

REVISION OF SPECIFICATION / STR

Ref:Final draft spec. No. C-K513 (Rev-1), Spec/STR for Pre-laminated Shaded Compreg for use in Railway 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 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	<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:

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

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

INDIAN RAILWAYS



SPECIFICATION / SCHEDULE OF TECHNICAL REQUIREMENTS FOR PRE-LAMINATED SHADEDCOMPREG FOR USE IN RAILWAY COACHES

S. No.	Month / Year of issue	Revision / Amendment	Page No.	Reason for Revision/ Amendment
1	December, 2005	Nil	-	First issue
2	September, 2020	Rev.1	1, 2, 3, 4, 5, 6, 9, 10 & 11	<ul style="list-style-type: none"> • Amendment 1 to 6 & corrigendum-1 have been incorporated. • In section A, Clause 1.3 replaced with clause 6.1 and has been modified. • New Clause 6.2 has been added in section A • In Section –A, table-1, for Flexural strength and Resistance to Impact strength, word “Minimum” has been added. • In Section-A, clause 5.1 has been modified. • Clause 1.1.6, 1.2.6 1.4.2, 1.4.3, 1.4.4, 1.4.5 & 1.4.6 of Section-B have been modified. • New Clause 1.5 Documentation & 1.6 Training have been added in section B

Issued By:

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

Signature-	Prepared By: C.M.Prasad JE/Design/SS	Checked By: M.K.Arun SSE/Design/SS	Approved By: G.K.Singh Director/SS
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Signature-			
Name & Designation	Prepared By: C.M.Prasad JE/Design/SS	Checked By: M.K.Arun SSE/Design/SS	Approved By: G.K.Singh Director/SS

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**SPECIFICATION / SCHEDULE OF TECHNICAL REQUIREMENTS FOR
PRELAMINATED SHADED COMPREG FOR USE IN RAILWAY COACHES**

SECTION-A

1. Scope

1.1 This **Specification/** schedule of technical requirements for Prelaminated shaded compreg for use in Railway coaches consists of two sections i.e. Section-A and Section-B. Section-A covers the technical requirements, method of sampling and testing of Prelaminated shaded compreg and Section-B covers infrastructure requirements of manufacturing, testing and quality control.

1.2 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.

1. Requirements

1.1 Material and construction

1.1.1 Wood veneers used shall be from hard species conforming to Class-I of Appendix A of IS: 303 with individual thickness of maximum 2 mm and shall be free from major defects to timber. Each veneer will be treated/impregnated throughout the surface and cross section with resin system conforming to IS 846. Such veneers after drying shall be so assembled in such a grained configuration and hot-pressed at suitable temperature and pressure so that the material so produced to comply with the requirements of this STR.

The material shall have one/both side bearing the decorative coating with semi-mat surface finish. However, material with one side decorative coating shall have the other side roughened to promote adhesion to the base material.

The exterior coating shall be of cream marble to F-84 of Formica or CP-698 of Capri Hans or 2001 of wood polymer or Stardust Grey to 008 of Decolem or any other shade as mutually decided between purchaser and the supplier.

1.2 Workmanship and finish

1.2.1 The product shall be of uniform quality and free from surface defects like checks, splits, blisters, warps discolouration, overlap, air bubbles etc. likely to affect the aesthetics and end-use of the material.

1.3 Dimensions and tolerances

1.3.1 The thickness of the pre laminated shaded compreg sheets shall be as specified by the purchaser with a tolerance of $\pm 5\%$. Other dimensions such as length and width shall be in accordance with the requirements of the purchaser.

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1.4 General requirements

1.4.1 The decorative coating prelaminated on one side of the compreg sheet shall have adequate resistance against scratch by sharp tools, nails, etc. The decorative coating shall not show any cracks, split or delamination when saw cut, screwed, riveted, nailed, bolted or drilled.

2. Sampling and acceptance

2.1 0.5% of the number of sheets offered for inspection or a minimum of 3 pieces whichever is more shall be drawn at random from a batch or lot. The sample shall be considered to perform to the specification when it passes in the tests indicated in this STR. In case of failure in one or more tests, double the number of original samples shall be drawn for tests. Should any one of the retest samples fail to meet the requirements, the entire lot shall be rejected.

2.2 The manner of distribution of the test samples for different tests prescribed in this STR shall be at the discretion of the inspecting officer/purchaser.

