

राजेश कुमार श्रीवास्तव
Rajesh Kumar Srivastava
कार्यकारी निदेशक/पुल एवं संरचना
Executive Director/B&S



भारत सरकार- रेल मंत्रालय
अनुसंधान अभिकल्प और मानकसंगठन
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Government of India-Ministry of Railways
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सं. CBS/PBEJ/Reg.

दिनांक: 28.02.2023

1. Principal Chief Engineer All Zonal Railways
2. Chief Administrative Officer (Construction) All Zonal Railways

विषय: Standard QAP for Elastomeric bearing, POT-PTFE bearing and Expansion Joint.

संदर्भ: This office letter of even number dated 16.05.2014.

1. Standard QAP for Elastomeric bearing, POT-PTFE bearing and Expansion Joint was issued to Zonal Railway in 2014 vide the letter under reference. The standard QAPs needed updation in view of the change in the specification. Accordingly, it has been revised.
2. Standard QAP for Elastomeric bearing, POT-PTFE bearing and Expansion Joint is enclosed for kind information and necessary action please.
3. A copy of the revised Checklist has also been uploaded on RDSO's website i.e. 10.100.2.12 → Directorate → Bridge & Structures → RDSO's letters to Railways.

संगलग्नक: As above.

Digitally Signed by Rajesh
Kumar Srivastava
Date: 28-02-2023 12:31:27
Reason: Approved

(राजेश कुमार श्रीवास्तव)
(Rajesh Kumar Srivastava)
कार्यकारी निदेशक/पुल एवं संरचना
Executive Director/B&S

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STANDARD QUALITY ASSURANCE PLAN FOR ELASTOMERIC 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 Checks & Tolerances	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	RAW MATERIAL Elastomer	Physical and Chemical Test	As per manufacturer certificate & test required by Authorized inspecting Official of Zonal Railway from Govt./ NABL approved lab	Manufacturer test certificate & Challan	Verification of Reference document.	Authorized inspecting Official from Zonal Railway	From batches at Random and at discretion of Inspecting official	Fabricators record.	IRC:83 (Part-II) & referred documents	1. The elastomer used in the manufacture of Elastomeric Bearing should be either Natural Rubber (NR) or Chloroprene Rubber (CR) as the raw polymer. 2. Raw material must meet requirements given in Para 4 (Material) of IRC:83 (Part-II) .
2.0	Mild Steel	<u>Mechanical & Chemical Test</u> UTS, Yield Stress, Elongation%, Bend test , Impact test at 0 degree centigrade or -20 degree for sub-zero zone, test for C, Mn, Si, P, S etc.	As per Mill TC & test required by Authorized inspecting official of Zonal Railway from Govt. Lab ./ NABL approved lab.	Mill TC and Challan	Verification of Reference document and Complete visual inspection	Authorized Inspecting official of Zonal Railway	One test piece per thickness per heat./ at discretion of Inspecting official	Fabricators record Co-related with Mill TC & test report.	IS: 2062, E250 ,Quality BO is generally used. However Quality C shall be used for sub zero condition. (As specified in approved Drg.).	1. Laminates of mild steel conforming to IS: 2062 / IS: 1079 or equivalent international grade shall be used. The yield stress of the material shall not be lesser than 250 Mpa. 2. Uses of any other materials like fibreglass or similar fabric as laminates are not permitted for the purpose of this Code. 3. Physical condition of raw material must be visually checked for Pitting, rusting, rolling defect etc before use. 4. Corrosion protection of exposed steel surfaces, if any, shall conform to the requirement of

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S. No.	Component Operation	Characteristic Checks & Tolerances	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
										<p>relevant part covering corrosion protection of bearing plates.</p> <p>5. 100 % Ultra Sonic Testing shall be conducted for 12mm & above thick plates as per provision of relevant specification (IS:4225 or ASTM A435) before processing the material for manufacturing.</p>
3.0	<u>Manufacturing Process</u>	Dimension and tolerances.	Visual & Measurement	As per approved drawing	Measurement of dimension	Manufacturer inspecting agency	At Discretion of Inspecting official	Fabricators record.	IRC 83 Part-II & as per approved drawing	<p>1 All Bearing shall conform to the provisions in Clause 6 on Manufacturing and Workmanship and Table 5: Manufacturing Tolerances of IRC:83 (Part-II) in all respects.</p> <p>2 Internal report shall be furnished which will be verified by Zonal Railway Inspector. However random check may be done by Zonal Railway inspector during Manufacturing.</p> <p>3 Manufacturing process (any stage) shall be open to inspection by Railway inspecting official.</p>

