

SSE/PL

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NE Railway

Office of the
General Manager/Engg.
N.E.Railway Gorakhpur

No.CE/NER/Track/Circul/2001/275/Pt.-II

Dated 23.03.05

(CE Circular No. 91)

Mr.DEN/ Coord,
N.E.Railway,
LEN, EEN & RSB.

**Sub : Fabrication, Erection, Painting, Inspection and Maintenance
of Steel Channel Sleepers.**

1. (a) Use of Steel Channel Sleepers :-

In view of restrictions imposed by Supreme Court on procurement of wooden Sleepers, the only option left for replacement of unserviceable wooden sleepers is the use of Steel Channel Sleepers on girder bridges as the use of FRP sleepers, apart from the fact that it is very costly, has not yet been approved by Railway board and trials are still going on. Therefore as per present policy of the Board, through renewal of bridge sleepers on steel girders is to be carried out only with Steel Channel Sleepers and the released wooden bridge sleepers after such planned renewal of bridge sleepers on steel girder bridges, may be used for casual renewal of existing wooden bridge sleepers.

(b) The drawing for provision of channel sleeper on respective girder bridges should be prepared and approved in advance.

Fabrication of steel channel sleeper :- For manufacturing of steel channel sleepers, it shall be ensured that steel channels manufactured by SAIL, TISCO & VSP are only used to ensure quality. Fabrication should be based on RDSO report no. BS-45 (revised on May-2004) i.e. Guide lines on fabrication of steel channel sleepers.

With the ambitious targets of providing steel channel sleepers, it is most essential to ensure quality in fabrication of Steel Channel Sleepers as well as in procurement of its fittings. The important aspects of quality control in fabrication are as under :-

- (i) Quality of materials being used for manufacturing sleepers.
- (ii) Quality of process in manufacturing sleepers in Workshop.
- (iii) Accuracy in collection of Field Details.

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- (iv) Preparation of correct Drawings.
- (v) Manufacturing of Sleepers as per Drawing and Specification.

3. TBTR Work through Agency :-

3.1 Credentials of Tenderers and special conditions of contract :- Only the tenderers having minimum capabilities (both financial & technical) mentioned under para 3.2 here after, with credentials of past performance in the execution of similar nature of work as per Rly. Board's letter no. 94/CE-I/C 7/4 dated 17.10.2002, shall be considered for award of manufacturing and laying/fixing of the Steel Channel Sleepers. Some important special conditions as given below must be instituted in the conditions of the contract.

- (I) The contractor at his own expenses, shall provide all materials required for the work. The contractor shall maintain a minimum stock of at least three months consumption of all materials required for the work and which are to be supplied by him.
- (II) All materials required for incorporation in the final work to be supplied by the contractor shall be in conformity with the specifications laid down in the drawing specified in the tender and the contractor shall furnish proof/test certificate in support of this to the satisfaction of the Engineer/authorised inspecting agency.
- (III) All steel sections to be procured by the contractor shall be tested by the manufacturer at its premise as per IS code before dispatch. The contractor shall produce the manufacturer's test certificate to Railway prior to start of fabrication work. Verification of the quality of parent material in reference to test certificate may be carried out by Railway, if required. The contractor shall have to make all necessary arrangements at this own cost for carrying out all necessary testing including ultrasonic testing as per standards laid down in IS code. The rejected lot should be set aside and the matter be brought to the notice of manufacturer as per extant rules in vogue for disposal. It must be ensured that quality of raw steel used for fabrication should be the essence of the contract and rigidly followed.
- (IV) Within 7 days of the acceptance of the tender and before the work is commenced, the contractor shall have to submit a detailed network of the major item of works by Critical Path Method for approval of the Engineer. Besides, the contractor shall also submit detailed scheme for fabrication and inspection proposed to be adopted by the contractor well in advance, before the physical commencement of fabrication of sleepers for approval of the Engineer of the Railway. The fabricated sleepers will be brought to the site by the contractor for fixing progressively.
- (V) The programme shall clearly provide for and indicate the time required for the preliminary activities before starting the work and shall indicate dates of commencement and completion of the various sections of the work. The programme shall be supported by details of plants & equipments and labour and other resources that the contractor purposes to deploy to achieve the progress.

