

SPECIAL CONDITIONS, SPECIFICATIONS AND SCOPE OF WORK

Name of work: - Regirdering of existing BGML Standard steel girder 18.30 of Bridge No.163 UP/ DN (3X18.3m), 192 UP (2x18.30M) and 442 UP/DN (1x14.40M+3x18.30M) in SAH-ST section in Jurisdiction of SSE(Br.) BL of BCT division with 25 Tonne Axle loading standard steel girder.

- i. The scope of work includes supply, fabrication and erection of steel plate girder welded type 14 Nos. of 18.30 M span & 02 Nos. of 14.40 M span including metalizing of Girder to Bridge No. **163 UP/ DN (3X18.3m), 192 UP (2x18.30M) and 442 UP/DN (1x14.40M+3x18.30M)**
- ii. Assembling, erecting, bolting with HSFG bolt with contractor's bolt and launching (as per the launching scheme submitted by the contractor and approved by the Railway) of steel girder 18.30 & 14.40 of Bridge No. 163 UP/ DN (3X18.3m), 192 UP (2x18.30M) and 442 UP/DN (1x14.40M+3x18.30M) in SAH-ST section.
- iii. Dismantling the existing trolley refuges and providing new trolley refuges.
- iv. De-launching / removing of existing girders from running track under traffic block or mega block as per approved scheme including isolating track, all types of handling of the track as per the site requirement.
- v. Design, manufacturing, supplying of elastomeric bearing and fixing of the same as per RDSO drawing.
- vi. Providing, cutting, fabricating, drilling & fixing structural steel conforming to IS:2062 for galvanized tie runner angle of mild steel on H Beam sleeper or wherever required as per instruction of site in-charge.
- vii. Fabricating, supplying and fixing in position Galvanized H Beam sleeper of mild steel of tested quality conforming to IS: 2062, on fabricated girders including all fixtures fastenings as per approved Railway drawings.
- viii. Fabricating, supplying and fixing of 6 to 8 mm thick steel galvanized chequered plate conforming to IS: 3502 for pathway, trolley refuges, floor for the bridge including fixing the same over steel H Beam sleeper by drilling holes in H Beam sleeper and trolley refuges as directed by SSE/Br.
- ix. Providing temporary arrangement such as scaffolding etc. For safe completion of the work.
- x. Re-fixing of inspection ladders shall be done from existing de-launched girders. If required, inspection arrangement may be allowed to fabricate with new material, the payment for which will be made under separate USSOR item.
- xi. All track related works involved such as laying service rail, cutting of rails, drilling holes, rail renewal, dismantling of existing track etc complete in running track during speed restriction or during block period.
- xii. Complete laying and handling of track including cutting, drilling of holes and laying of rails on new steel girders is to be done.
- xiii. Transportation of released material from river bed to nominated place for clearance of water way as per decision of site in charge.
- xiv. The work is to be executed as per the Railway's approved plan. This plan is only for general guidance & actually item to be operated shall be as per the tender schedule & site condition. Decision of Engineer-in-charge or his representative shall be final and binding on the contractor. The plan is available in the Dy.CE(Br-Line)DDR for reference. Tenderers are requested to visit the site of work before quoting their rates.
- xv. All materials to be used in the work shall be as per relevant IS specification, wherever applicable, and shall be approved by Engineer in charge before use in work.
- xvi. The work shall be done as per instructions given by site Engineer and as per Railway's standard specification for materials and work.
- xvii. Contractor shall take all care to avoid any damage to underground cables, telephone cable, OFC cables, water pipe lines, sewerage system etc. Any damage to the railway property on account of contractor's negligence shall be made good at contractor's cost.

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- xviii.** In case any ambiguity between special conditions and general standard condition, special conditions shall prevail. In case of any dispute arising out of the punctuation and or any typographical error in the schedule, the same will be corrected with reference to USSOR-2021 of Western Railway in original manuscript available with COS/WA.
- xix.** For movement of officers and supervisors, contractor shall provide one four-wheeler Vehicle such as Bolero, Sumo or similar etc exclusively. The vehicle shall remain till the currency of contract.
- xx.** Contractor shall have to provide a foldable temporary office for Railway administration having minimum 6 chairs, 1 table, 1 stool, one filing cabinet at no extra cost.
- xxi.** Contractor shall have to arrange precision measuring instrument /equipment like leveling instrument, total station, laser distance meter, staff, tape etc during execution of the work.
- xxii.** Any other ancillary work required for successful completion of work.

1. SOME IMPORTANT DETAILS OF THE EXISTING BRIDGE:

Note: - The details given above are as per Railway's records and are given only for general guidance of the tenderer(s). Tenderer must inspect the site themselves and get the idea of location/approaches and other features of the Bridge/site before quoting their rates.

Sr. No.	BRIDGE NO.	SPANS IN MTR	KM	BETWEEN SECTION	NEAREST RLY. STATION
1	163 UP	3x18.30 M	113/21-23	Saphale -Surat	VGN
2	163 DN	3x18.30 M	113/22-24	Saphale -Surat	VGN
3	192 UP	2x18.30 M	133/17-19	Saphale -Surat	GVD
4	442 UP	1x14.40+3x18.30 M	264/17-21	Saphale -Surat	ST
5	442 DN	1x14.40+3x18.30 M	264/18-22	Saphale -Surat	ST

2. METHOD OF DOING WORK.

Tenderers are supposed to develop and submit the complete detail scheme their own and same will require to be approved by Railway Engineer in charge of work. The scheme shall be developed under the following guide line.

