

**MODEL QUALITY ASSURANCE PLAN FOR POT-PTFE BEARINGS**

1. Name of Manufacture: .....

2. Drg. No.: .....

3. Name of Project/Railway: .....

4. Authority (CA No./LOA No./Order No.) .....

| S. No. | Component Operation                     | Characteristic Checked   | Frequency & Type of check  | Reference Document     | Fabricator's quality control                | Inspection details   |   | Type of Records   | Acceptance criteria  | Remarks  |
|--------|---|--|--|------------------------|---|--|---|---|--|--|
|        |   |  |  |                        |   | Inspecting Agency  | Extent of Inspection                      |   |  |  |
| 1      | 2                                       | 3  | 4  | 5                      | 6   | 7  | 8   | 9   | 10   | 11   |
| 1.0    | <b>RAW MATERIAL:</b><br>Cast Steel (CS) | <b><u>Physical Test</u></b><br>UTS, Yield<br>Stress,<br>Elongation%,<br>Reduction of<br>Area,<br>Impact test at 0<br>degree<br>centigrade or -20<br>degree for sub-<br>zero zone<br>Micro Exam;<br>Hardness test | As per Mill<br>TC & test<br>required by<br>RDSO/Auth<br>orized<br>inspecting<br>official of<br>Zonal<br>Railway<br>from Govt.<br>Lab ./<br>NABL<br>approved<br>lab | Mill TC and<br>Challan | 1.Verification<br>of reference<br>document. | RDSO/Auth<br>orized<br>Inspecting<br>official of<br>Zonal<br>Railway | One<br>integral<br>Test piece<br>per heat | Fabricator<br>s record<br>Co-related<br>with Mill<br>TC & test<br>report. | IS:1030<br>Cast steel<br>shall<br>generally<br>comply with<br>Grade 280-<br>520W or 340-<br>570W<br>(Grade/class<br>as per<br>relevant<br>approved<br>Drg.). | Manufacturer's test certificate<br>shall be furnished. UST shall<br>be conducted as per provision<br>of relevant specification before<br>processing the material for<br>manufacturing. UST after load<br>test shall also be carried out. |
| 1.1    |   | <b><u>Chemical Test</u></b><br>C, Mn, Si, P, S,<br>Cr, Ni, Mo, Cu ,V   |  |                        | 2.Complete<br>visual<br>inspection.         |  |   |   |  |  |
|        |   | <b><u>Ultrasonic Testing</u></b><br><b><u>(On cast steel 100% before &amp; after load Test</u></b>   |  |                        |   |  |   |   |  |  |

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|--------|------------------------|---|---|---------------------|--|--|--|--|--|--|
|        |                        |   |   |                     |  | Inspecting Agency                                    | Extent of Inspection   |  |  |  |
| 1      | 2                      | 3   | 4   | 5                   | 6  | 7  | 8  | 9  | 10   | 11   |
| 1.2    | Mild Steel             | <p><b><u>Mechanical Test</u></b><br/>UTS, Yield Stress, Elongation%, Bend test , Impact test at 0 degree centigrade or -20 degree for sub-zero zone</p> <p><b><u>Chemical Test</u></b><br/>C, Mn, Si, P, S, CE.</p> <p><b>Physical condition</b> i.e. Pitting,rusting,rolling defect, etc.</p> <p><b><u>Ultrasonic Testing of plates (100%)</u></b></p> | As per Mill TC & test required by RDSO/Authorized inspecting official of Zonal Railway from Govt. Lab ./ NABL approved lab. | Mill TC and Challan | <p>1. Verification of reference document.</p> <p>2.Complete visual inspection.</p> | RDSO/Authorized Inspecting official of Zonal Railway | One test piece per thickness per heat.<br><br><br><br><br><br><br><br><br>100% | Fabricator's record Co-related with Mill TC & test report. | IS: 2062-11, E250 ,Quality BO is generally used. However Quality C shall be used for sub zero condition. ( As specified in approved Drg.).<br><br><br><br><br><br><br>IS:4225 or ASTM A435 | Manufacturer's test certificate shall be furnished. UST shall be conducted as per provision of relevant specification before processing the material for manufacturing. UST after load test shall also be carried out. |
| 1.3    | Stainless Steel (S.S.) | <p><b><u>Physical Test</u></b><br/>UTS, Yield Stress, Elongation %, Hardness</p> <p><b><u>Chemical Test</u></b><br/>C, Mn, Ni, Cr, P, S, Si, Mo</p>   | As per Mill TC & test required by RDSO/Authorized inspecting official of Zonal Railway from Govt. Lab ./ NABL approved lab. | Mill TC and Challan | <p>1. Verification of reference document.</p> <p>2.Complete visual inspection.</p> | RDSO/Authorized Inspecting official of Zonal Railway | One test pc. Per heat  | Fabricator records.  | Stainless steel shall conform to AISI 316L/xO2Cr17Ni12Mo2 of IS:6911<br><br>Or<br><br>(Grade/class As per relevant approved Drg.).   | Manufacturer's test certificate shall be furnished. Sample drawn from each lot of S.S shall be drawn by authorize inspecting official and tested in Govt./NABL approved laboratory.                                    |

