

TECHNICAL SPECIFICATIONS AND SPECIAL CONDITIONS

1. General Terms

- a. The contractor has to visit Bridge sites for better appreciation of quantum and requirements of work and quote his rate accordingly.
- b. The work includes cutting of standard rolled section of H- Beam 200 to size and shape, drilling, assembling, welding, riveting, bolting, milling, grinding, galvanizing and performance of any other activity required in manufacturing of H-Beam sleepers and supply of all fittings & fixtures.
- c. No drilling, cutting, punching or exposing the bare metal, welding etc., will be permitted after galvanizing.
- d. Execution of all items is governed by General and Special conditions of Contract.
- e. Tenderer should carefully study all the General / Special conditions and specifications accompanying the tender schedule / form in general and get himself / themselves acquainted with the site conditions.
- f. In case of any deviation from standard RDSO drawing, contractor will have to prepare detailed manufacturing, assembling & fixing drawing and submit the same for approval of HQ before commencement of work.
- g. Mistakes in drawing :- The Contractor shall be responsible for and shall pay for any alterations for the works due to any discrepancies, errors or omissions in the drawings or other particulars supplied by him whether such drawings or particulars have been approved by the Railway Administration or not provided that such discrepancies, errors or omissions be not due to inaccurate information or particulars furnished to the Contractor on behalf of the railway. If any dimension figure upon a drawing or plan differ from those obtained by scaling the drawing or plan, the dimensions as figured upon the drawing or plan shall be taken as correct.
- h. Contractor has to follow the relevant RDSO drawing for H- Beam and its fitting for bridges. The list of material and its concerned approved RDSO drawing list is enclosed. However, any item left to be mentioned in the list and specifically mentioned in schedule shall be treated as fitting and shall be paid under relevant item by weight. No extra rate shall be paid for any special type fixture or fittings, other than that are been taken in MS item schedule.
- i. H- Beam sleeper may have to be fabricated for **60 kg / 52 kg OR 52 kg / 90R** running rail (main rail) / guard rail or any other combination as per instruction of Engineer in-charge, as through Rail renewal work may also be done simultaneously.
- j. Galvanizing of entire fabricated H- Beam sleeper along with all MS fittings i.e., hook bolts, clips, nut bolts etc., shall have to be done by hot dip galvanizing method (minimum thickness of galvanizing shall be 100 microns at any point) as per the specifications mentioned in the tender document

SCOPE OF THE WORK

The scope of work detailed hereinafter is an outline of the services expected from the contractor. It is not the intent to specify all the minute details of the services expected. All items which are required for the design, manufacturing, transporting & fixing of the Steel H-Beam Sleepers are deemed to have been included in the scope and details of the work whether explicitly mentioned or not. The contractor is expected to adopt all necessary measures and complete the required work in every respect to ensure smooth and timely planning and execution of the work.

The scope includes fabrication, transporting, assembling/ supply and fixing of steel H-Beam sleepers to RDSO Drg. RDSO / B-1636/4R, B-1636/5, B-1636/9 & RDSO/B-1636/11 and other suitable drawings for track circuited / Non track circuited locations by removing of track and old channel sleepers with fittings.

DESCRIPTION OF THE WORK

The girder bridges are provided with channel sleepers, which are to be replaced with galvanized steel H-Beam sleepers to the RDSO drawing. Work will be in running lines and is required to be carried out under traffic blocks. The existing track on the bridge will be dismantled during the block, the track on channel sleepers will be removed and new steel H- Beam sleepers along with all its fittings will be fixed. The running rail and the guard rail will be fixed/re-fixed before clearing of the block.

This work is to be executed at different Bridges in IZN division (NER), however contractors are advised to get themselves familiarized with the site conditions before participating in the work. Proposed bridge may however be subjected to modification at a later stage, which will not induce any change in structure of contract agreement.

FABRICATION & WORKMANSHIP

- a. 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.
- b. Fabrication, Workmanship shall generally comply with current IRS Specification No. B1 [INDIAN RAILWAY STANDARD SPECIFICATION FOR FABRICATION AND ERECTION OF STEEL GIRDER BRIDGES AND LOCOMOTIVE TURN-TABLES] with latest correction / amendments thereof unless otherwise specified in special conditions of this Contract or as specially directed by the Engineer in writing.
- c. The Contractor shall submit manufacturer's test certificates confirming 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.
- d. The workmanship and finish shall be usually to the best general practice in modern structural shops. The greatest accuracy shall be observed in the manufacture of every part of the work all similar parts shall be strictly inter-changeable.

Following Specifications shall be followed with upto date correction slips:

1. RDSO Specification No. BS-45 for fabrication of Fabrication of Steel channel Sleepers.
2. IS-4759 for hot dip galvanizing process.
3. Indian Railway Bridge Code as corrected up-to-date.
4. Indian Railway Welded Bridge Code 1972.
5. Indian Railway Schedule of Dimension for Broad Gauge.
6. IS-226, Specification for structural steel standard quality.
7. Indian Railway specification B-1 for Fabrication and erection of Steel Girder Bridges.
8. IS:1929 for Rivets.
9. IS: 2155 - 1962. Rivets for general purposes (Below 12mm dia Meter).
10. IRS H-19. For Bolts & Nuts.
11. IS: 102 - 1962. Ready mixed Paint, Brushing red lead non-setting priming.
12. IS: 2339 - 1963. Aluminum Paints for general purposes in dual container.
13. IS: 123 - 1963. Ready mixed Paints, Brushing, finishing semi gloss for general purposes to Indian Standard Colors. Red Oxide.
14. BSS 916 and /or IS: 1963-1967. Black Hexagonal Bolts/Nuts etc. and Lock nuts(6 to 39 mm) and Black Hexagonal Screws (Dia 6 to 24 mm).
15. IS: 800 - 1984.
16. IS 3063 For spring washer
17. IS: 1148 - 1973. Hot Rolled Steel Rivet Bars for structural purposes.
18. IS: 2062 - 1975. Steel grade for Welded Structures.
19. IS Code No.1759-1984 & IS-2629-1985 for hot dip galvanizing process
20. Any other specification found relevant for fabrication of steel H-Beam sleeper & its fittings.

