

Full Bore Fire-Tite® Tank Car Bottom Unloading Valves Series 9RET & 9REL

Installation, Maintenance and
Operating Instructions

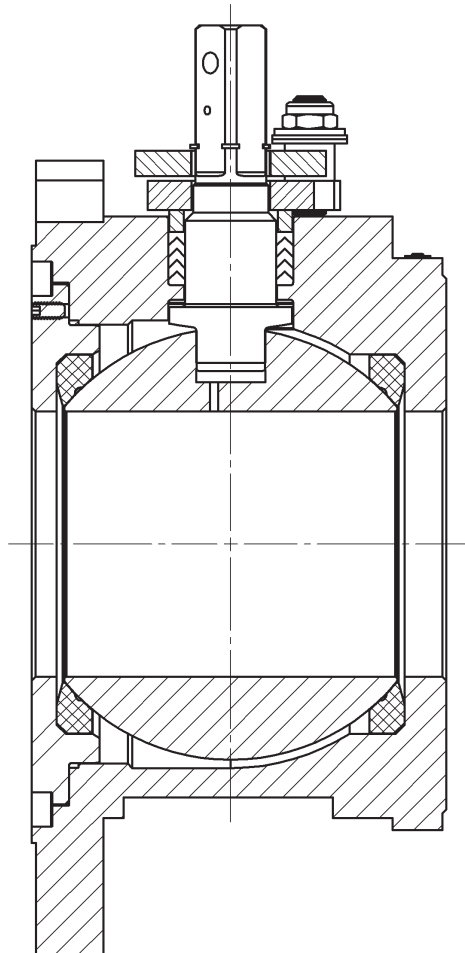


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READ THESE INSTRUCTIONS FIRST!

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/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® 4" (DN 100) Series 9RET & 9REL Fire-Tite Tank Car Bottom Unloading 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**).

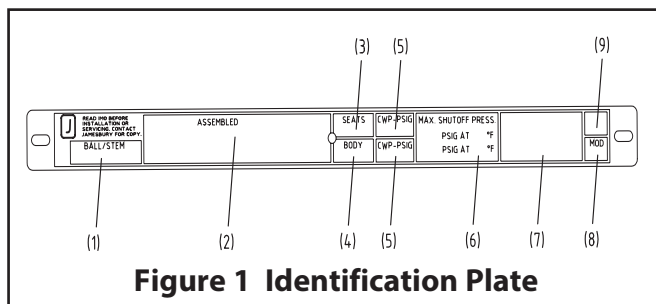


Figure 1 Identification Plate

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. The machined line of the top of the stem (5), is a visual indicator of the ball (3) port position and flow direction. **Figure 2** shows the valve installed on the tankcar. Line horizontal indicates the closed position. Line vertical indicates the open position. This applied to both Standard and FO operation.

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 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!

Open the valve

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 tongue and groove connection is installed against the tank car.

Refer to the Section 4, **MAINTENANCE** for stem seal adjustment. If there is weepage past the stem seals 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 stem seal adjustment described in the **MAINTENANCE** section.

3.3 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.

3.4 Steam jacket connections

The steam-jacketed valve should be firmly attached to the tank car prior to fitting and welding of steam jacket connections. See **Section 3.2**.

The valve does not need to be disassembled prior to fitting or welding of steam jacket connections; however the valve must be in either the fully open or fully closed position.

Carefully fit the steam lines to the valve's steam jacket connections. There should be no side loads on the valve's steam jacket connections due to misalignment of the steam line piping.

Welded connections should only be made by ASME, Section IX qualified welders. Additional AAR welder qualifications may apply.

An AAR certified welding inspector should inspect the steam jacket connection welds prior to pressure testing.

Following approval of the welds, pneumatically test the pressure tightness of the steam jacket connections to the maximum system steam pressure plus 10%. **DO NOT EXCEED** 250 psig (17.2 barg). Cover the welds with a leak detection fluid and observe for three (3) minutes. Any indication of leakage is cause for rejection.

