

# Jamesbury® Tank Car Ball Valve Inspection Procedure

Installation, Maintenance and  
Operating Instructions

## Table of Contents

|          |  |          |
|----------|--|----------|
| <b>1</b> | <b>SCOPE</b> .....                                       | <b>3</b> |
| <b>2</b> | <b>WARNINGS</b> .....                                    | <b>3</b> |
| <b>3</b> | <b>GENERAL</b> .....                                     | <b>3</b> |
| <b>4</b> | <b>VALVE CLEANING</b> .....                              | <b>3</b> |
| <b>5</b> | <b>GENERAL VALVE INSPECTION</b> .....                    | <b>3</b> |
|          | 5.1 Sealing Area Criteria.....                           | 3        |
| <b>6</b> | <b>DETAILED INSPECTION OF<br/>VALVE COMPONENTS</b> ..... | <b>4</b> |
|          | 6.1 Ball .....   | 4        |
|          | 6.2 Stem.....  | 4        |
|          | 6.3 Cap/Insert .....                                     | 5        |
|          | 6.4 Body.....  | 6        |
| <b>7</b> | <b>TESTING</b> .....                                     | <b>8</b> |

### **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](http://www.metso.com/valves) for the latest documentation.

### **SAVE THESE INSTRUCTIONS!**

Subject to change without notice.  
All trademarks are property of their respective owners.

## 1 SCOPE

This manual contains guidance for inspecting *Jamesbury* tank car ball valve components and determining their acceptability for continued service. These instructions shall be used in conjunction with the specific Installation, Maintenance and Operation (IMO) manual for the ball valve under repair.

## 2 WARNINGS

PRIOR TO READING THESE INSTRUCTIONS, READ AND UNDERSTAND THE SPECIFIC IMO FOR THE TANK CAR VALVE BEING REPAIRED.

FOLLOW ALL DISASSEMBLY INSTRUCTIONS IN THE SPECIFIC IMO FOR THE TANK CAR VALVE BEING REPAIRED.

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

**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.

WHEN HANDLING THE VALVE ASSEMBLY, TAKE ITS WEIGHT INTO ACCOUNT! PLACE LIFTING DEVICES SECURELY AROUND THE VALVE BODY. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN DAMAGE OR PERSONAL INJURY FROM FALLING PARTS.

## 3 GENERAL

All used soft goods (seats, packing, seals, bearings, and o-rings) shall be replaced with using OEM parts. For a list of repair/service kits, see the specific IMO manual for the ball valve under repair.

### **WARNING**

THE USE OF NON-OEM PARTS IN THE REPAIR OF A *JAMESBURY* TANK CAR BALL VALVE CAN RESULT IN POOR PERFORMANCE, INCREASED MAINTENANCE FREQUENCY AND/OR FIELD FAILURES RESULTING IN EQUIPMENT DAMAGE OR PERSONAL INJURY.

## 4 VALVE CLEANING

All valve components shall be clean and free of debris.

Valve shall be cleaned using a media compatible solution.

Cleaning methods shall not damage the components or their sealing surfaces.

## 5 GENERAL VALVE INSPECTION

**Valve components shall be replaced using ONLY OEM parts.**

Inspect all ball valve components for damage before reassembling valve.

Proper lighting shall be used when inspecting parts. Inspection mirrors may be used to achieve necessary angle of view.

Sealing Surfaces are areas on the valve components which are critical to the valve sealing performance. Sealing surfaces are shown in **Figures 2 through 6**. No damage as defined in sealing area criteria (5.1) shall be allowed on these surfaces.

Functional Surfaces are areas on the valve components which are critical to the valve performance, fit and/or assembly of the product. Functional surfaces are shown in **Figures 2 through 6** as dotted line.

### 5.1 Sealing Area Criteria:

Corrosion- Pitting and/or raised corrosion products on sealing surfaces are not acceptable.

Staining- Staining is light corrosion that can be visually detected but not felt with a fingernail. Staining is acceptable on seat sealing areas.

Scratches- Scratches are visually noticeable, mechanical damage, deep enough to catch a finger nail in. Damage that will "catch" a fingernail or that produces raised material (such as dents) are not acceptable in sealing areas.