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4.0	Final inspection (See Note below)									
4.1	General Inspection	Dimensions of bearing as per specified tolerances.	Visual examination and dimensional check	As per relevant drg. & specification	Measurement of dimension	Authorized inspecting officials from Zonal Railway	100%	Fabricators record & test report.	IRC 83 (Part-II) & referred documents	<p>1. All Bearing shall conform to the provisions in Clause 7.9.1.1 of IRC:83 (Part-II) in all respects for Level 1 acceptance testing.</p> <p>2. All Bearing shall conform to the provisions in Clause 7.9.2.1 of IRC:83 (Part-II) in all respects for Level 2 acceptance testing.</p>
4.2	Chemical & Physical Test	Physical and Chemical Test.	As per manufacturer certificate & test required by Authorized inspecting Official of Zonal Railway from Govt./ NABL approved lab	Manufacturer Test Certificate & Challan	Verification of reference document.	Authorized Inspecting Official from Zonal Railway	From batches at Random/ Discretion of Inspecting official	Fabricators record.	IRC 83 (Part-II) & referred documents	<p>1. Specially moulded test pieces shall conform to the provisions in Clause 7.9.1.2 of IRC: 83 (Part-II) in all respects for Level 1 acceptance testing/ Level 2 acceptance testing.</p> <p>2. Ozone resistance test shall be mandatory for all acceptance level.</p> <p>3. Test certificate shall be furnished by manufacturers for level I acceptance/ Level II acceptance.</p>
4.3	Load Test on complete bearings									
a)	Axial load test	Variation in stiffness	All bearing of the lot shall be tested.	As per relevant drg. and specification	Fabricators record.	Authorized Inspecting Official from Zonal Railway	100% In case of large lot	Fabricators record.	IRC 83 (Part-II) & referred documents	For both Acceptance Level 1 & Acceptance Level 2, all 100% bearings to be checked for axial load tests as per Clause 7.9.1.1 (C) of IRC:83 (Part-II)
b)	Shear Modulus test	Shear modulus by plotting shear stress strain curve	Load testing on test bearings.	As per relevant drg. and specification	Fabricators record.	Authorized Inspecting Official from Zonal Railway	Mandatory for Large lot and on discretion of Inspecting	Fabricators record.	IRC 83 (Part-II) & referred documents	Bearing to be checked as per Clause 7.9.2.3 of IRC:83 (Part-II)

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							official for small lot			
c)	Compressive Stiffness Test	Compressive load deformation curve and compressive stiffness	Load testing on test bearings.	As per relevant drg. and specification	Fabricators record.	Authorized Inspecting Official from Zonal Railway	Mandatory for Large lot and on discretion of Inspecting official for small lot	Fabricators record.	IRC 83 (Part-II) & referred documents	Bearing to be checked as per Clause 7.9.2.3 of IRC:83 (Part-II)
d)	Shear Bond Test	Required adhesion between elastomer to steel laminate.	Load testing on test bearings for.	As per relevant drg. and specification	Fabricators record.	Authorized Inspecting Official from Zonal Railway	Mandatory for Large lot and on discretion of Inspecting official for small lot	Fabricators record.	IRC 83 (Part-II) & referred documents	Bearing to be checked as per Clause 7.9.2.3 of IRC:83 (Part-II)
4.4	Special Acceptance Inspection									
	TGA Method /Any Other Test as per Special Contract Agreement/ As per provisions in Clause 7.9.3 of IRC: 83 (Part-II)	Special type of test (Other than test mentioned in clause 4.3)	As per manufacturer certificate & test required by Authorized inspecting Official of Zonal Railway from Govt./ NABL approved lab	As per special contract agreement	Fabricators record.	Authorized Inspecting Official from Zonal Railway	Discretion of Inspecting official	Test report from Govt./ NABL approved lab	IRC 83 (Part-II) & referred documents	As per provisions in Clause 7.9.3 of IRC: 83 (Part-II)

Note:

- For the purpose acceptance testing (Clause 7.9 of IRC:83- Part II), acceptance lots shall be classified as below:
A lot size of 24 or larger number of bearing shall be defined as a large lot and a lot size of less than 24 bearings shall be defined as small lot.
When the number of bearings for a project is large and phased production is permitted, bearing supplied in any one phase will be considered as a large lot.
- The level of acceptance testing shall generally be graded into the following two levels depending on lot size:
Level 1 acceptance testing
Level 2 acceptance testing
Acceptance testing level 1 is a higher level inspection and shall be applicable to large lots. This level of inspection can be specified for small lots also as per the discretion of the Railway. This shall involve manufacture of extra bearings to be used as test bearing and eventually consumed in destructive testing. Acceptance testing level 2 shall be applicable in general for all lots, unless otherwise specified, and shall not involve any destructive testing of finished bearings.