The tenderer shall maintain a master-steel tape of approved make for which he has obtained a certificate of accuracy from the National Laboratory. 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.

Any hole if required in the fabrication will be either drilled or gouged and chamfered with suitable chamfering tool. However punching is permissible in canted bearing plate only. Punching or use of gas for making holes shall not be permitted. No cutting, drilling or any other operation exposing the bare metal shall be permitted after the fabricated H-Beam sleeper is galvanized.

Contractor shall be fully responsible for quality & dimensional accuracy of steel H-Beam sleepers. Any acceptance, approval or passing by railway administration of sleeper or of the materials incorporated therein shall not in any way limit the contractor's liability thereunder.

The responsibility for obtaining all raw materials from approved sources required for the manufacture and fixing of Steel H-Beam Sleepers shall rest entirely with the contractor. Raw materials shall be conforming to specification mentioned, elsewhere in the tender document and shall have to be procured from RDSO approved firms where ever such approval is available.

All fittings like elastomeric neoprene / rubber pads, bolts, nuts, cleats, packings etc., supplied

and fitted under relevant schedule (MS or NS) shall be procured from RDSO approved firms and inspected by ADEN concerned or his authorized representative

FABRICATION OF H-BEAM SLEEPERS.

1. Fabrication of H-Beam Sleepers shall be done at bidder's own workshop with his own tools, plants, machines and consumables as per RDSO's Drawing Nos. B-1636/4R, 5 & RH-1122, RH-983 and other drawings mentioned therein and as per RDSO's specification No. BS:45. H-Beam Sleeper should be made of standard rolled section ISHB-200 @37.3 kg/m conforming to IS:2062 Gr.B. Beams and MS Plates to IS:2062 Gr.B fully killed and normalized steel. The H-Beam Sleepers and all the required MS fittings shall be galvanized as per IS:4759.
2. The test on sleepers should be done as per RDSO's guidelines. The Agency will arrange to conduct test as per RDSO's guidelines on completed H-Beam Sleepers. All the specifications used in fabrication and manufacturing of Channel sleeper as per BS-45, will be maintained in manufacturing of H-Beam sleeper, with updated IS specifications.
3. The fittings of H-Beam Sleepers shall be inspected not below the rank of ADEN and used only after certification. The charges for any special testing or chemical analysis during this inspection will be borne by the Agency. The required fittings like elastomeric pads of steel sleepers shall be procured from RDSO approved sources and their inspection certificate by RDSO shall be produced before use. The testing and test on the sleepers should be done as per those with H-Beams as mentioned above.

TEST PROCEDURE FOR MASS OF GALVANISED COATING

1. The mass of galvanized coating shall be determined by any of the methods as mentioned below as mutually agreed between the Railway & contractor

2. STRIPPING METHOD

3. CLEANING OF TEST PIECE

The test piece shall be washed with solvent naphtha, trichloroethylene or any other suitable organic solvent, followed by alcohol and finally dried thoroughly.

4. STRIPPING SOLUTION

Dissolve 20 gms. of antimony trioxide (SB₂O₃) or 32 gms of Antimony Dichloride (SB CL₃) in 1000ml of concentrated Hydrochloric acid (specific gravity 1.16)

Immediately before tests, prepare the stripping solution by adding 5ml of the solution prepared under clause 9.1.1.2. to 100ml of concentrated Hydrochloric Acid (specific gravity 1.16), mix well.

5. PROCEDURE: (IS:6745-1972)

Weight the cleaned test specimen whose mass is less than 200gms. nearest to 0.01gms. For test piece whose mass is between 300 to 1000gms. to the nearest 0.1gms. And for test specimen of over 1000 gms. to the nearest 0.5gms. After weighing, immerse each test piece singly in test solution prepared as per clause 9.1.1.2. and allow to remain there until the violent evolution of hydrogen and only a few bubbles are being evolved. this requires about 15 to 30 seconds.

The mass of zinc coating (in g/m²) of surface may be calculated as per the following formula:

where,
$$M = [(M1 - M2) / A] \times 106$$

M = mass of zinc coating, in g/m², of surface
M1 = original mass, in g, of test piece
M2 = mass in g, of stripped test piece, and A = coated area of the test piece, in mm².

6. LOT

All rolled and fabricated sleepers / fittings galvanized in a coating bath and comprising of one complete day's turnover shall constitute a lot. For all other materials of the same type in a coating bath whose coating character-sticks are intended to be uniform shall form a lot.

Samples shall be taken from each lot and tested for conformity for coating. A test piece of mild steel plate of 6mm thick and of size 100x100mm shall be used as sampling piece.

7. SCALE OF SAMPLING

The number of units to be selected from a bath shall be in accordance with column 1 & 2 of the table given below.

TABLE - SCALE OF SAMPLING

Lot size (No. of unit in a bath)	Sample size	Permissible No. of defective units
Up to 25	3	0
26 to 50	5	0
51 to 100	8	0
101 and above	13	1

8. TESTS FOR VISUAL INSPECTION

Visual inspection of the material in a lot shall be made to determine the conformity with the requirements of 3.2. If the inspection warrants rejection of the lot, the galvanized may segregate the good pieces of the lot and submit it once again for inspection.

If the lot inspected for visual inspection passes then the lot shall be declared as confirming to requirements of 3.2.

9. Number of tests for coating characteristics:-

Actual product may be used as test specimen.