Light scratches- Light scratches are scratches that can be visually detected and can be felt with a fingernail but in which the fingernail does not "catch". Light scratches can be acceptable in static sealing areas only when oriented concentric to the seal and not across the seal (which could provide a path for leakage past the seal).

Rub Marks- Rub marks are marks that typically appear in the ball wiping zone. The marks can be visually detected but not felt with a fingernail and are acceptable on ball sealing and wiping zones.

Damage- Damage consists of scratches, galling, pitting, cracks, corrosion and /or voids.

## 6 DETAILED INSPECTION OF VALVE COMPONENTS

### 6.1 Ball

Visually inspect the spherical surface for surface damage in the sealing and wiping zones. These zones are shown in **Figure 1**.

#### Zones on ball:

1. Sealing Zone- where the seat sits on the ball in the closed position.
2. Wiping Zone- path of the seat contact as the ball is rotated between open and shut.
3. Non-Working Zone- area that is never in contact with the seats.

Visually inspect the stem drive slot in the ball for damage. Marking of surfaces is acceptable. Material which has been raised up or deformed is not acceptable and considered damage. Any other damage in the non-working zone is acceptable.

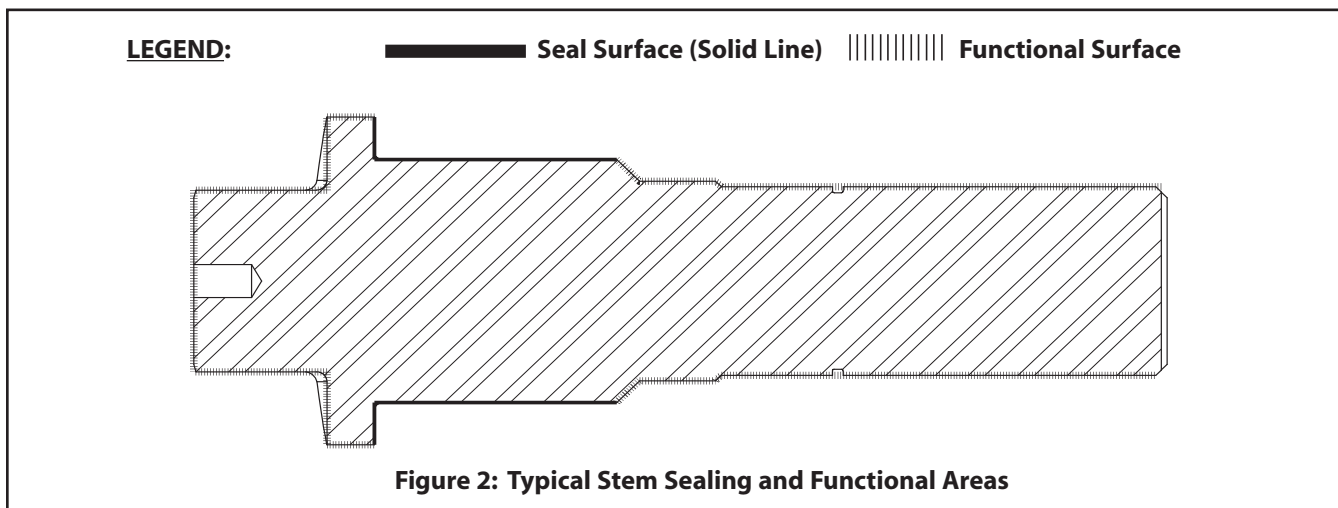
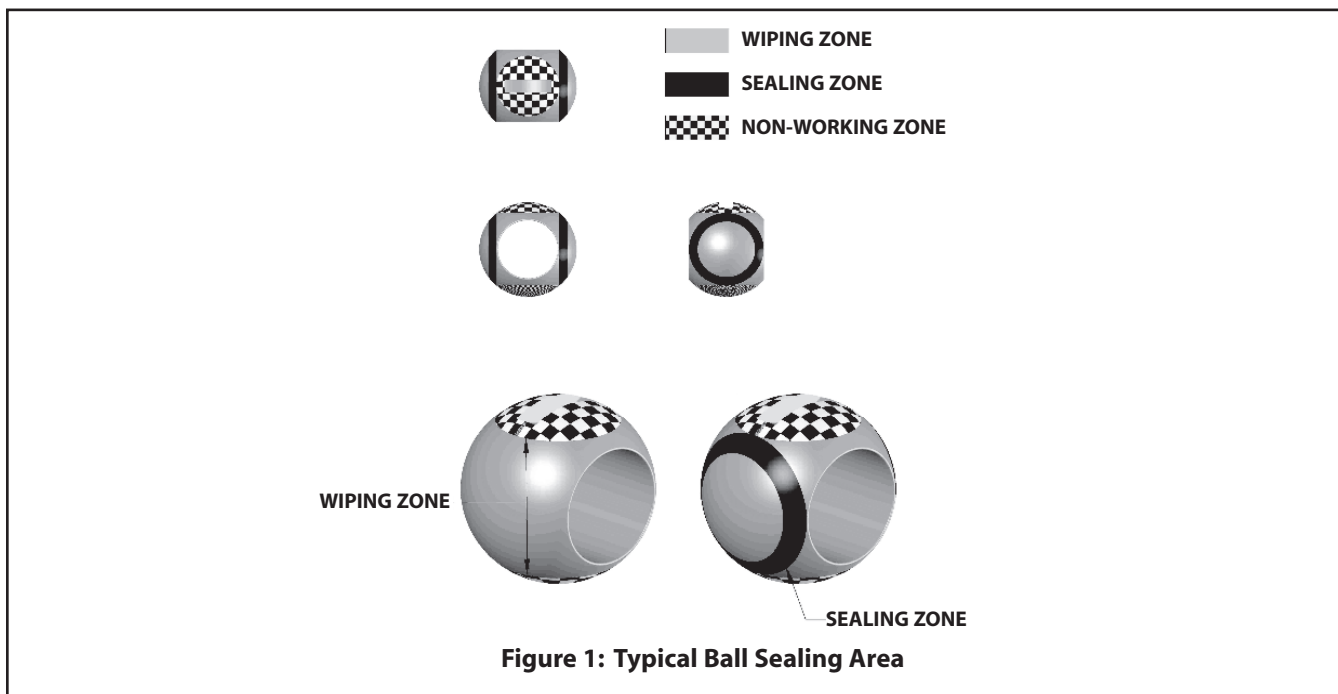
### 6.2 Stem