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STANDARD 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	RAW MATERIAL:	<u>Physical & Chemical Test</u>	As per manufacturer certificate & test required by Authorized inspecting Official of Zonal Railway from Govt./ NABL approved lab	Mill TC and Challan	1.Verification of reference document 2.Complete visual inspection 3. 100% Ultrasonic Testing before & after load Test.	Authorized Inspecting official of Zonal Railway	One integral Test piece per heat	Fabricator's record Co-related with Mill TC & test report.	Cast steel shall generally comply with Grade 340-570W of IS:1030/ (Grade/Class as per relevant approved Drg.).	1. Manufacturer's test certificate shall be furnished. 2. 100% UST shall be conducted before & after load test. Acceptance criteria shall be IS:9565 Level-III. 3. Cast Steel Material shall comply clause 4.1 and ANNEXURE-G of IRC:83 (Part-III) or Grade/Class mentioned in approved drawing.
1.1	Cast Steel (CS)	UTS, Yield Stress, Elongation%, Reduction of Area, Impact test at 0 degree centigrade or -20 degree for sub-zero zone, Hardness test, Test for C, Mn, Si, P, S, Cr, Ni, Mo, Cu ,V etc.								
1.2	Mild Steel	<u>Mechanical & Chemical Test</u> UTS, Yield Stress, Elongation%, Bend test , Impact test at 0 degree centigrade or -20 degree for sub-zero zone, test for C, Mn, Si, P, S, CE etc.	As per Mill TC & test required by Authorized inspecting official of Zonal Railway from Govt. Lab ./ NABL approved lab.	Mill TC and Challan.	Verification of Reference document and Complete visual inspection.	Authorized Inspecting official of Zonal Railway.	One test piece per thickness per heat./ at discretion of Inspecting official.	Fabricator's record Co-related with Mill TC & test report.	Grade E350 BR (min.) of IS: 2062, shall generally be used. However Quality C of IS:2062 shall be used for sub zero condition/ As specified in approved Drawing.	1. Manufacturer's test certificate shall be furnished. 2. 100% UST shall be conducted for plates. Acceptance criteria shall be IS:4225 are ASTM A435. 3. Physical condition of raw material must be visually checked for Pitting, rusting, rolling defect etc before use. 4. Mild Steel Material shall comply clause 4.1 and ANNEXURE-G of IRC:83 (Part-III) or Grade/class mentioned in approved drawing.

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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
1.3	Stainless Steel (S.S.)	<u>Physical & Chemical Test</u> UTS, Yield Stress, Elongation %, Hardness, Test for C, Mn, Ni, Cr, P, S, Si, Mo etc.	As per Mill TC & test required by Authorized inspecting official of Zonal Railway from Govt. Lab ./ NABL approved lab.	Mill TC and Challan.	Verification of Reference document and Complete visual inspection.	Authorized Inspecting official of Zonal Railway.	One test piece per thickness per heat./ at discretion of Inspecting official.	Fabricators record Co-related with Mill TC & test report.	Stainless steel shall conform to AISI 316 or AISI316L Or (Grade/class As per relevant approved Drg.).	<ol style="list-style-type: none"> 1. Manufacturer's test certificate shall be furnished. 2. Sample from each lot of S.S shall be drawn by authorize inspecting official and tested in Govt./NABL approved laboratory. 3. Stainless Steel Material shall comply clause 4.1 and ANNEXURE-G of IRC:83 (Part-III) or Grade/class mentioned in approved drawing.
1.4	PTFE	<u>Mechanical and Physical Properties</u>	per Mill TC & test required by Authorized inspecting official of Zonal Railway from Govt. Lab ./ NABL approved lab.	Manufacturer test certificate & Challan	Verification of reference document.	Authorized Inspecting official of Zonal Railway.	Sample from each lot of PTFE material/ at discretion of Inspecting official.	Fabricators record.	IRC:83 (Part-III) and referred documents or as per relevant specification / approved Drg.).	<ol style="list-style-type: none"> 1. Material shall be either polytetrafluoroethylene (PTFE) free sintered without regenerated material or any other material having requisite material strength and low frictional properties. 2. Pattern of dimple shall be as per Fig. 4 of IRC:83 (Part-III). 3. Manufacturer's test certificate shall be furnished. 4. Sample from each lot of PTFE shall be drawn by authorize inspector and tested in Govt./NABL approved laboratory. 5. PTFE material must comply the parameters given in Clause 4.2 of IRC:83 (Part-III).

