

ISO9001:2015	Doc No. BS-7.5.3.1-11	Version. No: 1.1	Date Effective: 01-07-2022
Document Title:	<b>SPECIFICATION AND SCHEDULE OF TECHNICAL REQUIREMENT (STR) FOR MANUFACTURE AND SUPPLY OF EXPANSION JOINT TO INDIAN RAILWAY FOR USE ON RAILWAY BRIDGES /ROB.</b>		

**RESEARCH DESIGNS AND STANDARD ORGANISATION  
MANAK NAGAR, LUCKNOW-226011**

Document No : **BS-7.5.3.1-11**

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**AMENDMENT HISTORY:**

<b>S.No.</b>	<b>Amendment Date</b>	<b>Version</b>	<b>Reasons for Amendments</b>
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 Expansion Joint alongwith specification. Major changes have been made.

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## **SPECIFICATION AND SCHEDULE OF TECHNICAL REQUIREMENT (STR) FOR MANUFACTURE AND SUPPLY OF EXPANSION JOINT TO INDIAN RAILWAY FOR USE ON RAILWAY BRIDGES/ROB**

### **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 Expansion Joint to Railways for use on Railway bridges/ROB

### **2.0 Specification of manufacture and supply of Expansion Joint:**

The specification for manufacturing and supply of Expansion Joint for Railways for use on railway bridges /ROB shall be IRC:SP:69-2011, Latest Edition.

### **3.0 Procedure for Registration of Firms for manufacture and supply of Expansion Joints**

#### **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.

#### **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, and 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."**

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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 Expansion Joint, 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 expansion joint 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 railway’s representative. The firm shall maintain list of consumption of raw material including test records for a period of atleast preceding five years. The record should be maintained in such a way that raw material traceability can be ensured with specific expansion joint 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 Expansion Joint.

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

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5.6 Covered shed area protected from rain, dust etc. should be provided for manufacturing, inspection and testing of Expansion Joint. 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 Expansion Joint 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 6 to 7 preferably 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:

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:** Fabricator should have the in house/Outsourced testing facilities as required in Table 1 and Table 2. In case in house, provide quantity, make, model no., S.No. Capacity, year of manufacture/commissioning, Machine number etc. preferably in a chart form as applicable. If outsourced, submit copy of MOU with NABL/NABCB accredited Lab and copy of some previous Test Certificate issued by NABL/NABCB Lab. The MOU should have validity of minimum 60 months.

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**Table 1: Standard for testing of Chloroprene Seal**

<b>Property</b>	<b>Standard</b>
Hardness	DIN 53505 ASTM D 2240*
Tensile Strength	DIN 53504 ASTM D 412*
Elongation at fracture	DIN 53504 ASTM D 412*
Tear propagation strength Longitudinal Transverse	DIN 53507 ASTM D 264* Dia C)
Shock elasticity	DIN 53512
Abrasion	DIN 53516
Residual compression strain (22h/70°C/30% strain)	DIN 53517 ASTM D 395 (Method B)
Ageing in hot air 14 days/7-%C) Change in hardness Change in hardness Change in tensile strength Change in elongation at fracture	DIN 53508
Ageing in ozone (24h/50 pphm/25°C/20% strain)	DIN 53509
Swelling behaviour in oil (168h/25°C) ASTM OIL No. 1 Volume change Change in hardness ASTM oil No.3 Volume change Change in hardness	DIN 53521
Cold hardening point	ASTM D 1043

**Note:** Only one set of specification viz. ASTM or DIN shall be followed depending on the source of supply.

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**Table 2: Standard for testing of Closed Cell Form Seal**

Property	Standard
Density	
Compression Set on 25mm	(ASTM D 3575)
Working temperature	-70 to + 70 <sup>0</sup> C
Water absorption (total immersion for 3 months) (	ASTM 3575)
Tensile strength	
Elongation at break	(ASTM D 3575)
Adhesion Strength	IS 3400 pt XIV
Low temperature stiffness	ASTM D-797
Ash Content	IS 3400 pt XXII
Polymer identification test Infrared Spectro photometry	ASTM D 3677

6.2 Fabricator should have the in house/Outsourced manufacturing facilities for rubber component.

- (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.
- (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) Sand/Grit Ballasting Machine
- (xii) Minimum three nos. of measuring instruments (micrometers, dial gages, vernier calipers, Go-No-Go gauges).
- (xiii) Automatic weighing system.

