

ISO9001:2015	Doc No. BS-S-7.5.3.1-10	Version No: 1.1	Date Effective: 01-07-2022
Document Title: SPECIFICATION AND SCHEDULE OF TECHNICAL REQUIREMENT (STR) FOR MANUFACTURE AND SUPPLY OF ELASTOMERIC BEARING TO INDIAN RAILWAY FOR USE ON RAILWAY BRIDGES /ROB.			

**RESEARCH DESIGNS AND STANDARD ORGANISATION
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Document No. : **BS-S-7.5.3.1-10**

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AMENDMENT HISTORY:

S.No.	Amendment Date	Version	Reasons for Amendments
1.	14-09-2010	1.0	STR approved by Railway Board
2.	28-06-2021 (effective from 01-07-2022)	1.1	Separate STR of Elastomeric bearings alongwith specification. Major changes have been made.

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1.0 Scope

This specification and STR covers the norms for objective evaluation of capability and capacity of any firm for manufacture and supply of Elastomeric Bearings to Railways for use on Railway bridges/ROB

2.0 Specification of manufacture and supply of elastomeric bearings:

The specification for manufacturing and supply of elastomeric bearing for Railways for use on railway bridges /ROB shall be IRC: 83 (Part-II): Latest Edition, with additional provisions in the following Para.

Para 7.7.1 of IRC:83 (Part-II)-2018 shall be read as:

For the purpose of grading level of acceptance testing (Clause 7.9), lots will be classified as below:

A lot size of 24 or larger number of bearing shall be defined as a large lot.

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.

Notwithstanding the provision of clause of IRC 83 (part-II), it is hereby specified that for every lot of less than 24 bearings i.e. small lot, one extra bearing shall be manufactured and out of the lot, one bearing will be selected at random for carrying out material tests.

3.0 Procedure for Registration of Firms for manufacture and supply of Elastomeric Bearings

3.1 The firm will ensure availability of

- (i) The required general and infrastructural facilities.
- (ii) Space required for manufacturing, testing and storage viz. manufacturing floor, Godown, store, office and test lab etc.
- (iii) Testing and measuring equipment duly calibrated.
- (iv) Trained technical manpower.

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3.2 In case fabricator is satisfied that the infrastructure and other available requirements listed above are commensurate with the stated requirements, then firm shall apply for registration ON-LINE on the RDSO website. All relevant documents like Guidelines for Registration and Quality Audit of Vendors in Bridge & Structure Directorate, Application Form, Schedule of Technical Requirement (STR). etc. are available on the RDSO website. The requisite charges as specified on website are to be deposited through the means as specified on the RDSO website.

3.2.1 The firm has to submit ONLINE complete application form, relevant supporting documents regarding compliance of STR and undertaking in support of self-compliance of this STR. The firm has also to submit the Undertakings and Documents as mentioned in Doc No. BS-G-4.2.3-1 (latest version) titled “*Guidelines for Registration and Quality Audit of Vendors in Bridge & Structure Directorate.*”

3.2.2 For detail procedure for Registration and other related aspects, refer to Doc No. BS-G-4.2.3-1 (latest version) titled “*Guidelines for Registration and Quality Audit of Vendors in Bridge & Structure Directorate.*”

4.0 Norms for Acceptance:

To qualify for manufacture and supply of Elastomeric Bearings, a firm must satisfy the requirement as laid down in Para 5, 6, 7 & 8.

5.0 **General and Infrastructural Requirements:** Provide Detail Information on items given below and enclose necessary documents in support as applicable ONLINE:-

5.1.1 The fabricator must have adequate organization including supervisors, skilled worker and other categories of manpower to execute the manufacturing work in competent manner. Firm shall employ full time engineer staff, qualified to manufacture bearings under quality control and as such have full time trained Chemist/Scientist/Engineer for chemical and physical testing. Necessary document/Undertaking in this regard shall be submitted to RDSO(Enclose list of staff along with Qualification & experience of employees.).

5.2 A proper organization must exist to perform the functions of purchasing of various raw materials, bought-out components, consumables, etc. and maintaining the purchasing documents including inspection certificates, test certificate etc. (Enclose list of staff along with Qualification & experience of employees.).

5.3 A proper procedure for maintenance of records for receipt and consumption of raw material should be in vogue or developed so as to allow verification by

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railway's representative. The firm shall maintain list of consumption of raw material including test records for a period of at least preceding five years. The record should be maintained in such a way that raw material traceability can be ensured with specific elastomeric bearing manufactured and supply by firm.

5.4 Adequate power supply should be arranged through distribution agencies with back up through captive generation. (Necessary documents in support to be enclosed).

5.5 Covered bay area with proper handling facilities should be available to handle day today fabrication of Elastomeric Bearings

The premises should have covered storage area to store raw material, sub-assemblies and finished products.

5.6 Covered shed area protected from rain, dust etc. should be provided for manufacturing, inspection and testing of Elastomeric bearing. Adequate space for storing fabricated component in controlled environment like temperature and humidity shall be available.