Sealing and functional surfaces are shown in **Figure 2**.

Visually inspect stem for galling. No galling is allowed

Visually inspect packing or stem seal area and thrust bearing area sealing surfaces. No damage is allowed in these areas.

If stem has threads, visually inspect the threads and gage threads for damage. No thread damage is allowed. Damage on threads may not be repaired.



### 6.3 Cap/Insert

Sealing and functional surfaces are shown in **Figures 3, 4 and 6**.

Visually inspect body seal sealing areas as shown below for damage.

Visually inspect seat sealing areas per **Section 6.4.1** and **Figure 6**.

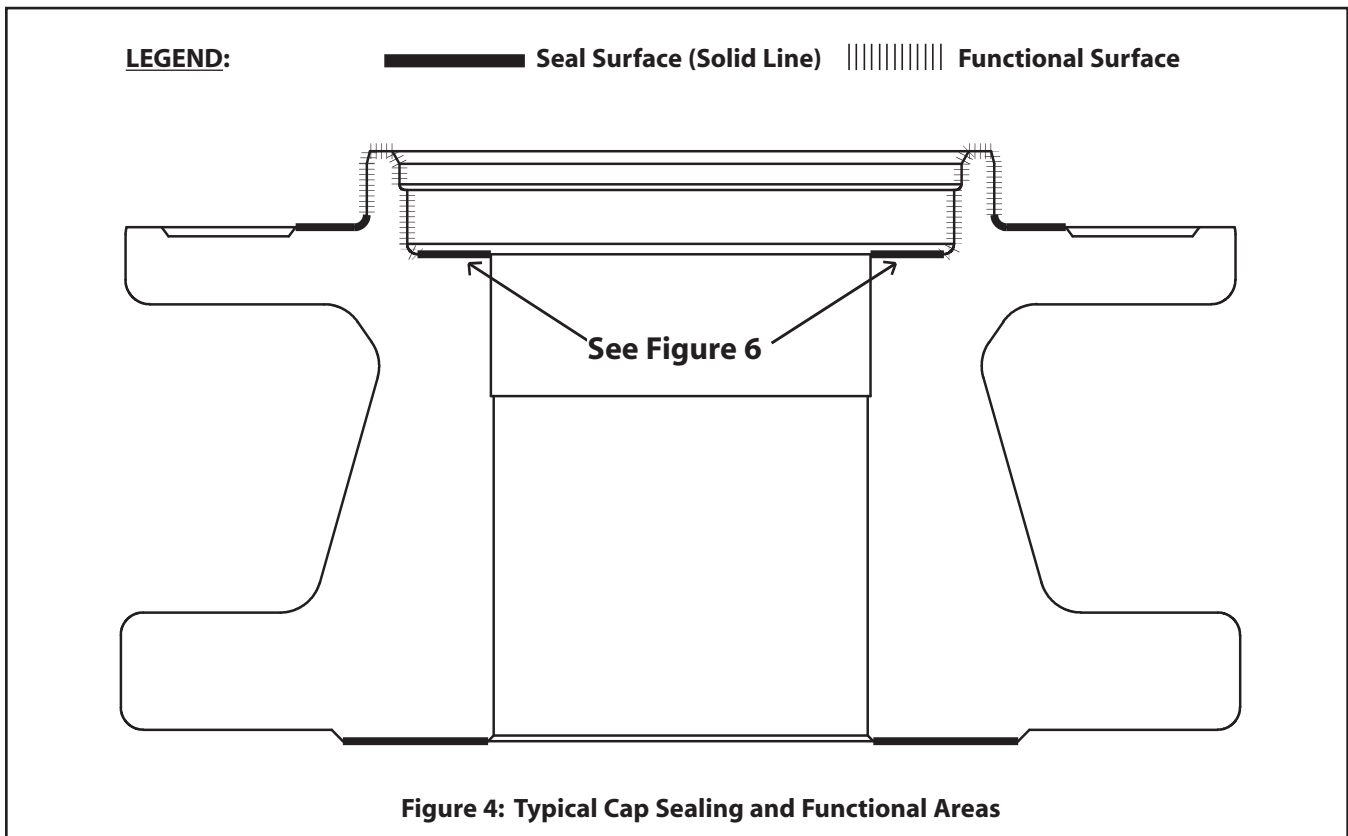
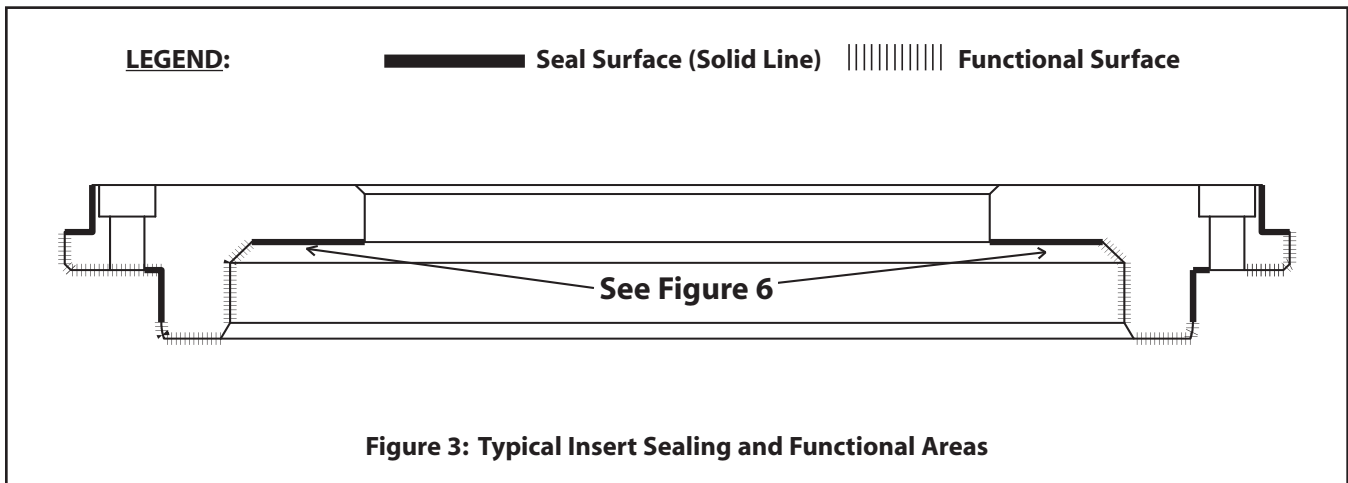
If equipped with phono-grooves, visually inspect them for damage.

