Government of India Ministry of Railways
Research Designs and Standards Organization
Manak Nagar, Lucknow-226011

Notice for Expression of Interest
Notice No. CT/DSD dated 12.09.2024

Applications are invited from the eligible Indian firms capable of manufacturing, supplying and installation of Composite Sleepers for use on Girder Bridges & Special Turnouts (for which standard concrete sleeper designs are not available) of Broad Gauge sections and for use on Critical locations of Meter Gauge & Narrow Gauge sections on Indian Railway track system. Interested firms satisfying following conditions may apply:

i) The firm should have manufactured and supplied composite sleepers to Indian Railways/ World Railways/ Metro Rail Systems/ Dedicated Freight Corridor of India etc. with satisfactory performance in regular revenue operation on an unballasted girder bridge for the last 3 years on mixed traffic routes with minimum 25T Axle Load.

OR

The firm should have JV agreement with Domestic/Internationally proven manufacturers of composite sleepers who have manufactured and supplied composite sleepers to Indian Railways/ World Railways/ Metro Rail Systems/ Dedicated Freight Corridor of India etc. with satisfactory performance in regular revenue operation on an unballasted girder bridge for the last 3 years on mixed traffic routes with minimum 25T Axle Load.

If certificates for Mixed Traffic Routes are not available, separate certificates for provenness on Goods and Passenger Traffic Routes fulfilling the above requirements may be submitted.

ii) The participating firms should have manufactured and supplied Composite Sleepers in the last three years.

iii) The participating firm whether an Indian Company, Joint Venture Company or a Wholly Owned Subsidiary of a foreign Company should be minimum 'Class-II local supplier' as per the provisions of "Make in India Policy" of Government of India.

Interested firms are requested to see the details on RDSO's website www.rdso.indianrailways.gov.in → EOI → EOI Notice No. CT/DSD dated 12.09.2024 for Development of suppliers of Composite Sleepers or may contact Director/Track-III, RDSO, Lucknow on Mobile No. 9794863280/ email: dtd3rdso@gmail.com on any working day for further details. Intending firms satisfying the conditions stipulated in the application form should apply to express their interest with requisite information to the Director/Track-III, Anusandhan Bhawan, Track Design Directorate, RDSO, Manak Nagar, Lucknow – 226011 (INDIA). There is no closure date for submission of above proposal.

Director/Track-III
For Director General (Track)
RDSO, Lucknow
(for & behalf of President of India)

भारत सरकार
रेल मंत्रालय
अनुसंधान अभिकल्प और मानक संगठन
मानक नगर, लखनऊ-226011

रुचि की अभिव्यक्ति के लिए सूचना
नोटिस क्रमांक सीटी/डीएसडी दिनांक 12.09.2024

भारतीय रेलवे ट्रैक सिस्टम पर, ब्रॉड गेज सेक्शन के गर्डर ब्रिज और स्पेशल टर्नआउट (जिसके लिए मानक कंक्रीट स्लीपर डिज़ाइन उपलब्ध नहीं हैं) पर उपयोग के लिए और मीटर गेज और नैरो गेज सेक्शन के महत्वपूर्ण स्थानों पर उपयोग के लिए कंपोजिट स्लीपर के निर्माण, आपूर्ति और स्थापना में सक्षम पात्र भारतीय फर्मों से आवेदन आमंत्रित किए जाते हैं। निम्नलिखित शर्तों को पूरा करने वाली इच्छुक फर्म आवेदन कर सकती हैं:

i) फर्म ने पिछले 3 वर्षों से मिश्रित ट्रैफ़िक रूट पर न्यूनतम 25T एक्सल लोड के साथ अनबैलस्टेड गर्डर ब्रिज पर नियमित राजस्व संचालन में संतोषजनक प्रदर्शन के साथ भारतीय रेलवे/विश्व रेलवे/मेट्रो रेल सिस्टम/भारत के समर्पित माल ढुलाई गलियारे आदि को कंपोजिट स्लीपर का निर्माण और आपूर्ति की हो।

अथवा

फर्म के पास कम्पोजिट स्लीपर के घरेलू/अंतर्राष्ट्रीय स्तर पर प्रमाणित निर्माताओं के साथ संयुक्त उद्यम समझौता होना चाहिए, जिन्होंने भारतीय रेलवे/विश्व रेलवे/मेट्रो रेल सिस्टम/भारत के समर्पित माल गलियारा आदि को कम्पोजिट स्लीपर का निर्माण और आपूर्ति की हो , तथा उन स्लीपरों ने न्यूनतम 25 टन एक्सल लोड के साथ मिश्रित यातायात मार्गों पर पिछले 3 वर्षों से अनबैलस्टेड गर्डर पुल पर नियमित राजस्व संचालन में संतोषजनक प्रदर्शन किया हो।

यदि मिश्रित यातायात मार्गों के लिए प्रमाण-पत्र उपलब्ध नहीं हैं, तो उपरोक्त आवश्यकताओं को पूरा करने वाले माल और यात्री यातायात मार्गों पर सिद्धता के लिए अलग-अलग प्रमाण-पत्र प्रस्तुत किए जा सकते हैं।

ii) भाग लेने वाली फर्मों ने पिछले तीन वर्षों में कम्पोजिट स्लीपर का निर्माण और आपूर्ति की हो।

iii) भाग लेने वाली फर्म चाहे वह भारतीय कंपनी हो, संयुक्त उद्यम कंपनी हो या किसी विदेशी कंपनी की पूर्ण स्वामित्व वाली सहायक कंपनी हो, उसे भारत सरकार की "मेक इन इंडिया नीति" के प्रावधानों के अनुसार न्यूनतम 'श्रेणी-II स्थानीय आपूर्तिकर्ता' होना चाहिए।

इच्छुक फर्मों से अनुरोध है कि कंपोजिट स्लीपर्स के आपूर्तिकर्ताओं के विकास के लिए अनुसंधान अभिकल्प और मानक संगठन की वेबसाइट www.rdso.indianrailways.gov.in → EOI → EOI Notice No. CT/DSD dated 12.09.2024 पर विवरण देखें। अधिक जानकारी के लिए निदेशक/रेलपथ –III, अनुसंधान अभिकल्प और मानक संगठन, लखनऊ से मोबाइल नंबर 9794863280/ईमेल: dtd3rdso@gmail.com पर किसी भी कार्य दिवस पर संपर्क कर सकते हैं। आवेदन पत्र में निर्धारित शर्तों को पूरा करने वाली इच्छुक फर्मों को दो प्रतियों में अपेक्षित जानकारी के साथ अपनी रुचि व्यक्त करने के लिए निदेशक/रेलपथ -III, अनुसंधान भवन, रेलपथ अभिकल्प निदेशालय, अनुसंधान अभिकल्प और मानक संगठन, मानक नगर, लखनऊ को आवेदन करना चाहिए। – 226011 (भारत) । उपरोक्त प्रस्ताव प्रस्तुत करने की कोई अंतिम तिथि नहीं है।

निदेशक/रेलपथ-III
कृते महानिदेशक (रेलपथ)
अनुसंधान अभिकल्प और मानक संगठन, लखनऊ
(भारत सरकार के राष्ट्रपति की ओर से)

Annexure-A1

Instructions/Guidelines for the firms expressing their interest against RDSO's Expression of Interest (EOI) No. CT/DSD dated 12.09.2024

1. DISCLAIMER:

This document has been prepared by Track Design Directorate of Research Designs & Standards Organization (RDSO), Lucknow, under Ministry of Railways, to provide background information of the product / system to the interested parties. While RDSO has taken due care in preparation of information contained herein and believes it to be accurate, neither RDSO nor any of its officers, employees give any warranty or make any representations, express or implied as to the completeness or accuracy of the information contained in this document or any information which may be provided in association with it. The information is not intended to be exhaustive. Interested parties are required to make their own enquiries and respondents will be required to confirm in writing that they have done so. The information is provided on the basis that it is non-binding on RDSO or any of its officers, employees or advisors.

