to returning to service make sure the test pressures are in accordance with an applicable standard.

When testing the valve for external tightness, keep the ball in the half open position.

If testing the valve seat tightness, please contact Metso for advice.

WARNING

WHEN PERFORMING ANY TESTS, NEVER EXCEED THE MAXIMUM OPERATING PRESSURE OR MAXIMUM SHUT-OFF PRESSURE LISTED ON THE IDENTIFICATION PLATE!

5. REPAIR KITS

Repair kits contain one pair of seats, a body seal, stem seals and a secondary stem seal. When ordering repair kits for your 9RFT valve order follow **Table 1 & Table 2**. Refer to **Section 1.2, Valve Markings** and check area "3" on your valve's identification plate to determine the correct seat material for your valve.

TABLE 1 - REPAIR KITS		
Seat Material	Valve Size	
	2" (DN 50) 9RFT	3" (DN 80) 9RFT
PTFE (T)	RKN-168TTT-RR	RKN-183TTT-RR
Xtreme®	RKN-168XTZ-RR	RKN-183XTZ-RR

TABLE 2		
Graphite Grounding Washer		
Series	Valve Size	
	2" (DN 50)	3" (DN 80)
9RFT	004 0847 60	004 0847 60

Repair kits listed in **Table 1** are for valves with 3/6 ball (area "1" in **Section 1.2, Valve Markings**). If the valve is other than 316 ball, contact the factory for proper repair kit. For example, a 2" 9RFT valve with monel ball will use kit RKN-168XTZ-71-RR.

6. SERVICE / SPARE PART

For further information on spare parts and service or assistance visit our web-site at www.metso.com/products/valves/tank-car-valves/.

NOTE: When ordering spare parts, always include the following information:

- a. Valve catalog code from identification plate,
- b. If the valve is serialized – the serial number (from identification plate)
- c. From **Figure 4**, the ballooned part number, part name and quantity required.

7. HOW TO ORDER 9RFT BALL VALVES

316 stainless steel body and trim:

2" 9RFT 31 3600 XTZ 2

3" 9RFT 31 3600 XTZ 2

For PTFE seats, substitute 'TTT' for 'XTZ'

TABLE 3
Recommended Torques - FT.LBS (N.m)

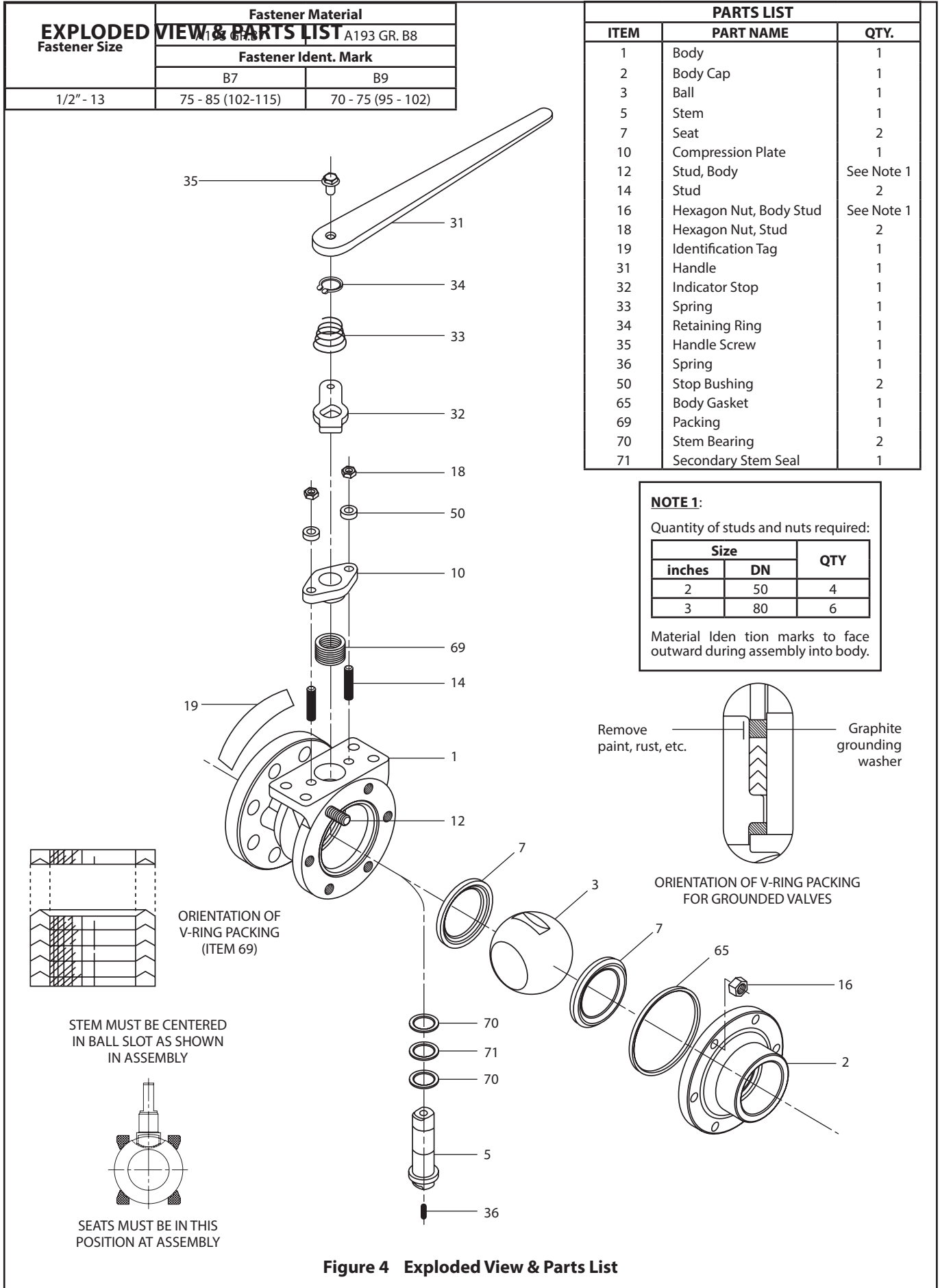


Figure 4 Exploded View & Parts List

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