

REVISION OF SPECIFICATION / STR

Ref: Draft Spec. No. RDSO/2007/CG-05 (Rev-2), Specification for UIC Type Elastomer Flange Connections for Intercommunication Between Passenger Coaches.

1. RDSO is reviewing the specification/STR to cater to the latest technological developments in the field, modify clauses not relevant in the present context and making them more enabling with focus on functional requirements.
2. It is requested that your comments / suggestions with regard to improvements / modifications in specification / STR of this item may be submitted in the following format along with the justification for the changes required.

Part A: Basic Information

SN	Particulars	Information
1	Name	
2	Designation	
3	Professional Qualification	
4	Organization / Firm's Name	
5	Address for Correspondence	
6	Contact No.	
7	Email ID	
8	<u>In case of Firm / Individual:</u> Manufacturing experience of item (or similar Item) on which comments are offered	
9	<u>Where relevant:</u> Whether any technical document to support suggested changes is available / enclosed for better appreciation	

Part B: Comments / suggestions on the specification

SN	Clause No. of RDSO STR / Spec	Clause, as exists in RDSO STR / Spec	Clause, as it should read after incorporation of comments / suggestions in the RDSO Spec / STR	Justification for changes

Comments may be sent to:

Director/SS/Carriage
Research Designs and Standards Organization
Manak Nagar, Lucknow – 226011

Email: edcar.rdso@gmail.com Or dirssrdso@gmail.com

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INDIAN RAILWAYS



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SCHEDULE OF TECHNICAL REQUIREMENTS FOR UIC TYPE ELASTOMER FLANGE CONNECTIONS FOR INTERCOMMUNICATION BETWEEN PASSENGER COACHES

S.No.	Month/Year of issue	Revision/ Amendment	Page No.	Reason for amendment
1	June – 2007	Nil	-	First Issue
2	November-2018	Rev.1	All pages	1. Upgraded the value of “Toxicity” and “Heat Release Rate”. 2. Clause No. 4.1 modified.
3	August-2020	Rev.2	9	Clause no. 10 of Section-A is modified.

Issued by:
CARRIAGE DIRECTORATE
RESEARCH DESIGNS AND STANDARDS ORGANISATION
MANAK NAGAR, LUCKNOW – 226011

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SCHEDULE OF TECHNICAL REQUIREMENTS FOR ELASTOMER FLANGE CONNECTIONS FOR INTERCOMMUNICATION BETWEEN PASSENGER COACHES

0. Foreword

- 0.1 This schedule is intended to cover the technical requirements/provisions relating to materials construction and tests and does not include all the necessary-provisions of the contracts.
- 0.2 This schedule draws references to some of the relevant Naval, UIC, ISO and other Indian Standard specifications. Unless otherwise stated, the latest version of the relevant specification shall be taken as reference.
- 0.3 For the purpose of deciding whether a particular requirement of the schedule is complied with the final value observed or calculated expressing the results of a test or analysis shall be rounded off in accordance with IS:2-1980. The number of significant places retained in the rounded off value should be the same as that of the specified value in this schedule.
- 0.4 In this schedule due consideration has been given to the developments in the field of polymeric materials, process technologies and serviceability requirements of the Indian Railways and the practices followed in advanced countries in the field.
- 0.5 This schedule consists of two sections i.e. Section-A and Section-B. Section-A covers the technical requirements, methods of sampling and tests of elastomer flange connections for intercommunication between passenger coaches and Section- B covers infrastructural requirements for manufacture, testing and quality control at the works of the manufacturers.

SECTION-A

1. Scope

- 1.0 This section prescribes the requirements and methods of tests of elastomer flange connections for intercommunication between passenger coaches.
- 1.1 'All the provisions contained in RDSO's ISO procedures laid down in Document No. QO-D-7.1-11 dated 19.07.2016 (titled "Vendor-Changes in approved status") and subsequent versions/amendments thereof, shall be binding and applicable on the successful vendor/vendors in the contracts floated by Railways to maintain quality of products supplied to Railways.'

2. Scope of Supply

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2.1 Scope of supply shall include the following items: -

2.1.1 Two Numbers/set of lateral side flanges Item-3 of RDSO drawing No. SK-99056 for BG and item-3 of the drawing No. SK- 89142 for MG coaches.