RDSO reserves the right not to proceed with the project, at a later stage or to change the process or procedure to take the project forward. In such eventualities, RDSO will not be held responsible. RDSO also reserves the right to decline to discuss the project further with any party expressing interest. No reimbursement of cost of any type will be paid to persons, or entities, expressing interest.

2. PURPOSE OF INVITING THE EOI:

The objective of the EOI is to invite proposals to list out the vendors available for supply of Composite Sleepers for use on Indian Railways from interested domestic firms who have manufactured and supplied composite sleepers to Indian Railways/World Railways/Metro Rail Systems/Dedicated Freight Corridor of India, with or without fastenings. Domestic firms in Joint Venture with domestic / international firms, who have manufactured and supplied composite sleepers meeting the provenness requirements, on Indian Railways/World Railways/Metro Rail System/Dedicated Freight Corridor of India, can also supply composite sleepers for Indian Railways. The composite sleepers should meet the Functional Requirement and Specification (FRS) given in this document as Annexure-B.

The intending participants will furnish proposals at their own cost and no claims, whatsoever; in this respect will be entertained by the Railways.

3. SUBMISSION OF EOI BY INTERESTED FIRMS:

Interested firms are requested to submit their response in the prescribed "Format for Letter of Response" given in Annexure-A2 to Director/Track-III, Track Design Directorate, Research, Designs and Standards Organization, Manak Nagar, Lucknow- 226011, UP (India).

Annexure-A2

FORMAT FOR LETTER OF RESPONSE

Respondents Ref. No.:

Date:

Director/Track-III
Building: Anushandhan Bhavan
Research Designs & Standards Organization
Ministry of Railways (MoR)
Manak Nagar
Lucknow,
INDIA 226011

Dear Sir,

Subject: RESPONSE TO – EOI FOR PARTICIPATION_____

1. We, the undersigned, offer the following information in response to the Expression of Interest sought by you vide your Notification No._____, dated ____.

2. We are duly authorized to represent and act on behalf of _____ (hereinafter the "respondent")

3. We have examined and have no reservations to the EOI Document including Addenda No(s)…….

4. We are attaching with this letter, the copies of original documents defining: -

   a) The Respondent's legal status;

   b) Its principal place of business;

   c) Its place of incorporation (if respondents are corporations); or its place of registration (if respondents are cooperative institutions, partnerships or individually owned firms);

   d) Self certified financial statements of Last three years, clearly indicating the financial turn over and net worth.

   e) Copies of any market research, business studies, feasibility reports and the like sponsored by the respondent, relevant to the project under consideration

5. We shall assist MoR and/or its authorized representatives to obtain further clarification from us, if needed.

   a) RDSO and/or its authorized representatives may contact the following nodal persons for further information on any aspects of the Response:

S. No.	Contact Name	Address	Telephone	E Mail
1				
2				

6. This application is made in the full understanding that:

   a) Information furnished in response to EOI shall be used confidentially by RDSO for the purpose of development of the project.

   b) RDSO reserves the right to reject or accept any or all applications, cancel the EOI and subsequent bidding process without any obligation to inform the respondent about the grounds for the same.

   c) We confirm that we are interested in participating in EOI for shortlisting for the supply of composite sleepers.

7. We certify that our turnover and net worth in the last three years is as under:

Financial Year	**Turn over**	**Net worth**

8. In response to the EOI we hereby submit the following additional details annexed to this application.

   8.1 Details of various items being manufactured/consultancy undertaken.
   8.2 Details of customer(s) and supplies made in the field of item under EOI.
   8.3 Experience and expertise for the items proposed in EOI.
   8.4 Details of man-power with their qualification and experience.
   8.5 Detailed proposal for items proposed in EOI including alternative proposal, if any.
   8.6 Details of Intellectual Property Rights (IPR) held, patent filed/held and MoU/agreement signed.
   8.7 Details of ISO certification.
   8.8 Undertaking as per Annexure-A2/1

9. The undersigned declare that the statements made and the information provided in the duly completed application are complete, true, and correct in every detail. We also understand that in the event of any information furnished by us being found later on to be incorrect or any material information having been suppressed, RDSO may delete our name from the list of qualified Respondents.

10. Our response is valid till (date in figures and words):_____

Yours sincerely,

(Signature)

NAME
In the Capacity of duly authorized to sign the response for and on behalf of……
Date

Annexure-A2/1

(To be taken on non-judicial stamp paper of appropriate value as applicable and dully notarised & witnessed)

UNDERTAKING

I, son of …… aged about ..... Years resident of…… do hereby solemnly affirm as under

1. That the deponent is the Authorised signatory of *(Name of the Sole Proprietorship Concern/ Partnership Firm/ Registered Company/ Joint Venture).*

2. That the deponent declares on behalf of *(Name of the Sole Proprietorship Concern/ Partnership Firm/ Registered Company/Joint Venture)* that:

   a) In regard to matters relating to the security and integrity of the country, no charge sheet has been filed by an agency of the Government / conviction by a Court of Law for an offence committed by the ----------(name of the entity) or by any sister concern of the ----------(name of the entity). Such a proceeding shall result into disqualification.

   b) In regard to matters other than the security and integrity of the country, ----------(name of the entity) has not been convicted by a Court of Law or indicted / passed any adverse order by a regulatory authority against it or it's any sister concern which relates to a grave offence, or would constitute disqualification. Grave offence is defined to be of such a nature that it outrages the moral sense of the community.

DEPONENT

VERIFICATION

I declare that the contents of para 1 to 2 above are true as per my knowledge and nothing has been hidden.

DEPONENT

Annexure-A3

APPLICATION FORM FOR DEVELOPMENT OF SUPPLIERS FOR COMPOSITE SLEEPERS

GOVERNMENT OF INDIA – MINISTRY OF RAILWAYS
RESEARCH DESIGNS & STANDARDS ORGANISATION
MANAK NAGAR, LUCKNOW -226011

(EOI Notice No. CT/DSD dated 12.09.2024)

SECTION 1 – GENERAL INFORMATION

I. Firms intending to supply Composite Sleepers manufactured from their manufacturing facilities in India

1. Name of the Firm

   a) Office Address

   b) Works Address

   c) E-mail address i) Office ii) Works

Copy of the following documents to be enclosed

   a) Proof of ownership of factory
   b) Factory license
   c) ISO certification
   d) Latest electricity bill

2. Name of the partners/shareholders/directors (Copy of Partnership deed/ Article of association etc. to be enclosed)

3. Details of Intellectual property right (IPR) held, Patent filed/held, for Composite Sleepers

4. Supplies of composite sleepers for any railway system made so far (if any):

II. Firms intending to supply Composite Sleepers manufactured by the Foreign Manufacturing Firm (OEM) under the arrangement of JV (The Manufacturing Facilities may be located in India or Abroad):

A) Details of Indian representative of the OEM firm/JV firm for execution of tender and supply of Composite Sleepers in India:

1. Name of the Indian Representative firm

   i) Office Address

   ii) Works Address for testing facility

   iii) E-mail address a) Office b) Works

2. Copy of the following documents to be enclosed

   a) Proof of ownership of works
   b) Factory license
   c) Latest Electricity Bill
   d) ISO certification

3. Details of JV with foreign firm:

   JV Agreement (duly notarized / Apostille authenticated in their respective country), as the case may be, with the foreign firm for supply of composite sleepers for Indian Railway to be enclosed (Sample Format of JV Agreement placed at **Annexure-A3/1**).

