

## REVISION OF SPECIFICATION / STR

**Ref:**Current Spec. No. C-9911(Rev-3) Corrigendum-1 Amendment-6, STR for Fire Retardant Curtain fabric.

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 alongwith 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	<b><u>In case of Firm / Individual:</u></b> Manufacturing experience of item (or similar Item) on which comments are offered	
9	<b><u>Where relevant:</u></b> 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:**

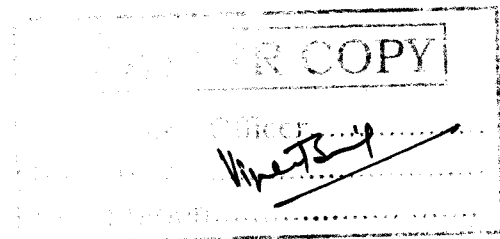
Director/SS/Carriage  
Research Designs and Standards Organization  
Manak Nagar, Lucknow – 226011

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

**INDIAN RAILWAYS**



सत्यमेव जयते



**SCHEDULE OF TECHNICAL REQUIREMENTS FOR  
FIRE RETARDANT CURTAIN FABRIC**

S.No.	Month/Year of issue	Revision / Amendment	Page No.	Reason for Amendment
1.	Nov. – 1999	-	-	First issue
2.	Feb., 2001	Rev.1	-	-
3.	May – 2001	Rev.2	-	-
4.	Feb. – 2005	Rev.3	3,4,5,6	To upgrade the fire resistant to UIC Standards
5.	Jan. – 2010	Amendment.1	6	Testing frequency of fire properties Modified and clause for quality check added.
6.	April-2013	Amendment.2	6	i) Colour Fastness to day light has been classified as Type test. ii) Toxicity test has been assigned as acceptance test. iii) Random quality check added under para 5.
7.	Feb-2014	Amendment.3	5	Condition for testing of Resistance to Spread of flame,LOI & Deteriorationin Visibility due to Smoke added.
8.	April-2015	Amendment.4	5&6	i)Fire Worthiness Properties upgraded ii) Heat Release Rate test specified
9.	May,2015	Corrigendum-1	6	Clause no. 5.4 deleted from amendment slip no.4
10.	Sept.2015	Amendment.5	6	New clause no. 5.4added
11.	August,2016	Amendment.6	3	To include the ISO Doc. No. QO-D-7.1-11, new sub clause no. 1.2 added under clause no. 1

Issued By:

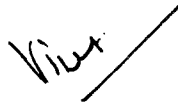
**Carriage Directorate  
Research Designs and Standards Organization  
Manak Nagar, Lucknow – 226011.**

Signature			
Name & Designation	Prepared By: Sonu Kr. Gupta JE/Design/SS	Checked By: Praveen Kumar Dy. Director/SS	Approved By: Vineet Singh Director/SS

**Amendment slip No.6** of August 2016 in spec No. C-9911(Rev.3) Schedule of Technical Requirements for fire retardant curtain fabric

**New sub clause – 1.2 added as under**

1.2 '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.'



**Amendment slip No.5** of September 2015 in spec No. C-9911(Rev.3) Schedule of Technical Requirements for fire retardant curtain fabric

**New clause – 5.4 added as under**

**5.4** Test for Heat release rate (HRR) shall be a type test and carried out on every six month till 31.03.2016. Thereafter it will be part of acceptance test.

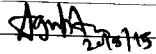
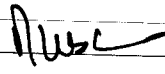
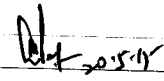
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**Corrigendum No.01 of Amendment slip No. 4** of may, 2015 to spec No. C-9911 (Rev.3) Schedule of Technical Requirements for fire retardant curtain fabric

**Clause – 5.4 deleted from Amendment slip No. 4. Of April-2015**

Signature			
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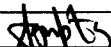
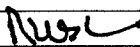
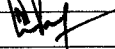
**Amendment slip No. 4** of April, 2015 to STR No. C-9911(Rev.3) for fire retardant curtain fabric.

