

East Central Railway  
Office of the Chief Administrative Officer (Con)  
Mahendrughat, Patna - 800 004

## CHAPTER - XII

Tender No. 36 of 2008-09 (Single)

## SPECIAL CONDITIONS AND SPECIFICATIONS FOR STEEL CHANNEL SLEPPERS

## 1.0. Details of relevant drawings

The following drawings and specifications shall be followed for various items to be fabricated / manufactured:

S. N.	Description of items	Drawing no.	Material specification
1.	Steel Channel sleeper	RDSO's Drg. No. RDSO/B/1636/R& RDSO/B/1636/1/R2 (Alt-2)	IS: 2062 E 250B(Fe 410 W)
2	M S Canted Bearing Plate For BG running rail	RDSO's Drg.No.RDSO/T-5155	IRS T-5-1965
3	Grooved Rubber Pad 10mm thick for running rail.	RDSO's Drg.No.RDSO/T-5156	IRS specification for 10 mm thick grooved rubber pad (Provisional)1999
4	Annular Cap	RDSO's Drg.No. RDSO/T-5159	IS:2062-2006 E 250 A/B
5	Single Coil spring washers for running rail.	RDSO's Drg.No.T-10773	IS:3063-1972
6	Tapered split pins	As suitable	
7	SQ-Head Bolts & Nuts for guard rails	RDSO's Drg. No. T-5164	IRS T-10-1968
8	Tapered washer for guard rail.	RDSO's Drg. No. RDSO/T-5462	IS:2062-2006 E 250A/B
9	Tapered washer for guard rail	RDSO's Drg No. RDSO/T-5200	IS:2062-2006 E 250A/B
10	Elastomeric pad 20/25mm thick	RDSO's Drg No. RDSO/1636/R& RDSO/B/1636/1/R2(Alt-2)	IRS specification for 20/25mm thick. Nylon cord reinforced Elastomeric pad (Provisional)-1998 No.RDSO/M&C/RP 195/98.
11	MS Clip(Outer)for BG running Rail	RDSO's Drg.No. RDSO/T-5197	IS:2062-2006 E 250A/B
12	MS Clip(Inner)for BG running rail	Dso's Drg No. RDSO/T-5198	IS:2062-2006 E 250A/B
13	"T" Head Bolts & Nuts for BG running rails	RDSO's Drg.No.RDSO/T-5160	IRS T-10-1968
14	8mm thick plain washer for BG running rail		IS:2062-2006 250 A/B
15	Hook Bolts	RDSO.Drg.No.RDSO/B/1636/1/R2 (Alt-2)	IS:2062-2006 E 250 A/B
16	6mm thick 600mm wide chequered plate.		IS:3502

**Note:-**

All fittings and fixtures shall be procured from RDSO approved sources as circulated under RDSO's letter no. CF/EF/Policy dt. 13/3/96 as amended upto date. This list is only indicative. All the fittings and fixtures necessary for the channel sleepers and their fixing will be supplied and fixed by the contractor.

2.0 **Fabrication and Workmanship-**

Fabrication, Workmanship shall generally comply with current IRS specification No.B1-79 with latest correction/amendments thereof unless otherwise specified in special conditions of this contract or as specially directed by the Engineer in writing.

The Contractor shall submit test certificates for Chemical, Metallurgical & structural properties conforming to appropriate standards of all steel material used for fabrications. All structural steel shall be free from rust, scales, laminations, cracks, fissure and other surface defects.

The workmanship and finish shall be equal to the best general practice in modern structural shops. The greatest accuracy shall be observed that in the manufacture of every part of the work all similar part shall be strictly inter-changeable.

**NOTES:**

- a) Only weldable steel conforming to IS:2062/2006 Grade-B Steel fusion welding quality shall be used for fabrication of Steel Channels Sleepers.
- b) No Re-rolled Steel should be used.
- c) Steel should be procured only from SAIL or TISCO or such reputed steel manufacturers only. The source of steel should be got approved by the Railway.
- d) In support of purchase, copy of vouchers are to be submitted.