- i.** Overhead electric block should be required for the work.
- ii.** The scheme shall be so made as to minimize the requirement of no of blocks and duration of blocks as well as speed restriction on the bridge.
- iii.** The scheme should not require use of railway locomotive power, Tower wagons, Railway cranes and slewing of Over Head Electric line.
- iv.** The work broadly includes:
 - v.** Supplying for fabricating various structural steel items i.e plate, angle, channel, flats etc.
 - vi.** Fabricating the steel supplied as per railways approved plan and requirement.
 - vii.** Fabricating and supply of steel sections for gussets and some other members.
 - viii.** Supply, fixing and erection of structures made up of mild steel with MS plates etc.
 - ix.** Bolting work with HSFG /Riveting work in various members of steel girders.
 - x.** In situ/field sand Blasting, Metalizing and painting.
 - xi.** Painting of girder components and other minor works as covered under Tender Schedule.
 - xii.** Other ancillary works as per schedule and as required for successful completion of work.
- xiii.** Before developing the scheme, the contractor should study the site condition including the road approach as well as acquaint himself/themselves well with pattern of flow of river etc.
- xiv.** The new fabricated components shall be kept ready before the block and shall be so kept in position to insert the same in the given block.

- xv. To carry out the work under train running conditions with or without speed restriction / Traffic blocks. Railway will make efforts to arrange speed restriction / traffic blocks as per requirements subject to availability of Engineering Time Allowance for that route and also prevailing traffic conditions. However, in case of delay on this account due to some exigencies / traffic conditions prevailing. Railway will not be responsible for any loss whatsoever to the agency. No claims shall be entertained by the Railway on this account.
- xvi. All the temporary arrangements for the work shall be made in such a way that these should not infringe the schedule of dimensions at any time except under traffic block.
- xvii. Other ancillary works like cutting of rivets, providing of turned bolts, riveting etc shall be done in the presence of Railway Engineer or his representative.
- xviii. Contractor shall arrange for sufficient no of turned bolts, rivets, steel, putty, etc., other tools and Tools & Plants and other materials which will be required for the work, before taking the work in hand.

SCOPE OF WORK AND GENERAL FEATURE OF THE TENDER.

Contractor should read carefully the following scope of work and special conditions before quoting the rates.

Tender for the work **consists THREE Schedules, Schedule-A** based on Western Railway Unified Standard Schedule of Rate – 2021, **Schedule-B** based on DSR-2023 and **Schedule-C NS item**. The tenderer/s is/are required to quote his/their rates in percentage **above/below/at par for each schedule separately**.

Railway reserves the right to accept the tender in whole or part or reject any tender of tenderer without assigning reasons for any such action.

Scope of work as mentioned above is tentative and to give fair idea of work. This does not give minute details of activities involved in successful completion of the item. Rate quoted shall be inclusive of such activities not mentioned above and incidental to complete the whole work. The location of site and span may vary according to approved drawings.

The sequence of the work and work site shall be decided by the Engineer in charge depending upon accessibility and availability of land/site.

Work shall be done as per approved drawings or as directed by the Engineer in charge on site order book including other incidental works as per the general drawing. As per the site conditions, occasionally the proposal for the bridges may have to be changed and the contractor shall be bound to execute the work at the rates provided in the tender for the increase/decrease of quantities of items due to such changes.

The contractors shall note that all excavation if found to slip shall be protected by them with proper shoring or sheet piling at their own cost and nothing extra will be paid on this account. The quoted rates shall be deemed to include cost of any such work and no claim whatsoever on this account shall be entertained from the contractor.

Measures to be ensured prior to start the work.

Before starting the execution of works like earth work, supply of ballast, P. Way works, bridge works, precast box launching etc. where the Schedule of Dimension is likely to be infringed, the Officer / Supervisor in charge of construction work (civil engineering, S&T or Electrical) shall ensure the following.

Inform ADEN/DEN of the section about

- Name & Address of the contractor assigned to execute the work.
- Location, duration and timing during which the vehicles are to be plied.
- Detailed planning of work including protection of track and safety measures proposed to be adopted.

Driving licenses are available and record of the drivers and vehicles is kept.

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Training to supervisor / staff of contractor – Competency certificate shall be issued by XEN / ADEN / Railway Engineer in Charge of Site. The contractor's certified supervisor will not be changed without prior permission. Violation of the clause by contractor will attract penalty.

Contractor's supervisor and Railway supervisor shall conduct a survey of site to assess the precautions to be taken at site for working of trains and materials required for protection.

Information as indicated above shall be obtained from contractor prior to the start of work.

Before starting of work, the land strips adjacent to running track where road vehicles / machinery is to ply for the work shall be demarcated by line in advance at an appropriate distance from the center of existing track in consultation with Railway Supervisor.

Barricading (of portable and reusable type) as per drawing as per design given by Engineer-In-Charge shall be provided in the complete length of work area along the track. Adequate watchman shall be also provided.

The work site shall be suitably demarcated to keep public and passengers away from area. Necessary signage boards such as "WORK IN PROGRESS" etc. shall be provided at appropriate locations to warn the public/passengers.

Measures to be ensured during the execution of the work.

Contractor has deputed trained supervisors at work site duly certified by ADEN/XEN/ in charge of the work. Drivers of vehicle have been briefed about safety and precautions to be taken while moving/working close to traffic.

Contractor shall ply road vehicles only between Sunrise and Sunset. In case of emergency where it is necessary to work during night hours, sufficient illumination shall be ensured in the entire work area for the safety of public and passengers. Also necessary additional staff shall be posted for night working.

Wherever provided, engineering indicator boards shall be retro-reflective.

Contractor shall ensure that road vehicle/machinery ply in such a way that they do not infringe the line of demarcation.

Lookout man shall be posted where necessary.