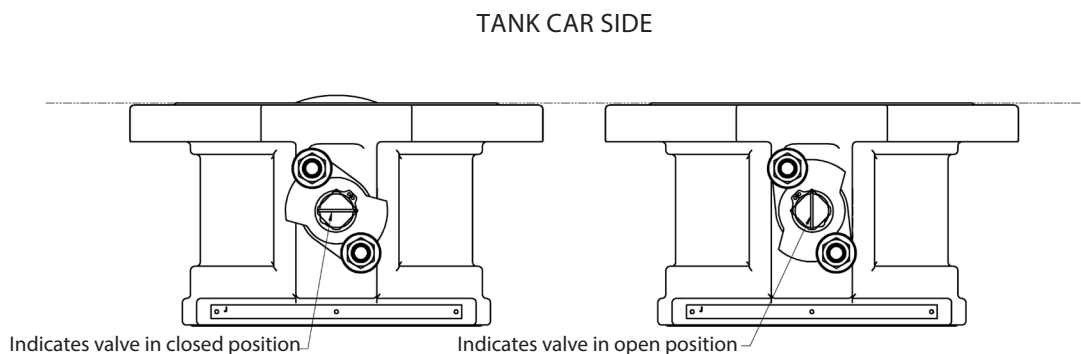


Figure 2

4 MAINTENANCE

4.1 General

Good operating procedure requires periodic observation to ensure that the valve is functioning well. The frequency of observation will depend on the application. Routine maintenance consists of tightening the hex nuts (item 18 in **Figure 8**) periodically to compensate for stem seal wear.

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 seal (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. PLACE THE VALVE IN THE OPEN POSITION AND DRAIN THE TANK CAR.
 - 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.

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. Valve needs to be raised above the working surface slightly because the ball protrudes slightly from either end of the valve when in the closed position.
3. Remove handle pin (35), handle (31) from top of stem; if present.
4. Remove the retaining ring (34) and hex nuts (18).

5. Remove the disc springs (76), flat washers (77), indicator stop (32), stop bushings (39), compression plate (10) and compression ring (9).
6. Compress the insert (2), using a maximum load of 18,600 lbs., to relieve tension from the socket head cap screws (73). The load must be evenly distributed around the flange of the insert. Ensure that the socket head cap screws (73) are not obscured.
7. Remove the six socket head cap screws (73). Slowly relieve the load on the insert (2). Remove insert (2) from the body (1) by tightening the set screws (72) evenly and alternately until the insert (2) can be removed. Should the insert (2) remain jammed in the valve, place the ball in the partially open position. Using a wooden or plastic rod and mallet, tap the insert from inside the valve. Do not use a metal rod or hammer on any valve component. **BE CAREFUL NOT TO SCRATCH THE BALL.**

NOTE In the event that a socket head cap screw (73) breaks; break the shape edges. Beware of handling the valve as sheared components may have sharp edges. Reduce the remnant of the cap screw to a level flush with the surface. Be careful not to damage any sealing surfaces.

WARNING

The socket head cap screws (73) are used for assembly purposes only. The screws are not considered pressure retaining. A minimum of two socket head cap screws (73) opposite each other are required to assure proper alignment and secure the insert (2).

8. Remove the body seal (65) and the seat (7), if the seat did not come out with the insert from the insert (2).
 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).
 10. Carefully remove the bottom seat (7) out of the body, **BEING CAREFUL NOT TO SCRATCH THE BODY SEALING SURFACE BEHIND THE SEAT.**
- NOTE** If the valve has Barrier seats, (see **Section 4.6.1**) for Barrier seat disassembly.
11. Press the stem (5) from the top into the valve body and remove it through the insert end of the body.
 12. Remove and discard the lower stem seals (70), and secondary stem seal (71), **BEING CAREFUL NOT TO SCRATCH ANY SEALING SURFACES IN THE BODY.**
 13. Remove the packing (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 insert (2).
4. Replace any damaged parts.

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 (stamped on the valve body or identification plate).
- c. From **Figure 8**, the ballooned part number, part name and quantity required.