In table No.1.of Clause 2.5, Properties at S. No. 7 to 10 has been amended, property at S. No. 11 added and shall be read as under:

S. No.	Property	Value	Method of Test
7.	Resistance to spread of flame	Class-A	Appendix-5 of UIC 564-2
8.	Limiting Oxygen Index	Minimum 35	IS: 13501
9.	Toxicity	Less than 1	NCD 1409
10.	Deterioration of visibility due to smoke	Class-A	Appendix-15 of UIC 564-2
11.	Heat Release Rate (MARHE i.e. Maximum Average Rate of Heat Emission in KW/m <sup>2</sup> ) as specified in EN 45545-2:2013	R1 (HL3)	ISO 5660-1: 50KW/m <sup>2</sup>

**New clause – 5.4 and 5.5 added as under**

- 5.4** Test for Heat release rate (HRR) shall be a type test and carried out on every six month till 01.01.2016. Thereafter it will be part of acceptance test.
- 5.5** The firm should have in-house testing facilities as per ISO 5660-1 for conducting test for Heat release rate (HRR) w.e.f. 01.01.2016. Till such time, firm should arrange testing at reputed laboratory as decided between IR/Inspecting Authority and manufacturer. The cost of testing will be borne by the manufacturer.

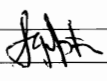
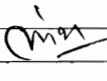
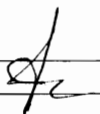
Signature			
Name & Designation	Prepared By: Sonu Kr. Gupta JE/Design/SS	Checked By: P. K. Srivastava Jt. Director/SS	Approved By: M.K. Pandey Director/SS

**Amendment slip No. 3** of Feb. 2014 to STR No. C-9911(Rev.3) for fire retardant curtain fabric.

**Following note to be added in the end of Clause No. -2.5 of Section – A**

**Note:**

The properties mentioned at S. No. 7, 8 & 10 (Resistance to spread of Flame, Limiting Oxygen Index & Deterioration of visibility due to smoke) of clause No. 2.5 of section-A, shall be tested 'after 10 (ten) washes followed by 10 (ten) dry cleaning'.


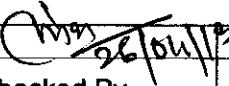
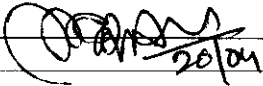
Signature			
Name & Designation	Prepared By	Checked By	Approved By

**Amendment slip No. 2** of April 2013 to STR No. C-9911(Rev.3) for fire retardant curtain fabric.

**Clause No. -5 of Section - A may be read as under,**

**5 No. of Test:**

All the tests given in Table - 1 except Colour fastness to day light shall be carried out on each lot. The test for Colour fastness to day light is type test and shall be done once in six months. However, manufacturers shall carry out this test for each lot and maintain the records of test results. Record of test results should be furnished by the manufacturer to inspecting agency at the time of inspection. RDSO may pick samples randomly from consignee end for quality check at any time. In case the samples do not conform to this schedule, the inspection of material will be suspended and action against the manufacturer for down gradation/delisting will be taken as per extent procedure.

Signature			
Name & Designation	Prepared By	Checked By	Approved By



Amendment slip No. 1 of January, 2010 to STR No. C-9911 (Rev.3) for fire retardant curtain fabric:

Read clause - 5 as under.

5. **No. of Test:**

All the tests given in Table-I shall be carried out on each lot except toxicity test. The test for toxicity shall be type test and shall be carried out once in six months or after manufacture of every 10,000 meters whichever is earlier.

Replace existing clause-5.3 with following.

- 5.4 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.

*Sd/-*

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## **Schedule of Technical Requirements for Fire Retardant Curtain Fabric**

### **0. Foreword:**

- 0.1 This schedule covers the technical requirements/provision relating to material, and tests and does not include all the necessary provisions of contract.
- 0.2 This schedule draws reference to some of the relevant Naval, UIC and other Indian Standard specification. The latest version of the relevant specifications shall be taken as reference.
- 0.3 For the purpose of deciding whether a particular requirement of this schedule is complied with, the final value observed or calculated , expressing the result of a test or analysis, shall be rounded off in accordance with the IS:2. 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 development in the field of textile materials and process technologies, serviceability, requirements of IR and the practices followed in advanced countries in this field.
- 0.5 Code of Practice for quality control and inspection shall be as per Annexure - I.

### **1. Scope:**

This schedule covers requirements and methods of tests of fabric to be used for curtains for all types of SG & EOG AC coaches including chair cars of Shatabdi coaches.

### **2. Requirements:**

- 2.1 The fabric should be manufactured out of inherent permanent flame retardant fibre whose flame retardancy does not diminish either with aging (ultra violet light degradation) or repeated washing. At the same time it is preferable to have fibre of substances, which do not nourish bacteria.
- 2.2 The base fabric shall be of plain & woven design, free from yarn defects and stains and should lay flat when it is spread. There should not be any chemical coating over the surface to achieve flame retardancy. It shall be

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thoroughly desized, scoured and heat set to maintain dimensional stability and have no shrinkage. The construction features like denier, number of ends and picks, shall be adjusted in such a way that the fabric retains the required level of air permeability. The fabric shall be sufficiently pliable and free from tackiness.