**2.1 Following specifications shall be followed:-**

- a) Indian Railway Steel Bridge Code as corrected up to date.
- b) Indian Railway welded Bridge Code 1972.
- c) Indian Railway Schedule of dimension for Broad Gauge-1939 (Reprinted in Metric units in 1973).
- d) IS:2062-1992, Steel for general structural purpose.
- e) Indian Railway Specification B-1, 1979: Fabrication and erection of Steel Girder Bridges.
- f) IPS H-5 for rivets.
- g) I:2155-1962 : Rivets for General purposes (Below 12mm diameter).
- h) IRS H-19, for bolts and nuts.
- i) IS: 102-1962, Ready Mixed Paint, Brushing Red Lead, Non setting priming.
- j) IS:2339-1963 : Aluminium paints for General purposes in dual container.
- k) IS: 123-1963 : Ready mixed paints, brushing, finishing Semi-gloss for General purposes to Indian Standard Colours Red Oxide.
- l) B.S.S.916 and/or IS:1963-1967 : Black Hexagonal Bolts/Nuts etc. black Hexagonal Bolts/Nuts and lock Nuts (6 to 39mm) and black Hexagonal Screws (dia 6 to 24mm).
- m) IS:800-1984.
- n) IS:1148-1973 : Hot Rolled Steel Rivet Bars for structural purposes.
- o) IS:2062-1975 : Steel grade-'B' for welded structures. The tenderer shall maintain a master steel tape of approved make for which he has obtained a certificate of accuracy from the National Laboratory.
- p) IS:815-1974 : Classification coating of covered electrodes for metal arc welding of structural steel.
- q) IS:817-1992 : Manual for metal arc welding.
- r) IS:822-1970 : Code of procedure for inspection of welds.
- s) IS:2629-1985 : Recommended practice for hot dip Galvanising of Iron & Steel.
- t) IS:2623-1986 : Method for testing uniformity of coating of zinc coated articles.
- u) IS:6586-1978 : Recommended practice for metal spraying for protection of Iron & Steel.
- v) IS: 5905-1989 : Sprayed aluminium and zinc coating on Iron & Steel.
- w) IS:4699-1968 : Refined secondary arc grade SZM 98.5 minimum contents 98.5% in corrosion resistant used for Galvanising.
- x) IS:1148-1973 : Hot forged rivets for structural purpose.  
Rolled materials before being laid off or worked, must be made straight if straightening or flattening is necessary, it shall be done by method that will not damage the material. Sharp kinks and bends shall be rejected.

**2.2 HOLING :**

Holes for rivets and bolts shall be drilled to conform to Clause 10 of IS:7215. All holes, except as stated here under shall be drilled to the required size or sub-punched 2mm. less in diameters and reamed thereafter to the required size. Thickness of the materials for sub-punching shall not be greater than 16mm. All matching holes for rivets or bolts shall register with each other so that a gauge of 0.8mm less in diameter than the holes can pass freely through the members assembled for riveting or bolting in the direction at right angle to such members. All punching and sub-punching shall be cleared and accurate and all drilling shall be free from burns. No holes shall be made by Gas Cutting process.

**3.0 WELDING :****General :**

The welding and welded work shall generally conform to IRS welded bridge code and subject to further specifications given in the following paragraphs.

All weldings, to the maximum extent possible, should be done either by fully automatic or semi-automatic process. Manual metal arc welding may be done only by welder possessing competency certificate issued by Govt. Recognised Agency/Institute duly certified by AEN/XEN.

All welding work shall be done in shops and the layout and sequence of operation shall be so arranged as to eliminate distortion and shrinkage stress. The parts to be welded shall be properly assembled and held firmly in position by means of Jigs and fixtures prior to and during welding.

3.1 **ELECTRODES :**

All Electrodes shall be kept under dry conditions. Any electrode with parts of its flux coating broken away or otherwise damaged shall be rejected. Any electrode older than six months from the date of manufacture or older than the date of expiry as specified by manufacturer should not be used. *Welding Electrodes to be used in the work should conform to RDSO approved firm and quality only.*

The Electrodes to be used should be No.8 SWG or 10 SWG of class B-1 & B-2 of mild steel for arc welding.

The Electrodes to be used in the work shall be of any of the following firms of repute :

M/s Advani Oerlikon Ltd., Mumbai.

M/s. Diffusion Engineering Ltd., Nagpur.

M/s. Valency Compound Service, Ahemed Nagar.

M/s. Modi Arc Electrodes, Modi Nagar.

M/s. D&H Secheron, Indore.

M/s. EWAC Alloys Ltd., Mumbai.