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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
1.5	Elastomer	Physical properties	As per manufacturer certificate & test required by RDSO/Authorized inspecting official from Govt. lab./ NABL approved lab.	Manufacturer test certificate & Challan.	Verification of reference document.	Authorized Inspecting official of Zonal Railway.	From each batch at Random.	Fabricators record.	IRC:83 (Part-III) & referred document/ as per relevant test procedure.	1. The elastomer to be used for the component of bearing shall be made of Natural Rubber (NR) or Chloroprene Rubber (CR). 2. Raw material must meet requirements given in Clause 4.4 and ANNEXURE-G of IRC:83 (Part-III). 3. Manufacturer's test certificate shall be furnished.
1.6	Brass sealing Ring	Physical & Chemical properties	As per manufacturer certificate & test required by RDSO/Authorized inspecting official from Govt. lab./ NABL approved lab.	Manufacturer test certificate & Challan.	Verification of reference document.	Authorized Inspecting official of Zonal Railway.	One test pc for full lot of supply/ discretion of Inspecting official.	Fabricators record.	CuZn37/CuZn 40 as per IS:410 or CuZn37 or CuZn39 Pb3 of EN12163 & EN12164 respectively or Grade/class As per relevant approved Drawing.	1. Test certificate shall be furnished by manufacturer. 2. One sample for full lot of sealing ring supply shall be drawn by Authorized Zonal Railway inspecting official for testing in Govt./NABL approved laboratory. 3. Material must meet requirements given in Clause 4.5 of IRC:83 (Part-III).
1.7	Bolts & Nuts	<u>Physical & Chemical properties</u>	As per manufacturer certificate & test required by RDSO/Authorized inspecting official from Govt. lab./	Manufacturer test certificate & Challan.	Verification of reference document.	Authorized Inspecting official of Zonal Railway.	As per relevant specification	Fabricators record.	IRC83 (Part-III) & referred documents Or Grade/class as per relevant approved Drawing.	1. Test certificate shall be furnished by manufacturer. 2. One sample for each lot of Bolts & Nuts supply shall be drawn by authorize inspecting official of Zonal Railway for testing in Govt./NABL approved laboratory. 3. Fasteners must meet

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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
			NABL approved lab.							requirements given in Clause 4.8 and ANNEXURE-G of IRC:83 (Part-III).
2.0	Manufacturing Process									
2.1	Process Inspection	Dimensional inspection ,NDT and visual inspection	Visual & Measurement	As per approved drawing	Measurement of dimension & Verification of reference document.	Authorized Inspecting official of Zonal Railway.	100 %	Fabricators record.	IRC 83 Part-III & as per approved drawing	<ol style="list-style-type: none"> 1. Internal report shall be furnished, However check shall be done in presence of Zonal Railway inspecting official. 2. Manufacturing tolerances and Manufacturing method of bearing shall confirm Clause 6.1 & Clause 6.2 of IRC:83 (Part-III) respectively. 3. The manufacturer should be able to establish the traceability of all major raw material (Annexure G of IRC:83 (Part-III) with procurement and consumption record and Mill Test Certificate/ material test report 4. Major metallic components as specified in Annexure G, shall be ultrasonically tested for soundness as per Level: 3 of IS: 9565 prior to use in bearings. 5. All welding shall be done by qualified welder on the basis of applicable WPSS and shall be in accordance to Clause 6.2.10 of IRC:83 (Part-III). 6. All structural welds shall be visually checked for weld size and location as per