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**). Although it is not required, a lubricant, compatible with the tank car commodity, may be applied to the seats, seals, ball and stem to facilitate assembly and for ease of initial operation.

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 insert; 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 insert 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 3**) will be adjacent to the ball (3), being careful not to cut or scratch the seat.

NOTE: For Barrier seat assembly, (see Section 4.6.2).

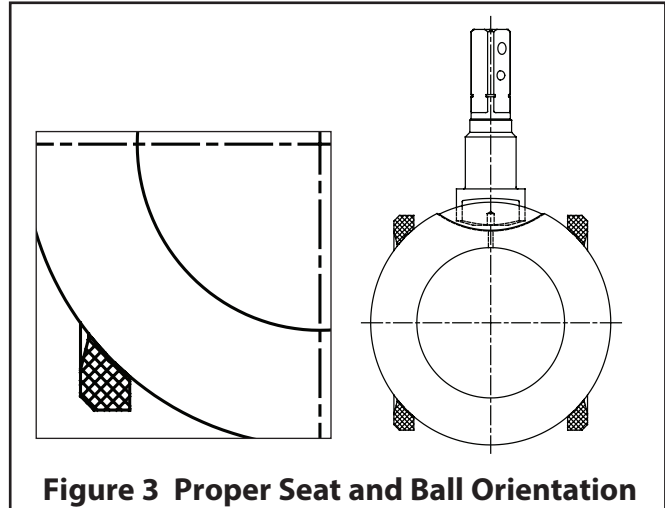


Figure 3 Proper Seat and Ball Orientation

6. From inside the body (1), insert the one lower stem seal (70), the secondary stem seal (71), and the second lower stem seal (70) into the stem bore (see **Figure 8**).
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 packing (69) (see **Figure 4** for proper v-ring orientation), over the stem (5).

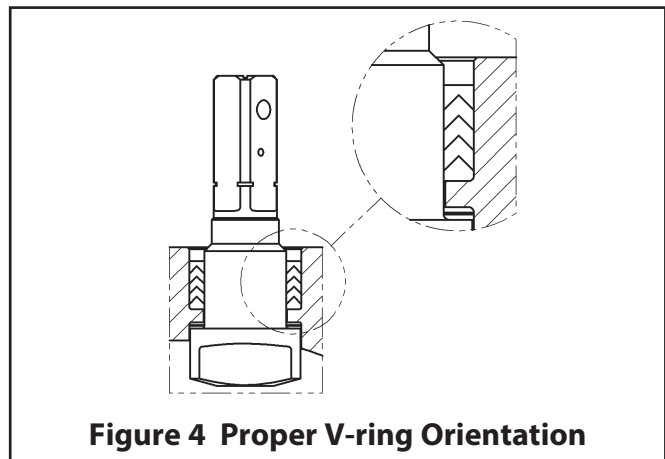


Figure 4 Proper V-ring Orientation

9. Place the compression ring (9) on the stem (5) and fit the compression plate (10) over stem (5) and bonnet studs (14). Place one stop bushings (50) over each bonnet stud (see **Figure 5** for proper orientation).
10. Place indicator stop (32) over the stem (5). A tamper-proof pin in the stem will allow the indicator stop onto the stem only one way. At this point, the stem with the indicator stop mounted and located between stop bushings (39) is positioned so that a counterclockwise rotation of the stem will open the valve.

NOTE: For valves with the "FO" option, (see **Identification Plate**), the indicator stop (32) is marked "FO". When placing the indicator stop over the stem, "FO" marking must be facing up. At this point, the stem with the indicator stop mounted and located between stop bushings (39) is positioned so that a clockwise rotation of the stem will open the valve.

11. Place retaining ring (34) over the stem and into the groove on the stem.
12. Place two disc springs (76) over each bonnet stud (14), (see **Figure 5** for proper disc spring orientation). Place a flat washer (77) over each bonnet stud (14).