B) Details of the OEM Firm:

1. Name of the OEM Firm

   a) Office Address

   b) Works Address

   c) E-mail address i) Office
   ii) Works

2. Copy of the following documents to be enclosed for record purpose

   a) Ownership of factory or any relevant document
   b) Factory license or any relevant document
   c) ISO certification or any relevant document

3. Name of the partners/shareholders/directors (Relevant documents to be submitted)

4. Details of Intellectual property right (IPR) held, Patent filed/held for Composite Sleepers

5. Supplies of composite sleepers for any Railway system made so far:

SECTION 2- TECHNICAL INFORMATION

A. PAST PERFORMANCE (As applicable)

1. List of important customers of the manufacturing firm

2. Details of important orders of manufacturing and supplying of composite sleepers (attach details as enclosure documents)

Location	Railways where laid	Quantity (nos./Sets)	Size (Length x Width x Depth)	Year of laying & GMT carried	Performance*
Girder Bridges					
Ballasted tangent and curved track					
Switch & Crossing					

*Certificate from the user Railway to be enclosed.

B. Material Specification, Quality Control & Infrastructure

1. Test result of Composite sleepers/ties issued by a reputed test lab / institute in respect of physical and mechanical properties as mentioned in FRS for Composite Sleepers

2. Specify the composite material and its constituents being used in manufacturing of the composite sleepers

3. Description of the manufacturing process with process flow chart

4. List of specialized machinery and plant involved in manufacturing process.

5. Testing and measuring equipments available duly calibrated (by manufacturers/suppliers in India)

6. Technical Manpower & QAP available (copy to be submitted by manufacturers in India)

7. Layout plan (dimensioned) showing space for manufacturing, testing, storage, Labs etc. be submitted by manufacturers/suppliers in India

I/We have read the 'Procedure for development of suppliers for composite sleepers **(Annexure-A4)** and Functional Requirements and Specification (FRS) for Composite Sleepers (**Annexure-B)**.

I/We further declare that the statements made and the information furnished by me/us in this form are correct.

Enclosures:

Signature of Firm's competent authority
Name/s in capital with designation and seal

NOTE: Where the space provided against any item is insufficient, the information should be furnished on a separate sheet of paper, which should be appended to this form

Annexure-A3/1

FORMAT FOR JOINT VENTURE AGREEMENT

THIS JOINT VENTURE AGREEMENT EXECUTED AT.....on this.....day of ..... 2024 between M/s. .....Registered office at .....as the first party, M/s. .....Registered office at.....as the second party, M/s. .....Registered office at .....as the Third party (The expression and words of the first and second and third party shall mean and include their heirs successors, assigns, nominees execution, administrators and legal representatives respectively).

WHEREAS all the parties are engaged mainly in the business of……and General Contracts for various Government Departments and organizations.

WHEREAS the parties herein above mentioned are desirous of entering into a Joint Venture for carrying on Engineering and/or contract works in connection with **manufacturing, supply and installation of Composite Sleepers to Indian Railways (including all ancillary works),** as mutually decided between the parties to this Joint Venture.

WHEREAS all the parties are desirous of recording the terms and conditions of this Joint Venture to avoid future disputes.

NOW THIS AGREEMENT WITHNESSTH AS UNDER:

1. That in and under this Joint Venture agreement the work will be done jointly by the First party, Second party and Third party in the name and style of M/s..... .....(Joint Venture of M/s.....M/s..... and M/s)
2. That all the parties shall be legally liable, severally and jointly responsible for the satisfactory/successful execution/completion of the work in all respects and in accordance with terms and conditions of the contract.
3. That the role of each constituent of the said Joint Venture in details shall be as under:

   The first party shall be responsible for.....

   The second party shall be responsible for.....

   The third party shall be responsible for.....
4. The share of profit and loss of each constituent of the said Joint Venture shall be as under:

   The share of the first party shall be .....

   The share of the second party shall be.....

   The share of the third party shall be .....

   (Note: The constituent member of the JV, which fulfils the provenness criteria of having successfully supplied composite sleepers which are performing satisfactorily in regular revenue operation for the last three years, should have minimum 26 percent share in the JV)
5. That all the parties of this Joint Venture shall depute their experienced staff as committed commiserating with their role and responsibility and as required for the successful completion of the works in close consultation with each other.
6. That the investment required for the works under this Joint Venture shall be brought in by the parties as agreed to between them from time to time.
7. That all the Bank Guarantee shall be furnished jointly by the parties in the name of Joint Venture.

8. That the party number.....to this Joint Venture shall be the prime (lead) contractor and will be responsible for timely completion of work and to co-ordinate with the Railways to receive payments and also to make all correspondence on behalf of this Joint Venture.

9. That all the above noted parties i.e.....undertake not to make any change in the agreement without prior written consent of the Railway.

NOW, the parties have joined hands to form this Joint Venture on this.....Day of .....two thousand. with reference to and in confirmation of their discussions and understanding brought on record on.....

IN WITNESS THEREOF, all/both the abovenamed parties have set their respective hands on.....the day.....and year..... above mentioned in the presence of the following witness:

WITNESSES:

1. First party

2 Second party

3 Third party

Authorized Signatory of 1st Party

M/s .....

Authorized Signatory of 2nd Party

M/s .....

Authorized Signatory of 3rd Party

M/s ....

Note- As applicable depending on number of constituent partners of JV

Annexure-A4

PROCEDURE FOR DEVELOPMENT OF SUPPLIERS FOR COMPOSITE SLEEPERS

1. The interested manufacturing firm having In-house facilities and infrastructure for designing and manufacturing of the composite sleepers with manufacturing facilities in India should attach the details given in Section 1 (I) & Section 2 (B) of Application form for development of suppliers for Composite sleepers. The details submitted shall be verified by RDSO officials.

2. The firm relying on the association with its foreign collaborator through JV or otherwise for supply of Composite Sleepers on Indian Railways shall submit the details given in Section 1 (II) & Section 2 (A & B) of Application form for development of suppliers for Composite sleepers along with necessary documents.

3. The interested firm will also submit a budgetary estimate of cost of the sleepers.

4. The details forwarded by the firm shall be scrutinized by RDSO. The deficiencies noticed, if any, may be advised to the firm for information/ clarification. Any additional information required for scrutiny/examination may also be sought from the applicants. Notwithstanding this, RDSO reserves the right to summarily reject the offer in case it does not contain the requisite details.

5. After satisfactory verification/scrutiny of documents, as the case may be, the firm will manufacture 9 nos. prototype sleepers as per the specified shape, size (2700mm x 250mm x 180mm) and material specification and test reports given in FRS for Composite Sleepers (Annexure-B) within 90 days for prototype approval by RDSO. The testing charges, as applicable, shall be borne by the firm.

6. These prototype sleepers shall be subjected to type test/initial test for product approval as per para 3.2 of FRS for Composite Sleepers. Dimensional Requirements, Static Load Test, Impact Load Test, Voids Test and screwing/un-screwing test given at para 2.3, 2.5.1, 2.5.3, 2.6 and 2.8 respectively will be conducted in RDSO. Further, firm will submit test result of Composite sleepers as per para 2.4 of FRS for composite sleepers for prototype approval. Firm will also submit test results of Dynamic Fatigue Test & Inflammability test given in para 2.5.2 & 2.7 respectively of FRS for composite sleepers.

7. After satisfactory results of above mentioned tests in para 6 above, firm may be permitted for conducting field trial of minimum 100 composite sleepers on girder bridges on BG route for a period of 06 months or till the passage of 30 GMT, whichever is later. The supply for the trial sleepers shall be made against the PO/LOA placed by the Zonal Railway.