3. Tests

3.1 The samples shall comply with the requirements given in Table-I.

TABLE-1

S. N	Characteristics	Requirements	Method of test appendix
1.	Flexural strength (Minimum)	120 MPa	Annexure-F of IS: 13411
2.	Resistance to boiling water:		
	Appearance	Degree 5	Annexure-D of IS: 2046
	Increase in thickness	Curve 2 of Annexure-A	
	Blistering of de lamination	Shall not be visible	
3.	Resistance to surface wear	Index No. 3	Annexure-C of IS: 2046
4.	Resistance to dry heat at 180°C <ul style="list-style-type: none"> Appearance - Gloss - Others - 	Degree 5	Annexure-E of IS: 2046
5.	Dimensional suitability at 20°C <ul style="list-style-type: none"> Machine Direction - At right angle of the Machine direction - 	Curve 4 of Annexure A	Annexure-G of IS: 2046
6	Resistance to staining Rating scale	Not worse than 5	Annexure-M of IS: 2046

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7.	Resistance to colour change (blue wool stone number) - In xenon arc light (min.) OR In enclosed carbon arc light (minimum)	6 5	Annexure-N of IS: 2046 Annexure - O of IS: 2046
8.	Surface finish (by 60° specular cross meter) Gloss value	18-40	ASTM-D-523
*9	Resistance to Impact strength by falling weight method (Kgf.m) (Minimum)	0.035	Annexure — A of this specification
10	Resistance to steam a) Appearance (rating scale)	Not worse than 4	Annexure — T of IS: 2046
11	Resistance to spread of flame	Class B	Appendix-4 of UIC-564-2 OR
12	Toxicity	Less than 1	NCD-1409
13	Limiting Oxygen Index	Min. 30	IS: 13360 Part-6, Section19
14	Deterioration of visibility due to smoke	ClassA	Appendix-1of UIC-564-2 OR
15	Heat Release Rate (MARHE i.e. Maximum Average Rate of Heat Emission in KW/m ²) as specified in EN 45545-2: 2013	R21(HL3)	ISO 5660-1: 25 KW/m ²

* - This test is to be carried out for 3 mm thickness.

3.2 **No. of Test:**

All the tests given in Table — 1 except Resistance to Dry Heat at 180°C and Dimensional Stability at 20°C shall be carried out on each lot. The test for Resistance to dry heat at 180°C and Dimensional stability at 20°C are type tests. The test for Resistance to dry heat at 180°C and Dimensional stability at 20°C shall be done once in a six months. However, manufacturers shall carry out these tests for each lot and maintain the records of test results. Records of test result 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.

3.3 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.

4. **Packing**

4.1 The material shall be supplied in packed condition in such a way that there is no damage to the decorative coating on the prelaminated side during transit. The mode of packing shall be as agreed between the purchaser and supplier.

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5. Marking

5.1 Each prelaminated shaded compreg sheet should be marked suitably **on back at a distance of 600 mm along each direction** by indelible ink with the following particulars:

- (i) Name of manufacturer (**initials**)
- (ii) Month & year of manufacture
- (iii) Batch number

6. General

6.1 The following clause included in the specifications of the item which appear in RDSO's vendor directory:

"All the provisions contained in RDSO's ISO procedures laid down in Document No. QO-D-~~7~~ 8.1-11 **Version 1.3** dated ~~19.07.2016~~ **01.07.2020** (titled "Vendor - Changes in approved status") and subsequent versions/amendments thereof, shall be binding and applicable on the successful vendor/vendors in the contract floated by Railways to maintain quality of products supplied to Railways".

6.2 Manufactures and purchaser should follow the Make in India policy.

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Name & Designation	Prepared By: C.M.Prasad JE/Design/SS	Checked By: M.K.Arun SSE/Design/SS	Approved By: G.K.Singh Director/SS

APPENDIX - A

IMPACT STRENGTH (by falling weight method): - The drop impact test shall be carried out with a falling weight type of impact tester, which shall essentially consist of the following:

- i) A rigid metallic base preferably with leveling screws. A specimen support in the shape of a hollow steel cylinder of internal diameter 50 ± 0.05 mm, external diameter not less than 57mm and height not less than 25mm. The ring/hole should be so situated that its axis coincides with the line of fall of the striker. A device for clamping the test specimen to hold it in position while under impact shall also be provided.
- ii) A weighted striker with a hardened hemispherical striking surface 12.5 ± 0.05 mm diameter capable of being clamped released and falling freely in the guides. The spherical striking surface of the plummet shall be free from faults or any other imperfections. The line of fall of the striker shall be perpendicular to the specimen surface and shall be concentric to the axis of the ring.
- iii) Superstructure shall consist of rigid frame with guides to adjust the height of the striker. The height of the frame shall be such that the maximum height of fall of the striker is not less than 600 ± 2 mm for 3mm thickness of sheet.
- iv) Trial Run: - Load the striker with weights so that the product of the height of fall and the combined load of weights and striker is equal to the expected impact strength of the material under test. Hold the striker in position by the release mechanism. Operate the release mechanism so that the striker falls on to the specimen. If the specimens unbroken or cracked on one surface only, it shall be recorded as 'unbroken'. If the specimen is broken or shows a crack or tear extending from one surface to the other, it shall be recorded as 'broken'.
- v) If the specimen breaks, test a second specimen in accordance with the foregoing procedure but with an impact energy 'S' kgf.m less than that of the blow applied to the first specimen, where 'S' is as shown in Table below. If the second specimen also breaks, test a further specimen in the same manner but with an energy 'S' kgf.m less than that of the blow applied to the second specimen. Continue this sequence of operations until a specimen does not break.
- vi) If the first specimen does not break, test a second specimen but with an impact energy 'S' kgf.m greater than that of the blow applied.

Twenty test specimens shall be subjected to test and no specimen shall be struck more than once.