If equipped with NPT threads, visually inspect and gage threads for damage.

If insert threads into body, visually inspect the threads for damage.

Dry fit insert into the body thread to check fit.

Visually inspect the sealing surface between the valve and Tank car for damage.



## 6.4 Body

Sealing and functional surfaces are shown in **Figure 5 and 6**.

Visually inspect body seal, packing, and thrust bearing seal areas for damage.

Visually inspect seat sealing area per **Section 6.4.1** and **Figure 6**.

If equipped with phono-grooves, visually inspect them for damage.

If insert threads into body, visually inspect the threads for

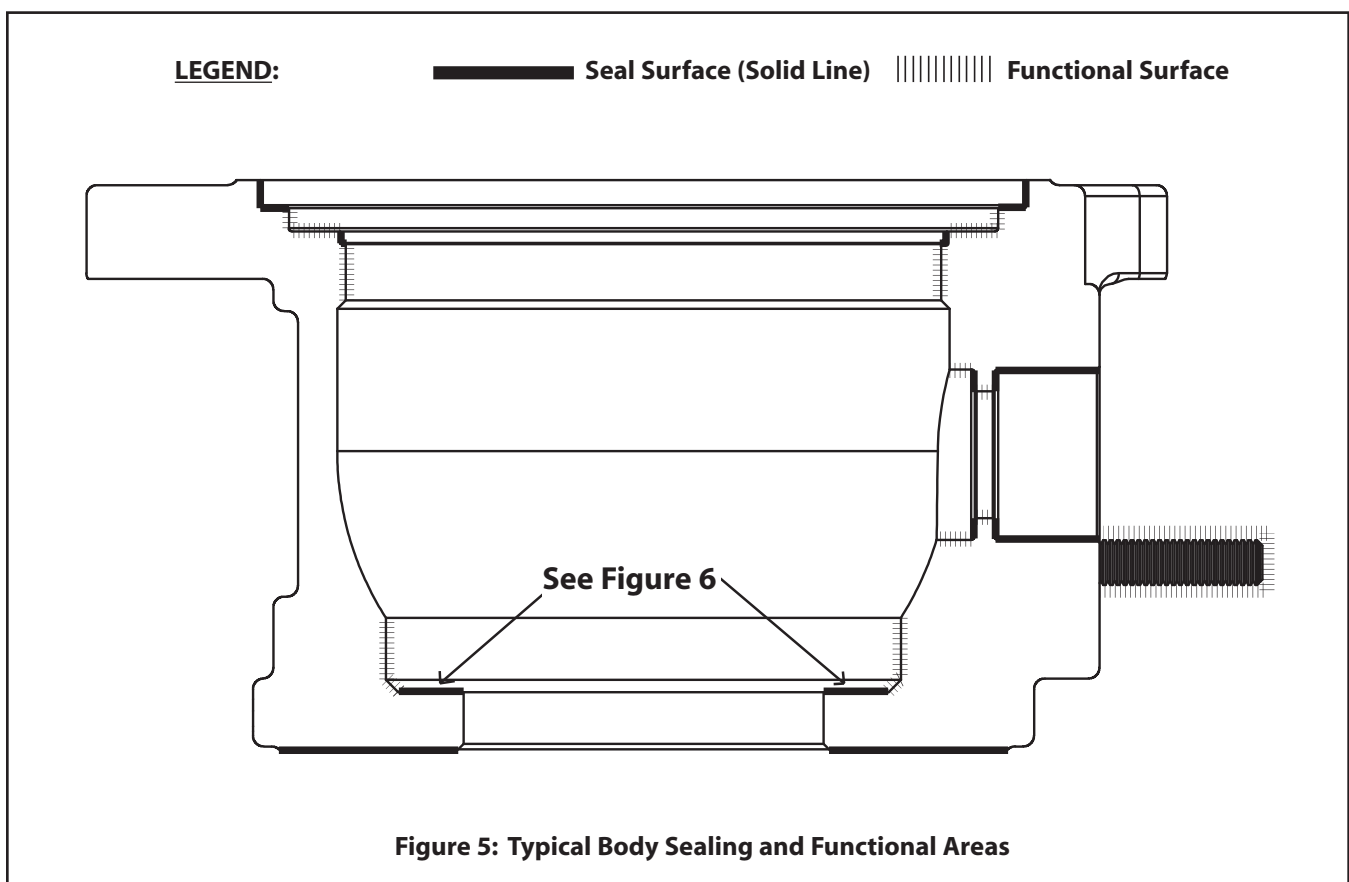
damage. Dry fit the insert into the body threads to check fit.