In unusual circumstances, where the operator apprehends infringement to track while working truck/machinery near running track, the following action shall be taken:

The contractors/supervisor/vehicle operator immediately advises the situation to Railway official and assists him in protecting the track.

Protections shall be done as for other emergencies.

Individual vehicle/machinery shall not be left unattended at site of work. If it is unavoidable and becomes necessary to stable the road vehicle/machinery at plant near running track, these shall be properly secured against any possible roll-off and always be manned even during non-working hours.

All temporary arrangement required to be made during execution of work shall be made in such manner that moving dimension do not infringe. Necessary checks shall be exercised by site in charge from time to time.

In case, work has been planned to be done within 6M of Centre of track but at more than 3.5M it shall be ensured that: -

Necessary precautions for protection of track have been taken and caution order issued to trains.

Look out man has been posted along the track at a distance of 800M from the location of work with red flag and whistle to warn the road vehicles regarding approaching trains.

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In case, work is planned to be done within 3.5M of centerline of running track, it shall be ensured that work is done under block protection only and necessary safety precautions for protection to track as per Para No. 806 and 807 of IRPWM are taken.

Mobile phones or walkie talkie sets should be provided where necessary at work sites.

While inspecting the worksite, it shall be used to ensure that all the requisite measures have been taken during execution of work.

Precautions required to be taken during execution of work requiring traffic blocks.

Any work, when infringing the moving dimensions, shall be started only after block has been imposed and track protected.

At locations where night working is unavoidable, proper illumination arrangement should be made.

Before closing the work, the track shall be left with proper track geometry so that trains run safely.

After completion of work, the released sleepers and fittings should be properly stacked away from the track to be kept clear of moving dimensions.

Block shall be cleared only when all the temporary arrangements, machineries, tools, plant etc. have been kept clear of moving dimensions.

Stacking of materials along the track.

The sites for material stacking shall be selected in advance ensuring that no part of the stacked material would infringe the standard moving dimensions. A plan of proposed stacking locations be made and signed jointly by an authorized Railway representative and contractor's representative.

The selected locations shall be marked by lime in advance.

Presence of an authorized Railway representative during unloading and stacking shall be ensured.

The material shall be stacked to such a height that it does not lead to infringement to Schedule of Dimension in case of accidental roll off.

Safety aspects to be observed while working in OHE area.

No electrical work close to running track shall be carried out without permission of Railway representative.

A minimum distance of 2M has to be maintained between live OHE wire and body part of worker or tools or metallic support etc.

No electric connection etc. can be tapped from OHE.

Authorized OHE staff should invariably be present when relaying work or any other major work is carried out.

Power block is correctly taken and "Permit to Work" is issued.

The structure bonds, track bonds, cross bonds, longitudinal rail bonds are not disturbed and is disconnected for the work they are reconnected properly when the work is completed.

The track level is not raised beyond the permissible limit during the work.

No extra payments shall be made for any precautionary measures, deputation of labours for safety.

CODE OF PRACTICE

The work will be executed based on provisions in the following Codes and also the structural design to be submitted for launching, erection & temporary arrangements is to conform to the standard codes with the latest amendments till the date of tender opening. Any other codes, references made use of by the tenderer/s in execution/design shall be specifically brought out in their tender along with the results and advantages of the same including brief design calculations and plans.

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Indian Railway Standard specifications/codes of practice

IRBM, Indian Railways Bridges Rules - Rules specifying the loads for design of Superstructure and sub-structure of bridges and for assessment of strength of the existing bridges including Chapter-VII of the Rules for the opening of a Railway - adopted - 1941 - Revised - August 1982 incorporating Correction Slips No.1 to 42 (Hereinafter referred to as the Bridge Rules 2008 with its latest correction slips).

Indian Railway's Standard (IRS) Bridge Substructures and Foundation Code - Code of Practice for the design of substructure and foundations of bridges - adopted 1936 - Revised - 1985. (Hereinafter referred to as "the Substructure Code-2003") incorporating Correction Slips No.1 to 39.

IRS Concrete Bridge Code along with latest correction slips- Code of Practice for Plain, reinforced and prestressed concrete for general bridge construction incorporating Correction Slips 1 to 13 and SI Units - adopted 1936 - Revised 1997 (hereinafter referred to as "the Concrete Bridge Code-2003").

Indian Railway Schedule of Dimensions along with latest correction slips-2004 -1676mm gauge including correction slip No. 1 to 7.

Indian railways Unified Standard Specifications (Works & materials) Vol. I & II of 2010.

IRS specifications B-1 as per the latest version and correction slips. This will be applicable for fabrication and erection of mild steel liners, welded member construction shall be used & guideline to be referred from IRBM up to latest correction slip.

Indian Standard codes of Practices.

1. IS: 456:2000 for Plain and Reinforced concrete.
2. IS : 2911 - Part I/Section 1 & 2 of 1979 for design and Construction of piles
3. IS: 2911 -Part II /Section 3 & 4 of 2010 for design and Construction of piles.
4. IS : 2911 -Part III -1980 for under reamed piles
5. IS: 2911- Part IV -1979 - Load test on piles.
6. IS: 1343 -1980 Indian Standard Code of Practice for prestressed Concrete.
7. IS : 1892 -1979 Codes of Practice for sub-surface investigation (First Revision)
8. IS: 226 - for Structural (Mild) Steel.
9. IS: 1786-2008- High Strength Deformed Steel bars and Wires for Concrete Reinforcement.
10. IS: 14268-1995 -Uncoated stress relieved low relaxation strand for prestressed concrete.
11. IS: 800-1984 - General Construction and Steel.
12. IS: 12330-1988- Code of practice for Sulphate Resistance Cement.
13. IS: 10262 -1982 – Code of guideline for concrete Mix Design.
14. IS: 2062 - 2011 - Specification for structural steel (Standard quality) – With latest amendment if any.
15. IS: 875 - 1964 - Code of Practice for structural Safety of Buildings and loading standards.
16. IS: 1893-1975-Criteria for Earthquake resistant design and structures (Third Revision- 1976).
17. IS : 383-1970-Specification For Coarse And Fine Aggregates From Natural Sources For Concrete
18. IS : 2386 – 1963 Part I to VIII – Methods Of Test For Aggregates For Concrete
19. IS: 9103 – 1999 - Concrete Admixtures – Specification.
20. IS: 4925 – 1968 - Specification For Concrete Batching And Mixing Plant.
21. IS : 269 – 1989 Ordinary Portland Cement, 33-Grade - Specification