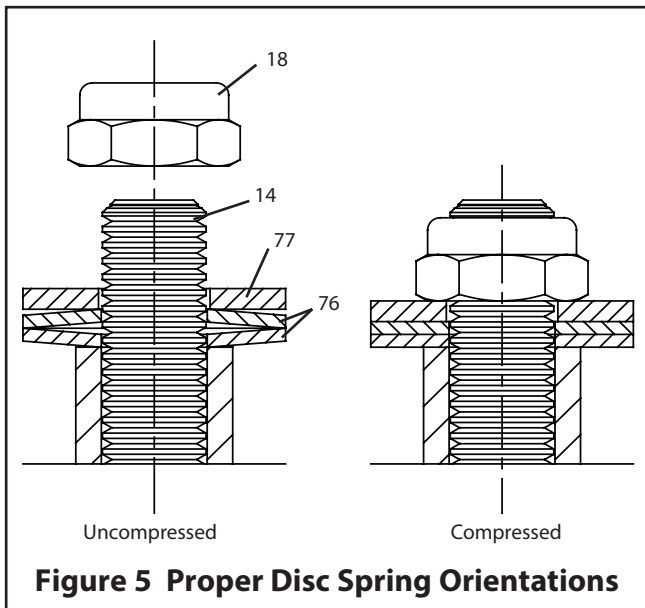


Figure 5 Proper Disc Spring Orientations

13. Holding the stem (5) firmly against the lower stem seal, place a bonnet stud nut (18) on each bonnet stud (14) and tighten nuts alternately until the disc springs (76) are fully compressed and flat. Then tighten an additional $\frac{1}{4}$ turn. Verify that the compression plate (10) remains parallel with the body bonnet. If necessary, retighten the bonnet stud nuts (18) until the bonnet plate is level.

WARNING

IF THE BONNET PLATE IS NOT LEVEL AND PARALLEL TO THE BODY, AN UNEVEN LOAD IS APPLIED TO THE PACKING AND MAY RESULT IN LEAKAGE AND PREMATURE WEAR.

14. 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 3**).
15. Gently place the body gasket (65) into the machined recess of the body (1).
16. Place the second seat (7) into the insert (2) so that the proper surface adjacent to the ball, (see **Figure 3**).

NOTE: For Barrier seat assembly, (see **Section 4.6.2**).

17. Liberally apply Dow Corning 111 Lubricant & Sealant, or equivalent, to the threads of the socket head cap screws (73) and the set screws (72).
18. Install the set screws in manner that they do not protrude through the insert (2) or above the insert face. Wipe all excess lubricant from the insert surface.
19. Fit the insert (2) into the valve body (1), aligning the mounting holes in the insert with the threaded holes in the body.
20. Compress the insert (2) into the body (1) to relieve tension on the socket head cap screws (73). The load must be evenly distributed around the flange of the insert. Ensure that the socket head cap screw positions are not obscured. Install the lubricated socket head cap screws and tighten them in a crisscross pattern to approximately 23 IN·LBS. Slowly relieve the load compressing the insert.

WARNING

A MINIMUM OF TWO (2) SOCKET HEAD CAP SCREWS, OPPOSITE EACH OTHER, ARE REQUIRED TO SECURE THE INSERT. IT IS NOT RECOMMENDED TO PLACE A VALVE BACK IN SERVICE WITH LESS THAN TWO (2) INSERT SCREWS (73)!

21. If valve is equipped with a handle, 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 pin (35) through hole in handle.
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.

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!

4.6 Barrier Seat Assembly

This section covers the disassembly and assembly of Barrier Seats only. Follow the instructions in the **DISASSEMBLY and ASSEMBLY** sections of this IMO for all other parts.

4.6.1 DISASSEMBLY

1. Break the tack welds and remove the seat (7) and O-ring (49) from the valve insert (2) and body (1), **BEING CAREFUL NOT TO SCRATCH ANY SEALING SURFACES IN THE BODY OR THE INSERT.**
2. Clean the areas that were previously tack welded in both the body and the insert to bare metal. other parts.