Where a seal is used between the valve body and the tank car, visually inspect the sealing surface between the valve and tank car for damage.

Visually inspect thrust bearing area for wear or galling.

If equipped with threaded holes, visually inspect them for damage.

If the body has threaded fasteners, gage the threads for damage. Replace any fastener where the threads are damaged, or have been heated, stretched or corroded.



### 6.4.1 Seat to Body Sealing Area

The seat seal against the body occurs at the transition of the angle on the back of the seat (see **Figure 6**). This band of continuous sealing area and must meet the sealing area criteria. The location of the sealing band varies for each ball valve model, size and seat material. Dimensions for each *Jamesbury* Tank Car Ball valve are provided in **Table 1**.

The repair facility must use their own judgement and experience when evaluating damage severity in sealing

areas. Metso recommends that all repairs be confirmed by gas testing each rebuilt valve for shell and seat leakage.

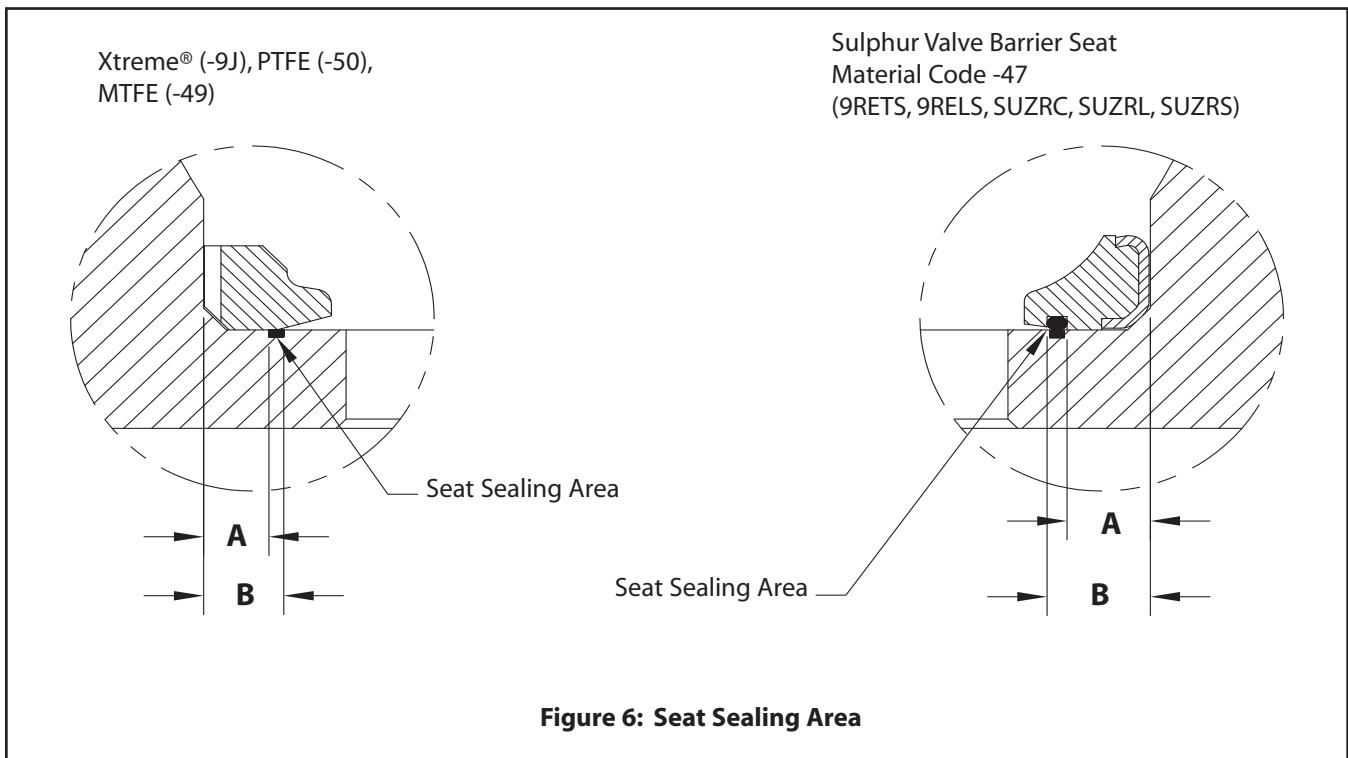


Figure 6: Seat Sealing Area

Table 1: Dimensions for ball valve seat cavity sealing location

| Jamesbury<br>Railroad Ball Valves   | Size |     | PTFE (-50) |       | Xtreme (-9J) |       | MTFE (-49) |       | W-Barrier (-47) |       |
|-------------------------------------|------|-----|------------|-------|--------------|-------|------------|-------|-----------------|-------|
|                                     | Full | STD | Amin       | Bmax  | Amin         | Bmax  | Amin       | Bmax  | Amin            | Bmax  |
| 6RFT                                | 1    | -   | 0.212      | 0.292 | -            | -     | 0.212      | 0.292 | -               | -     |
| 6RA3                                | 2    | -   | 0.180      | 0.260 | -            | -     | 0.180      | 0.260 | -               | -     |
| 9RFT/9FRT/9150RRR                   | 2    | -   | 0.181      | 0.259 | 0.176        | 0.264 | -          | -     | -               | -     |