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|     |  |   |   |   |  |  |                                    |                     |  |  |
|-----|--|---|---|---|--|--|------------------------------------|---------------------|--|--|
| 1.4 | PTFE<br>(confined & dimpled )                                  | <ul style="list-style-type: none"> <li>a) Tensile strength</li> <li>b) % of Elongation At break.</li> <li>c) Dimensional Stability</li> <li>d) Resistance to heat</li> <li>e) Durometer Hardness</li> <li>f) Specific Gravity.</li> <li>g) Density</li> <li>h) Electric strength ( Proof test)</li> <li>i) Appearance and finish</li> </ul> | As per manufacturer certificate & test required by RDSO/Authorized inspecting official from Govt. lab./ NABL approved lab | Manufacturer test certificate & Challan | <ul style="list-style-type: none"> <li>1. Verification of reference document.</li> <li>2. Complete visual inspection.</li> </ul> | RDSO/Authorized Inspecting official of Zonal Railway | One test pc for Full Lot of supply | Fabricators record. | Grade A of BS:3784 or equivalent<br><br>(Grade/class as per relevant specification / approved Drg.). | Manufacturer's test certificate shall be furnished. Sample from each lot of PTFE shall be drawn by authorize inspector and tested in Govt./NABL approved laboratory.   |
| 1.5 | Elastomer<br>( Neoprene WRT/ Bayprene 110 or equivalent/D enka | <p><b>Physical properties</b></p> <ul style="list-style-type: none"> <li>a) Hardness (IRHD)</li> <li>b) Minimum Tensile strength (MPa)</li> <li>c) Minimum Elongation at break (%)</li> <li>d) Max. Compression set (%)</li> <li>e) Accelerated ageing</li> <li>f) Max. change in hardness.</li> </ul>                                      | As per Mill TC & tests required by RDSO/Authorized Zonal Railway inspecting official from Govt.lab/ NABL approved lab     | Manufacturer test certificate & Challan | Verification of reference document.  | RDSO/Authorized Inspecting official of Zonal Railway | From each batch at Random          | Fabricators record. | IRC:83 (Part-III) & (Part-II) and IS:3400 (as per relevant test procedure)                           | Test certificate shall be furnished by manufacturer. Sample from each lot of Elastomer as prescribed in specification shall be drawn by authorize inspecting official of RDSO /Zonal Railway and tested in Govt./NABL approved laboratory. |

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| S. No. | Component Operation                               | Characteristic Checked   | Frequency & Type of check  | Reference Document                      | Fabricator's quality control        | Inspection details                                   |                                    | Type of Records     | Acceptance criteria   | Remarks  |
|--------|---|--|--|---|-------------------------------------|--|------------------------------------|---------------------|---|--|
|        |   |  |  |   |                                     | Inspecting Agency                                    | Extent of Inspection               |                     |   |  |
| 1      | 2   | 3  | 4  | 5                                       | 6                                   | 7  | 8                                  | 9                   | 10  | 11   |
|        |   | g) Max. change in tensile strength.<br>h) Max. change in elongation<br><br><u>Chemical Test</u><br>i) Ash content shall not exceed 5%<br>ii) The raw elastomeric ( polychloroprene) content of the compound shall not be lower than 60%.<br>iii) Sp. Gravity | As per Mill TC & tests required by RDSO/Authorized Zonal Railway inspecting official from Govt.lab/ NABL approved lab  | Manufacturer test certificate & Challan | Verification of reference document. | RDSO/Authorized Inspecting official of Zonal Railway | From each batch at Random          | Fabricators record. | IRC:83 (Part-II) & IS:3400 (as per relevant test procedure)                   | Test certificate shall be furnished by manufacturer. Sample from each lot of Elastomeric as prescribed in specification shall be drawn by authorize inspecting official of RDSO /Zonal Railway and tested in Govt./NABL approved laboratory. |
| 1.6    | Brass sealing Ring<br><br>(20mm wide x 2mm Thick) | <u>Physical properties</u><br>(i) Tensile strength (N/mm <sup>2</sup> ),<br>(ii) Elongation %<br>(iii) Bend test<br>(iv) Vickers Hardness<br><br><u>Chemical Test</u><br>Cu ,Pb, Fe and total Cu+Pb+Fe& Remainder Zn   | As per Mill TC & tests required by RDSO/Authorized Zonal Railway inspecting official from Govt.lab / NABL approved lab | Manufacturer test certificate & Challan | Verification of reference document. | RDSO/Authorized Inspector appointed by Zonal Railway | One test pc for full lot of supply | Fabricators record. | IS:410, CuZn37 (HB)<br><br>Or<br>(Grade/class As per relevant approved Drg.). | Test certificate shall be furnished by manufacturer. One sample for full lot of sealing ring supply shall be drawn by RDSO/Authorized Zonal Railway inspecting official and tested in Govt./NABL approved laboratory.                        |