4.6.2 ASSEMBLY

1. Place O-ring (49) in the groove on the back of the seat (7). A small amount of lubricant, compatible with the commodity in the tank car, applied to the O-ring will help hold the O-ring in the groove during assembly.
2. Insure that all sealing surfaces are cleaned before continuing.
3. Slide the first seat (7) with O-ring (49) into the body (1) below the stem opening and tilt it into place so that the proper face will come in contact with the ball (3), (see **Figure 6**).
4. Center and firmly clamp the seat (7) and O-ring (49) into the body (1) using the fixture in **Figure 7**. Ensure threads of threaded rod and nut are clean and in good condition. Apply a lubricant compatible with the media to the threads. To compress each seat, apply a torque of 12 – 15 ft lbs to the nut. Tack weld the seat into position per the instructions indicated in **Figure 7**.
5. Assemble seat (7) and O-ring (49) into the insert (2) using steps 1 – 4 above and **Figure 7**.

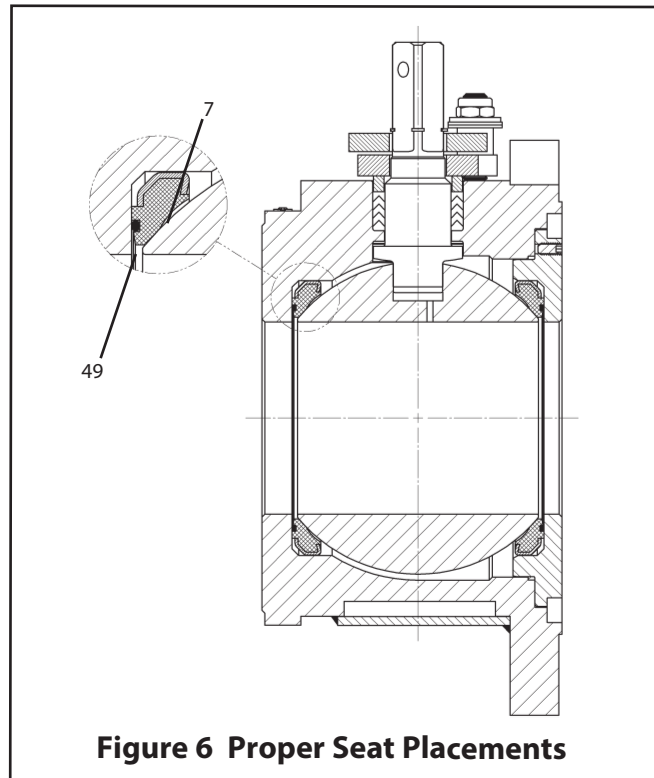


Figure 6 Proper Seat Placements

5 REPAIR KITS

*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.

See **Table 1** for Repair Kit part numbers.

TABLE 1.

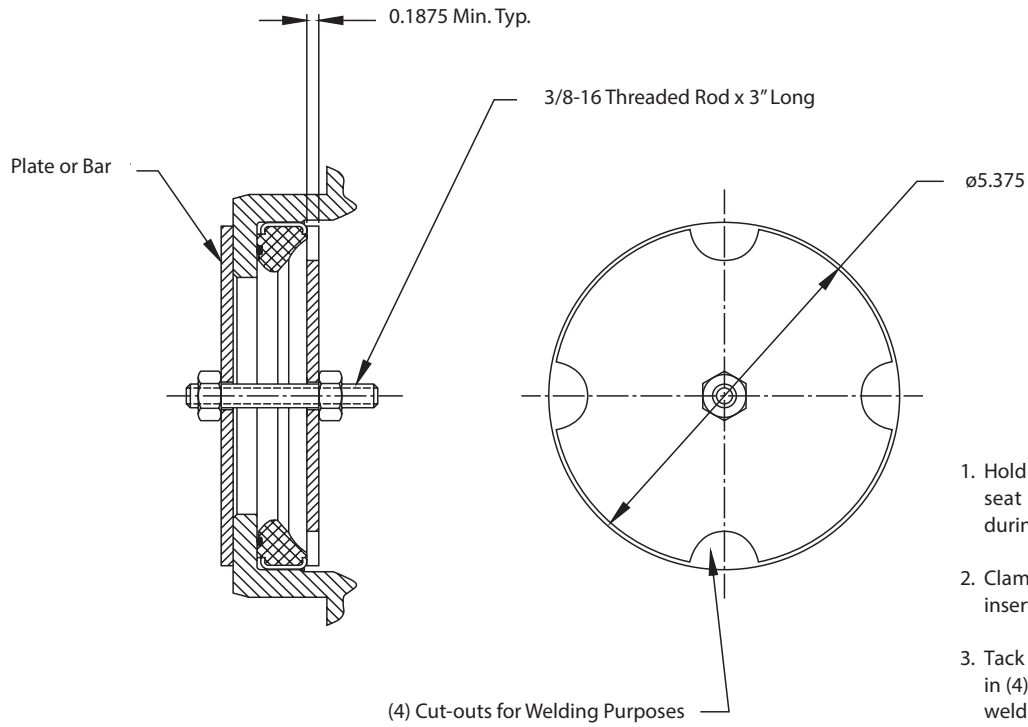
REPAIR KITS	
PTFE Seats	RKR53TT
Xtreme® Seats	RKR53XT
Barrier Seats	RKR53MB