- (VI) The contractor shall submit to the Engineer a weekly report giving progress of works including mobilization of his construction plant, machinery, manpower, materials etc.
- (VII) It shall be ensured that the works are carried out according to the aforesaid agreed programme and no changes are made except with the prior approval or at the instance of the Engineer. The contractor shall immediately inform the Engineer, whenever there is, or is likely to be any change in his work schedule.
- (VIII) The contractor shall participate in periodical meetings with the Engineer to review the progress of the work. In case of a slippage in the time schedule due to contractor's inability to perform as per agreed programme, the contractor shall take such action as may be necessary to bring back his work to schedule without additional cost to the Railway, either by employing over time operations, increasing the number of shifts, capacity of construction plants, or as directed by the Engineer.
- (IX) The Railway shall make available to the contractor only the land space required for stacking of the fabricated materials. No land will be made available for contractor's establishment, office go downs, workshop, etc.
- (X) Railway is not in a position to arrange electric power supply to the contractor. The contractor shall make arrangement of electric power supply at site, if required by him/them.
- (XI) The tenderer shall in their own interest, examine the drawings, conditions of contract and the specifications of work. They shall also inspect the site and satisfy themselves on their own as to the hydrological, climatic and physical conditions prevailing at site, the nature, extent and practicability of the works, all existing and required roads and other means of communications and accesses to the sites.
- (XII) All works embracing more than one process shall be subject to examination and approval by the Engineer at each stage thereof and the contractor shall give due notice to the Engineer or his authorised representatives in writing when each stage is ready. In default of such notice, the Engineer shall be entitled to apprise the quality and the extent thereof, even at a later stage at the risk and cost of the contractor.

The Engineer or any of his concerned departmental officials shall be entitled at any time to inspect and examine any material intended to be used in or on the works, either at workshop or at any other place/places where such materials are lying and the contractor shall give also facilities as may be required for such inspection and examination.

- (XIII) No work should be covered up or put out of view without the approval of the Engineer or his authorised representative and the contractor shall afford full opportunity for examination and measurement of any work which is about to be covered up or put out of view. The contractor shall give at least 7 days notice to the Engineer or his representative whenever any such work is ready for examination and the Engineer or his authorised representative without unreasonable delay, unless he consider it unnecessary and advise the contractor accordingly, attend for the purpose of examination and/or measurement. In the

event of failure of the contractor to give such notice, he shall, if required by the Engineer, uncover such work at his own cost.

(XIV) The contractor shall use every reasonable means to prevent any of the highways or bridges communicating with or on the routes to the site from being damaged or injured by any traffic of the contractor or any of his sub-contractors and in particular shall select routes, choose and use vehicles and restrict and distribute loads so that any such extra-ordinary traffic as will inevitably arise from the moving of the construction plants and materials from and to the site shall be limited as far as reasonably possible so that no damage or injury may be occasioned to such highways and bridge.

3.2 Essential Equipments for Tenderers :- Tenderers must have at least following equipments :-

- (i) Cutting Equipments :-
 - (a) Pug cutting machine (i.e. mechanically controlled torch with consumables)
 - (b) Hand gas cutting equipments
- (ii) Drilling machine preferably radial drilling machine.
- (iii) Punching machine.
- (iv) Shaper & planer (for manufacturing of bearing plates).
- (v) Riveting equipments :-
 - (a) Air compressor with accessories
 - (b) Holder
 - (c) Pneumatic Hammer for accuracy
 - (d) Hand tool
- (vi) Arc electric welding plant or DG welding set.
- (vii) Jigs & Fixtures for fabrication of channel sleepers.
- (viii) Steel Tape
- (ix) Weld testing facility
 - (a) Dye Penetration test.
 - (b) N. D.T. equipments
- (x) Painting equipments
 - (a) Manual Painting equipments
 - (b) Metallising equipments.

However as per latest instructions of RDSO Galvanising is to be done.

3.3 Passing of Steel Channel sleepers:- For passing the channel sleepers to ensure quality of fabrication, a check list has been prepared for the inspecting officers and is enclosed as Annexure I

4. Fixing of Steel Channel Sleepers:- The flexibility which the bridge timber offers for maintenance of final track geometry is not available with steel channel sleepers. Therefore line & level of girders are required to be checked & corrected wherever necessary. Wherever it is not possible to correct such inaccuracies in the girders, it has to be made good suitably by making necessary changes in the channel

sleeper for which a detailed survey for each position of channel sleepers would be necessary.

High degree of dimensional accuracy in fabrication of channel sleepers is needed apart from accurate placement of girders. This is the reason why it is being insisted before finalisation of the drawings for channel sleepers to prepare detailed drawings in the division based on site verification at appropriate level. Therefore personal involvement of AEN, DEN and Sr. DEN is must.

At the time of placement, all the points enumerated in annexure-II should be considered and details should be verified.

4.1 Block Activities for fixing of Steel Channel Sleepers (Through departmental labour or Agency) :-

Laying of Channel sleepers require meticulous planning. The various activities for laying of Channel Sleepers should be planned in three blocks as under :-

- (a) Pre-Block activities.
- (b) Block activities.
- (c) Post Block activities.