Each sample shall be tested by testing one specimen. In case the first test specimen representing a sample unit fails to confirm to the requirements specified in 5, the second & third specimens shall be tested. If any one of the 2nd or 3rd specimen fails to confirm to the requirements, the sample unit shall be considered defectives. If the number of defective units in a lot exceeds permissible number specified in the above tables, the lot shall be rejected.

The materials in a lot which have been rejected may be stripped and re-galvanized and again submitted for inspection and tests.

The lot shall be declared as confirming to the specification if Cl. 4.6.2 is satisfied.

ASSISTANCE TO THE CONTRACTOR: -

The Contractor shall be solely responsible to procure any material or obtain other licenses or permits required for the fulfillment of the contract and the grant by the Railway administration or any other authority of a quota certificate or permit required under any law for distribution or acquisition of iron and steel or any other commodity or any other form of assistance in the procurement of the material aforesaid or any attempt to render assistance in the matter aforesaid, shall not be construed as a representation on the part of the Railway administration that the material covered by such license or permit or quota certificate is available or constitute any promise, undertaking or assurance on the part of the Railway administration regarding the procurement of the same or effect any variation in the rights and liabilities of the parties under the contract. But, if by reason of any such assistance as aforesaid, the Contractor obtains any materials at less than their market price or the cost of production of the sleepers is lowered the price of sleepers payable under the contract shall be reduced proportionately, and the extent of such reduction shall be determined by the Railway administration whose decision shall be final and binding on the Contractor.

All the fittings & rubber pads etc to be supplied as per the direction of Engineer in-charge and to meet the Railways requirement. Any material does not meet the requirement if seen during service within specified time period shall be replaced by the contractor free of cost immediately.

TRACK LINKING WITH H-BEAM SLEEPERS.

1. For linking of track on girders the provisions in the IRPWM-2020, IRICEN Pune's publications on quality control in the track linking, track circulars issued by PCE/ North Eastern Railway shall be followed.
2. Design and provision of Guard rail shall be as per IRPWM 2020. The end of the guard rails

should be bent vertically and buried and a piece of timber fixed on the end of prevent entanglement of hanging loose couplings.

3. The linking of track on girders with H-Beam Sleeper shall be done as per RDSO's drg. No. B-1634/4R, 5 & 9 and instruction / notes laid therein. Track fitting of H-Beam sleeper should be as per drawing no. RH-983 & RH-1122 developed by M/s. Rahee Industries Ltd., Kolkata or as per guidelines issued by RDSO and or as directed by the Engineer.
4. H Beam sleeper shall be laid at a maximum spacing of 600mm center to center for BG except at cross girder locations where the clear distance between two sleepers at cross girder locations should not be more than 450 mm.
5. The rails and guard rails shall be fastened to sleeper as per RDSO's Drawing No. B- 1636/5 and as per Drg. No. T-5155 to 5164. The gangway shall be provided as per RDSO's Drg. No. B-1635/5.
6. Complete handling of the rails like cutting, cropping, drilling of holes for the fish bolts, making holes in guard rails for its fixing etc. complete as required as per the approved design & drawings shall be done by the contractor at their cost. No gas cutting of rails will be permitted.
7. Suitable block will be arranged for execution of work. However contractor will not be entitled to any claim arising out of non-availability of block and idling of labour on some particular day / days.
8. Released material from dismantled track shall have to be transported and neatly stacked at the nearest station or site as directed by Engineer-in-Charge. Rate of this item includes all work required in connection with transportation and stacking.
9. SLEEPER SPACING: - Maximum centre to centre of spacing between two sleeper should not be more than 600mm, except at the location of cross girder and joint sleeper. The clear distance between two sleepers at cross girder locations should not be more than 450 mm and clear distance between joint sleepers should not be more than 200 mm. If the spacing is beyond this specified limit, no payment will be made to the contractor. However, in case of welded joints the standard sleeper spacing may be varied by the Railway's representatives.

TEST CERTIFICATES.

1. All materials for the work shall pass tests and / or analysis prescribed by the relevant IS specifications or such other equivalent specifications.
2. All raw materials shall be obtained from recognized producers or their authorized representatives and the contractor shall furnish copies of test certificates from the manufacturers including proof sheets, mill sheets etc. showing that the materials have been tested in accordance with the requirements of various specifications and codal provisions and to the satisfaction of the Railway.

3. Any approval given by the Railway in consequence of such tests or analysis shall in no way limit or interfere with the absolute right of the Railway to reject the whole or part of such materials supplied, which in the judgment of the inspecting authority / Engineer does not comply with the conditions of the contract. The decision of the Engineer in this regard shall be final, binding and conclusive for all purpose.

2. SCOPE OF WORK:

GALVANIZED STEEL H- BEAM SLEEPER

The quoted rates include -

- i) Fabrication, Supply and fixing of Steel H-Beam Sleepers along with relevant fittings / fixtures to suit RDSO's drg for different bridges as per site conditions, Loading with all riveted / Welded components as per RDSO's drawing No. B-1636/4R, B-1636/5 & RH-1122 (with latest alteration) and other drawings mentioned therein or approved drawing supplied by Railway and specification thereto complete in all respect including supply of riveting of canted bearing plates. Relevant specification & schedule of H-Beam sleeper enclosed herewith.
- ii) H-Beam Sleeper should be made of rolled section ISHB-200 confirming to IS:2062 as per approved drawing Nos. RDSO/B/1636/4R, 5&9 (with latest revision) or any other latest relevant drawing and after fabrication shall be galvanized as per IS:4759.
- iii) Supplying galvanized steel H-Beam sleeper as per the drawing mentioned above and including all the fittings.
- iv) Supplying & fixing galvanized MS canted bearing plate duly galvanized and welded / riveted there on to H-Beam, supplying and fixing MS pad plate for the guard rails duly fixing by welding along with rubber pads and also galvanizing the whole assembly after the welding of pad plates with contractor's own labour tools and machinery.
- v) Galvanization of M.S. canted bearing plates, MS pad plates below guard rail and MS packing plates if any required.