8. In case of failure of samples in any of test, the firm may be given one more chance, if the firm so desires. For this purpose, the firm shall submit another set of improved samples within three months from the date of advice of failure. In this regard, the firm shall inform in writing the corrective steps taken. Having satisfied with the steps taken by the firm, the sample may be taken for retesting along with testing charges for retesting. If the samples submitted for retesting fail, the case will be closed.

9. The firm shall develop facilities for testing of composite sleepers as given in para 3.3 of FRS for Composite Sleepers within 30 days after issuance of LOA.

10. After satisfactory performance in field trial, the firms will be eligible for regular supply to all Zonal Railways. The installation of Composite sleepers shall be done by the OEM or their authorized representative only.

11. In case of any doubt/dispute, decision of RDSO shall be treated as final and binding.

Annexure-A5

Trial Scheme for Field Trial of Composite Sleepers

1. The following aspects are required to be inspected for assessing the performance of composite sleepers laid on girder bridges:

   i) The condition of rail seat, sleeper surface and fittings are to be inspected to check end splitting, any visible cracks and tendency of spike killing. Magnifying glass shall be used for observing crack/sign of distress etc. Observations shall be recorded in Proforma-I given at Annexure-A5/1.

   ii) To check the tendency of spike killing, screwing and unscrewing test shall be conducted once in three months and details will be recorded in the column "any other observations" in Proforma-I given at Annexure-A5/1. This test shall be conducted on one sleeper on each bridge. Screwing and unscrewing test shall be done 4 times in one hour and the tendency of spike killing shall be observed.

   iii) **Measurement of track parameters:** Gauge and X-level shall be measured on every fourth sleeper i.e. on sleeper no. 1, 4, 7 and shall be recorded in the prescribed Proforma-II given at Annexure-A5/2. It will help in observing seasonal variation in gauge of composite sleeper of particular make/design.

2. **Frequency of Inspection by field officials:** Initially, observations shall be recorded by JE/SSE (P.Way) once in a week till one month. If condition of sleepers/fittings is found satisfactory, the frequency of inspection can be raised to once in a month. The above record is to be maintained and recorded by SSE/P.Way in a register in manuscript form. The register shall be scrutinized by the ADEN during his monthly trolley inspection.

3. The performance of sleepers shall be considered satisfactory if number of defective composite sleepers are not more than 1% after 06 months of service with regard to the acceptance criteria given below:

   i) There should be no notch (depression) formation in rail bearing area of sleeper in top and bottom of sleeper.
   ii) There should not be any crack requiring sleeper to be replaced.
   iii) There should not be any phenomena of end splitting.
   iv) There should not be tendency of spike killing during service as well as while conducting screwing and unscrewing test.
   v) There should not be loosening of fittings.
   vi) There should not be any warp, sag, hog or any other permanent deformation that would require replacement of sleeper.
   vii) In case, gauge varies with temperature, there shall be uniform variation. Erratic variation of gauge shall not be acceptable. Gauge should be within limit as per para 525(1) of IRPWM.
   viii) The cross level variation shall be within limits. Twist will be measured on a base of 3.0m and it should be within limit as per para 525(2) of IRPWM.

4. The details shall be recorded in Proforma I, II & III enclosed at Annexure-A5/1, A5/2 and A5/3 (if laid on Steel Girder Bridges) respectively. The observations specific to Composite Sleepers, as mentioned at para 1 above shall be continued for specified trial period and report shall be submitted to RDSO in Proforma – I & II on monthly basis. Proforma – III shall be submitted to RDSO once only. Any adverse features noticed shall be quickly reported to RDSO and Railway Board.

5. Whenever any unusual behaviour such as crack/fracture of composite sleeper is noticed at any location, it shall be inspected by the Divisional Engineer and a report shall be submitted to RDSO, who may depute a team to the site for further analysis. Safety of train operations is to be ensured in all cases and in case the railway feels it necessary to replace/remove the composite sleeper from site even before inspections by RDSO, it shall be done. In such an eventuality also, the removed material shall be properly kept for RDSO's inspection and analysis.

Annexure-A5/1

Proforma – I for Visual Inspection of Composite Sleeper

Location:

Section:

Design/Make (OEM):

Laid by (OEM/Authorised representative of OEM):

Annual GMT of route:

Notching of sleeper (if used on bridges) (mm):

Span configuration (if used on bridges):

Division/Rly:

Indian Rep. /Supplier:

Date of laying:

Total No. of sleepers laid:

Gouging for rivet heads (if used on bridges) (dia & depth in mm):

Date of Inspection	Average ambient temperature	Sleeper No.	Condition of				Any visible cracks	Phenomena of warp, Sag, Hog	End splitting	Any other observations
			Fittings-tightness receptivity	Rail bearing area of sleeper		Sleeper surface				
				Top	Bottom					

Signature of JE/SSE (P.Way):

Countersigned by ADEN/DEN:

Annexure-A5/2

Proforma – II for Performance of Composite Sleepers

Location/Bridge No.. : Date of laying: Annual GMT:

Section: Division/Rly: No. of sleepers:

Date of Inspection	Average ambient temperature	Sleeper No.	Depth of Sleeper **(exclusive of notching)**	Gauge	X-level	Other observations	
						Condition of fittings	Any other observation

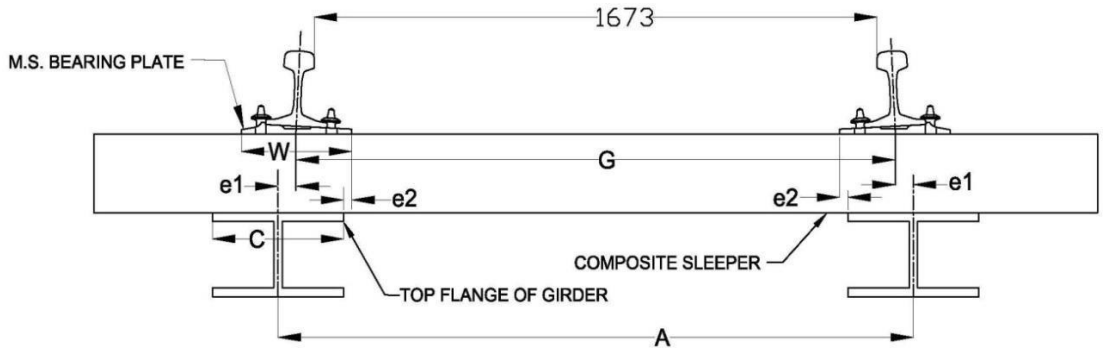
Remarks:

1. Any problem experienced during laying & maintenance in field :
2. Gauge variation observed due to seasonal temperature variation :
3. Overall performance of the sleeper :

Signature of JE/SSE(P. Way): Countersigned by ADEN/DEN:

Annexure-A5/3

Proforma – III for details of seating of rail and MS Bearing Plate with respect to Girder



Span of Bridge	Centre to Centre distance of Girder Flanges (A)	Centre to Centre distance of rail foot (with 1 : 20 rail inclination)	Half width of Top Flange of girder	Half width of MS Bearing Plate supporting rail	Distance between Centre of Top Flange of girder and Centre of rail foot	Distance between edge of Top Flange and edge of MS Bearing Plate	Remarks, if any
(m)	A (mm)	G (mm)	C/2 (mm)	W/2 (mm)	e1 = (A-G)/2 (mm)	e2= e1 + W/2 –C/2 (mm)	
24.4	1980	1754	200	127	113	40	(Example)

Note 1: An example has been shown for riveted plate girder of 24.4 m span with 52 Kg running rail. In case, a bridge consists of girders of different span, e1 & e2 for each of such spans to be given. In cases like curved track on bridge where e1 & e2 may vary from sleeper to sleeper, maximum e1 and e2 should be mentioned.
Note 2: G = 1760 mm for 60 Kg (UIC) rail and 1754 mm for 52 Kg rail
Note 3: W= 270 mm for MS Bearing plate to Drg No. RDSO/T-1033 for 60 Kg rail & 254 mm for MS Bearing plate to Drg No. T 10671 for 52 Kg rail
Note 4: e2 may be +ve or –ve depending on the situation where edge of MS Bearing plate is outside or inside the top flange of girder. In the drawing shown above, e2 is +ve.