2.1.2 One number/set of upper flange Item-2 of RDSO SK-99056 for BG and item-2 of SK- 89142 of MG coaches.

3. Performance Requirements

3.1 The elastomer flange connections shall be fitted on passenger coaches as per arrangement shown in RDSO.SK-99056 for BG and SK-89142 for MG coaches.

3.2 The elastomer flange connections shall be used on coaches fitted with screw coupling and side buffers or center buffer couplers. Maximum travel in buff and in draw will be 90 mm and 58 mm for BG and 65 mm and 33 mm for MG coaches respectively.

3.3 Environmental conditions in which Elastomer flange connections to be used shall be as under:-

Maximum temperature in sun	70°C
Maximum temperature in shade	45°C
Humidity	100% saturation during rainy season
Rainfall	Fairly heavy
Environment	Dusty during hot weather saline and corrosive in coastal areas

4. Design Requirements

4.1 In order to achieve the intended physical and fire retardant properties, the firm has to declare the primary elastomer to be used along with and its source of procurement (i.e. OEM or Authorized dealer of OEM) in their QAP. In case of procurement from Authorized dealer of OEM, a document from OEM supporting valid Authorization alongwith documents to establish traceability of purchase from OEM shall also be furnished to inspecting agency. The firm has to get verified all the physical and fire retardant properties by the Vendor approving authority at the time of initial approval/subsequent audit or whenever primary elastomer is changed in the QAP. The firm should maintain complete purchase records of raw material procured through OEM or Authorized dealer and quantity manufactured in order to ensure consistency in quality. During inspection, these records shall also be furnished to inspection agency.

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- 4.2 Unless otherwise stated all flanges shall be black.
- 4.3 The odour shall be as slight as possible and shall be not be objectionable.
- 4.4 Dimensions and tolerances shall be as specified in RDSO drawing number SK- 99056 for BG and SK- 89142 for MG coaches.
- 4.5 The flange connections shall meet with all the requirements of Article 1 of UIC Code 561 OR.

5. **Physical Characteristics of Elastomer**

Characteristics required:

5.1 **Hardness in delivery condition**

Hardness of flanges in delivery condition when tested as per method given in article 5.4.1 of UIC Code 845 R of January, 2004 shall be 70 ± 5 degrees IRH or Shore type A.

5.2 **Tensile characteristics**

5.2.1 **Delivery condition**

Tensile characteristics of samples from flanges in delivery condition tested in accordance with Article 5.4.2 of UIC Code 845 R of January, 2004 shall be as under:

Yield strength	-	>1600 N/cm ²
Elongation percentage	-	>350

5.2.2 **After ageing for 7 days at 70 °C**

The characteristics recorded after ageing shall not differ by more than 20% from those recorded before ageing.

5.3 **Resistance to tearing in delivery condition**

When tested as per method given in Article 5.4.3 of UIC Code 845 R of January, 2004, the resistance to tearing of samples shall be greater than 300 N/cm thickness.

5.4 **Flexibility in delivery condition**

The diameters of the rings from flanges in delivery conditions, shaped by means of the device defined in Article 5.4.4 of UIC Code 845 R of January, 2004 and then compressed and subjected to a temperature of

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Firstly 27 ± 2 °C
Secondly -10 °C

The diameter of the rings shall remain at least equal to 85% of the original diameter after compression is discontinued.

5.5 Resistance to Abrasion in submission condition

Samples from flanges when prepared and tested as per Article 5.4.5 of UIC Code 845 R of January, 2004 shall have abrasive wear of less than 150 mm³.

5.6 Resistance to Ozone

When tested as per Article 5.4.6 of UIC Code 845 R of January, 2004 for resistance to ozone, the test piece shall not reveal any cracks or fissure visible with a lens magnifying 7 times.

5.7 Resistance to spread of flame

Test pieces from flanges, when tested to method 'A' of Appendix 10 of UIC Code 564-2 OR shall conform to class A.

5.8 Limiting Oxygen Index

Limiting oxygen index value should be minimum 35 when test pieces from flanges tested as per IS:13360 part-6, Section-19.