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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
										drawing as well as controlled as per the following tests: - Visual test (all structural welds) - Liquid penetration test as per IS: 822 (all structural welds) - All full penetration butt welds shall be controlled through ultrasonic testing as per IS 4260 / AWS D1.5 / ASME Section VIII.
2.2	Tolerance of fit between different component of bearing	Dimensional Inspection	Visual and measurement	As per relevant Drg	Measurement of dimensions & surface roughness.	Authorized Inspecting official of Zonal Railway.	100%	Fabricators record	IRC 83 Part-III	1. Inspection records to be furnished. However random checking may be done in presence of inspecting authority of Zonal Railway. 2. Tolerance of fit between different component of bearing shall comply clause 6.1.4 of IRC:83 (Part-III).
2.3	Corrosion Protection	Surface preparation & protective coating system	Visual and measurement	As per drawing and relevant specification	Fabricators record & check.	Authorized Inspecting official of Zonal Railway.	100%	Fabricators record.	IRC-83 Part-III & referred document.	1. Surface preparation & protective coating system must be in accordance to clause 6.3 of IRC-83 Part-III. 2. Internal report shall be furnished. However, total DFT shall be checked randomly by inspecting authority of Zonal Railway.
3.	Inspection on finish bearing									
3.1	Dimensional Inspection	Over all Dimensional check of finished bearing	Visual and measurement	As per drg. and relevant specification	Fabricators record & check.	Authorized Inspecting official of Zonal Railway.	100%	Fabricators record.	IRC-83 Part-III	1. All bearings of the lot shall be visually inspected for absence of any defects in surface finish, shape or any other discernible superficial defects. 2. All bearings shall be

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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
										checked for overall dimensions as per manufacturing tolerances specified in Clause 6.1 of IRC:83 (Part-III). 3. All bearings must meet requirements given in Clause 7.4.3 of IRC:83 (Part-III).
3.2	Load Test a) Proof Load Test b) Friction test c) Rotation test	Load Testing parameters as per Clause 7.4.3 of IRC-83 Part-III	At least one or a pair of bearings (depending on the requirement) of each type and different vertical load capacity selected at random shall be load tested	As per relevant Drawing.	Fabricators record.	Authorized Inspecting official of Zonal Railway.	At least one or a pair of bearings	Fabricators record.	IRC-83 Part-III	1. All bearings must meet requirements given in Clause 7.4.3 of IRC:83 (Part-III). 2. Proof Load Test of bearings shall be done as per Clause 7.4.3.3.1 of IRC:83 (Part-III). 3. Friction Test of bearings shall be done as per Clause 7.4.3.3.2 of IRC:83 (Part-III). 4. Rotation Test of bearings shall be done as per Clause 7.4.3.3.3 of IRC:83 (Part-III).
3.3	Final Clearance Inspection	After load test bearing must be checked for condition of components	Visual and measurement and testing	As per relevant Drg. & specification	Measurement of dimension	Zonal Railway.	100%	Fabricators record.	IRC 83 Part-III	After load testing DP test and ultrasonic testing of bearings to be done for checking any damage during testing before final clearance.

- 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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STANDARD QUALITY ASSURANCE PLAN FOR EXPANSION JOINTS

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 Checks & Tolerances	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	RAW MATERIAL									
1.1	Mild Steel For Steel Plates, Angles, Splice Plates, Anchor Loops, Studs etc	<u>Mechanical, Chemical Test</u> UTS, Yield Stress, Elongation %, Bend test, Impact test at 0 degree centigrade or -20 degree for sub-zero zone, test for C, Mn, Si, P, S, CE.	As per Mill TC & test required by Authorized inspecting official of Zonal Railway from Govt. Lab ./ NABL approved lab.	Mill TC and Challan	1. Verification of reference document. 2. Complete visual inspection.	Authorized Inspecting official of Zonal Railway	One test piece per thickness per heat.	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.).	1. Manufacturer's test certificate shall be furnished. 100% UST shall be conducted for 12mm & above thick plates as per provision of relevant specification before processing the material for manufacturing. 2. Raw Material to be cleared by nominated inspecting official of Zonal Railway in accordance to provisions specified in IRC:SP:69-2011. 3. Physical condition of raw material must be visually checked for Pitting, rusting, rolling defect etc before use.
1.2	Strip Seal and other Elastomer Components	<u>Physical & Chemical Test</u>	As per manufacturer certificate & test required by Authorized inspector of zonal Railway from Govt./ NABL approved lab	Manufacturer test certificate & Challan	Verification of reference document.	Authorized Inspecting official appointed by Zonal Railway	From batches at Random and at discretion of Inspector	Fabricator's record.	IRC:SP:69-2011 & referred documents	The sealing element shall be made of Chloroprene rubber (CR). The properties of the material shall be as specified in Table 7.4.2.2.1 for CR as given in IRC:SP:69-2011
2.0	Welding:									