6 REPAIR / SPARE PARTS

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

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

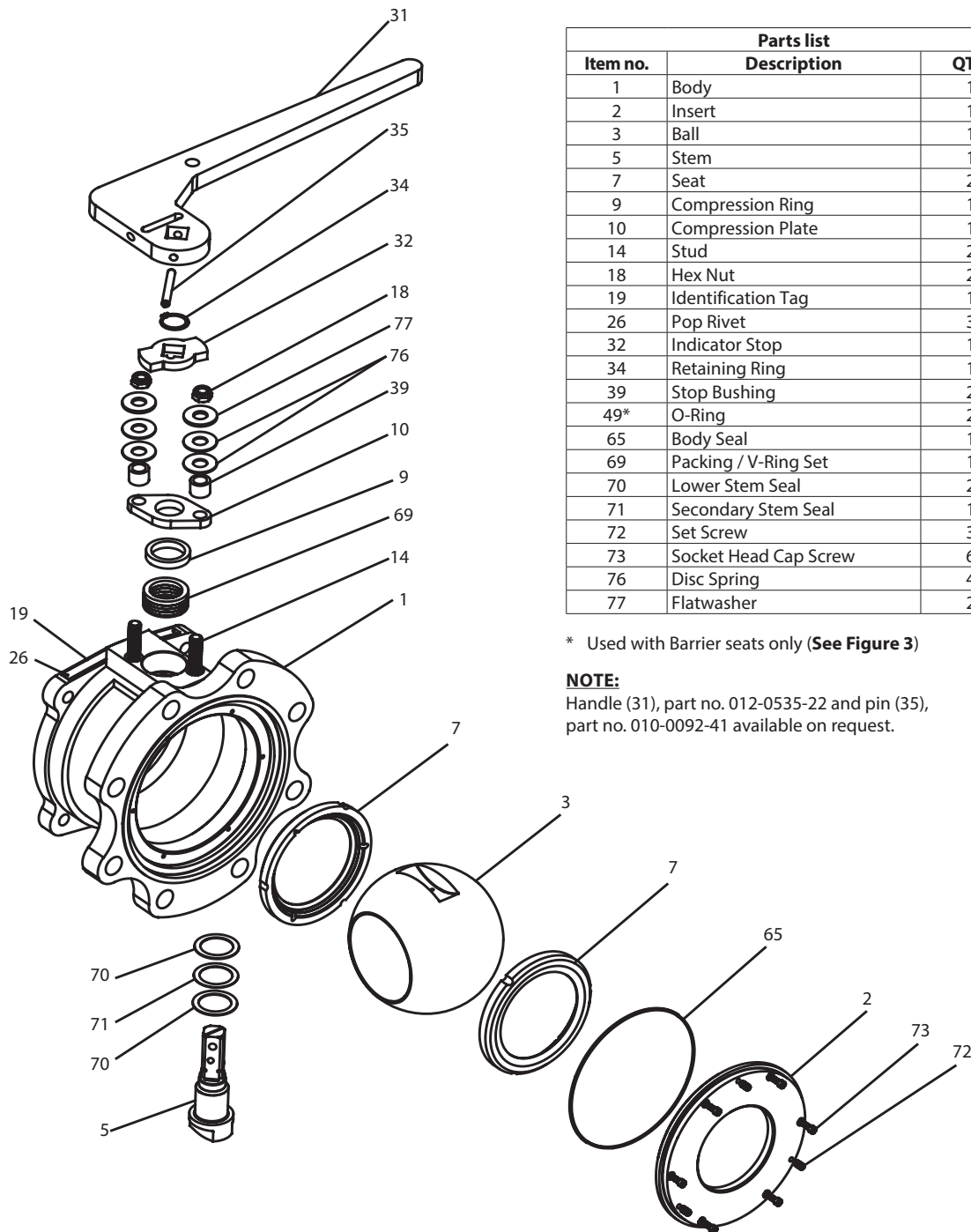
- a. Valve catalog code from identification plate.
- b. If the valve is serialized – the serial number (from identification plate)
- c. From **Figure 8**, the ballooned part number, part name and quantity required.
- d. Repair kits contain one pair of seats, a body seal, stem seals and a secondary stem seal.