5.9 Deterioration of visibility due to smoke

Test pieces from flanges, when tested to Appendix 15 of UIC Code 564-2 shall conform to minimum class A.

5.10 Toxicity

The toxicity index should be less than 1.0 when test pieces from flanges tested as per Naval specification No.NCD-1409.

5.11 Heat Release Rate

Heat Release Rate (MARHE i.e. Maximum Average Rate of Heat Emission in KW/m²) shall be tested as per ISO 5660-1: 50 KW/m² and requirements as specified in R1 (HL3) of EN 45545-2:2013.

6. Manufacture

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- 6.1 The Eastomer flange connections shall be manufactured by direct molding.
- 6.2 The surface of the flange connections shall be even without cracks, pitting or burrs. There shall be no blistering.
- 6.3 Any treatment carried out with the objective of hiding a defect likely to be detrimental to the use of flange connections is forbidden.

7. Inspection

- 7.1 Inspection shall be carried out at the works of the manufacturer.
- 7.2 Manufacturer shall provide such additional materials or test pieces as may be required for testing and checking in compliance with this specification at his cost.
- 7.3 Manufacturer shall provide free of charge labour and appliances required by the inspecting authority.

8. Tests

- 8.1 The tests shall be classified as type tests, routine tests and acceptance tests.

8.2 Type Tests

- 8.2.1 All tests as specified in the schedule shall be carried out during initial approval/renewal of the manufacturer.
- 8.2.2 The test for resistance to ozone shall be repeated at an interval of six months.

8.3 Routine Tests

- 8.3.1 These tests shall constitute determination of hardness, tensile strength, Percentage elongation at break, resistance to tearing, resistance to spread of flame and flexibility test. The manufacturers shall keep the record of these tests for every batch/lot. In addition the values of specific gravity and ash content shall also be recorded for each batch/lot for the purpose of comparison with the lot offered for inspection as the same may be required during acceptance tests.

8.4 Acceptance Test

- 8.4.1 All the tests except resistance to ozone and resistance to abrasion mentioned in clause 5 of Section -A shall constitute acceptance test. When test specimens are required to be specifically prepared they shall form integral parts of the component/product. The authenticity of this integral part as compared to the product shall be verified as under: -

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- a) Polymer identification shall be identical
- b) Specific gravity Variation shall be within ± 0.02
- c) Ash content Variation shall be within $\pm 1.0\%$

Note: Manufacturer shall supply at least one test specimen of size 150x150x2 mm made from the rubber compound prepared for batch/lot production along with each lot of elastomer flange connection for quality check.

8.4.2 Preparation of Test Pieces

8.4.2.1 Test pieces shall be prepared as under for carrying out tests to check compliance of test pieces with requirements of clause as under: -

Nature of inspection and test	Number of test pieces	Shape and dimension of test pieces
i) Verification of the hardness in delivery condition	Each sample flange selected as per clause 9.2	On flange itself
ii) Tensile test		Dumb-bell shaped test pieces in accordance with ISO Standard 37 type 2
a) In delivery condition	3	samples for test after accelerated ageing shall be treated as per clause 8.4.2.2 of this schedule
b) After accelerated ageing	3	
iii) Test for resistance to tearing	3	Test pieces as defined in Article 5.4.3 of UIC Code 845 R of January, 2004
iv) Flexibility test	1	Test piece in the shape of a parallel piped 500mmx50mmx8mm
v) Abrasion test	1	Disc 16mm+/- 0.2mm in diameter and 6mm in thickness
vi) Test for resistance to ozone	1	Dumb-bell shaped test piece in accordance with ISO Standard 37 type 2
vii) Test for Resistance to spread of Flame	12 (6 longitudinally and 6 laterally)	Test pieces as defined in Appendix-10 of UIC – 564 -2 OR
viii) Deterioration of visibility due to smoke	3	Test pieces as defined in Appendix-15 of UIC – 564 -2 OR
ix) Limiting Oxygen Index	5	Test pieces as defined in IS:13360 part-6, Section-19.
x) Toxicity	1	150mmX150mm
XI) Heat Release Rate	3	100x100 mm

8.4.2.2 Test pieces for tensile test after accelerated ageing shall, after cutting up, baked at 70 °C for 7 days. The operations shall be carried out in accordance with ISO standard 188.