FITTINGS & FIXTURES (GALVANIZED EXCEPT NON-METAL)

- i) Supply of Fittings for steel H-Beam sleepers to suit for different bridges as per site shall be done as per Drawing No. RDSO/B-1636/4R, 5 & 9 and other drawings mentioned instruction /note laid therein. Track fitting for H-Beam sleeper should be as per drawing no. RH-983 & RH-1122 developed by M/s. Rahee Industries Ltd. Kolkata or as per guidelines issued by RDSO or as directed by the Engineer. Relevant specification & schedule of H-Beam sleeper fittings enclosed herewith.
- ii) H-Beam Sleeper MS fittings shall be galvanized as per IS:4759 and IS Code No.1759-1984 & IS-2629-1985.
- iii) All fittings shall be procured from RDSO approved firms and before supply of the same it should be inspected by ADEN concerned. The details of fittings are at Annexure – B.
- iv) All the mild steel fittings and fixture have to be galvanized at the contractors cost before dispatch.
- v) Material List & DODL List per Sleeper for Steel H-Beam and Fittings should be prepared by manufacturer and get the approval from department before execution of the work.
- vi) All the fitting and fixture and grooved pad plate, packing plate(As per RDSO drawing and as per field requirement), which is required for replacement of channel sleeper with H-Beam

sleeper, shall be paid in original tonnage under the relevant schedule item No.191240 . No further NS item will be operated for any special fitting and fixture, unless directed by Engineer-Incharge.

- iv) The H-Beam Sleeper fittings shall confirm to Drg. No. RDSO/T-5155 to T-5164 ,T-5197 to T-5200 & for track circuit area with latest alteration.

Rubberized & nylon pad item

Different types & sizes of elastomeric pads are required for Welded / Riveted Plate Girder and Through Girder Bridges & Under Slung Bridges. It should be supplied as per type of bridges and the size may slightly vary as per site condition and to suit H-Beam sleeper.

All pads shall be procured from RDSO approved suppliers with prior approval of Engineer in-charge concerned. Contractor shall have to submit copies of challan and bill for such procurement. Neoprene shall have to be used in place of rubber. Material will be inspected / test-witnessed by Railway's authorized representative at supplier's workshop / laboratory before the same is supplied / used.

Fixing of all elastomeric pads must be done with Epoxy adhesive as approved by Rly's and supplied by contractor at his own cost as specified in **RDSO** Drg. Of H- Beam.

RIVETS /BOLT & RIVETING/ BOLTING

- a) The rivet holes shall be 1.5mm greater than the diameter of the rivet bars used. The rivets shall be made to specification IS:1929.
- b) The shanks of the un-driven rivets shall be made of a length sufficient to fill the holes thoroughly and to form the head.
- c) The clearance i.e., the difference in diameters between the rivet measured under head before being heated and the rivet holes shall not be less than 0.75mm.
- d) Rivets shall completely fill the holes and shall be properly bolted by means of pressure or percussion riveters of approved design.
- e) All rivets shall be properly heated to straw heat for the full length of the shank, firmly backed and closed.
- f) All loose and burnt rivets with cracks, badly formed eccentric or deficient heads shall be cut out and replaced by others. Permissible deviation of driven rivets shall be as per Appendix VI of IRS BI 1979.
- g) Where practically feasible, all riveting shall be done by pneumatic or hydraulic riveters. The working pressure to be employed when using pneumatic or hydraulic tools shall be approved by the Engineer. Hand riveting shall only be done when sanctioned by the Engineer.
- h) When all the rivets of joint have been finally passed they shall be painted with one coat of Red Lead to IS:102.
- i) **BOLTING:** All turned and fitted bolts shall be carefully turned and shall be paralleled throughout the barrel. The following limits of tolerance shall be permitted upon the diameter of the barrels of turned bolts and holes which they are to fit.

	Barrel of Bolts	Holes
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Limit of Tolerance	High 0.00mm	0.13mm
	Low -0.13mm	-0.00mm

The barrels of each framed bolts shall be of such a length so that it is in full contact with the work throughout the screwed portion, beginning made at least 1.6mm less in diameter than the barrel or to suit the next similar size of metric screw thread. The barrel portion shall be jointed to the thread portion by a degree chamber within the thickness of washer, unless otherwise specified, Faces of heads and nuts bearing on steel work shall be machined.

All such bolts shall be provided with washers having a hole of 1.5 mm larger in diameter than the barrel and thickness of not less than 6mm so that the nut, when tightened, shall not bear on the unthreaded body of the bolt. In all cases where the full bearing area of the bolt is to be enveloped, the threaded portion of the bolt shall not be within the thickness of the parts bolted together. The threaded portion of each bolt shall project through the nut by at least one thread. Tapered washers shall be provided for all heads and nuts bearing on leveled surface.

WELDING

The welding & welded work shall generally confirm to IRS bridge code and subject to further specifications given in the following paragraphs. All the welding should be done by standard arc welding process.

GENERAL

Only weld able Quality Steel confirming to IS: 2062 shall be used for fabrication of H-Beam Sleepers.

Manual metal welding may be done only by welder possessing valid competency certificate or where access of the location of welds does not permit automatic welding. Except for special type of edge preparation such as single & double “U” single & double “J” the fusion edges of all the parts which are to be joined by welding may be prepared by using mechanically controlled automatic flame cutting equipment and to be ground to a smooth finish special edge preparation should be made by machinery or gauging.

All welding work shall be done in shops and the layout and sequences of operation shall be so arranged as to eliminate distortion & shrinkage stresses.

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 electrodes older than 6 months from the date of manufacture or older than the date of expiry as specified by the manufacturer should not be used.

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. In case of “U” grooved joints the edges shall be prepared with an automatic flame torch in two phases following level out with grounding pass or by machining.