Signature of JE/SSE(P. Way): Countersigned by ADEN/DEN:

Annexure-B

Functional Requirements Specification for Composite Sleepers

1.0 SCOPE

This specification is intended to provide guidelines for design, manufacturing and use of engineered composite sleepers and their components for use on Girder Bridges & special Turnouts (where concrete sleepers design is not available) of Broad Gauge sections and for use on Critical locations of Meter Gauge & Narrow Gauge sections on Indian Railway track system. The specification contains minimum performance requirement for engineered composite sleepers.

The specification covers physical dimensions, physical properties and structural strength of engineered composite sleepers. The specification does not cover material and techniques or equipment needed for manufacturing of the engineered composite sleepers.

2.0 TECHNICAL REQUIREMENTS

2.1 MATERIAL REQUIREMENTS

2.1.1 A composite material is a material formed using two or more discretely identified materials (e.g. a polymer, binder with reinforcement) to obtain specific properties that are superior to the individual material.

2.1.2 Engineered polymer composite sleeper incorporates a polymer matrix of a primary component duly bonded with a polymer binder, with reinforcement. Toxic preservatives shall not be used to manufacture the sleeper. The sleeper shall resist decay and insect attack. Water absorption shall not cause loss of strength requiring the sleeper to be replaced. The sleeper shall be non- hazardous and non-leaching.

2.1.3 The composite sleeper is to be developed as per the manufacturer's specification to suit the requirements of the Indian Railway. The manufacturer has to specify the type of raw material proposed to be used in manufacturing the product. The source of supply of raw materials, their specifications, testing procedure, quality assurance plan etc., shall have to be specified by the manufacturer along with supporting documents.

2.2 GENERAL REQUIREMENTS

Engineered composite sleepers shall meet the following general requirements:

2.2.1 Sleeper shall permit use of standard rail, MS bearing plates and holding down fasteners, such as rail screws without requiring special procedures for installation other than ordinary pre-drilling of the sleeper.

2.2.2 Sleeper shall give satisfactory performance under axle load of 25t and shall be able to provide rail seat loading (compression) without failure. Sleeper shall be stiff enough to support the weight but flexible enough to absorb the vibration

induced by passing trains. In effect, its performance in this respect shall be at par or better than hard wood sleepers, prevalent on Indian Railway system.

2.2.3 Sleeper shall not be prone to failure (e.g. cracking or fracture) due to weather-related high heat or freezing temperatures, in all four temperature zones of Indian Railway system.

2.2.4 Sleeper shall not warp or sag to the level of permanent deformation that would require replacement of the sleeper.

2.2.5 Sleeper shall not require end caps. Sleeper shall not split or crack in any way requiring the sleeper to be replaced.

2.2.6 Material surface degradation due to solar ultraviolet (UV) radiation exposure shall not render the composite Sleeper unserviceable.

2.2.7 It would be preferable if the colour of the sleeper is grey or any other lighter colour. The sleeper shall not be of black or red colour.

2.2.8 It shall not have any cracks on external surface or splitting marks. Sleepers shall be solid and shall be free from voids in general.

2.2.9 Sleeper shall be fire retardant in prevailing Indian conditions and shall be suitable for use in track circuited area.

2.2.10 The manufacturer shall specify 'specific gravity range' of sleepers supplied/used for structural testing. Every sleeper, supplied afterwards, shall conform to the same 'specific gravity range'.

2.2.11 The sleeper shall be durable, so as to retain necessary strength and other structural properties during service in track.

2.2.12 The sleeper shall be resistant to rot, bacteria and insects such as termites, borers etc which may reduce strength and/or integrity of sleeper.

2.2.13 Service life of the composite sleeper shall be minimum 1200 GMT or 35 years, whichever is earlier.

2.3. **DIMENSIONAL REQUIREMENTS**

2.3.1 Before manufacturing, supplier shall ascertain the acceptable sizes of the sleepers.

2.3.2 As per locations where composite sleepers to be used, various size of Composite sleepers are given in following paras:

2.3.2.1 For use on Steel Girder Bridges of Broad Gauge Sections:

Minimum length of sleepers should be equal to the distance between outer flanges of girder plus 305 mm but not less than 2440 mm for BG Track. However, the minimum width and depth of sleeper to be used on Steel Girder Bridges should be as under:

Centre to Centre of Girder	Width and Depth of Composite Sleeper
Up to 1,850 mm	250 mm x180 mm
Up to 2,000 mm	250 mm x 200 mm
Up to 2,300 mm	250 mm x 225 mm

2.3.2.2 For use on special Turnouts (where concrete sleepers design is not available) of Broad Gauge Sections:

Before manufacturing sleepers, supplier shall ascertain what sizes shall be accepted. However, the minimum width and depth of sleeper should not be less than 250mm and 180mm respectively.

2.3.2.3 For use at critical locations of Meter Gauge and Narrow Gauge sections:

Before manufacturing sleepers, supplier shall ascertain what sizes shall be accepted. However, the minimum width and depth of sleeper should be as under:

Meter Gauge	200 mm x 150 mm
Narrow Gauge	200 mm x 125 mm

2.3.3 Sleepers shall have all four sides smooth (non-skid). The ends should have neat & smooth vertical surface free of any crack, voids etc.

2.3.3 Sleeper surface flatness in the area of the bearing plate shall be within 0.5 mm.

2.3.4 Sleepers shall have a thickness tolerance of +2mm, -2mm, width tolerance of +3mm, -3mm, and length tolerance of +5 mm, -5 mm.

2.3.5 Cross section of the sleepers should be truly rectangular and tolerance of squareness of the end faces of sleepers shall be within 0.5 mm.

2.3.6 Tolerance for straightness of all the edges of the sleeper shall be within 2 mm per meter length.

2.4 PERFORMANCE REQUIREMENTS

2.4.1 Engineered composite sleeper shall meet physical and mechanical performance requirements listed in table given below:

Table- I Physical and Mechanical Properties

Mechanical Properties	Typical Value
Modulus of Elasticity (Flexural)	6000 MPa (min.)
Compressive strength	40 MPa (min.)
Modulus of Rupture (Bending Strength)	70 MPa (min.)
Shear Strength	7 MPa (min.)
Screw Spike Withdrawal	30KN (min.)

As per JIS code no. E 1203

Coefficient of Thermal Expansion	1.35 X 10^{-4}/^{o}C (max.)
Weatherability	Test Results shall be as per JIS E 1203:2007
Electrical Resistivity	1 x 10^{10} ohms at 500 V

2.4.2 All the parameters given in table-I shall be tested by ASTM or any other method approved by RDSO, in a Govt/NABL accredited Laboratory and test certificate shall be produced at the time of inspection.

2.5 STRUCTURAL REQUIREMENTS

Structural testing of the product on randomly selected samples of a product lot has to be conducted to ascertain the structural integrity of the product. The following structural tests shall be performed on the engineered composite sleepers.

2.5.1 STATIC LOAD TEST

This test is carried out to assess the adequacy of design.

2.5.1.1 PRESCRIBED TEST SCHEME (As per APPENDIX A)

Load - 30t on each rail seat ±5%

Rate of loading - 5t/min. ±5%.

The test scheme along with format for recording the observations is given at Appendix-A.