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8.4.2.3 RDSO may draw the samples for quality checks at its discretion and firm shall arrange the testing of these samples in a reputed outside laboratory as decided between RDSO and manufacturer. Testing charges shall be borne by the manufacturer.

9. Sampling

- 9.1 All flanges offered for inspection at a time shall constitute a lot.
- 9.2 Inspecting Officer shall select flanges at random from each lot presented for carrying out inspection. Samples shall be selected at 0.1% of the number of flanges in the lot offered subject to a minimum of 1 Sample selected shall be indelibly marked.
- 9.3 For fire retardant properties i.e. test for Resistance to spread of flame as per Appendix-10 of UIC-564-2 OR, Deterioration of visibility due to Smoke as per Appendix-15 of UIC-564-2 OR, Limiting Oxygen index as per IS:13360 part-6, Section-19, Toxicity as per NCD-1409 and Heat Release Rate as per ISO 5660-1: 50 KW/m², samples shall be drawn at the rate of 1 in 250 or part thereof.
- 9.4 One flange connection shall be selected for each series of tests.
- 9.5 Unless otherwise specified, all samples shall be tested in delivery condition.

10. Warranty

- 10.1 The manufacturer shall at his expense replace the Elastomer Flange connections failing or proving unsatisfactory in service within a period of ~~60 months after their delivery or date of fitment whichever is later~~, **84 months from the date of supply or 72 months from the date of fitment whichever is earlier** for failure attributed to defective/faulty design, defective material or poor workmanship. This warranty shall survive notwithstanding the fact that the equipment may have been inspected, accepted and payment thereof made by the purchaser. For the replaced equipment, the period of ~~60~~ **72** months would commence when the replaced equipment is commissioned in service. The sole judge in this case would be the purchaser.

11. Criteria for Acceptance

- 11.1 In case any characteristic which as a result of tests is found not to comply with the required conditions, samples at twice the scale indicated in clauses 9.2 and 8.1 shall be drawn and tested to meet the requirements of the schedule. The whole lot offered shall be rejected if any sample fails to meet any of requirements of this schedule during retests.

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11.2 In eventuality of rejection of a lot, IR marking shall be crossed out indelibly in presence of Inspecting Officer.

12. Marking

12.1 The flange connection shall be stamped indelibly with the following marks-

- i. Manufacturer's name / trade mark.
- ii. Month and Year of manufacture.
- iii. Batch / Lot Number
- iv. 'IR' mark.

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SECTION - B

SCHEDULE OF INFRASTRUCTURE, MANUFACTURING & TESTING FACILITIES AND QUALITY CONTROL REQUIREMENTS

1. Scope

This section covers the infrastructural requirements for manufacture and testing of elastomer flange connections for intercommunication between passenger coaches.

2. Requirements

All vendors seeking registration must fulfill the requirements of this schedule.

3. General & manufacturing facilities:

3.1 Manufacturers shall have adequate space and covered area with cemented floor to accommodate the following:

- i) Damp free space for storage of raw materials
- ii) Independent manufacturing area
- iii) Finishing and inspection area

The covered area should be free from dampness and humidity.

3.2 The manufacturer shall have the following weighing facilities:

- a) Electronic weighing balance of 2 to 5 kg capacity.
- b) Mechanical spring balance or platform weighing machine of the capacity of minimum 50 kg of reputed make.

It shall be ensured that the weighing machines are calibrated regularly as per manufacturers/IS specification.

3.3 One number internal mixer (Kneader) of adequate capacity should be available for mixing elastomer compound.

3.4 One number open mixing mill of 14"x36" for sizing of elastomer sheet should be available.

3.5 Minimum one number hydraulic power press of size 3ft.x6½ft. length platen size should be available for moulding of flanges.

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3.6 One mould for each horizontal and vertical Flange shall be available in accordance to the dimensions specified in the relevant drawings.

3.7 Manufacturer shall ensure that a system should exist to check the dimensional accuracy of the mould before its use, in case the mould is used after a gap of considerable time period.