5.7 The firm is required to have in-house capability for designing the bearings based on forces, movements and rotation etc. supplied by the clients. For this purpose an adequately equipped design office with full time design engineer shall be there.(Enclose list of staff along with Qualification & experience of employees).

Note: Applicant has to submit neat copy of plan of works premises & show detail of specific area/space for each activities especially mentioned in Para 5.5 to Para 5.7.

5.8 Firm should submit the details of equipments/machinery i.e. make, model, year of manufacture, machine no. etc. for Equipments and Machineries mentioned in para 6preferably in a chart form.(Machinery owned by sister concern will not be accepted).

5.9 It should be mandatory to inform the RDSO through FAX/E-mail (followed by confirmation copy through courier/speed post) as soon as any machinery is removed from the firm's premise (even for repair etc.). RDSO should be informed again, when brought back and made operational.

5.10 Digital Signatures:

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It is mandatory for all the vendors to obtain Digital Signature Certificate & get registered with IREPS at <http://www.ireps.gov.in> immediately after approval from RDSO

6.0 Facilities required for manufacturing of Elastomer/rubber components

6.1 RAW MATERIAL:

(i) The Elastomer used in manufacture of elastomeric bearing should be either Natural Rubber (NR) or Chloroprene Rubber (CR). It should be in accordance to relevant provision of IRC-83 (Part-II) latest edition. Important points are given as below:

(a) In case of Chloroprene rubber (CR), the grade of raw elastomer shall be:

(i) Neoprene WRT, Baypren 110, Skyprene B-5 and Denka S-40 V grade are to be used as raw elastomer in case of Chloroprene rubber for the manufacturing of the elastomeric bearings and no other chloroprene should be accepted as equivalent of neoprene WRT.

(ii) The firm for elastomeric bearings shall either import chloroprene directly, or will purchase the material from an authorized agent of the foreign manufacturer.

(b) In case of Natural Rubber, Grade of raw elastomer shall be RSS 1X conforming IS :5561

(ii) Laminates of mild steel conforming to IS: 2062/IS: 1079 or equivalent internal grade shall be used. The yield stress shall not be lesser than 250 MPA.

6.2 Fabricator should have the in-house manufacturing facilities. Following machines/equipment should be available with the manufacturers: for supply of Elastomeric Bearings. Provide quantity, make, model no., S.No. capacity, year of manufacture/commissioning, Machine number etc. preferably in a chart form as applicable.

(i) Close Mixing mill/Open mixing mill.

(ii) Extruder Machine

(iii) Automatic thermic heating molding

(iv) Adequate number of dies and transfer moulds for the product.

(v) Minimum three numbers of portable pneumatic tools (grinders, drilling machines, chipping machines).

(vi) Cutting dies for steel plates.

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- (vii) Buffing machine/Polishing Machine
- (viii) Straight cutting Machine
- (ix) Hydraulic press machine
- (x) Suitable spraying facilities for application of adhesive within built provision of stirring.
- (xi) Minimum three nos. of measuring instruments (micrometers, dial gages, vernier calipers, Go-No-Go gauges).
- (xii) Sand/Grit Ballasting Machine
- (xiii) Automatic weighing system.

6.3 Following laboratory facilities for testing of elastomeric bearing/elastomer must be available with fabricator/firm .Provide quantity, make, model no., S.No., capacity, year of manufacture/commissioning, Machine number etc. preferably in a chart form as applicable.

- (i) Universal Tensile strength testing machine
- (iii) Fixture for load deflection with suitable electromechanical load testing machine
- (iv) Fixture for bond test with suitable electromechanical load testing machine
- (v) Minimum two set suitable fixture for compression load deflection test with suitable electromechanical load testing machine.
- (vi) Calibrated measuring tape
- (vii) Calibrated Vernier Caliper
- (viii) Calibrated parallelism meter
- (ix) Ageing oven /Chamber
- (x) Compression set testing apparatus
- (xi) Minimum two Nos shore hardness testers with standard test pieces.
- (xii) Separate laboratory mixing mill and laboratory testing hydraulic press with temperature control, digital indicator timer and pressure gauge.
- (xiii) Viscometer to check viscosity of adhesive
- (xiv) Specific gravity testing apparatus

6.4 The firm should have in-house/Outsourced testing facilities for followings parameters in given specification or should have an arrangement with a NABL/NABCB approved test laboratory for getting required test done.

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- (i) Rubber/Elastomer testing facilities along with Spectrophotometer for ozone resistance testing as per ISO: 1431-1.
- (ii) Polymer content testing facilities as per ASTM D-297
- (iii) Ash content Testing facilities as per IS 3400-Part XXII
- (iv) Polymer identification testing as per IS 3400:Part XXII
- (v) Pyrolysis testing facilities as per IS 3400:Part XXII
- (vi) Percentage polymer content as per IS 3400:Part XXII
- (vii) Adhesion strength of elastomer to steel plate as per IS 3400 Part XIV Part A
- (viii) Polymer identification and conformation about percentage of polymer content and ash content by TGA method.