The welding surface 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.

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 for automatic welding and 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 welds meet requirement and quality specified, in the Drg. and/or specifications. Any weld found defective shall be cut by using either chipping hammer or gauging torch in such a manner that adjacent material is not injured in any way. In case of damage to parent metal entire steel section will be rejected.

Planning of the Welds involving deformation of the surface either during de-slagging operation or thereafter shall not be allowed.

Fusion faces and surrounding surfaces within 50mm of welds shall be free from all mill scale and free from oil paint or any substance which might affect the quality of the welds and impede the quality/progress of welding. They shall be free from irregularities which interfere with the disposition of specified size of weld or be the causes of defects.

All mill scale within 50mm of welds shall be removed on welding either by picking followed by thorough power weld brushing or by other approved methods. If preparation or cutting of the fusion faces is necessary the same shall be carried out by shearing, chipping, gas cutting or flame gauging. Where no gas cutter or hand gauging is employed the blow pipe or gauging blow pipe shall be properly guided.

ASSEMBLY FOR WELDING

Before taking of 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 15 mtrs. long assembled at the Railway. The rails for linking of the steel track shall be made available free of charges by Railway at a point convenient to the Railways. Transport of the rails and sleepers 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. 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.

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 1.5 mm. If greater separation occurs at any position the size of fillet weld shall be increased at such position by the amount of gap.

JIGS & MANIPULATORS

Jigs and manipulators shall be used where practicable and shall be designed to facilitate welding by automatic or semi-automatic process and to ensure that all welds are easily accessible to the operators.

MINIMUM LEG LENGTH AND THROAT THICKNESS IN FILLET WELDS

The minimum leg length of fillet weld as deposited shall not be less than the specified size. In no case shall a concave weld be deposited unless specifically permitted. The 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.

DE-SLAGGING

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

QUALITY OF WELDING

The weld metal as deposited, including track weld if 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 present steel metal without under cutting or over lapping at the toes of the weld. The surface of the weld shall have a uniform consistent contour and regular appearance.

WEATHER CONDITIONS

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

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 TS-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.

SUPERVISOR

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

3. ERECTION MARKING

Each fabricated H- Beam sleeper and fittings, whether assembled prior to dispatch or not so assembled shall bear an erection mark, which will help to identify the member and its position in respect of the whole structures to facilitate re-erection at site. These erection marks shall be suitably incorporated in the shop detail and erection drawings.

The fabricator's name and drawing No., date of manufacturing / fixing etc. should be indicated on all H-Beam sleepers suitably on a plaque (100x75 mm) fixed on the web of the H-Beam sleeper at left end.

4. CRITERIA FOR TESTING

The contractor shall conduct tests in accordance with following norms.

- a) Visual examination 100% (One hundred percent).
- b) Mechanical test.
- c) Dye penetrant examination.

VISUAL EXAMINATION

The contractor shall conduct the 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 +0.1mm 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. Unwelded craters.

- e. Undercuts
- f. Cracks in welded parts and heat affected zones.
- g. Porosity in welds and spot welds.
- h. Compression in welded joints and a result of electrode while carrying out contact weldings.
- i. Displacement of welded elements.
- j. The Contractor shall document all data as per sound laboratory practices.

MECHANICAL TEST

The contractor shall carry out 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 test 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.

DYE PENETRANT EXAMINATION

All welds, as desired by Engineer will be examined by dye penetrants for detection of discontinuities, as per IS-3658-81, IS-12889-89 and RDSO's specification No. MRC/HDT/4/91/APPD.

5. INSPECTION AND TESTING OF FABRICATION

The Inspection of the finished H- Beam sleepers will be arranged by the Sr. DEN/DEN concerned or his authorized representative not below the rank of ADEN, North Eastern Railway. Necessary office accommodation for the inspecting staff at / near the manufacturing premises will have to be made available by the Contractor free of cost. Necessary Transport facilities to and from the nearby Railway Station convenient to the Inspecting staff Rest House accommodation for the purpose of Inspection should be provided free of cost to the Inspecting Staff by the Contractor.

The contractor will first manufacture 20 nos. of steel H- Beam sleepers for trial. Once the process is perfected he will manufacture the first lot of 100 sleepers and present them to the Railways for their inspection. The inspection of this first lot consisting of 100 sleepers shall be done ADEN concerned, North Eastern Railway. Once first lot is passed, then the contractor shall fix them at site over the bridge. After this the further fabrication, supplies and fixing shall be inspected by ADEN of the section where the sleepers are being fixed. The contractor shall submit before inspection the details of measurement etc. for each sleeper in a suitable Performa to the inspecting Engineers in advance and will give a certificate that the sleepers manufactured confirm to the specifications and the relevant drawings. The rejected sleepers shall not be repaired and incorporated in the work.

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 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 prior to dispatch, by an authorized representative of Railway. If any structure found not to comply with any of the provisions of these specifications, 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 defects as rectifiable.

Defects which may appear during fabrication shall be made good with the consent of 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 and the test results obtained at the contractors works by independent tests at the Government Test House or elsewhere and should the material so tested be found to be unsatisfactory the costs of such tests shall be borne by the contractor.

The contractor shall be required to install and operate all necessary testing equipment required for testing the sleepers. The testing equipment for the same must be available at manufacturing site. In addition, the contractor shall arrange at his own cost for any further tests on materials, as may be indicated by the Engineer/ Inspecting Officer, being carried out at recognized Material Testing Centers and /or institution during the progress of manufacture of the sleepers, even though Test Certificates for such materials are available.

QUALITY CONTROL

Contractor shall furnish a check list for checking fabrication quality of H-Beam sleepers which shall be approved for Railway administration for further adoption.

Contractor will set up an internal quality control mechanism on the basis of standard well-recognized practices, so as to ensure continuous monitoring of quality and consistency.