(a) Pre-Block activities :-

- (i) Ensure correctness of Channel Sleepers & its fittings.
- (ii) Tools & Plants i.e. Jacks, wooden blocks, wedges, spanners, gang tools etc. may be arranged in advance.
- (iii) Existing rail level/proposed rail level marked on reference post in advance.
- (iv) Ensure location of rail joints as per IRPWM.
- (v) The spacing of Channel Sleepers should be marked well in advance in the running rail, on top of girder and also at rail joints.
- (vi) Rivet holes marked as per site condition & punched, in 25 mm thick elastomeric rubber pads.
- (vii) Interlacing of Steel Channel Sleepers should be done in advance to save time during block period with imposition of suitable speed restriction and caution etc.
- (viii) Inner/outer clips with its fitting may be fitted to the channel sleepers & kept loose.
- (ix) Path way/ Gang way can be removed.
- (x) Make guard rail, running rail fittings loose and tight so that it can be easily loosen during block period.

(b) Block activities :-

- (i) Take suitable block (minimum 2 Hrs) for fixing the channel sleepers.
- (ii) Guard rail removed and kept on either approaches of bridge.
- (iii) Remove closure rails on either side of bridge in case of LWR/CWR.

- (iv) Rails made free from sleepers & lifted on jacks & kept on wooden blocks.
- (v) After removing wooden sleepers girder top flange painted with approved paint (as top flange painting is difficult in normal course).
- (vi) Channel sleepers brought at marked location on elastmeric rubber pad & rails lowered and fastened properly.
- (vii) Closure rails shall be fixed on either side in case of LWR/CWR.
- (viii) Guard rail shall be fixed if time permits, otherwise it can be done later on.
- (ix) Track parameters checked and if found fit then block cancelled and first train allowed with speed of 10 kmph SR.

(c) Post Block activities :-

- (i) Proper fixing of guard rail, gang way / path way etc.
- (ii) Tightening of fittings & fastening, ensuring square ness of sleepers.
- (iii) Release of speed restriction to normal after completion of all activities.

5. Painting of Steel Channel Sleepers :- Corrosion is deterioration of metal due to its interaction with the corroding environment. When steel is exposed to the atmosphere, it combines chemically with the oxygen to form oxides. This is generally described, as rust. In addition, steel gets corroded by other harmful chemicals to which it may be exposed, such as acidic fumes and salts in sea spray etc. Corrosion may take place either (i) Uniformly over large areas, referred to as "Uniform Corrosion", or (ii) limited over local area, referred to as "local Corrosion" (iii) Restricted to an extremely minute area, referred to as "pitting".

The corrosion should be detected at the earliest by under taking regular inspections at different levels and it must be prevented by adopting any one of the following means:-

- (a) Protective coatings by painting. (IRBM Para 217)
- (b) Metallising – a form of protection by spraying a metal either zinc or Aluminium. (IRBM Para 218)
- (c) Use of epoxy based paints. (IRBM Para 218)
- (d) Galvanising:- RDSO has recommended Galvanising of steel channel sleepers conforming to IS-2629 and superseded other painting procedures mentioned above vide RDSO publication BS- 45 of 2004 Revised May 2004

However in order to prolong the protection given by galvanizing, the galvanized channel sleepers shall be painted with one coat of ready mixed paint of Red oxide zinc chromate conforming to IS:2074 followed by one coat of Aluminium paint conforming to IS:2339. Determination of thickness, uniformity and weight of zinc coating shall be as per IS-263.

5.1 Frequency of Painting :- It has been experienced that steel channel sleepers are subjected to heavy corrosion due to dropping of night soil, humidity and other local conditions. So the existing painting practice of once in 5 year does not fulfil the purpose, this period should be reduced to three year. This system may be helpful to

check corrosion because once sleeper will be corroded there will be no other alternative but again to provide Metallising.

6. **Inspection Register** :- Steel Channel Sleepers require careful inspection to ensure that all fittings are intact and effective and there is no corrosion in Channel Sleepers. This calls for proper documentation. It is therefore proposed to introduce "Steel Channel Sleeper Inspection Register" where the performance of these sleepers would be recorded. The proforma for this Register is enclosed as Annexure -III & IV.

DEN/Sr.DENs of the Divisions should ensure that all JE/SE/SSE(P.Way) in their jurisdiction have the "Steel Channel Sleeper Inspection Register" with adequate pages for all bridges as per the proforma.