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S. No.	Component Operation	Characteristic Checks & Tolerances	Frequency & Type of check	Reference Document	Fabricator's quality control	Inspection details		Type of Records	Acceptance criteria	Remarks
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1	2	3	4	5	6	7	8	9	10	11
a)	Submission of WPSS	Review of WPSS	Verification	IRS B1-2001 IS 9595-96 WBC-2001	Verification of Reference Document	RDSO	100%	Fabricator's Record	IRS B1-2001 IS 9595-96 WBC-2001	Only approved WPSS shall be used for fabrication
b)	WPQR	Witnessing of established WPSS Witnessing of Welder Qualification test	Visual, DT & NDT at approved lab	As per code requirement	Verification of Reference Document	RDSO	100%	Approved WPSS and certified welders	IS 7310(I)-74	Only certified welders as per extant policy to be engaged in the job.
c)	Preheating	Measurement of Temperature	Visual with thermal Chalk	As per approved WPSS	Verification of Reference Document	Authorized Inspecting official appointed by Zonal Railway	Random	Inspection Report of Inspection Official & Fabricator's Record	IRS B1-2001	Work shall be as per approved WPSS & WPQR
d)	Baking of Electrode, Flux	To have moisture free Electrode & Flux	Visual Check of Electrodes & beating	As per Manufacturer's recommendations	Verification of Reference Document	Authorized Inspecting official appointed by Zonal Railway	Random	Inspection Report of Inspection Officials & Fabricator's Record	IRS B1-2001	Work shall be as per approved WPSS & WPQR
e)	Selection of correct Electrodes & Flux	Reference to WPSS, IRS Class, etc.	Visual	As per approved WPSS	Verification of Reference Document	Authorized Inspecting official appointed by Zonal Railway	100%	Inspection Report of inspection official & Fabricator's Record	Source should be RDSO approved vendors where applicable	Work shall be as per approved WPSS & WPQR
f)	Current Condition	Measurement of Amp. & Voltage	Visual with Ammeter & Voltmeter	As per approved WPSS	Verification of Reference Document	Authorized Inspecting official appointed by Zonal Railway	Random	Inspection Report of Inspection Official & Fabricator's Record	IRS B1-2001	Work shall be as per approved WPSS & WPQR
3.0	<u>In Process Inspection</u>	(a) Angle Profile	Size, thickness Dia , profile	Conc n specific	Visual & dimensional verification	Firm & Authorized Inspecting	100% by Firm & random by	Fabrication record maintained	IRC:SP:69-2011 & referred	Random check & Rly official will record their observations & records shall be maintained

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S. No.	Component Operation	Characteristic Checks & Tolerances	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
				ation & drawing	w.r.t. concern specification & drawings	Official nominated by Zonal Rly	Zonal Rly	by Firm	documents/ approved drawings	by Firm
		(b) Anchorage	Size by Gauge,	Concer n specific ation & drawing	Visual & dimensional verification w.r.t. concern specification & drawings	Firm & Authorized Inspecting Official nominated by Zonal Rly	100% by Firm & random by Zonal Rly	Fabrication record maintained by Firm	IRC:SP:69-2011 & referred documents/ approved drawings	
		(c) Profile	Length, width, thickness As per drawing	Concer n specific ation & drawing	Visual & dimensional verification w.r.t. concern specification & drawings	Firm & Authorized Inspecting Official nominated by Zonal Rly	100% by Firm & random by Zonal Rly	Fabrication record maintained by Firm	IRC:SP:69-2011 & referred documents/ approved drawings	
		(d) Weld check	Size by gauge & DPT	Concer n specific ation & drawing	Visual & dimensional verification w.r.t. concern specification & drawings	Firm & Authorized Inspecting Official nominated by Zonal Rly	100% by Firm & random by Zonal Rly	Fabrication record maintained by Firm	IRC:SP:69-2011 & referred documents/ approved drawings	
		(e) Stud	Dia & length of stud Length,	Concer n specific ation & drawing	Visual & dimensional verification w.r.t. concern specification & drawings	Firm & Authorized Inspecting Official nominated by Zonal Rly	100% by Firm & random by Zonal Rly	Fabrication record maintained by Firm	IRC:SP:69-2011 & referred documents/ approved drawings	
		(f) Dimensional Check	width, thickness As per drawing	Concer n specific ation & drawing	Visual & dimensional verification w.r.t. concern specification	Firm & Authorized Inspecting Official nominated by Zonal	100% by Firm & random by Zonal Rly	Fabrication record maintained by Firm	IRC:SP:69-2011 & referred documents/ approved drawings	