M/s. Weld Craft Pvt., Ltd., Tunkur Road.

3.2 **PREPARATION OF JOINTS :**

The edge shall be prepared with an automatically controlled flame cutting torch correctly to the size and dimension of the groove prescribed in the design and shop drawing.

The welding surfaces shall be smooth, uniform and free from fine tears notches or any other defects which may adversely effect welding and shall be free of loose scale, slag rust, grease, paint, moisture or any other foreign material.

3.3 **WELDING PROCEDURES :**

The welding procedure shall be arranged by the contractor to suit the details of the joints as indicated on the drawing and the position at which welding has to be carried out. Working procedure shall cover the following:-

- a) Type and size of Electrodes.
- b) Current and for automatic welding are Voltage.
- c) Length of run for Electrode, or for automatic welding speed of travel.
- d) Number and arrangement of runs in multi run welding.
- e) Position and set up of parts.
- f) Preparation and set up of parts.
- g) Welding sequence.
- h) Pre or post heating.
- i) Any other relevant information.

The welding procedure shall be so arranged that the distortion and shrinkage stress are reduced to a minimum and the welds meet requirement and quality specified, hereunder.

Any weld found defective shall be cut by using either chipping hammer or gouging torch in such a manner that adjacent material is not injured in any way.

Fusion faces and surrounding surface within 50mm of welds shall be free from all mill scale and free from oil paint or any substances which might effect the quality of the welds and impede the quality/progress of welding. They shall be free from irregularity, which interfere with the deposition of specified size of weld or be the cause of defects.

3.4 **ASSEMBLY FOR WELDING:**

Before taking up mass production of any type of sleeper the production of 20 sleepers shall be taken up and the dimensions thereafter shall be checked by means of a test track 13 Mtrs. long assembled at the Workshop. The rails for linking of the steel track shall be made available free of charge by Railway at a point convenient to the Railways which should be returned to Railway after its use is

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over. Transportation of the Rails from this point to the contractors workshop and returning the same to the point of collection shall be done by the contractor at his own cost.

3.5 **ACCURACY OF FIT UP :**

Parts to be fillet welded shall be brought into as close contact as practicable and the gap due to faulty workmanship or incorrect fit up shall not exceed 1.5mm.

3.6 **JIGS & MANIPULATORS :**

Jigs, fixtures and manipulators shall be manufactured by the contractor and used during fabrication to ensure dimensional accuracy, minimum welding distortion and facilitate welding in flat or horizontal position and to ensure that all welded locations are easily accessible.

3.7 **MINIMUM LEG LENGTH AND THROAT THICKNESS IN FILLET WELDS**

The minimum leg length of a fillet weld as deposited, shall not be less than the specified size. In no case shall a concave weld be deposited unless specifically permitted. Where permitted, leg length shall be increased above that specified, so that the resultant throat thickness remains the same as would have been by the deposition of a flat faced weld of the specified leg length.

3.8 **DE-SLAGGING:**

After making each run of welding all slag shall be thoroughly removed and the surface cleaned.

3.9 **QUALITY OF WELDING:**

The weld metal as deposited, including tack weld is to be incorporated, shall be free from cracks, slag inclusion, porosity, cavities and other deposition faults. The weld steel shall be properly fused with the parent steel metal without undercutting or over lapping at the toes of the weld. The surface of the weld shall have a uniform consistent contour and regular appearance.

3.10 **WEATHER CONDITIONS:**

Welding shall not be done under open weather conditions, which might adversely affect the quality of welding. It should be done only under a covered shed in a workshop.

3.11 **QUALIFICATION AND TESTING OF WELDERS:**

The contractor shall satisfy the Engineer that the welders are suitable for the work for which they will be employed and shall produce evidence to the effect that welders have satisfactorily completed appropriate tests as prescribed in I. S.- 877. The Engineer may at his own discretion order periodic tests of the welder and/or of the welds produced by them. Such tests shall be at the expense of the contractor.

3.12 **SUPERVISOR:**

The Contractor shall employ a competent welding supervisor to ensure that standard of quality of materials, workmanship and welding comply with the requirements laid down in the specifications.

4.0 **GALVANIZING :**

Galvanizing of steel channel sleepers and MS fittings shall be done by hot dip process of thickness  $100 \pm 5$  microns with zinc conforming to IS : 869-77 and IS: 2629-85.