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

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earlier. If outsourced, submit copy of MOU with RDSO approved firm for Elastomeric Bearing. The MOU should have validity of minimum 60 months.

### 6.3 Facilities required for manufacturing and supply of Expansion Joints

Following machines/equipment shall be available with the manufacturer: Provide quantity, make, model no., S.No. Capacity, year of manufacture/commissioning, Machine number etc. preferably in a chart form as applicable.

- Oxy acetylene gas profile cutting equipment of adequate size.
- Radial drilling machines of adequate capacity.
- Shaper machine.
- Welding rectifier/transformer.
- Suitable welding manipulators for assembly of expansion joints.
- Grinder.
- Adequate no. of measuring instruments (Vernier calipers, Go-No-Go gauges).
- Gauges for checking weld size, throat thickness and edge preparation etc.
- Wire brushes and deslagging hammers for all welders.
- Facilities for surface preparation/painting and metalizing.
- Hot dip galvanization facilities (Out sourcing is permitted MOU with agency shall be required for minimum period of 60 months.)
- Sand/Shot Blasting
- Elcometer.

6.4 Following laboratory facilities for testing of Expansion Joint 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) Cyclic motion testing facilities as per Para 8.3..2.1 of IRC:SP:69-2011
- (ii) Ponging testing facilities as per Para 8.3..2.2 of IRC:SP:69-2011
- (iii) Debris Expelling facilities as per Para 8.3..2.3 of IRC:SP:69-2011
- (iv) Pull out testing facilities as per Para 8.3..2.4 of IRC:SP:69-2011
- (v) Opening movement vibration test facilities as per Para 8.3..2.5 of IRC:SP:69-2011

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- (vi) Fatigue testing facilities
- (vii) Abrasive resistance test facilities
- (viii) Universal Tensile strength testing machine
- (ix) Calibrated measuring tape
- (x) Calibrated Vernier Caliper
- (xi) Calibrated parallelism meter
- (xii) Ageing oven /Chamber
- (xiii) Minimum two nos shore hardness testers with standard test pieces.
- (xiv) Viscometer to check viscosity of adhesive
- (xv) Specific gravity testing apparatus
- (xvi) Bend Test facilities
- (xvii) Impact testing facilities

6.5 Material to be procured must meet the requirement of relevant specifications (current version). Generally following specifications are referred to and fabricator is required to have copies of these specifications:

- IS : 1079 for shuttering plates
- IS:1030 for cast steel
- IS : 2062 for structural steel
- AISI : 304 for stainless steel
- IS : 1364 for hexagonal screws
- IS : 1852 for general tolerances

6.6 Firm shall give an undertaking regarding various test method as given in IRC: SP:69-2011, Latest Edition.

“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 Expansion Joint as per IRC:SP:69-2011.However outsourced testing facilities has been seen/checked by M/s .....(Firm Name) and found in order as per IRC:SP:69-2011.

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6.6 At any stage, in case client demands the testing certificate or test requirement, the same should be done from NABL/NABCB accredited Lab or 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 expansion joint 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 any other 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 performa followed to be enclosed.

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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 Performa followed to be enclosed.

7.9 The fabricator must have relevant specifications/Codes commonly referred in connection with fabrication of Expansion Joint.

## 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

a) The firm should have successfully executed/completed at least one work of manufacturing and supply of Expansion Joint for bridge. For the purpose of this clause, the manufacture and supply for one set of Expansion Joint 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	ED/B&S/Steel	ADE/B&S and Staff.	-	Through intranet/soft copy.
Compliance of Directive contained in this document	ADE/B&S	DBS/IV	Directorate staff	-	-
Requirement of Deviation from Directive	DBS	ED/B&S/Steel	ADE/B&S	-	Through intranet/soft copy

## 19.0 ABBREVIATION:

- ED = Executive Director/B&S
- DBS = Director/Joint Director (B&S) Concerned.
- ADE = Assistant Design Engineer concerned
- SE = Section Engineer Concerned
- JE = Junior Engineer (Design)

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