QUALITY ASSURANCE

The contractor shall establish a quality assurance team in his work shop, which will do the stage checks at various levels to ensure total quality control.

WARRANTY :

The contractor Guarantees that the steel H-Beam sleeper, which he supplies, shall be manufactured fully in accordance with specifications. In all cases the Contractor guarantees that its design shall strictly follow the detailed drawings with such modifications as are notified in respect of each type.

The Contractor further guarantees that the steel H-Beam sleepers shall be free from defects in

material and workmanship. The contractor shall be liable to arrange the necessary replacements of the defective sleepers free of any charge during the maintenance period only to the extent that such replacements are attributable to or arise from faulty workmanship or material or design in the manufacture of the Sleepers or fitting. All replacements shall be made free of cost at destination including fixing. If the contractor so desires, the replaced sleepers can be taken over by him or disposed as he deems fit.

If the Contractor fails to replace the defective sleepers within the one month, the cost of the said sleepers at double the rate stipulated in the Contract shall be recovered from the payments due to the Contractor including the amount of "Security Deposit".

FACILITIES FOR TEST AND EXAMINATION :-

The Contractor shall, at his own expense afford to the Inspecting Officer all reasonable facilities and such accommodation as may be necessary for satisfying himself, that the sleepers are being and/or have been manufactured in accordance with the particulars.

The Inspecting Officer shall have full and free access at any time during the execution of the contract to the Contractor's work for the purpose aforesaid, and he may require the Contractor to make arrangements for inspection of the sleepers or any part thereof or any material at his premises or at any other place specified by the Inspecting Officer and if the Contractor has been permitted to employ the services of a sub-contractor, he shall in his contract with the sub-contractor, reserve to the Inspecting Officer a similar right.

TEMPLATE

Templates needed throughout the work shall be of steel plate in such cases as the inspecting officer may consider necessary.

6. 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. Competency certificate for site incharge will be issued by ADEN concerned, North Eastern Railway, on application by contractor prior to commencement of work.

7. SPECIFICATION FOR GALVANIZATION & ITS TESTING.

Galvanizing of H-Beam sleepers and all other steel fittings shall be done by hot dip process of thickness 100 microns with Zinc conforming to IS-869-1977 and IS-2629-1985 after fixing the bearing plates. The specifications & guide lines are at Annexure-B.

QUALITY OF ZINC

Zinc conforming to atleast grade Zn. 99.5 specified in IS:209-1979 (latest) shall be used for the purpose of galvanization.

BASE METAL

Requirement shall be in accordance with Clauses. 2.1 to 2.1.5 of IS:6158-1971.

SURFACE PREPERATION

Surface preparation shall be as per Clause.4 of IS: 2629-1966. Shot or sand/grit blasting may be used instead of pickling to avoid hydrogen embrittlement.

GALVANIZING

The H-Beam sleepers may be galvanized as per the IS:2629-1966 and IS:4759-1984 unless otherwise specified in the succeeding paragraphs.

COATING REQUIREMENTS MASS OF ZINC COATING

The requirement for the mass of zinc coating for all steel items shall not be less than 705 g/Sq.m and the galvanization thickness shall not be less than 100 microns.

FREEDOM FROM DEFECTS

The zinc coating shall be uniform, adherent reasonably smooth and free from imperfections such as flux, ash and dross inclusions, bare patches, black spots, pimples, lumpiness and runs, rust stains, bulky white deposits and blisters. These terms have been defined in IS:2629-1966.

STEEL EMBRITTLEMENT

Recommended precautions to properly design, fabricate and prepare the material for Galvanising to prevent embrittlement shall be as per IS:6158-1971.

8. **SAMPLING & CRITERIA FOR CONFIRMITY**The following sampling plan shall be followed for ascertaining the conformity of galvanized coating.
9. **INSPECTION /TESTING / TEST CERTIFICATES:**
 - a) The finished steel H-Beams and all riveted / welded components are subject to inspection by ADEN N.E. Railway, IZN Division.
 - b) All expenses involved for Inspection /Testing shall be borne by the H- Beam sleeper manufacturer.
 - c) The H-Beam Sleeper manufacturer have to provide assistance, instruments, machine, labour and any material which are required for examining, measuring and testing of any materials and workmanship as may be selected and required by N.E. Railway or their Authorized Representative without any extra cost NE Railway.
 - d) **Inspection call letter** should be sent by the H-Beam Manufacturer minimum **5 (five) days in advance** at our Office at DRM (Engineering), IZN Division.
 - e) Test Certificates for raw materials (both physical and chemical) and finished materials are to be provided and submitted by the H-Beam Manufacturer at the time of Inspection and along with supply without any extra cost to Railway.

10. DELIVERY PERIOD:

All fabricated H- Beam sleepers within **06 (Six) months** from the date of issuing LOA.

11. EXTENSION OF DELIVERY PERIOD:

If there is delay for reasons not attributable to the H-Beam Manufacturer, NORTH EASTERN RAILWAY, IZN DIVISION, upon receipt of written request from the H-Beam Manufacturer may extend the Milestone / Completion time as suitable and fit reasonable to NORTH EASTERN RAILWAY, IZN DIVISION. No extra claim (including escalation) of H-Beam Manufacturer will be entertained in such cases of time extension being granted.

1. DELIVERY -:

1. Sleepers have to be supplied at bridge site / depots as directed by Engineer-in-Charge, these are preferably be delivered at Bridge sites of IZN Division.
2. 80% of rate will be paid on receipt of galvanized H-Beam sleepers with fittings and fixtures at the bridge site. However, at any given time not more than 50% sleepers per bridge will be paid without fixing under this clause.
3. For payment purpose, actual weight of finished H-Beam sleeper with all MS fittings will be considered. This should however, not vary more than 2% of nominal wt. of sleeper and its fixture, calculated from standard weight table / std. approved drawings.
4. For H-Beam sleepers payment will be made on the basis of nominal wt. or actual wt., whichever is less subject to prescribed rolling tolerances as relevant code or as per IS-1852.
5. Sleepers not fixed within one month of their receipt at bridge site, wharfage will be charged @ Rs. 1/- per sleeper per day.
6. All nuts should have self-locking screws threaded insert (stainless steel helisert). No extra payment shall be made for this.