| 9RFT/9FRT/9150RRR                   | 3    | -   | 0.274      | 0.356 | 0.274        | 0.356 | -          | -     | -               | -     |
| 6RIB3                               | 4    | -   | 0.411      | 0.493 | -            | -     | 0.411      | 0.493 | -               | -     |
| 9RET/9REL/9150RR                    | 4    | -   | 0.400      | 0.483 | 0.400        | 0.483 | -          | -     | -               | -     |
| 9RETS/9RELS (Sulphur Service)       | 4    | -   | -          | -     | -            | -     | -          | -     | 0.461           | 0.651 |
| 5RRR/5RFF/5RFT                      | -    | 1   | 0.097      | 0.176 | -            | -     | 0.097      | 0.176 | -               | -     |
| 7RRT/7150RR                         | -    | 1   | 0.097      | 0.176 | 0.145        | 0.224 | -          | -     | -               | -     |
| 5RRU/5FRF/5ATR/5RRF/5RRT/5RNT       | -    | 2   | 0.174      | 0.260 | 0.266        | 0.352 | 0.174      | 0.260 | -               | -     |
| 7RRT/7150RR                         | -    | 2   | 0.174      | 0.260 | 0.266        | 0.352 | -          | -     | -               | -     |
| 5RRF/5RRT                           | -    | 3   | 0.209      | 0.290 | -            | -     | 0.209      | 0.290 | -               | -     |
| 7RRT/7150RR                         | -    | 3   | 0.210      | 0.293 | 0.209        | 0.289 | -          | -     | -               | -     |
| 5REB3                               | -    | 4   | 0.249      | 0.330 | -            | -     | -          | -     | -               | -     |
| 5RET/AZFRS/AZFRC/AZFRL              | -    | 4   | 0.361      | 0.443 | -            | -     | 0.361      | 0.443 | -               | -     |
| SUZRS/SUZRC/SUZRL (Sulphur Service) | -    | 4   | -          | -     | -            | -     | -          | -     | 0.320           | 0.398 |

### 6.4.2 Remediating Damage

Body and Cap/Insert sealing areas may be dressed by hand with 600 grit (minimum) sandpaper or equivalent so long as it is applied concentric to the seal and not across the sealing area.