1. Hold o-ring in place in back of seat with compatible grease during assembly.
2. Clamp seat firmly in body or insert seat cavity.
3. Tack weld 1/4" (6.35 mm) long in (4) places 90° apart using 308L weld rod. Do not exceed 300°F at weld. Clean weld areas to bare metal before welding.

Figure 7 Barrier Seat Fixture & Instructions

7 EXPLODED VIEW & PARTS LIST



Parts list		
Item no.	Description	QTY.
1	Body	1
2	Insert	1
3	Ball	1
5	Stem	1
7	Seat	2
9	Compression Ring	1
10	Compression Plate	1
14	Stud	2
18	Hex Nut	2
19	Identification Tag	1
26	Pop Rivet	3
32	Indicator Stop	1
34	Retaining Ring	1
39	Stop Bushing	2
49*	O-Ring	2
65	Body Seal	1
69	Packing / V-Ring Set	1
70	Lower Stem Seal	2
71	Secondary Stem Seal	1
72	Set Screw	3
73	Socket Head Cap Screw	6
76	Disc Spring	4
77	Flatwasher	2

* Used with Barrier seats only (See Figure 3)

NOTE:

Handle (31), part no. 012-0535-22 and pin (35), part no. 010-0092-41 available on request.

Figure 8

8 HOW TO ORDER STYLE 9RET & 9REL FULL PORT *FIRE-TITE* TANK CAR BOTTOM UNLOADING VALVES

To specify Style 9RET & 9REL Full Port *Fire-Tite* Tank Car Bottom Unloading Valves, choose the appropriate code from each of the boxes shown at right.

EXAMPLE: The valve specified above is a 4" NPS Style 9RET valve with standard construction and options, ASTM A216 body, 316 ball and 17-4 PH stem, and *Xtreme* seats and seals.

1	2	3	4	5	6	7	8
0400	9RET	3	22	HB	XT	A	-

1	Size
0400	4" (DN 100) NPS

5	Ball / Stem Material
HB	316 SS / 17-4 PH

2	Style
9RET	Full Bore, AAR Female Tongue / Raised Face, Standard Height, Bottom Outlet Valve
9REL	Full Bore, AAR Female Tongue / Raised Face, Low Profile, Bottom Outlet Valve

6	Seal Materials
TT	PTFE / PTFE
XT	XTREME / TFM
MB	MTFE - 316 - Viton / TFM

3	Construction
3	Standard Construction
4	Steam Jacket Construction
5	Steam Jacket w/ Barrier Seats (Use MB Seats Only)

7	Model
A	Model A

4	Body Materials
22	ASTM A216, Gr. WCB
36	ASTM A351, Gr. CF8M

8	Word Modifiers
FO	Counter-Clockwise to Close, Handle Rotation
-	Standard

Subject to change without prior notice.

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