- 2.3 In appearance, finish, shade/colour and in all other respects not defined in this specification, the finished fabric should conform to sealed pattern in the custody of indenting agency except that when the sealed fabric is of wool, allowance shall be made for the slightly different finish and minute shade variation inherent consequent to another material being used.
- 2.4 The roll length should be  $100 \pm 5$  metres or as ordered. Short lengths of minimum 20 metres length shall be permitted but the number of such short lengths shall not be more than 2 per lot and the total short lengths shall not be more than 5% of the total ordered quantity.
- 2.5 Usable width of the finished fabric shall be 120 cm (min.) or as specified by the purchaser. Fabric shall comply with the requirements given in the Table -I. Unless otherwise stated in the individual test procedure, the tests shall be conducted at  $27 \pm 2^{\circ}$  C and at 65% RH.

**Table I**

S.No. test	Property	Value	Method of
1.	Mass of fabric (minimum) (Part 1)	250±20 gms  per square meter	IS: 7016
2.	Breaking strength (Kg/5 cm width) (Min.)		
	a) Direction A	50	IS: 7016 (Part 2)
	b) Perpendicular to direction A	50	
Note:- The direction with higher value shall be taken as A and the other direction shall be perpendicular to A .			
3.	Tearing strength (load in kg) Method C2 of min. in either direction (calculation of results to get value in kg/cm should not be done)	3	Appendix C of IS:2076
4.	Colour fastness to dry and wet rubbing	Shall not stain	Appendix C of IS:1259

5. Colour fastness to day light	Not less than No.4	Appendix D of IS:1259
6. Dimensional change (%) max. (shrinkage in warp or weft direction)	3	Appendix F of IS:1259
7. Resistance to spread of flame	Class-A or B	Appendix-5 of UIC 564-2 OR
8. Limiting oxygen index	Min.28	IS:13501
9. Toxicity	less than 1	NCD 1409
10. Deterioration of visibility due to Smoke	Class-A or B	Appendix-15 of UIC 564-2 OR

### 3. Tests:

- 3.1 The test shall be conducted as prescribed in relevant IS or other specification mentioned.
- 3.2 Test pieces shall be cut from the samples in the required number and in the appropriate manner as specified in the individual methods of test. Samples for tear strength and resistance to spread of flame as stipulated in Table I shall be cut as per test methods prescribed, from additional length of the fabric.

### 4. Sampling and criteria for conformity:

- 4.1 In any consignment, all the rolls of curtain fabric offered against one despatch note and of same design/composition shall constitute one lot.
- 4.2 Conformity of the lot to the requirements of the specification shall be ascertained for each lot separately. The number of samples to be drawn will be as follows :

#### SCALE OF SAMPLING

Lot size (Rolls)	No. of rolls to be selected
1 to 10	1
11 to 50	2
51 to 100	3
101 to 200	4

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**5. No. of test:**

All the tests given in Table-I except the test of limiting oxygen index, toxicity and deterioration of visibility due to smoke shall be carried out on each lot. The test for toxicity shall be done once a year and tests for limiting oxygen index & deterioration of visibility due to smoke shall be done once in six months. For the purpose of these tests an authorised representative of Inspecting Authority shall draw a sample at time intervals mentioned above and the firm shall arrange testing at a reputed laboratory as decided between RDSO/Inspecting Authority and manufacturer. The cost of testing will be borne by manufacturer. The above tests may also be carried out in presence of RDSO/Inspecting Authority at firm's premises, in case the testing facilities are available with them.

5.1 Each of the length obtained from a lot shall be examined for visual defects and if found satisfactory, further tests as specified shall be carried out.

5.2 From each of the rolls selected according to 4.2, suitable length of fabric shall be cut, care being taken to exclude not less than 0.25 m length of fabric from either end. The test specimens necessary for the various tests specified in the standard shall be cut, from the lengths of fabric thus obtained. Scheme of selection of test specimens from the sample length is given in clause 3.2. All the samples shall be kept out of contact from one another or any other material that may cause contamination.