12. DEFECT LAIBILITY PERIOD:

The subject items in bill of quantity (BOQ) shall be strictly supplied in accordance with the specification, sizes, quantities and no deviation from such specification or alteration shall be made. H-Beam Sleeper manufacturer shall fully guarantee that the supplied items shall perform strictly in accordance with the specification and to be free from all defects in respect of materials and workmanship etc. Should any supplied items not perform as intended or should materials and workmanship prove / found defective within a period of **12 (twelve) months from the date of last laying**, the supplied item in BOQ upon intimation of deficiency / defect, be promptly replaced /repaired by H-Beam Sleeper manufacturer to our satisfaction without delay and no extra cost to us.

If H-Beam Sleeper manufacturer fails to effect proper replacement within a reasonable time of receipt from our intimation to this effect, we shall be free to take such corrective action at H-Beam Sleeper manufacturer.

Contractor shall have to maintain H-Beam sleepers for a period of one year at his own cost from the date of installation. This will include replacement of all worn out, broken or missing fittings, rubber / elastomeric pads etc., Replacement of entire steel H-Beam sleeper may also have to be

done in case of weld defect / failure or metal defect / failure.

13. PERFORMANCE GUARANTEE: - PERIOD OF 12 MONTHS FROM THE DATE OF COMPLETION OF WORK.

- a) On completion of the delivery of the H-Beams & Fittings to NORTH EASTERN RAILWAY, IZN DIVISION, the H-Beam Manufacturer shall be responsible for repairing / replacement of items covering the defects attributable to the H-Beam Manufacturer for a further.
- b) The H-Beam Manufacturer shall make good and remedy at his own expenses within such period as stipulated by NORTH EASTERN RAILWAY, IZN DIVISION, any defect which may develop or may be noticed before the expiry of 12 months.
- c) In case the H-Beam manufacturer fails to make adequate arrangements to rectify the defects within seven days after receipt of Notice from NORTH EASTERN RAILWAY, IZN DIVISION, necessary arrangements will be made by NORTH EASTERN RAILWAY, IZN DIVISION to rectify the defects without further Notice to the H-Beam Manufacturer and cost of such rectification shall be recovered from the amount kept by NORTH EASTERN RAILWAY, IZN DIVISION towards Performance Guarantee.

14. TAXES & DUTIES

H-Beam manufacturer's rate for the above work should be inclusive of all taxes and duties applicable during the tenure of the contract.

15. PRICE VARIATION

No price-variation of any kind will be allowed in this contract under any circumstances. Price shall remain firm for entire scope of work.

16. QAP

After award of tender, Contractor should immediately (not later than 15 days) submit QAP and WPSS for approval of competent authority duly detailing material quality, relevant code/manual/specification etc., Inspection authority, Characteristic check, frequency, reference documents, role of inspection authority & acceptance norms. QAP will be prepared by agency & got sanctioned from competent authority (Sr. DEN).

During work execution, Inspection authority, Characteristic check, frequency, reference documents, role of inspection authority & acceptance norms should not vary from approved QAP without approval of competent authority.

Annexure-B

Fitting items required for one set Steel H-Beam Sleeper

Sl. No.	Description	Drg. No	Per Sleeper quantity required (In No. / set)
1	Dia 350mm long hook bolt with double nut.	B 1636/5	4
2	Single coil spring washer for 28mm dia hook bolts	IS 3063	12
3	Nylon cord reinforced Elastomeric pad (320 x 25 / 30 x 305) As per RDSO/M&C/RP-197/03	B 1636/5	2
4	G R Pad 10mm thick	T 5199	2
5	Tapered washer	T 5161	4
6	Tapered washer	T 5162	4
7	G R Pad 6mm thick	T 5163	4
8	Bolt & Nut	T 5164	4
9	Single coil spring washer (IS 3063)	T 10773	4
10	Tapered split pin Suitable		8
11	Elastic Rail Clip	RH 1122	4
12	Special line	RH 1122	4
13	4 Rail Pad with Embedded Steel Pad Plate	RH 1154	2

NOTE:- Fittings must be as per Drg. No.RDSO/B-1636/4R and 1636/5, RDSO/T- 8759

to RDSO/T-8765, RDSO/T- 5197 to RDSO/T-5200, RDSO/T-5155 to RDSO/T-5164, RH-983 & RH-1122 or any other relevant / latest drawing along with all specifications as mentioned on drawings as suitable for different Bridges of IZN Division. List of above fittings / material is indicative. Actual may vary as per latest drawing / specification.

1. All MS fittings / items should be hot-dipped galvanized as per IS-6745 of 1972 with coating thickness not less than 100 microns at any point.
2. All nuts & bolts should have self -locking screw thread insert (Stainless Steel Helisert) and it should be tightened only by torque wrench up to 67.5 NM for 22 mm dia. and 80.0 NM for 25 mm dia.
3. Fittings shown in Drgs. but not mentioned in this annexure shall have to be provided by tenderer at no extra cost, but payable under relevant item by weight.
4. All required material & work for insulating H-Beam sleeper but not mentioned in this annexure shall have to be provided by tenderer at no extra cost.
5. Quality of insulation has to be to the satisfaction of the Engineer-in-charge of the work.