5.0 **CONTROL IN THE FABRICATION AND ASSEMBLY OF VARIOUS STRUCTURE :-**

5.1 **Criteria for Testing :** The contractor shall conduct test in accordance with following norms.

- a) Visual examination 100% (One hundred percent).
- b) Mechanical Test.
- c) Dye Penetration Examination.

5.2 **TESTS:**

5.2.1 **Visual Examination:**

The contractor shall conduct visual examination and measurement of the external dimensions of the weld for all joints. Before examining the welded joints surface area close to it on both side of the weld for a width not less than 20mm., shall be cleaned of slag and other impurities. Examination shall be done by a magnifying glass, which has a magnification power of 10 and measuring instrument, which has an accuracy of  $\pm 0.1$  mm, or by weld gauges. Welded joints shall be examined from both sides.

The contractor shall examine the following during the visual checks.

- a) Correctness and shape of the welded joint.
- b) Incomplete penetration of weld metal.
- c) Influx.
- d) Burns.
- e) Un-welded craters.

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- f) Under cuts.
- g) Cracks in welded parts and heat effected zones
- h) Porosity in welds and spot welds.
- i) Displacement of welded elements.

The contractor shall document all data as per sound Laboratory practices.

**5.2.2 Mechanical Test :**

The Contractor shall carryout various mechanical tests to determine weldability, the metal alloyability, nature of break, correct size and type of electrodes, degree of pre-heat and post-heat treatment etc. The type, scope and sample of various mechanical tests shall be determined in agreement with the Engineer. The number of tests conducted shall depend on the results obtained to satisfy the Engineer that the correct type and size of electrode, degree of pre-heating and post-heating and weldability of different metal are being followed.

**5.2.3 Dye Penetrate Examination :**

All welds as desired by Engineer will be examined by dye penetrates for detection of discontinuities as per IS: 3658-81, IS:12889-89 and RDSO's Specification No. NRC/NDT/4/91/APPD.

**6.0 Inspection and testing of fabrication:**

The Engineer shall have free access at all reasonable times to the Contractor's works where the fabrication of steel work is carried out and shall be afforded be all reasonable facilities including transport by the Contractor for satisfying himself that the fabrication is being under taken in accordance with the provisions of the drawings and specifications.

The Contractor shall continuously inform the Engineer of the progress in fabrication as and when the individual pieces get ready for inspection. The Contractor shall give a minimum of three working days notice to the Engineer for inspection of the individual pieces.

Unless directed otherwise, inspection shall be made at the place of manufacture in two stages (i) Before galvanizing (to check up the quality of fabrication) (ii) After galvanizing (to check up the quality of galvanizing) by an authorized representative of Railway. Should any structure found not to comply with any of the provisions of this specification it shall be liable for rejection. No structure or part of the structure, once rejected shall be re-submitted for inspection/test, except in cases where the Engineer considers the defect as rectifiable.

Defects, which may appear during fabrication, shall be made good with the consent and according to the procedure laid down by the Engineer. All gauges and templates necessary to satisfy the Engineer shall be supplied by the Contractor. The Engineer, may at his discretion, check the test results obtained at the Contractors works by independent tests at the Government Test House or else where the costs of such tests shall be borne by the Contractor.

**7.0 Marking, Packing and Dispatch :**

Each piece shall be distinctly marked before delivery in accordance with the approved marking diagram and shall bear such other marks as will facilitate erection.

**8.0 Supervision of work :**

During the entire progress of the work the contractor shall have a competent supervisor in personal charge of the work. All works shall be done by skilled competent workmen.

**9.0 GENERAL:**

Elastomeric pad shall be fixed in position on top of girder using poly chloroprene based adhesive approve by Engineer.

The gauge, level, alignment of the track shall be adjusted by the Contractor suitably as per satisfaction of the Engineer and as per tolerances laid down in Indian Railway Permanent Way Manual for New Track.

The fabricator's name & Drg. No. should be indicated on all Channel Sleepers suitably on a plaque fixed on the web of the channel sleeper at one end.

The above conditions are read/understand and accepted by me/us with the rates offered by me/us as above.

Witness

i. \_\_\_\_\_

Signature of Tenderer(s)

2. \_\_\_\_\_

Date \_\_\_\_\_

T. BRAITHWAITE BURN & JESSOP CONSTN CO. LTD

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