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22. IS : 8112 – 1989 - 43 Grade Ordinary Portland Cement - Specification
23. IS : 12269 – 1987 Specification For 53 Grade Ordinary Portland Cement
24. IS: 8041 – 1990 - Rapid Hardening Portland Cement – Specification.
25. IS : 455 -1983 – Portland slag cement
26. IS : 1489 - 1991 (Part I & II) - Portland-Pozzolana Cement-Specification
27. IS : 4031 – 1988 - Method of Physical tests for hydraulic Cement
28. IS: 10080 – 1982 - Specification For Vibration Machine.
29. IS: 2720 – Part I to XLI (with latest update) - Methods of test for soils.
30. IS: 1498 – 1970 – Classification and identification of soils for general engineering.
31. IS: 6403-1981-Code Of Practice For Determination Of Breaking/Bearing Capacity Of Shallow Foundations.
32. IS: 4926 – 2003- Ready Mixed Concrete.
33. IS: 383 - 1970 – Course & fine aggregate from natural source for concrete.

Other references

1. Indian Road Congress (IRC): - Codes for items not specifically covered by any of the Railway codes or provisions mentioned in these documents.
2. UIC 772 - Bearing for rail bridges.
3. MOST's Guidelines for Recommended Practice for grouting of post tensioned cables in re-stressed concrete bridges.
4. Super structure is steel girder. Approved design of steel girder by RDSO for the purpose is available. Following specifications listed in the RDSO drawing for various component of work shall be followed.

IS : 9595-96 – Metal arc welding

IS : 4000-1992 – HSFG Bolt design

BS : 111 (RDSO) – Guideline for HSFG Bolts

IS : 1367 (Part 1 to 14) – Bolts, nuts and washers

IS : 3935-66, EN ISO: 13918-08, BS EN ISO 6892 – Shear studs

IRS-B1 – Steel fabrication

IS : 2062-2011- Steel for all member except bearing : E250W grade BO or As specified in IRS-B1

In case of clarification about following a particular specification, decision of Engineer in charge shall be final.

In the event of any difference of opinion in regard to any item of work not explicitly covered by specifications or Codes or in regard to the interpretation of specifications including Codes, the directions and decisions of the Chief Engineer in charge shall be final and binding on the successful tenderer. All such changes, modifications to designs and decisions shall not be entitled for any claim or compensation for payment. No plea of customs or usage shall be entertained. The tenderer should note that there might be changes after approval of design as per site conditions, which they are bound to carry out and comply with. There may be changes in the design even during the construction stage or before completion of the work and the successful tenderer shall not be entitled for any claim or compensation on this account and shall be bound to carry out without additional liability as covered in agreement, such changes, modifications, revised designs as may be required to suit the completion of this work.

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PRIORITY-WISE REFERENCES:

In case of any discrepancy or disagreement between different specifications to be followed for any item of work, the following preferences shall be adopted in the order of precedence as they appear below: -

1. Provisions in the NIT as modified/supplemented/ /clarified in the "Technical and Price Bid"
2. IRS Codes of Practice/Standard Specifications.
3. BIS. Codes.
4. Indian Roads Congress specifications.
5. British Standard Specifications.
6. American standard specification;

Provision of any other relevant Codes: For items not covered by any of the above standards and specification, Engineering Practices as approved otherwise shall be followed. Decision of the Chief Bridge Engineer / Principle Chief Engineer, Western Railway, Churchgate, Mumbai, for the application of any other Code shall be final and binding.

MATERIAL SUPPLIED BY CONTRACTOR: -

Material conforming to various IS/Railway standards shall only be supplied and used in work after getting the approval for the same in writing from Engineer-in-Charge.

The contractor shall have to submit the cash memo and Challan along with the lot of steel/cement purchased from various retail factory outlets to SSE/BR in token of proof of purchases of steel or cement from reputed dealers. Steel/Cement shall not be allowed to be used by SSE/BR without these documents. The test certificate from manufacturer or any other approved laboratory shall be produced at the beginning and subsequently at intervals as decided by the Engineer.

Contractor shall remove from site such materials as rejected by the Engineer-in-charge within reasonable time as specified by him.

The payment of steel/cement shall be as per quantity calculated and actually used by the Railway according to prescribed specification and approved drawings. If any extra quantity of steel / cement over and above shown in the drawing and standard laid down has been used by the contractor, in the opinion of Engineer-in-charge for any other reasons such as wastage or bad workmanship or any reasons if any, in the opinion of Engineer-in-Charge, then the cost of such material steel/cement shall not be paid by the Railway. All excess consumption shall be borne by the contractor.

All concreting to be done for CC/RCC work shall mechanically mix by use of concrete mixer and properly compacted by use of vibrators.

Concreting for CC/RCC work shall also be permitted from nearby RMC/batching plant with Railway's approved concrete design mix. The ready mixed concrete may be used whenever required shall confirmed to the specification of the concrete as laid down in the Indian Railway Concrete Bridge Code. For other aspect which are not cover in the Indian Railway Concrete Bridge Code, IS : 4926-2003, IS : 5892-1970 etc. may be referred.