2.5.1.2 ACCEPTANCE CRITERIA

No visible cracks should be developed on the outer surface of the sleeper on holding the 30t load for 5 minutes. There should not be any bulging in the sleeper on application of load. Load should not get released on holding the incremental load up to 30t for taking dial gauge reading for deflection. Deflection at any rail seat of sleeper under load should not exceed 1 mm.

2.5.2 DYNAMIC FATIGUE TEST

This test is carried out to assess the rail seat abrasion, structural integrity of the product and to ensure absence of any voids and other inherent manufacturing defects inside the composite sleeper.

2.5.2.1 PRESCRIBED TEST SCHEME (As per APPENDIX B)

Load -	4 to 20t on each rail seat ±5%
Horizontal -	40% of the vertical load ±5%
No. of cycles -	2 million
Frequency -	5 Hz ±5%

The test scheme along with format for recording of observations is given at Appendix-B. Sleepers once subjected to static test shall not be used for this test. Sleepers that have passed this test successfully shall not form a part of the supply and are not considered fit for being used in the field.

2.5.2.2 **ACCEPTENCE CRITERIA**

The sleeper shall not develop any cracks of shear, flexural or torsional rupture in nature on the surface of the sleeper up to 2 million cycles. Hairline localized cracks may be permissible provided there is no reduction in the load carrying capacity of the sleepers.

2.5.3 **IMPACT LOAD TEST**

Impact test is required to assess shock absorption capacity of sleeper i.e. to assess its performance against derailment forces.

2.5.3.1 **TEST SCHEME (As per APPENDIX C)**

The test scheme envisages dropping of the wheel on sleeper placed at $30^0 \pm 1^0$ slope to horizontal plane at following two locations:

i) 294mm away from centre line of rail towards centre of sleeper
ii) 200mm away from the end of sleeper, within sleeper

Wheel drop details are
i) Weight of wheel - 500Kg ± 5Kg
ii) Height of drop – 75cm to 80 cm
iii) No. of drops - 2 at the same location

The test scheme along with format for recording of observations is given at Appendix-C. Sleeper successfully passing static load test may be used for impact load test.

2.5.3.2 **ACCEPTANCE CRITERIA**

Recess formation / crack / chipping should be limited to 1/3rd of total depth or 60mm depth of Composite sleeper from top, whichever is less.

2.6 **VOIDS TEST**

2.6.1 If the composite sleeper does not have voids, this test is not required. Manufacturer/Supplier will submit clear coloured images of cross section of sleeper for conformation. The sleepers subjected to Impact test shall be cut at two random locations to verify the same.

2.6.2 No void greater than 2mm diameter and 50 mm long will be allowed anywhere in the sleeper. Voids shall be uniformly distributed and shall not be interconnected in a way such as to form any plane of weakness.

2.6.3 Every composite sleeper shall conform to para 2.6.2 and shall be x-rayed. The manufacturer/supplier shall install an X-ray machine capable of detecting the voids. The records of these tests are required to be maintained at the

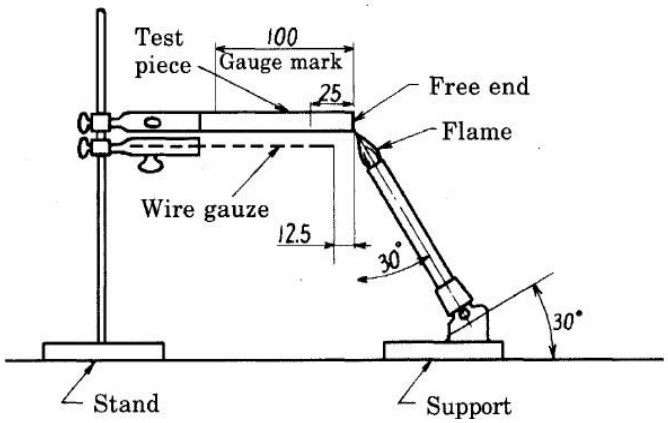
manufacturer/supplier's premises and supplied to railways/RDSO at the time of inspection of sleepers. The methodology for void testing by X-ray machine shall be approved by Railway / RDSO.

2.7 INFLAMMABILITY TEST

The sleeper shall be self-extinguishing in nature. A test piece of 127 mm x 12.7 mm x 12.7 mm shall be prepared. It shall be subjected to inflamability test as shown in the sketch below. Bunsen burner of 8.5-11.5 mm barrel diameter using LPG as fuel shall be used. The flame shall be a stable blue with a height of about 25mm. The burner shall be placed 30 degrees inclined to the vertical as shown in the following figure.

Burning resistance test apparatus

Unit: mm



The test piece shall be brought in contact of blue flame for 30 seconds and then the flame shall be removed. The burning flame of the test piece should self-extinguish within 120 seconds. The length of burn should be less than 100 mm on the test piece.

Inflamability test may be carried out as per the above scheme or any other scheme as per International standards with the approval of RDSO.

2.8 SCREWING/UNSCREWING TEST

One sleeper from every lot or 250 sleepers, whichever is less shall be screwed and unscrewed in the rail seat area. Rail screw shall be allowed cooling after every operation. No slipping phenomena shall be observed up to 8 times of operation. Further, same hole shall be plugged with plug and again screwing and unscrewing operation shall be done on plugged area. No slipping phenomena shall be observed up to 5 times of operation. For this purpose, plugs of same material will be supplied by the supplier.

3.0 PRODUCT INSPECTION AND TESTING

3.1 GENERAL

3.1.2 The supplier shall supply at his expense, all the sleepers required for tests and retests, sample of materials, labour, machine, tools, gauges, apparatus, forms of test reports etc. and any other item which may be necessary or required by the

inspecting officer for carrying out any or all of the checks and tests mentioned in these specifications and shall render all reasonable assistance in conducting such checks and tests. All measuring and testing appliances shall be got checked and calibrated by approved agency or as directed by the inspecting officer. The calibration certificate shall be furnished to the inspecting officer. The cost of all such checks and calibrations shall be borne by the supplier.

3.1.3 Inspecting officer and the purchaser shall have free access at all reasonable times to the works in which the sleepers are manufactured. They shall be at liberty to inspect the manufacturing/testing of sleepers at any stage and to reject sleepers which do not conform to specification.

3.2 TYPE TEST /INITIAL TEST FOR PROTOTYPE APPROVAL

The supplier shall manufacture 9 nos. prototype sleepers of size 2700 mm x 250 mm x180 mm for prototype testing and approval.

3.2.1 All sleepers should fulfil dimensional requirements stipulated in Para 2.3.

3.2.2 The supplier should submit test certificate from a Govt./NABL accredited or RDSO approved laboratory for fulfilment of physical and mechanical performances stipulated in Para 2.4. They shall submit clear coloured images of cross-section of sleeper in all three directions i.e. XX, YY & ZZ to show whether composite sleepers are having voids or not. The same shall be verified by cutting the sleepers at two locations after conducting the Impact test. They shall submit the methodology for void testing so that stipulation at Para 2.6.2 may be ensured. The supplier shall further submit certificate from a Govt/NABL accredited Laboratory that sleepers conform to the provisions regarding inflammability given in Para 2.7. Screwing/unscrewing test as stipulated in para 2.8, shall be conducted at RDSO.

3.2.3 Regarding fulfilment of structural requirements mentioned in Para 2.5, the following tests except Dynamic Fatigue Test shall be conducted at laboratory at RDSO, the testing charges of which will be borne by the firm, as applicable. Dynamic Fatigue Test shall be conducted at any Fatigue Test Centre of a Government Institution and test results will be submitted to RDSO.

3.2.3.1 **Static Load Test**:

3 nos sleepers shall be subjected to Static Load Test as stipulated in Para 2.5.1. All sleepers should fulfil the acceptance criteria.