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|--------|---------------------------|--|--|---|-------------------------------------|---|-------------------------------|---------------------|--|--|
|        |                           |  |  |   |                                     | Inspecting Agency                               | Extent of Inspection          |                     |  |  |
| 1      | 2                         | 3  | 4  | 5                                       | 6                                   | 7   | 8                             | 9                   | 10   | 11   |
| 1.7    | Bolts & Nuts              | <b>Physical properties</b><br><br>(i) Tensile strength (MPa)<br>(ii) Hardness (BHN)<br>(iii) Head sound - ness test<br>(iv) Depth of decarburization.<br><b>&amp; Chemical Test</b><br><br>C,P & S<br><br>Dimensional check as per specification | As per Mill TC & test required by RDSO/Authorized inspecting official from Govt.lab/ NABL approved lab<br><br>Visual & Measurement | Manufacturer test certificate & Challan | Verification of reference document. | Authorized Inspector appointed by Zonal Railway | As per relevant specification | Fabricators record. | IS:1364 & IS: 1367 (property class 8.8)<br><br>Or<br>(Grade/class as per relevant approved Drg.).  | Test certificate shall be furnished by manufacturer. One sample for each lot of Bolts & Nuts supply shall be drawn by authorize inspecting official of Zonal Railway and tested in Govt./NABL approved laboratory. |
| 1.8    | Adhesive for bonding PTFE | Peel of strength   | As per Mill TC & test required by Zonal Railway inspection official from Govt./ NABL approved lab.                                 | Manufacturer test certificate & Challan | Verification of reference document. | Zonal Railway.                                  | One sample per lot.           | Fabricators record. | Adhesive for bonding PTFE to backing plates shall produce a bond with a minimum peel strength of 4N/mm width when tested in accordance with BS:5350 ( Part C9) | Test report shall be furnished to inspecting official.   |
| 1.9    | Paint                     | Verification of Manufacture's Test Certificate, Inspection Certificate, Chalan   | Visual   | Manufacturer test certificate & Challan | Verification of reference document. | Zonal Railway.                                  | Each Batch                    | Fabricators record. | As per relevant Specification  | Paint should be as per IRS: B1   |

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|--------|---|-----------------------------|---------------------------------|--|---|---|----------------------|---------------------|------------------------------------|---|
|        |   |                             |                                 |  |   | Inspecting Agency                                       | Extent of Inspection |                     |                                    |   |
| 1      | 2   | 3                           | 4                               | 5                                      | 6   | 7   | 8                    | 9                   | 10                                 | 11  |
| 2.0    | <b><u>Manufacturing Process</u></b>   |                             |                                 |  |   |   |                      |                     |                                    |   |
| 2.1    | a) plan dimension<br>b) individual height of the component<br>c) Thickness of elastomeric pad | Dimensional inspection      | Visual & Measurement            | As per approved drawing                | Measurement of dimension                                | Manufacturer's inspecting official                      | 100 %                | Fabricators record. | IRC 83 Part-III & as per drawing   | Internal report shall be furnished, However random check may be done in presence of Zonal Railway inspecting official.  |
| 2.2    | Check after attachment of stainless steel plate<br>a) Flatness<br>b) Surface Finish           | Dimensional inspection      | Visual & Measurement            | As per approved drawing                | Measurement of dimension                                | Manufacturer's inspecting official                      | 100%                 | Fabricators record. | IRC 83 Part-III, IS: 822 & IS:3658 | Internal report shall be furnished, However, random check may be done in presence of Zonal Railway inspecting official.   |
| 2.3    | <b>NDT test</b><br><br>DP test on welding of the top plate and bearings after load test       | DP Test, weld Size , visual | DP Test of weld, visual & gauge | As per approved WPSS & Drg.            | Visual inspection & verification of dimension by gauge. | Manufacturer's inspecting official/ Zonal Railway/RD SO | 100%                 | Fabricators record. | IS:3658 -1981                      | Internal report will be furnished by the manufacture and final clearance will be given by RDSO.   |
| 2.4    | <b>Hardness</b><br>a) On major steel components<br>b) On the hard facing zone                 | Hardness tester             | measurement                     | As per drg. and relevant specification | Fabricators record & check.                             | Manufacturer inspecting official/ Zonal Railway         | 100%                 | Fabricators record. | IRC 83 Part-III                    | Internal report will be furnished, however, random check will be done in presence of Railway representative inspecting authority.<br>Firm should keep the records of hard facing and submit the same to inspection official at the time of inspection |