5.3 All the tests given in Table 1 except test for toxicity, limiting oxygen index and deterioration of visibility due to smoke shall be carried on each lot. The test for toxicity, LOI and deterioration of visibility due to smoke are type tests and shall be carried out in the manner specified in para 5 of this specification

**6. Criteria for Conformity of Bulk Sample:**

6.1 The lot shall be declared as conforming to specification for various characteristics referred in Table 1, if for each of the characteristics (except for type tests mentioned in para 5.3) the test results on all the individual specimens are found to be within limits of the specification. Failing of a sample on account of any of the characteristics shall mean rejection of full lot.

**7. Packing:**

a) The material shall be securely packed in the form of a roll so as to ensure safe transportation.

b) The cloth shall be packed in neat and dry condition. Each roll/bolt of the cloth shall be marked at outer end (within 5 cm) showing

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nomenclature of the store, category number, manufacturer's name and trade mark, month and year of manufacture, meterage and lot number.

- c) Each piece of cloth shall be neatly rolled on a LDPE/HGPE tube 19 mm. The roll shall then be packed suitably with the layer of polyethylene film 0.05 mm (IS: 2508). These rolls so packed then be further packed in a layer of Hessian Cloth (IS:2818). The seam of the Hessian packed shall be sewn with twine jute supply. While stitching, care shall be taken to avoid any damage to the fabric.

**8. Marking:**

Before despatch, each pack, shall be legibly marked with indelible marking ink/paint showing the following details:

- a) Nomenclature and category number of the store
- b) Quantity packed. Total number of rolls and total meterage
- c) Lot and serial number
- d) Month and year of packing
- e) Name and trade mark of the manufacturer
- f) Name and address of the consignee
- g) Inspector's stamp
- h) A/T number and date.

**9. Storage:**

The rolls of fabric shall be stored vertically on dry, clean, firm and level surface. The rolls shall be protected from dust, moisture, etc.

**10. Warranty:**

The store supplied against an order shall be deemed to bear a warranty of the contractor against defective materials/workmanship and performance for a period of 1-1/2 years from the date of supply. If from the date of receipt of the stores, the stores supplied are found by the consignee to be so defective, the same shall be replaced immediately with serviceable stores without any charges or cost.

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## **ANNEXURE - I**

### **CODE OF PRACTICE FOR QUALITY CONTROL AND INSPECTION**

#### **1. THE SYSTEM:**

- 1.1 The manufacturer shall furnish to the Purchasing/Inspecting Authority information in respect of Quality Control System enforced at their works on various materials used in the manufacture of components.

#### **2. RECORDS, TEST AND SAMPLING:**

- 2.1 The manufacturer shall furnish to the Purchasing/Inspecting Authority the details of tests and inspection records and other relevant records as required under the Quality Control Systems in force. These records and reports shall be maintained by the competent technical authority of the manufacturer and shall be open to examination to the Purchasing/Inspecting Authority at all reasonable time . The Purchasing/Inspecting Authority at their discretion may draw samples of materials referred to in para 1 at any stage of production for conformity tests either at the works of the manufacturers or in an approved laboratory. In case the samples do not conform to the requirements of this Schedule double the number of samples from the same lot/batch shall be drawn for re-tests. Should any of the re-test samples not conform to the requirements the entire lot/batch shall be rejected.

#### **3. APPROVED MANUFACTURERS:**

- 3.1 The manufacturer should have complete manufacturing and quality control facilities as per this schedule, at their works.
- 3.2 For reasonable quality assurance, it is desirable that the materials are procured from manufacturers approved by Research Design and Standards Organisation (RDSO), Lucknow or by any other agency as assigned by the purchasing authority, based on evaluation of the materials as per the specifications, manufacturing and quality control facilities and quality assurance programme. However such approval does not guarantee the supply of consistent quality of materials and therefore, every batch offered shall be subjected to inspection and testing as per this schedule.
- 3.3 The approved manufacturers shall be subjected to periodical re-appraisal (periodicity of such materials shall be ascertained by the approving authority). In case of withdrawal of any manufacturing and quality control



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facilities provided at the time of approval or the materials produced at the time of reappraisal not conforming to this schedule, the manufacturers are liable to be withdrawn from the approved list. The approving authority reserves the right to withdraw the manufacturers from the approved list without assigning the reason.

- 3.4 The consignee may also periodically arrange testing, if so desired, in an approved laboratory for confirmatory tests within six months from the date of receipt of supplies, in their original packings. In case the samples do not conform to this schedule, the consignee may at their discretion suspend the manufacturer for further supply and the fact brought to the notice of the approving/ inspecting agency.