3.2.3.2 **Impact Load Test:**

3 nos sleepers shall be subjected to Impact Load Test as stipulated in Para 2.5.3. All sleepers should fulfil the acceptance criteria.

3.2.3.3 **Dynamic Fatigue Test:**

3 nos sleepers shall be subjected to Dynamic Fatigue Test as stipulated in Para 2.5.2. All the three sleepers should fulfil the acceptance criteria.

3.2.4 The above five tests: Static Load Test, Impact Load Test, Dynamic Fatigue Test, Screwing/Unscrewing Test, and Voids Test shall constitute one round of testing. ln case of failure of samples in the first round of test, the firm may be given one more opportunity, if the firm so desires. For this purpose, the firm shall submit another set of improved samples within three months from the date of advice of failure. The test results of parameters found non-conforming to acceptance criteria would be intimated to the firm. lf the firm desires to offer the improved samples for second round of testing, the firm shall inform the corrective steps taken in writing. Having satisfied with the steps taken by the firm, the samples may be accepted for retesting along with testing charges for retesting. If the samples submitted for retesting fail, the case will be closed.

3.2.5 Dimensional Requirements, Static Load Test, Impact Load Test, Voids Test and screwing/un-screwing test given at para 2.3, 2.5.1, 2.5.3, 2.6 and 2.8 respectively will be conducted in RDSO for prototype approval.

3.2.6 The prototype sleepers shall be approved by RDSO after technical scrutiny and verification of test certificates and carrying out laboratory tests described in preceding Para.

3.3 TESTS OF COMPOSITE SLEEPERS FOR TRIAL/REGULAR SUPPLY

3.3.1 All sleepers shall be within the dimensional tolerance given in Para 2.3. 100% of composite sleeper to be supplied shall be checked visually and dimensionally, and recorded in the format given in Appendix-D.

3.3.2 All the parameters given in table-I of Para 2.4 shall be tested by ASTM or any other approved method approved by RDSO in Govt/NABL accredited or RDSO approved laboratory for every production lot or 250 sleepers, whichever is less and test certificates shall be produced by the supplier at the time of inspection.

3.3.3 STATIC LOAD TEST

Minimum one sleeper for every 250 sleepers supplied or part thereof shall be subjected to Static Load test as per Para 2.5.1. The test sleepers shall be randomly selected from the lot. This test shall be conducted in the supplier's premises in presence of RDSO/Railway's representative. In case of failure of any sleeper in this test, the production lot shall be subjected to further test on randomly selected two sleepers from the rest of the the sleepers. In case of failure of any of the two randomly selected sleepers, the whole lot will be rejected.

Sleeper successfully passing this test may be used for impact load test.

3.3.4 IMPACT LOAD TEST

Minimum one sleeper for every 250 sleepers supplied or part thereof shall be tested as per Para 2.5.3. Sleepers successfully passed in the static test, may also be used for impact test. This test shall be conducted in the supplier's premises in presence of RDSO/Railway's representative. In case of failure of any sleeper in this test, the production lot shall be further subjected to another test on randomly selected two sleepers from rest of the sleepers. If any one of the two sleepers fails in this test, whole lot will be rejected.

3.3.5 **VOIDS TEST**

If the composite sleeper does not have voids, this test is not required. In case of composite sleepers having voids, every composite sleeper shall conform to para 2.6.2 and shall be X-rayed. The void testing shall be carried out as per Para 2.6.3.

3.3.6 **INFLAMMABILITY TEST**

One sleeper from every lot or 250 sleepers, whichever is less, shall undergo inflammability test as per Para 2.7 in the supplier's premises. In case of failure of any sleeper in this test, the production lot shall be subjected to further test on randomly selected two sleepers from the rest of the sleepers. In case of failure of any of the two randomly selected sleepers, the whole lot will be rejected.

3.3.7 **SCREWING/UNSCREWING TEST**

One sleeper from every lot or 250 sleepers, whichever is less shall be subjected to this test as per Para 2.8 in the supplier's premises. In case of failure of any sleeper in this test, the production lot shall be subjected to further test on randomly selected two sleepers from the rest of the sleepers. In case of failure of any of the two randomly selected sleepers, the whole lot will be rejected.

4.0 MARKING

4.1 Every sleeper shall be permanently marked by way of punching/stencilling with manufacturer's name, batch no., month and year of manufacturing.

4.2 Any sleeper not meeting the above specifications will be rejected and marked red at the end of the sleeper. Such sleepers shall be cut in at least two parts to avoid intermingling of rejected sleepers with passed ones.

5.0 LOADING AND DISPATCH

Only those sleepers which have been passed, marked and accepted by the inspecting officer shall be loaded for dispatch.

6.0 WARRANTY

The sleepers shall be guaranteed by the supplier for sound manufacture and service for a period of 5 years from the date of installation. If during the guarantee period any sleeper develops defects attributable to bad material, workmanship and/or dimensions requiring withdrawal from service, the cost of sleepers and their replacement shall be borne by the supplier.

APPENDIX A (Para 2.5.1.1)

TEST SCHEME FOR STATIC LOAD TEST

The test shall be carried out on both ends of sleepers. Test sleeper shall be placed on test floor under the reaction frame. A mild steel plate of 260x220 mm size shall be placed on rail seat position of the sleeper. Another M S plate of larger size shall be kept over the plate projecting out of the sleeper's width. On this plate, two dial gauges shall be fixed on both side of the sleeper to measure deflection under the applied load.

A remote-controlled hydraulic jack of 100 t capacity shall be used for application of static load on sleeper. To ensure the accuracy of applied load, a pre-calibrated compression proving ring shall be placed between the hydraulic jack and the sleeper, the gap between the sleeper and proving ring shall be filled up by cast iron blocks and steel packing plates. The centre of hydraulic jack, proving ring and test sleeper shall be aligned with the help of plumb bob, to ensure precise application of test load.

The maximum test load shall be applied up to 30 t in the increment of loading @5 t/min starting from 5 t. The maximum applied load 30 t shall be sustained for five minutes. Development of cracks and deflection of sleepers shall be observed and noted after each increment of load.

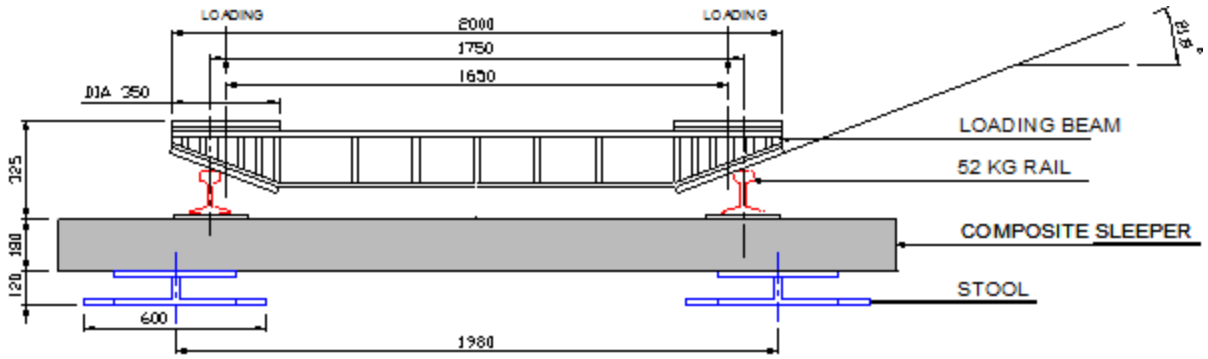
FORMAT FOR STATIC LOAD TEST RECORD

Firm's Name				
S.O./P.O. no. & date				
Batch no. & size				
Date of Inspection				
Identification No.	Load (T)	Deflection (mm)		Remarks
		Rail Seat 1	Rail Seat 2	
	0			
	5			
	10			
	15			
	20			
	25			
	30 (after 5 minutes)			
	Permanent deformation after load removal			
Sample Test Results				
Signature of the Inspector				

APPENDIX B (Para

2.5.2.1) TEST SCHEME FOR DYNAMIC LOAD TEST

The drawing of dynamic loading arrangement is given below:



LOADING ARRANGEMENT OF TESTING OF COMPOSITE SLEEPER

The direction of transfer of loading on rail head is arranged in such a way that 40% of applied vertical load may be converted into horizontal load on the rail. For this purpose, a loading frame is designed to suit the required loading parameters as per the test scheme. The applied dynamic vertical load range shall be 4.0 T to 20.0 T (39.2KN to 196.2KN) and frequency of loading shall be 5 Hz. Both rail seats of the sleepers shall be tested under dynamic conditions for the specified loadings and frequency simultaneously.