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|--------|---|------------------------|---------------------------|--|------------------------------|--|----------------------|---------------------|---------------------|--|
|        |   |                        |                           |  |                              | Inspecting Agency                                    | Extent of Inspection |                     |                     |  |
| 1      | 2   | 3                      | 4                         | 5                                      | 6                            | 7  | 8                    | 9                   | 10                  | 11   |
| 2.5    | <b>Corrosion Protection</b><br>a) Grit Blasting<br>b) Zn metalizing<br>c) Painting  |                        | Visual and measurement    | As per drg. and relevant specification | Fabricators record & check.  | Manufacturer inspecting official/<br>Zonal Railway   | 100%                 | Fabricators record. | IRC 83 Part-III     | Internal report shall be furnished. However, total DFT shall be checked randomly from the finished store in presence of inspecting authority of Zonal Railway.   |
| 2.6    | <b>Assembly</b><br>a) Parallelism<br>b) Overall Height  | Dimensional Inspection | Visual and measurement    | As per drg. and relevant specification | Measurement of dimensions .  | Manufacturer inspecting official/<br>Zonal Railway   | 100%                 | Fabricators record. | IRC 83 Part-III     | During assembly all the bearing components should be checked for proper cleanliness and greasing of PTFE & Stainless steel surfaces. Random check shall be done in presence of Zonal Railway's inspecting authority. |
| 2.7    | <b>Marking</b>  |                        |                           | IRC 83 Part-III                        | Fabricators record.          | Manufacturer's inspecting official/<br>Zonal Railway | 100%                 | Fabricators record. | IRC 83 Part-III     | During internal final inspection the same component shall have to be fixed on each bearing.  |
| 2.8    | <b>Tolerance of fit between different component of bearing</b><br>a) Piston Cylinder<br>b) Elastomeric pad & Cylinder<br>c) Guide & Adjacent component<br>d) Pin & Cylinder | Dimensional Inspection | Visual and measurement    | As per relevant Drg.                   | Measurement of dimensions .  | Manufacturer's inspecting official/<br>Zonal Railway | 100%                 | Fabricators record. | IRC 83 Part-III     | Inspection records to be furnished. However random checking may be done in presence of inspecting authority of Zonal Railway.  |

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|--------|---|---|---|--------------------------------------|------------------------------|---|----------------------|---------------------|-------------------------------|--|
|        |   |   |   |                                      |                              | Inspecting Agency   | Extent of Inspection |                     |                               |  |
| 1      | 2   | 3   | 4   | 5                                    | 6                            | 7   | 8                    | 9                   | 10                            | 11   |
| 2.9    | <b>Overall dimension of any unmachined cast steel component</b>   | Dimensional Inspection  | Visual and measurement                                | As per relevant Drg.                 | Measurement of dimensions .  | Manufacturer inspecting agency  | 100%                 | Fabricators record. | As per relevant specification | Checking records to be furnished. However random checking may be done by inspecting authority of Zonal Railway.  |
| 2.10   | <b>Load Test</b><br>a) Deflection Test<br>b) Co-efficient of friction test<br>c) Combined Load test<br>d) Rotation test | Load Testing parameters as per IRC-83 Part-III  | One bearing will be tested per lot of 25 nos. or part | As per relevant Drg.                 | Fabricators record.          | RDSO (One bearing will be tested per lot of 25 nos or part)<br><br>For other cases as per code. | Random               | Fabricators record. | IRC-83 Part-III               | Deflection test will be done for all bearings by manufacturer and checking record to be furnished by the manufacturer. However test shall be carried out on the bearings randomly selected by the RDSO official.   |
| 3.0    | <b>Final Inspection</b><br>Over all dimensional check of finished bearing   | Part dimension checking, overall height inspection and after load test condition of components inspection | Visual and measurement                                | As per relevant Drg. & specification | Measurement of dimension     | RDSO  | 100%                 | Fabricators record. | IRC 83 Part-III               | After load testing, DP Test & ultrasonic testing of bearings to be done by RDSO to check for damage during testing. Final clearance given by RDSO.<br>Firm should keep the records of hard facing and submit the same to inspection official at the time of inspection and inspection official of RDSO should also check hardness of hard facing randomly. |

Note: 1. Firm should maintain traceability of raw material used for fabrication of every POT-PTFE bearings and the record should be made available to the inspecting authority on demand.

2. Certificate of elastomeric should not be older than 6 months.

3. Certificate of PTFE should not be older than 1 year.

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