ITEM WISE SPECIFICATION FOR SCHEDULE "A"

Work is to be executed as per WRUSSOR-2021.

Item No. 25072: Ordinary Portland Cement 53 grade of approved brands/makes

Item No. 25080/25082: Supply of steel reinforcement of approved brands/makes for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete. 25082: Thermo-Mechanically Treated bars of grade Fe-500D or more of approved brands/makes.

Item No. 031090: Design, manufacturing, supplying and fixing in position elastomeric bearing true to line and level conforming to IS:3400, IS:226, BS-5400 under prestressed concrete girders/ Steel Girders, for Precast as well as cast-in-situ girders as per approved drawing. The rate shall include cost of load test of

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one no. bearing from Railway approved firms and all fixing materials, equipments, machineries, labour, taxes, loading, unloading, leading, lifting etc. complete. Rates include getting the drawing approved from Railway and cost of inspection during manufacturing from railway approved organization. (Note: 1. The rate is for finished item complete and paid only after fixing in position below the girder. 2. The volume shall be given in the drawing and no deduction shall be made for inserted steel plates etc.).

Item No 41010- Supplying, fabrication, assembling of all types of steel girders of specified spans with structural steel conforming to Quality "B0" Grade

Designation E250 conforming to IS:2062, erection / slewing / end launching of steel girders with cranes or any other approved

launching methods as per site conditions (not requiring traffic block) on substructure including provision of trolley refuges etc.,

complete as per approved QAP and drawings conforming to IRS-B1-2001 and other relevant codes and specifications.

Note:

1. Detailed fabrication and erection drawings & launching methodology will be prepared by the contractor and got approved from Railway.

2. The rate is all inclusive including launching in position, complete in all respect except cost of (i) Painting / Metalising; (ii) Bearings &

(iii) HSFG bolts which shall be paid extra under relevant item.

3. The payment shall be made on the theoretical weight of main components and gusset plates only.

4. Payment Schedule:

(i) Receipt of material at site: 40%

(ii) Fabrication of girders: 20%

(iii) Erection/Launching: 20%

(iv) Completion in all respects: 20%

Item No. 041020: Supplying and fixing HSFG bolts of any dia and any length with suitable nuts including DTI washers conforming to IRS-B1-2001 for bridges and steel structures with contractors labour, tools and plants and lead and lift etc., complete

Item No. 041013: Extra for using steel conforming to Grade Designation E350 instead of Grade Designation E250 of Quality "B0" as per IS: 2062

Item No. 041040/41: Metalizing of steel work of girders with sprayed aluminium after surface preparation by Sand/grit blasting, followed by one coat of etch primer (IS:5666) & one coat of Zinc Chrome primer (IS:104) and two coats of aluminium paint (IS:2339) with all labour, T&P and material as a complete job duly conforming to all relevant specifications and process given under Clause 39 of IRS-B1-2001

Item 41070/72 : Providing and fixing various size HTS holding down bolts conforming to relevant Codes/Specification in concrete column or in other structures with proper nuts, bolts, washers/plates, grouting of holes with cement or epoxy concrete with all material, labour, T&P as a complete job. With epoxy concrete grouting.

Item 41080: Supplying, Fabricating and fixing access ladders, inspection platforms, Trolley refuges etc., on bridges with structural steel conforming

to IS:2062 including welding / bolting, priming painting with one coat of ready mixed paint of Zinc Chromate (IS:104) with DFT of 25-

30 microns followed by one coat of Zinc Chrome Red Oxide (IS:2074) with DFT of 25 microns with all material, labour, T&P as a

complete job.

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Note: Painting shall be paid separately under relevant item.

Item 41340/43 Delaunching of existing and Launching & fixing of new girder/slab in exact location of all type of steel/PSC girders/Slabs available at

site, during block, complete job including lifting to any height as per site requirement, provision of approaches, and placing of released material away from bridge stream or roads as the case may be.

Note: Payment under this item shall be made for the total weight of girder removed and newly launched girder.

Delanching of existing Structural steel plate girders / slabs and Launching New Structural steel plate girders

Item 41290/92 Removing of existing bed plate from existing bed block, supply, fabrication and erection of new bed plate of approved sizes in exact position over bed block of pier/abutments by giving full and even bearing, setting them on the layer of free flow nonshrinkable grouting compound, scrapping or chipping of bed block, if required, fabrication and fixing of holding down HTS bolts of suitable sizes along with nuts, washers etc., drilling holes of

41292 More than 12.20 M and up to 18.30 M clear span

41294 Supply of HTS holding down bolts with nuts, washer etc.

Item 52060 Providing and inserting nipples of size 12 to 20 mm dia. with approved fixing compound after drilling holes for grouting as per Technical Specifications including subsequent cutting/removal and sealing of the hole as necessary after completion of grouting.

Item 52070/73 Grouting of masonry/concrete by injection process duly Sealing of cracks, through nipples complete as per Technical Specification and

procedure given in IRBM Para No 209 including necessary admixture. Payment shall be as per use of cement by weight in case of neat

cement/cement mortar grouting and weight of Epoxy in case of Epoxy Grouting. (Cement will be paid extra). Epoxy grout

Item 52080 Applying epoxy mortar over leached, honey combed and spalled concrete surface and exposed steel reinforcement complete as per

Technical Specification with average thickness of 10mm including priming coat, mortar plaster and seal coat of epoxy.