A panel of three sleepers is made for testing of one sleeper. This panel is supported on a loading stool designed and sleepers are fixed with the help of hook bolts. Canted bearing plate is fixed on the rail seat surface in between the rail bottom and sleeper top. Vertical load of specified range (4.0 T to 20.0 T) is applied through actuators at both rail seats of the central sleeper simultaneously at the frequency of 5 Hz. Average deflections below both rail seats are recorded under 20.0 T static load with the help of dial gauge after completion of every 2.5 lakh cycles of loading. Permanent set at both rail seats are also measured/calculated after completion of 2.0 million cycle of loading for the central sleeper in each case.

The details of loading parameters and observations made during testing of sleepers shall be recorded.

Format for Dynamic Load Test Record

Firm's Name						
S.O./P.O. no. & date						
Batch no. & size						
Date of Inspection						
Identification No.	Load (T)		Frequency	No. of Cycles	Deflection (mm)	Remarks
	Max.	Min				
				2,50,000		
				5,00,000		
				7,50,000		
				10,00,000		
				12,50,000		
				15,00,000		
				17,50,000		
				20,00,000		
Sample Test Results						
Signature of the Inspector						

APPENDIX C (Para 2.5.3.1)

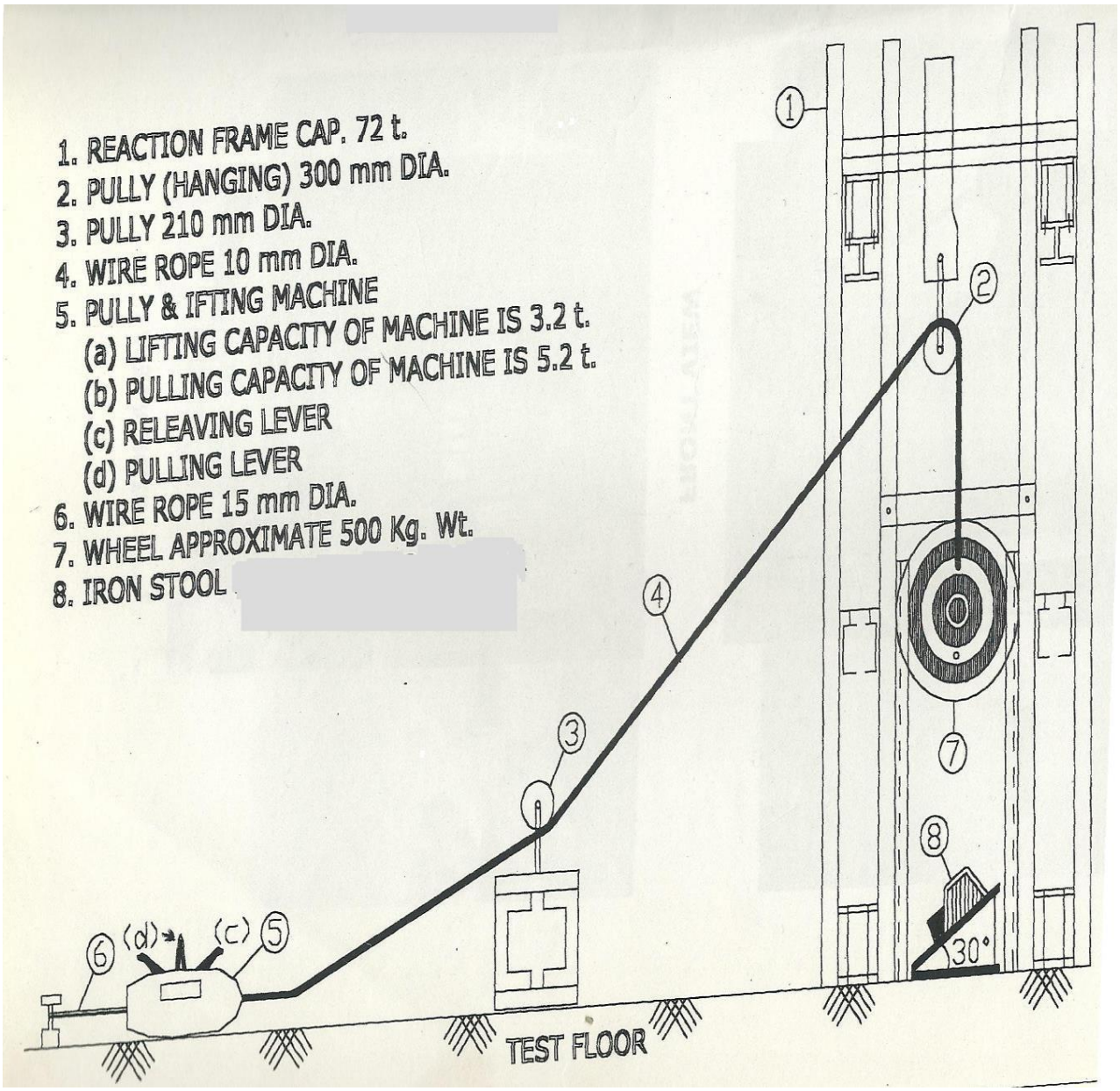
TEST SCHEME FOR IMPACT LOAD TEST

Sleeper shall be placed on two nos. bearing plates at an inclination of 30 degree, under a loco wheel of approximate weight 500 kg, hanged on the test frame (Pl. refer the sketch). The wheel shall be tied with one end of a wire rope and the other end of the wire rope is attached with the lifting and pulling machine. The lifting and pulling machine is used to keep the wheel at desired height and for sudden drop on the sleeper. The position of the wheel and location of strike on sleeper shall be aligned before drop. The wheel shall be positioned at the height of 75 cm from the edge of sleeper and dropped freely releasing the lever of pulling machine on both ends of the sleeper at two locations i.e. 200 mm away from the sleeper end within sleeper and 294 mm away from the center line of the rail towards center of sleeper. The wheel shall be dropped twice at each of four locations on the sleeper.

FORMAT FOR IMPACT LOAD TEST RECORD

Firm's Name										
S.O./P.O. no. & date										
Batch no. & size										
Date of Inspection										
Identification No.	Location of Impact	Size of groove and damaged portion in mm								Remarks
		After 1st drop of wheel				After 2nd drop of wheel				
		a	b	c	d	a	b	c	d	
Sample Test Results										
Signature of the Inspector										

SKETCH FOR TEST SCHEME FOR IMPACT LOAD TEST



APPENDIX D (Para 3.3.1)

Format for Dimension Record

Firm's Name												
S.O./P.O. no. & date												
Batch no. & size												
Date of Inspection												
Sleeper No.	General Dimensions			Rail Seat (Surface Flatness)		Edge Straightness				End Squareness		Remarks
	L	W	D	1	2	1	2	3	4	1	2	
Signature of the Inspector												