4. Testing facilities:

4.1 Controlled atmosphere laboratory to maintain standard temperature and humidity for elastomer testing should be available.

4.2 Tensile testing machine capable to read the load and elongation as per the requirement of the product should be available. The tensile testing machine should have all the provisions in accordance with ISO Standard 37.

4.3 The firm shall have facility to conduct Tear Strength Test or Resistance to Tearing test as per Clause - 5.4.3 of UIC Code 845 R of January, 2004.

4.4 The firm shall have facility to conduct flexibility test as per article 5.4.4 of UIC Code 845 R of January, 2004.

4.5 The firm should have minimum one number of hot air oven to facilitate the testing the ageing test in accordance with ISO Standard 188.

4.6 The firm should have minimum one number muffle furnace for conducting ash content test.

4.7 The firm should have minimum one number Shore 'A' hardness tester.

4.8 The firm should have one number Vernier caliper with digital display.

4.9 The firm should have the suitable facility for preparing the test specimen from the product.

4.10 The firm should have minimum one number of chemical balance, 4 crucibles and one desiccator's of adequate size for measuring ash content.

4.11 The firm should have the facilities for testing the specimens for resistance to abrasion and resistant to ozone. In case in-house testing facility is not available with the firm, the same can be tested in reputed outside laboratory. The testing charge shall be borne by the manufacturer.

4.12 The firm should have in house testing facilities for Resistance to spread of flame

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As per Appendix-10 of UIC 564-2 OR, limiting oxygen index as per IS: 13360 part-6, Section-19, Deterioration of visibility due to smoke as per Appendix-15 of UIC 564-2 OR, Toxicity Index as per Naval Specification No.NCD:1409 and Heat Release Rate as per ISO 5660-1.

5. Quality control requirements:

- 5.1 The firm should have acquired ISO: 9001- 2008 certification by a certifying agency, which is accredited to NABCB.
- 5.2 The Quality manual of the firm for ISO: 9001- 2008 should clearly indicate at any stage the control over manufacturing and testing of the said railway product.
- 5.3 There should be a system to ensure the traceability of the product from raw material stage to finished product stage. The system should also facilitate to identify the raw material composition from the finish product stage.
- 5.4 It should be ensured that there is a Quality Assurance Plan for the product detailing the following various aspects:
 - Organisation chart
 - Process flow chart
 - Stage inspection details from raw materials stage to finish product stage
 - Various parameters to be checked and level of acceptance of such parameters indicated and method to ensure control over them.
 - Disposal system of rejected raw material and components.
- 5.5 There should be at least one full time technologist having a minimum bachelor's degree in relevant field with experience of at least 5 years or a person with diploma in relevant field with 12 years experience. He should be free from day-to-day production, testing and quality control responsibilities. He should be mainly responsible for development of a product, analysis of products, control over raw material, and corrective action in case of difficulties in achieving the parameters.
- 5.6 Ensure that the incharge of the Quality Control Section is having a qualification of minimum bachelor's degree in the relevant field and has a minimum of 5 years experience. Alternatively he should be a diploma holder with minimum of 12 years experience. He should be actively involved in day-to-day activities of quality control / stage inspection / compliance of QAP etc.
- 5.7 The firm must ensure that proper analysis is being done on monthly basis to study the rejections at various internal stages and it is documented.

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5.8 The firm should ensure that latest version all the relevant specifications, IS standards are available with the firm.

6. Documentation:

Firm shall maintain following documents/records:

- 6.1 A well documented Quality Plan.
- 6.2 Incoming raw material register with Test Certificates references of suppliers and internal test results.
- 6.3 Stage inspection results including finished products results.
- 6.4 Records of internal rejection and its analysis vis-a-vis action plan.
- 6.5 Records of final products inspection by external agencies (like RDSO), non-conformity reports and case analysis as well as action taken thereof.
- 6.6 Records for maintenance of dies/moulds.
- 6.7 Ensure that proper systems are available for dealing with customer complaint.

7. Training:

- 7.1 Training needs should be identified for all concerned officials and regular training shall be organised and imparted on maintenance of machines, quality assurance, safety parameters etc.

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