Item 191000 Dismantling Works - - - -

191010 Dismantling existing track on girder bridges including guard rails and foot path etc., cutting existing SW panels /

LWR, if required into free rails of not less than 12 metre length and leading all released materials to nominated place within 50m of bridge approaches and stacking the released materials clear of infringements, as per direction of Engineer-in- Charge. Note: Rail cutting and drilling shall be paid separately.

191011 Under Traffic Block Conditions

Item 192050

Complete Track Renewal on Bridge with Steel Channel/Hbeam sleepers as per approved drawings including leading of running and guard rails, sleepers and fittings, bending of guard rails, drilling of holes, cutting of rails etc. and leading the released rails, sleepers & fittings near bridge approaches under traffic block as directed and making track structure fit for normal speed.

Item 211200

Hiring of machinery for minor miscellaneous works for short duration including operator/driver, fuel, lubricants and consumable. The contractor shall arrange all statutory permits as required by rules and regulations prevailing in the area of work.

Payment shall be made for actual working hours at site.

211201 JCB Backhoe Loaders 3DX Plus or similar with minimum 1.10 cum bucket capacity

Item 211170

Galvanisation of Railway's Chequered Plates, Channels, Plates, Angles, and I-Section by hot dip process with Zinc Coating and mass of Zinc coating shall not be less than 705 g/sqm and galvanisation thickness shall not be less than 100 microns including necessary surface preparation as per Clause-4 of IS:2629-1985. Galvanisation shall be done as per IS:2629-1985 and IS:4759-1996 with Zinc conforming to IS:209-1992, duly taking all the measures for safeguarding against embrittlement of hot-dip galvanised iron and steel products as per IS:6158-1984 with all contractor's labour, material, tools, plant, all lead, lift and crossing of tracks etc. complete and as directed by the Engineer in-charge.

Item 194020

Providing and fixing of flared portion of guard rails of any rail section over PSC sleepers including fixing of with all fittings, including leading of rails and fittings, squaring and adjusting spacing of sleepers as required, providing nose blocks duly cutting wooden blocks supplied by railways and fixing it with bolts of 16mm dia as directed complete and finished as per RDSO's approved drawing. Note:

1. One set consists of LH & RH side rails of one end.
2. Required P.Way fittings will be supplied at SSE stores depot.

Item 194030 Drilling holes 25mm to 40mm dia. with drill twist in the foot of guard rails for fixing guard rails on bridge as directed.

Item 195040

Supplying & fixing Gang pathway of MS /Stainless Steel chequered plates between guard rails on un-ballasted deck bridge for gang

pathway, overlapping at regular intervals of 2m to 2.5m with bolts duly drilling holes in chequered plate, as directed on new bridge or

replacement of existing gangway on old bridge including removal of old chequered plates and stacking near approaches of bridge

clear from all infringement.

Note: Overlapping of chequered plates shall not fall in between sleepers.

Item 195043

Anti skid Stainless steel chequered plate conforming to latest IS: 6911, ISS Symbol 409 M, minimum 6mm thick (excluding bead height) with flat bottom and top pattern conforming to IS: 3502, 1A with bead height of minimum 0.8 mm - on New Bridges as per RDSO drawings.

Item 211020 Erection or removal of temporary Engineering Indicator Board or any other board at specified locations without causing

infringement to track etc. complete and as directed. - - - - -

211021 For erection & 211022 For removal

Item 161040 Drilling holes of 16 mm to 32 mm dia. with Rail Drilling machine including chamfering with appropriate chamfering tools in all types of rail section with contractor's tools & plants, equipment, consumable with all lead & lift etc. complete, as directed by Engineer in-charge. Rail Drilling Machine will be as per RDSO specification No. TM/SM/3, dated 24.04.1991. - - - - -

161041 Outside track

161042 On running track

Item 161000 /161010 Quick cutting with abrasive rail cutter of all types of rail sections including wear resistant, head hardened rails up to 110 UTS, with

Contract or stools & plants, equipment, consumable with all lead& lift etc. complete as directed by Engineer in-charge. Abrasive Rail

Cutter will be as per RDSO Specification No. TM/SM/1 (Rev. 01 of 2012 with latest status of RDSO; Rail Cutting Wheel Abrasive Disc will be as per RDSO Specification No.TM/SM/2(Rev. 01 of 2020)

Item 161011 60 Kg - 110/90 UTS - Outside Track &

Item 161014 60 Kg - 110/90 UTS - On Running Line

SPECIFICATION OF METALIZING:

TECHNICAL SPEFICATIONS, SURFACE PREPARATION:

1. Surface Preparation

The surface shall be thoroughly cleaned and roughened by compressed air blasting or centrifugal blasting with a suitable abrasive material in accordance with Clause 3 of IS:6586. Immediately, before spraying it shall be free from grease, scale, rust, moisture or other foreign matter. It shall be comparable in roughness with a reference surface produced in accordance with appendix A of IS:5905 and shall provide an adequate key for the subsequently sprayed metal coating.

2. Metal Spraying

The metal spraying shall be carried out as soon as possible after surface preparation but in any case within such period that the surface is still completely clean, dry and without visible oxidation. If deterioration in the surface to be coated is observed by comparison with a freshly prepared metal surface of similar quality which has undergone the same preparation, the preparation treatment should be repeated on the surface to be coated.

The wire method shall be used for the purpose of metallizing the diameter of the wire being 3mm or 5mm. Specified thickness of coating shall be applied in multiple layers and in no case less than 2 passes of the metal spraying unit shall be made over every part of the surface. At least one layer of the coating must be applied within 4 hours of blasting and the surface must be completely coated to the specified thickness within 8 hours of blasting.

a) Purity of Aluminium

The chemical composition of aluminum to be sprayed shall be 99.5% aluminum conforming to 15:2590.

b) Appearance Of The Coating

The surface of the sprayed coating shall be of uniform texture and free from lumps, coarse areas and loosely adherent particles.