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S. No.	Component Operation	Characteristic Checks & Tolerances	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
					& drawings	Rly				
		(g) Straightness check	By line dori	Concern specification & drawing	Visual & dimensional verification w.r.t. concern specification & drawings	Firm & Authorized Inspecting Official nominated by Zonal Rly	100% by Firm & random by Zonal Rly	Fabrication record maintained by Firm	IRC:SP:69-2011 & referred documents/ approved drawings	
4.0	<u>Finished expansion joint inspection</u>	(a) Dimensional check	Length, width, thickness As per drawing	Concern specification & drawing	Visual & dimensional verification w.r.t. concern specification & drawings	Authorized Inspecting Official	100% by Inspecting Official.	Fabrication record maintained by Firm	IRC:SP:69-2011 & referred documents/ approved drawings	Quality check list (like sample Annexure-II) as per approved drawing to be maintained by Firm & same to be checked & verified by concern Rly official.
		(b) Straightness check	By line dori Size by gauge	Concern specification & drawing	Visual & dimensional verification w.r.t. concern specification & drawings	Authorized Inspecting Official	100% by Inspecting Official	Fabrication record maintained by Firm	IRC:SP:69-2011 & referred documents/ approved drawings	
		(c) Welding check-by gauge/DPT	Material Size, length Dia etc.	Concern specification & drawing	Visual & dimensional verification w.r.t. concern specification & drawings	Authorized Inspecting Official	100% by Inspecting Official	Fabrication record maintained by Firm	IRC:SP:69-2011 & referred documents/ approved drawings.	
5.0	<u>Additional acceptance tests</u>									
(a)	Cyclic motion test	Sign of Distress	One expansion joint per lot supply	Approved drawing and specification	Verification of reference document	Authorized Inspecting Official	One expansion joint per lot supply	Fabrication record maintained by Firm	IRC:SP:69-2011	Expansion Joint must meet requirements given in Clause 8.3.2.1 of IRC:SP:69-2011.
(b)	Ponding Test	Leakage	One expansion joint per lot supply		Verification of reference document	Authorized Inspecting Official	One expansion joint per lot supply	Fabrication record maintained by Firm	IRC:SP:69-2011	Expansion Joint must meet requirements given in Clause 8.3.2.2 of IRC:SP:69-2011.

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S. No.	Component Operation	Characteristic Checks & Tolerances	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
(c)	Debris Expelling Test	% Debris Expelling	One expansion joint per lot supply		Verification of reference document	Authorized Inspecting Official	One expansion joint per lot supply	Fabrication record maintained by Firm	IRC:SP:69-2011	Expansion Joint must meet requirements given in Clause 8.3.2.3 of IRC:SP:69-2011.
(d)	Pull-out Test	Stretching of Joint	One expansion joint per lot supply		Verification of reference document	Authorized Inspecting Official	One expansion joint per lot supply	Fabrication record maintained by Firm	IRC:SP:69-2011	Expansion Joint must meet requirements given in Clause 8.3.2.4 of IRC:SP:69-2011.
(e)	Opening Movement Vibration Test	Ability to withstand against the repeated movement	Discretion of inspecting officials		Verification of reference document	Authorized Inspecting Official	As per special contractual agreement	Fabrication record maintained by Firm	IRC:SP:69-2011	Expansion Joint must meet requirements given in Clause 8.3.2.5 of IRC:SP:69-2011.
6.0	Painting Process	Verification of Manufacturer's Test Certificate Inspection Certificate, Challan	Visual	Verification of Manufacturer's Test Certificate, Challan	Verification of reference document	Authorized Inspecting Official	Each Batch	Fabricator's record	As per relevant Specification	Paint should be as per IRS: B1:2001 or as per contract conditions as applicable
7.0	Packing & Dispatch	(a) Marking of expansion joints (b) Clamping of joints (c) packing of expansion joint	Visual check	As per contract	Verification of reference document	Authorized Inspecting Official	Each Batch	Fabricator's record	As per relevant Specification	Packing and dispatch arrangement should be in accordance to contractual agreement.

Note:- 1. If there are any studs in the approved drawing, Annexure-II shall be referred for Quality Control.

2. If there are Bolts & Nuts in the approved drawing, then Annexure-III shall be referred for Quality Control.

Proforma for Quality Assurance for Inspection of Automatic Stud Welding General Data

Name of Inspector _____, Date of Inspection: _____

Fabricating Agency: _____, Workshop _____

Drg. No. _____, Span no. _____, No. of studs per span _____

Approved QAP No _____, Dia. Of stud : _____, Length of stud: _____

Inspection Results (If answer to any question is NO, then the process needs to be checked and inspection to be repeated)