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Table: - Relationship between increment of energy for trial run and energy of blow immediately - preceding increment.

Energy of blow immediately Preceding increment.	Increment (S) of energy for Trial run (kgf.m)
Greater than 0.56	Not less than 0.28
0.28 up to and including 0.56	0.14 ± 0.014
0.14 up to and including 0.279	0.056 ± 0.014
0.07 up to and including 0.139	0.028 ± 0.008
0.035 up to and including 0.069	0.14 ± 0.006
Less than 0.035	Not greater than 0.001

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SECTION-B

(i) SCOPE

This section covers the infrastructural requirements for manufacture of Prelaminated shaded compreg sheets for use in Railway passenger coaches.

1. REQUIREMENTS

The manufacturer seeking approval to manufacture and supply prelaminated shaded compreg sheet shall comply all the requirements mentioned below.

1.1 General and Manufacturing facilities

- 1.1.1 There should be a provision of covered area, with adequate space underneath for storage of raw material i.e. wooden logs, resin chemicals, etc. The covered area should have display board showing different colour shades nominated for different chemicals and raw materials to avoid mix-up of store.
- 1.1.2 The firm should have resin-manufacturing plant with at least one number of resin kettle of 1 tonne capacity each.
- 1.1.3 The firm should have resin impregnation plant of adequate capacity.
- 1.1.4 The firm should have at least one resin impregnation cum dryer plant of adequate capacity.
- 1.1.5 The firm should have at least one boiler of adequate capacity with all its accessories.
- 1.1.6 The firm should have at least one number four daylight heavy duty hydraulic hot press to manufacture boards of final **adequate** size ~~2850 mm x 1220 mm~~ with adequate margin of trimming. The press should have heating and cooling facilities with temperature, pressure and time control.
- 1.1.7 The firm should have suitable facilities to laminate the decorative coating. The colour / shades of the laminated coating should be of approved colour as per the requirements of the Railways.
- 1.1.8 The firm should have at least two indirectly heated drying chamber for drying the Veneer.
- 1.1.9 The firm should have at least one nos. of heavy duty double dimensional saw.
- 1.1.10 The firm should have a small machine shop consisting of lathe, drilling machine for minor repair of machineries.
- 1.1.11 The firm should have weighing machine, platform type, for measuring up to 1000 kg. of weight.

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1.2 TESTING FACILITIES:

- 1.2.1 The testing lab should have facility for temperature and humidity control.
- 1.2.2 The firm should have an electronic balance.
- 1.2.3 The firm should have one universal testing machine of adequate capacity.
- 1.2.4 The firm should have one impact testing machine of adequate capacity.
- 1.2.5 Gloss value-measuring meter for gloss test and surface finish.
- 1.2.6 The firm should have in house testing facilities to conduct all the tests mentioned in table -1 of section 'A'. However, in case the in house testing facility for "Resistance to colour change", "Resistance to Dry Heat at 180°C" and "Dimensional Stability at 20°C" are not available, the firm should arrange testing at NABL/NABCB accredited or reputed laboratory as decided between IR/Inspecting authority and the firm. The cost of testing shall be born by the firm.

1.3 Measuring instruments:

The firm should have the following measuring instruments:

- a) Vernier calipers with Digital display
- b) Micro meters with Digital display
- c) Moisture meter with Digital display
- d) Thermometer with Digital display
- e) Hydrometer
- f) Measuring scale
- g) Measuring tape

- 1.3.1 The firm should have arrangement for periodical calibration of all the measuring instruments mentioned above.

1.4 QUALITY CONTROL REQUIREMENTS

- 1.4.1 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.
- 1.4.2 The firm should must ensure that there is a QAP for the product detailing 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.
- 1.4.3 There should be at least one full time technologist, ~~qualified a minimum bachelor's degree which having a qualification in relevant field and has with experience of at least 5 2 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.

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- 1.4.4 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~~ 2 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.
- 1.4.5 The firm should have acquired ISO: 9001- ~~2000~~ 2015 (or latest) series certification and the product for which the approval is sought should be broadly covered in the scope of the certification for manufacture and supply.
- 1.4.6 The Quality manual of the firm for ISO: 9001- ~~2000~~ 2015 (or latest) should clearly indicate at any stage the control over manufacturing and testing of the said railway product.
- 1.4.7 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.
- 1.4.8 The firm should ensure that latest version all the relevant specifications, IS standards are available with the firm.

1.5 DOCUMENTATION

Firm shall maintain the following documents/records:

- 1.5.1 A well-documented Quality Plan.
- 1.5.2 Incoming raw material register with Test Certificates references of suppliers and internal test results.
- 1.5.3 Stage inspection results including finished products results.
- 1.5.4 Records of internal rejection and its analysis vis-a.-vis action plan.
- 1.5.5 Records of final products inspection by external agencies (like RDSO), Nonconformity reports and case analysis as well as action taken thereof.
- 1.5.6 Records for maintenance of dies/moulds.
- 1.5.7 Ensure that proper systems are available for dealing with customer complaint.

1.6 TRAINING

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.

Signature-			
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