3. Method for the Determination of Local Thickness

a) Equipment

Any magnetic or electro-magnetic thickness meter that will measure local thickness of a known standard with an accuracy of ± 10 percent.

b) Calibration of Instrument

Calibrate and check the meter on one of the following standards (as appropriate):

(I) (Applicable to magnetic and electro-magnetic meters other than the pull-off type) A soft brass shim free from burrs, The thickness of the shim shall be measured by micro meter and shall be approximately the same as the thickness of the coating.

c) Procedure

For each measurement of local thickness, make an appropriate number of determinations, according to the type of instrument used.

With instrument measuring the average thickness over an area of not less than 0.645 cm^2 , the local thickness shall be the result of the one reading.

With instruments having one or more pointed or rounded probes, the local thickness shall be the mean of three readings within a circle of 0.645 cm^2 area.

With meters having two such probes, each reading shall be the average of two determinations with the probes reversed position.

4. Method Of Test For Adhesion

Using a straight edge and hardened steel scribe which has been ground to a sharp 30 degree point, scribe two parallel lines at a distance apart equal to approximately 10 times the average coating thickness. In scribing the two lines, apply enough pressure on each occasion to cut through the coating to the base metal in a single stroke.

5. Inspection

a) Determination of Local Thickness

The minimum local thickness shall be determined by the method described above.

b) Adhesion

The sprayed metal coating shall be subjected to an adhesion test using the method described above. If any part of the coating between the lines breaks away from the base metal, it shall be deemed to have failed the test

Articles, which have been rejected shall have the defective sections blasted clean of all sprayed metal prior to respraying. Where the rejection has been solely due to too thin a coating, sprayed metal of the same quality may be added provided that the surface has been kept dry and is free from visible contamination.

c) Determination of thickness of coating: -

Thickness shall be measured by commercially available Elcometer. Method adopted shall be in accordance to IS: 3203-1982/IRS Specification B1-2001. Equipment/Elcometer which is to be used should be any magnetic or electro-magnetic thickness meter that will measure local thickness of known standard with an accuracy of ± 10 percent.

NOTE: -For each measurement of local thickness, one reading per 10 Sqm Surface area randomly for each layer of metalizing and painting to be recorded in a separate register by the Engineer in charge and contractor duly signed.

6. Stage Inspection: - All components/fabricated girders undergoing surface preparation and Metalizing shall be checked in following stages and joint record will be maintained for every item, signed by Engineer's representatives and contractor or their authorized representative.

- I. **Stage:** - After grit blasting for ensuring surface finish to Sa 2.1/2 (Sa two and half) to IS-9954-1981 i.e. near white metallic surface and ensure proper removal of oil and grease.
- II. **Stage:-**After Metalizing- Nominal thickness of the coating shall be 150microns & local thickness shall be not less than 110 microns as per IRS-B-1- 2001.
- III. **Stage:-**After etch primer application- For ensuring proper application and finish as per IS- 5666.
- IV. **Stage:** - After application of aluminium paint to IS: 2339- Total thickness of coating including Metalizing should not be less than 175 Microns.

7. Re-treatment of Defective Areas: -

Any defective area shall be cleaned of all sprayed metal by blasting and re-prepared to confirm the requirement of clause 1 prior to re-spraying. Where the defect has been solely due to, too thin a coating, sprayed metal of same quality may be added, provided that the surface has been kept dry and is free from visible contamination.

8. Additional Protective Coating of Paints: -

1.1 After Metalizing, the components are to be painted, as described below:-

- a) First Coat: - One coat of etch/wash primer conforming to IS-5666 of 1970 (or Latest). Etch primer should be applied immediately after metal spraying to minimize the chances of contamination of the sprayed metal by moisture or pollutant.
- b) One coat of Zinc –Chromate primer to IS-104-1979 with additional provision that Zinc-Chrome to be used in manufacturing of primer shall confirm to type 2 of IS:51.
- c) Two coats of aluminium paint to IS: 2339-1963.
- d) **The necessary paints should be procured from one of the reputed paint manufacturers on approved list of RDSO or as per ISI marked sealed pack of reputed manufacturer approved by Engineer-in-charge of the work.**
- e) 2nd, 3rd and 4th coating shall be applied either by brushing or spraying (as required) after the hard drying of first, second and third coat respectively.
- f) Total thickness of coating after painting (including Metalizing) should not be less than 175 microns.
- g) Corrosion pits and gaps between members connected together should be filled with putty conforming to IS:419-1967, before applying final coat.
- h) Linseed oil, raw or boiled used for mixing paints shall correspond to IS:77-1976.
- i) Manufacturer's test certificates for each lot of primers/paints/purity of aluminium wire shall be submitted to the Engineer- In – Charge for verification.

9. Other Specification: -

In case of any doubt regarding specification, stipulation of IRS-B-1-2001 (Latest correction) will be final and binding on the Contractor.

SPECIFICATIONS FOR STEEL WORK PAINTING:

1. ALL STEELWORK PAINTING WHETHER UNDER SOR OR NON-SCHEDULE ITEMS SHALL BE CARRIED OUT UNDER FOLLOWING SPECIAL CONDITIONS:

1. Contractor should make his own arrangements for scaffolding and derricks etc. for completion of work.
2. No chemical of any kind whatsoever should be used in the removal of oil, paint or rust.