For seat sealing areas that cannot be restored by hand dressing, a one-time machining allowance of 0.010 inches is provided on the overall seat cavity. This allowance may be used on a single cavity or shared between the 2 seat cavities (i.e. remove 0.010 inches on a body seat cavity or 0.005 inches on both the body and cap/insert set cavities).

When machining, care should be taken to keep the sealing area flat and parallel with respect to the valve body joint and provide a 125 RA maximum surface finish with a circular lay. Bodies and caps/inserts that have been machined should be stamped, "MCH" next to the valve tag to indicate that the one-time machining allowance is no longer available for repair of the valve.

The repair facility must use their own judgement and experience when evaluating damage severity in sealing areas. Metso recommends that all repairs be confirmed by gas testing for shell and seat leakage. Metso's recommend gas test procedure is provided in **Section 7**.

## 7 TESTING

Metso recommends certifying each valve with a gas seat and shell leak tests after rebuilding. Repair facilities may use the facility standard test or customer specified leak test procedure. In the absence of a local standard or customer specified leak test procedure, Metso recommends the following test procedure.

### 7.1 General

#### 7.1.1 Test fixtures

- Metso recommends stainless steel test fixtures to prevent contamination from corrosion particles.
- Tankcar side fixture is a flange that dimensionally matches the tankcar mounting interface on which the valve will be installed.
- Outboard fixture is a flange or fixture that seals against the outboard valve interface.
- Test fixtures, hoses, fittings etc. shall be clean to prevent introducing debris during testing.

#### 7.1.2 Gaskets

- Metso recommends testing with same gasket that will be used to install the valve on the Tankcar. (Use of non-standard gaskets or o-ring fixtures, may lead to erroneous results.)

#### 7.1.3 Media

- Test media shall be clean dry Nitrogen or clean dry compressed air.

### 7.2 Shell Test

**7.2.1** Mount the Tankcar side and Outboard pressure test fixtures with appropriate gaskets.

**7.2.2** Place the ball in the ½ open position and pressurize the valve body to 100 PSIG from the tankcar side fixture.

**7.2.3** Apply leak detection fluid (Sherlock®, Snoop®, etc.) to the outside of the valve and the gland packing. Observe the valve for leakage, in the form of continuously forming bubbles or foam, for 2 minutes.

**7.2.4** Adjust packing as needed to seal any leakage.

### 7.3 Seat Test

**7.3.1** After completing the Shell test, depressurize the valve and remove the outboard pressure test fixture.

**7.3.2** Place the ball in the closed position.

**7.3.3** Place water on the ball until the seat is covered.

**7.3.4** Pressurize the Tankcar side to 30 psig and observe the seat for bubbles that continue to form during the 2 minute observation time.

**7.3.5** NO LEAKAGE ALLOWED

**7.3.6** Upon a Successful 30 PSIG test, increase the pressure to 100 PSIG.

**7.3.7** Check for leakage for 2 minutes at 100 PSIG.

**7.3.8** NO LEAKAGE IS ALLOWED.

Subject to change without prior notice.

#### Metso Flow Control Inc.

**Europe**, Vanha Porvoontie 229, P.O. Box 304, FI-01301 Vantaa, Finland. Tel. +358 20 483 150. Fax +358 20 483 151

**North America**, 44 Bowditch Drive, P.O. Box 8044, Shrewsbury, MA, 01545, USA. Tel. +1 508 852 0200. Fax +1 508 852 8172

**South America**, Av. Independência, 2500-Iporanga, 18087-101, Sorocaba-São Paulo, Brazil. Tel. +55 15 2102 9700. Fax +55 15 2102 9748/49

**Asia Pacific**, Haw Par Centre #06-01, 180 Clemenceau Avenue, Singapore 239922. Tel. +65 6511 1011. Fax +65 6250 0830

**China**, 11/F, China Youth Plaza, No.19 North Rd of East 3rd Ring Rd, Chaoyang District, Beijing 100020, China. Tel. +86 10 6566 6600. Fax +86 10 6566 2583

**Middle East**, Roundabout 8, Unit AB-07, P.O. Box 17175, Jebel Ali Freezone, Dubai, United Arab Emirates. Tel. +971 4 883 6974. Fax +971 4 883 6836

[www.metso.com/valves](http://www.metso.com/valves)