7. **Inspection Schedule for AEN, SSE/SE and JE (P.Way)**:- Inspection Schedule for AEN, SSE/SE and JE (P.Way) is as under:-

- (i) AEN:-Once in 12 months (minimum one bridge under each J.E. quarterly).
- (ii) SSE/SE/JE:-Once in three months (By rotation between JE & SSE/JE).

8. **Maintenance of Steel Channel Sleepers**:-

- (i) Key man should inspect the Steel Channel Sleepers as in case of bridge timbers. He will carry a special spanner for tightening of nuts, hook bolts & clips. Inspecting official will also check the tightness of hook bolts, nuts & clips.
- (ii) If on Galvanised/Metallized surface of steel channel sleepers corrosion appears then these should be taken up for painting immediately (IRBM-217). Further painting shall be done along with girder painting.
- (iii) It must be ensured that the rubber pads/elastomeric pads are in correct position and these should be checked for any permanent set. Heavy vibrations and frequent requirement for tightening of bolts will be indicative of permanent set in the rubber pads/elastomeric pads. Actual permanent set can be found out by actual measuring of the thickness of the rubber pads/elastomeric pads. In case of any permanent set, the rubber pad/elastomeric pads should be replaced by the new ones. The frequency of such replacement along with the suppliers name should be recorded.
- (iv) Use of insulated steel channel sleepers in track circuited zones has been approved by RDSO on Trial basis. Reinforced polymer coating below rail seat on canted bearing plates and on lip area of outer and inner rail clips of the sleeper, provide required insulation in Track Circuited zones. This coating is to be checked for sign of its failure such as cracking, separation, disintegration, burning etc. Such occurrences, indicating failure of insulating material, as well as failure of track circuit are to be reported at once to Head- Quarter. Replacement is to be done with spare similar sleepers and fittings. If not available, replacement in such cases can be done with bridge timbers of appropriate size. However this should not be left on permanent basis, instead uniform type of sleepers be provided at the earliest to avoid change of track geometry on bridge.

- (v) Gauge & Cross-level have to be checked at every 3rd sleeper.
- (vi) All Rivet connecting the cauted bearing plates to the Channel Sleepers are to be tested by Rivets Testing Hammer, and the results to be recorded in the register. In no case more than two loose rivets should be allowed in one channel sleeper.
- (vii) Engineering Supervisors, Key-men and Mates must know the detailed structure of Steel Channel Sleepers, their various fittings and look for their common defects. DEN/AEN should educate them for this purpose. The topic should also be included in the syllabus of Divisional Training Centres

Kindly bring these instructions to the knowledge of all engineering railway officials/supervisors and field workers for compliance.

D.A. Annexure I to IV

[Signature]
23/3/05
(Chief Track Engineer)

Copy to: - 1. Secy to CE for information of CE.

2. CBE and CE /PL & TP for information.

[Signature]
23/3/05
(Chief Track Engineer)

ANNEXURE-I**CHECK LIST FOR CHANNEL SLEEPERS (BEFORE GALVANISING)**

1. Whether test certificate for quality of steel for channels and plate i.e. IS: 2062-1999 is available with the name of manufacturer. The material ISMC and plates should be manufactured by SAIL, VSP or TISCO.
2. Whether Test Certificate of rivets used in fabrication of channel sleepers is as per IS-1148-1982.
3. All dimensions of channel sleepers shall be as per approved drawing of Chief Engineer including C/C distance of hook bolts.
4. Kinks, bents and alignment of the channels and other components.
5. Testing of rivets (2x4Nos.) for M.S. canted bearing plate fitted with channels including soundness and shapes.
6. All welding in fabrication of channel sleepers shall be done as per IRS-Welded Bridge Code (Code of Practice for Metal arc welding etc.- 2001).
7. Classification, testing and approval of metal arc welding electrodes shall be as per IRS/M-28.
8. The weldment shall be inspected for dimensional accuracy and shall be within the tolerances specified. 100% visual checking of welding including thickness to find out defects in welding shall be done. In case of doubt, Dye penetration test (DPT)/ Radiographic test/Magnetic particle flaw detection test/Ultra sonic test shall be done. Invariably records of such testing shall be maintained by supplier and should be scrutinised and sample checking @ 1% by minimum DPT should be done.

CHECK LIST AFTER GALVANISING:-

1. Thorough visual checking of the galvanized sleeper.
2. Thickness of galvanizing by Digital Elco-meter only. Specified thickness is 86 micron i.e. 610gm/sq.m
3. Galvanized surface should be checked by steel "claw" to get the idea about the uniformity of top layers of Zinc.