Note:- If facility is in house provide details of Equipment like, Make, Model Number, Capacity, Year of manufacture/ commissioning and copy of test certificates issued earlier. If outsourced, submit copy of MOU with NABL/NABCB Lab and copy of some previous Test Certificate issued by NABL/NABCB Lab. The MOU should have validity of minimum 60 months.

6.5 Firm shall give an undertaking regarding various test method as given in IRC: 83 (Part II).

“Undersigned as an authorised signatory (as per Annexure 4) of M/s (Firm Name) give an undertaking that the entire in house manufacturing and testing facilities can accomplish the manufacturing and testing of Elastomeric Bearing as per IRC 83-2018 (Part-II).However outsourced testing facilities has been seen/checked by M/s(Firm Name) and found in order as per IRC:83-2018 (Part –II).

6.6 At any stage, in case client demands the testing certificate or test requirement, the same should be done from NABL/NABCB accredited Labor any other lab specified by client only.

7.0 Quality Assurance Aspect:

7.1 System for testing of raw material to ensure that it confirms to relevant specification should exist. The traceability of material with supplied bridge bearing should be there.

7.2 All equipment must meet the requirements of relevant BIS or other international specifications. It will be fabricators responsibility to satisfy the inspecting engineer that all the equipments/accessories confirm to BIS or

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anyother standard in absence of marking on such equipment/accessories. All these equipment/accessories will be subjected to periodic tests and records maintained. System of periodic maintenance of M&P must be in vogue and proper record maintained. A brief on this aspect should be enclosed.

- 7.3 There should be a system to ensure the traceability of the product from raw material stage to finished stage.
- 7.4 Firm should have Quality Assurance Plan (QAP) for the product manufactured by them detailing various aspect –
- Organization chart
 - Flow inspection details
 - Stage inspection details
 - Various parameters and to ensure control over them for ensuring quality.
- 7.5 A system should be in force for analysis of non conformities noticed during internal and external inspections of the final product and sub-assemblies. A dynamic arrangement for a feedback to the source or non conformities and rectification thereof should be in vogue. Necessary performas followed to be enclosed.
- 7.6 Quality control records must be maintained as per requirements. Necessary performas followed to be enclosed.
- 7.7 Proper records should be maintained for complaints received from the customers and corrective action taken. Necessary performas followed to be enclosed.
- 7.8 A system of identifying and segregating the non-conforming products and their disposal should be in force to avoid unintended use of non-conforming product. Necessary Performas followed to be enclosed.
- 7.9 The fabricator must have relevant specifications/Codes commonly referred in connection with fabrication of Elastomeric Bearings.
- 8.0 Quality audit:**
1. Quality Audit of the Registered Vendors will be done every five years.
 2. The firm should satisfy the following requirements to continue as approved vendor

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- a) The firm should continue to maintain the infrastructure, facilities and Machineries & plants as required at the time of Quality Audit as per prevailing STR.
- b) The firm should have executed/completed at least one work of manufacturing and supply of elastomeric bearing for bridges. For the purpose of this clause, the manufacture and supply for elastomeric bearing for at least one span against a multiple span will be considered/treated as completed work. The supply shall be for any Gov. agency/PSU. Supply to private firm shall be considered only for that firm whose turnover is more than 25 Crores.

Note:- i) Previous experience will be considered only for the works completed after fresh vendor registration or previous quality audit.

ii) The applicant has to submit the concerned fabrication details along with performance certificate from client, explicitly as supporting documents and in absence of documents, experience will not be considered. Certificate issued only by Govt./ Semi Govt./PSU's will be accepted for this purpose.

iii) Performance certificate from Private individuals can also be accepted provided the annual turnover of any year for last three financial years of private firm is not less than 25 Crores. In support of this the applicant has to submit necessary certificates or Audited Balance Sheets of Chartered Accountant or Income tax returns.

- c) The firm should not have any adverse report from any of the Railways.
3. For Quality Audit, firm will be inspected for facilities provided under Para 4 to 8 of this STR, which in turn will be verified, after inspection by the RDSO team. The firm should also give an undertaking that organizational and infrastructural requirement as required at the time of Quality Audit have been maintained.

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9.0 RESPONSIBILITY AND AUTHORITY:

The following table indicates responsibility related to this document:-

Activity	Responsible	Approver	Supporting	Consulted	Informed
Creation, maintenance of this document	DBS/IV	ED/B&S/Steel	DD Insp., AE/Insp. and Staff of DD/Insp.	-	Through intranet/soft copy.
Compliance of Directive contained in this document	ADE/B&S	JDBS/IV	Directorate staff	-	-
Requirement of Deviation from Directive	DBS/IV	ED/B&S/Steel	DD/Insp., ADE/Insp.	-	Through intranet/soft copy

10.0 ABBREVIATION:

- ED = Executive Director/B&S
- DBS = Director/Joint Director (B&S)/Insp.
- DD/Insp. = Deputy Director/Inspection
- ADE = Assistant Design Engineer
- SE = Section Engineer/Inspection
- JE (D) = Junior Engineer (Design)

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