Following Drgs. are to be followed for various component and fittings on H- Beam Sleeper

1. RDSO/T-8240 - Rail seat assembly for zero toe load fastening system for 60 kg. (UIC) rail on H-beam steel sleepers for Bridges (B.G.).
2. RDSO/T-8241- Special canted bearing plate for zero toe load fastening system for 60 kg. (UIC) rail on H-beam steel sleepers for Bridges (B.G.).
3. RDSO/T-8242 - M.S. bearing plate for zero toe load fastening system for 60 kg. (UIC) rail on H-beam steel sleepers for Bridges (B.G.).
4. RDSO/T-8244 - M.S. special liner for zero toe load fastening system for 60 kg. (UIC) rail on H-beam steel sleepers for Bridges (B.G.).
5. RDSO/T-8245 0 10 mm thick nylon cord reinforced elastomeric pad for zero toe load fastening system for 60 kg. (UIC) rail on H-beam steel sleepers for Bridges (B.G.).
6. RDSO/T-8353 & RDSO/T-8353/1- M.S. tapered washer, plain washer for H-beam sleepers on girder Bridge
7. RDSO/T-8391 - Rail seat assembly for rail free fastening system for 60 kg. (UIC) rail on H-beam steel sleepers for girder Bridge (B.G.).
8. RDSO/T-8392 0 SGCI bearing plate for rail free fastening system for 52 kg./60 kg. (UIC) rail on H-beam steel sleepers for girder Bridge
9. RDSO/T-8393 0 SGCI special liner for rail free fastening system for 60 kg. (UIC) rail on H-beam steel sleepers for girder Bridge (B.G.).
10. RDSO/T-8394 & RDSO/T-8394/1- HDPE pad for rail free fastening system for 60 kg. (UIC)

rail on H-beam steel sleepers for girder Bridge (B.G.)..

11. RDSO/T-8395 & RDSO/T-8395/1 - 25 mm dia: Special bolt & lock nut for rail free fastening system for 52 kg./60 kg. (UIC) rail on H-beam steel sleepers for girder Bridge (B.G.).
12. RDSO/T-8399 - 30 mm thick packing plate for rail free fastening system for Guard rail for H-beam steel sleepers for girder Bridge (B.G.)..
13. RDSO/T-8314 to RDSO/T-8316 -Special bearing plates for 10125 mm O.R. curved switch B.G. (1673mm) for 60 kg. (UIC) on PSC sleeper
14. RDSO/T-8342 -Assembly for switch expansion joint for long welded rail (with 80 mm max: gap) B.G. 60 kg. (UIC) on H-beam sleepers on girder Bridge.
15. RDSO/T-8343 -Rail seat assembly for switch expansion joint for long welded rail (with 80 mm max: gap) B.G. 60 kg. (UIC) on H-beam sleepers on girder Bridge.
16. RDSO/T-8344 - Special canted bearing plate with stopper strip & packing blocks for switch expansion joint for long welded rail (with 80 mm max: gap) B.G. 60 kg. (UIC) on H-beam sleepers on girder Bridge.
17. RDSO/T-8345 & RDSO/T-8346 - Bracket for switch expansion joint for long welded rail (with 80 mm max: gap) B.G. 60 kg. (UIC) on H-beam sleepers on girder Bridge.
18. RDSO/T-8347 -Bracket for switch expansion joint for long welded rail (with 80 mm max: gap) B.G. 60 kg. (UIC) on H-beam sleepers on girder Bridge.
19. RDSO/T-8348 - Bracket for switch expansion joint for long welded rail (with 80 mm max: gap) B.G. 60 kg. (UIC) on H-beam sleepers on girder Bridge.
20. RDSO/T-8349 - 2 mm thick stainless steel plate for switch expansion joint for long welded rail (with 80 mm max: gap) B.G. 60 kg. (UIC) on H-beam sleepers on girder Bridge.
21. RDSO/T-8350 0 10 mm thick composite grooved rubber sole plate for switch expansion joint for long welded rail (with 80 mm max: gap) B.G. 60 kg. (UIC) on H-beam sleepers on girder Bridge.
22. RDSO/T-8351 & RDSO/T-8352 - 25 mm dia: special bolt & nut for switch expansion joint for long welded rail (with 80 mm max: gap) B.G. 60 kg. (UIC) on H-beam sleepers on girder Bridge.
23. RDSO/T-8353 & RDSO/T-8353/1 - M.S. tapered washer ,plain washer for H-beam sleepers on girder Bridge.
24. RDSO/T-8391 - Rail seat assembly for rail free fastening system for 60 kg. (UIC) rail on H-beam steel sleepers for girder Bridge (B.G.)..
25. RDSO/T-8392 0 SGCI bearing plate for rail free fastening system for 52 kg./60 kg. (UIC) rail on

H-beam steel sleepers for girder Bridge (B.G.)..

26. RDSO/T-8393 - SGCI special liner for rail free fastening system for 60 kg. (UIC) rail on H-beam steel sleepers for girder Bridge (B.G.)..
27. RDSO/T-8394 & RDSO/T-8394/1 - HDPE pad for rail free fastening system for 60 kg. (UIC) rail on H-beam steel sleepers for girder Bridge (B.G.)..
28. RDSO/T-8395 & RDSO/T-8395/1 - 25 mm dia: Special bolt & lock nut for rail free fastening system for 52 kg./60 kg. (UIC) rail on H-beam steel sleepers for girder Bridge (B.G.)..
29. RDSO/T-8396 - Rail seat assembly for rail free fastening system for 52 kg. rail on H-beam steel sleepers for girder Bridge (B.G.)..
30. RDSO/T-8397 & RDSO/T-8398 - SGCI special liner for rail free fastening system for 52 kg. rail on H-beam steel sleepers for girder Bridge (B.G.)..
31. RDSO/T-8399 - 30 mm thick packing plate for rail free fastening system for Guard rail for H-beam steel sleepers for girder Bridge (B.G.)..
32. RDSO/T-8415 - Tie angle (10 mm thick) for switch expansion joint (with 80 mm max: gap) for H-beam sleepers on girder Bridge.

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