CHANNEL SLEEPER DRAWINGS

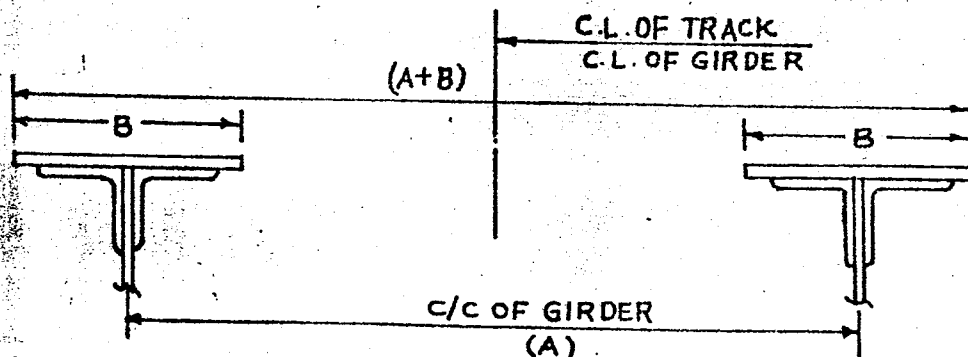
STANDARD ITEMS :-

- 1) Clear spacing should not exceed 510 mm.
- 2) Clear spacing should not exceed 200 mm at rail joints
- 3) Minimum length of sleeper 2440 mm.
- 4) Minimum width of sleeper 230 mm.
- 5) Standard RDSO's Drg.no.B-1636/R2,B-1636/1/R2(Alt.-1),B-1636/2 for straight track which shall include latest alterations.

GENERAL: - The following details are required to be considered and verified at site before preparation of drawings for channel sleepers for the particular bridge.

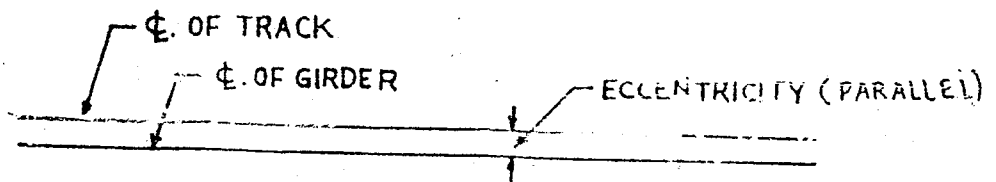
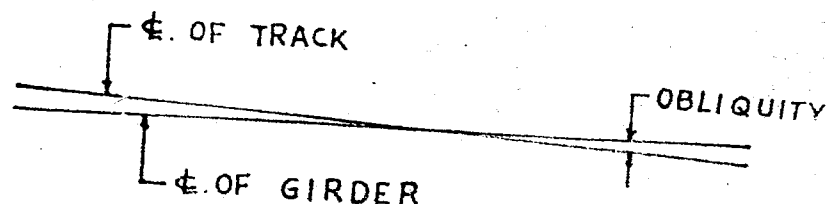
A) FOR STRAIGHT TRACK:-

- 1) GIRDER DRAWING NO: (a) R.D.S.O's Drg.No.-
(b) CE's Drg. No:-
- 2) CENTRE TO CENTRE OF GIRDER /RAIL BEARER, WIDTH OF FLANGES, ECCENTRICITY & OBLIQUITY OF GIRDER:-



Dimension 'A' & 'B' will decide the position of holes of hook bolt for the channel sleeper which shall be verified at site for individual channel sleeper before finalisation of drawing.

- Notes:- 1) If the track is eccentric on the girder then the same should be indicated. It has been observed in some cases that centre line of track is not matching with centre line of girders. The possibilities may be –
- (a) ECCENTRIC BUT PARALLEL – it is necessary to correct the girder, if the same is not possible then indicate the eccentricity correctly before finalisation of drawing and fabrication.



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Division.....
Sub Division
Unit

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Steel Channel Sleepers Inspection Register

(Annexure-IV)

Division..... Sub Division..... Unit.....
 Bridge No.s. & Span..... Date of laying.....
 Location, (km)..... Name of agency who Fabricated and fitted the sleeper.....
 Between Block - section..... Date of Galvanizing/Metallising.....

Sl. No.	Date of Inspection	Gauge & Cross level fitting	Condition of R.R. Pad	Condition of Rivet in channel sleepers	Condition of channel sleepers		Condition of Hook E	Condition of Check Rail / JE/SE/SS Guard rail / E fittings	Sign. Of AEN	Sign of Sr DEN/DEN	Remarks		
					Corro-sion	Crack							
1	2	3	4	5	6	7	8	9	10	11	12	13	14

↓
 In case of Dip at piers to be measured (which is due to sander in girder) to ascertain difference of piers levels