1. **Studs Material Inspection Report** Nos _____, Satisfactory? Yes/No
2. **Ferrules Material Inspection Report** Nos _____, Satisfactory? Yes/No
3. **Name of machine operator:** _____, **Date of qualification** of operator by officer: Certificate No _____; Date _____ (Not more than 2 years old Yes/No)
4. **Machine brand/serial no used for welding:** _____
5. **Machine settings (As per approved QAP or approved qualification record):**

Current	Duration	Cycles	Lift	Plunge	Special settings, if any

6. **Surface preparation(100%):**
 - a) Is surface free from rust/mill scale etc? Yes / No
 - b) Is surface free from grease/paints etc? Yes / No
 - c) Is the surface being cleaned of weld splatter/ broken ferrules during welding: Yes/No
7. **Visual Inspection of raw material** (on random samples, ~2-4%)(Only summary to be given here, Separate register may be made for detailed record)
 - a) **Studs**
 - (i) Is surface free from paint, galvanizing, grease and moisture: Yes / No
 - (ii) Is the flux intact at the tip of the stud: Yes / No

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(iii) Is the length of stud as per requirement: Yes/No

b) Ferrules:

(i) Are ferrules broken? Yes / No

(ii) Are the ferrules properly dry Yes / No(With Over drying/ Without Over Drying)

c) General Remarks on storage/ handling of materials etc__________
_____**8. Ring test(@5%):** *(Only summary to be given here, Separate register may be made for detailed record)*

No. of tests done_____ Results: NosOK_____, Nos NOT OK _____

9. Bend Test(@1%): *(Only summary to be given here, Separate register may be made for detailed record)*

No. of tests done_____ Results: Nos OK_____, Nos NOT OK _____

10. Visual Inspection of completed weld (@100%): *(Only summary to be given here, Separate register may be made for detailed record)*

a) Is the surface of flash having a shiny bluish hue?Yes / No

b) No of studs with good weld shape?_____

c) No of studs with defects within acceptable limits?_____

d) No of studs with repairable defects?_____

e) No of studs defective/with not repairable defects?_____

11. Measurement of Welded Stud Height(@5%): *(Only summary to be given here, Separate register may be made for detailed record)*

a) Height of welded stud: _____ mm, Burn Off Length _____ mm

b) Is the burn-off length proper? Yes / No

12. Is the member with studs acceptable?Yes/No**13. Changes required in welding process in light of defects observed, if any** __________

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Repairs of Defects (If possible)

a) Total Repairable Studs: Nos. _____

b) Date of repair: _____

c) Quality of repairs: OK / NOT OK**14. Replacement of Non Repairable studs (If possible)**

a) No of Non-repairable studs: _____

b) No of additional studs provided: _____

c) No. of studs cut: _____ nos.

d) Additional studs provided (with 50mm gap all around): _____ nos.

e) Quality of new studs: OK / NOT OK

QUALITY CHECK LIST OF EXPANSION JOINT (SAMPLE)

Date: _____

S.No.	Description	Required	Progress
1.	Size of the Edge Beam Length (+3, -0) mm		
2.	Anchor Studs Should be properly bend		
3.	Straightness throughout the Length of the Beam (no bending)		
4.	Proper Attachment of Splicing Plates at the end.		
5.	Proper Welding Size of Anchor Studs. (e.g. 8mm, 45 ⁰)		
6.	Seal Gap (6mm + 0, -1)		
7.	Edge Beam corner should be properly round like Fillet not Chamfer		
8.	Angle Joint Straight with proper "V" Shape		
9.	No Splatter, Primer & Final Paint Application		
10.	Hammer Test		

ANNEXURE-III

S. No.	Component Operation	Characteristic Checks & Tolerances	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	Bolts & Nuts	a) Physical properties e.g. Tensile strength, Hardness, Head soundness test, Depth of decarburization.	As per Mill TC & test required from Govt. lab/ NABL approved lab by Authorized inspecting official	Manufacturer test certificate & Challan	Verification of reference document.	Authorized inspecting officials	As per relevant specification	Fabricator's record.	IS:1364 & IS: 1367 (property class 8.8) Or (Grade/classes 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 authorized inspecting official of Zonal Railway and tested in Govt./NABL approved laboratory.
		b) Chemical Test for C,P & S etc.	As per Mill TC & test required from Govt. lab/ NABL approved lab by Authorized inspecting official	Manufacturer test certificate & Challan	Verification of reference document	Authorized inspecting officials	As per relevant specification	Fabricator's record.		
		c) Dimensional check as per specification	Visual Measurement	Approved design & drawing	Verification of reference document	Authorized inspecting officials	As per relevant specification	Fabricator's record.		