3. **SURFACE PREPARATIONS:** The surface preparation is the most important part of painting. The surface preparation shall be done to ensure removal of all loose dirt, dust, contaminants, loose and perished paint, and rust from the surface being painted and shall ensure sufficient adhesion to the paint layers being applied. The area where only top paint film shows deterioration, the cleaning shall be done using water/detergents, light wire brushing and light sand papering etc. (CLEANING). The area where rust has appeared and where existing pr -nary coat has developed blisters, cracks, brittleness etc or is peeling, are to be scrapped and manually hand cleaned by use of emery paper, wire brushes, scrappers etc, ensuring that they are not blunt. Acid paint removers flame etc. shall not be used for removing corrosion, paints etc. (SCRAPPING)
4. While painting on new steel, the same shall be properly hammered and scrapped to remove factory/mill scale taking care that steel is not deformed / damaged during the process. In newly welded structures, the painting shall be carried out after complete slag on the welding is removed by chipping etc.
5. **QUANTITY FOR SCRAPPING:** The quantity for scrapping complete paint film will be decided by the bridge inspector-in-charge of the work and shall be conveyed before start of work. Decision of engineer in charge in respect of dispute in this respect shall be final. The area scrapped should be followed by primer. If for any reasons beyond contractor's control painting can not immediately follow surface preparation (within 24 hours) corrosion should be prevented for a short time by means of temporary coating of linseed oil applied uniformly and thinly (one third liter on 10 Sq. m area will be sufficient).
6. The work will generally be carried out as per provision for painting work as per IRBM para 217 sub-para 1 to 4, Railway's standard specifications and as per instructions given by Engineer-in-charge. Following points may be noted.
 - a) Paint should be mixed in small quantities sufficient to be consumed within 1 (one) hour in the case of red lead paint and 5(five) days in the case of red oxide paint.
 - b) While painting with red oxide paint, a little quantity of lamp black shall be added to the paint while doing the first coat, similarly in the case of Aluminum paint a little blue paint can be added instead of lamp black for 1St coat.
 - c) Paint should be used within the prescribed shelf life from the date of manufacture. The quantity for paint procured should be such that it is fully utilized before the period prescribed for its use.

THE SHELF LIFE OF VARIOUS PAINTS USED IN THE RAILWAYS IS AS FOLLOWS:

1	Paint red lead ready mixed (IS:102)	04 Months
2	Paint red oxide ready mixed (IS:123)	01 year
3	Paint Aluminum (IS:2339)	
	(i)When paste and oil are not mixed	01 year
	(ii)When paste and oil are mixed	04 Months
4	Paint Zinc Chrome ate primer (IS:104)	01 year
5	Paint Red oxide Zinc Chrome (IS:2074)	01 year

The paint containers supplied by contractor shall indicate date of manufacture clearly and no paint shall be used after expiry date as above. No claim shall be entertained on account of unused paint if any.

- d) The coat of paint applied shall be such that the prescribed dry film thickness is achieved by actual trial for the particular brand of paint. The applied coat of paint shall be uniform and free from brush marks, sags, blemishes, scattering, crawling, uneven thickness, holes, lap marks, lifting, peeling, staining, cracking, checking, scaling, holidays and alleagatoring.
- e) The entire contents of a paint drum should be mixed thoroughly either by pouring a number of times or by mechanical mixing to get uniform consistency. The paint should not be allowed to settle down during painting by frequent stirring Jr mixing. Dryers such as spirit or turpentine should not be used.
- f) Mixing of Kerosene oil is strictly prohibited.

- g) **CONTROL OF PAINT FILM THICKNESS:** It is desirable to control and check the thickness of paint applied to a structure. The 'wet film thickness can be monitored by means of the wet film gauges and from the rate of paint consumption at intervals during application. To provide a recognizable surface appearance and assist in rapid visual inspection during the course of the work, a reference patch or patches of required thickness should be painted on the structure. Measurements of dry film thickness (OFT) should be done systematically over the whole structure and results assessed. Attention should be paid not only to the average DFT but also to uniformity of application. The normal thickness as also the minimum thickness of the dry film should be specified and ensured during execution. Any deviation from the above shall be made with the approval of Executive Engineer-in-charge of the work.
- h) The contractor shall arrange for an elcometer (magnetic or electronic) in perfect working condition having accuracy $\pm 10\%$ and supply the same with calibration gauge to Bridge Inspector in charge of work. The elcometer shall remain in possession of railway for the purpose of supervision till the completion of the work.
- i) **The necessary paints should be procured from one of the reputed paint manufacturers on approved list of RDSO or as per ISI marked sealed pack of reputed manufacturer approved by Engineer-in-charge of the work.**
- j) The lot of paint along with the purchase bills shall be brought to site of work and shall be produced for approval of the field engineer in charge of the work. The paint containers are to be opened in the presence of the railway representative only who shall inspect the container and the details of the paints including weight, batch no, lot no etc and the specifications etc. Only after the railway representative is satisfied regarding the quality of paint shall the same be applied on the structures. Any painting work carried out without satisfying the site engineer in charge of the work regarding the quality of paint shall not be measured and paid for. The structure shall be required to be scrapped at contractor's cost only and painted with proper quality paint. The consumption of the paint shall be correlated with the painted area and the balance stock of paint available at site. Proper records shall be maintained at site by the contractor for this purpose and the record, stock and other details shall be kept open for inspection at all times.
- k) If thinner is to be added to the paint supplied by the contractor it should be of the same manufacturer as that of the paint and to the manufacturer's recommendations. In all the cases, thinner will be added where necessary in the presence of Railway's representative. The Kerosene oil shall never be used as thinner. The Railway's representative shall check the viscosity of the paint at the time of application. The quantity of thinner should be decided after trial. Only required quantity of thinner shall be added such that the requisite thickness is obtained for each coat and the decision of the Site Engineer in charge in this respect shall be final and binding on the contractor.
- l) Through scrapping wherever required will be done with scrappers, wire brushes and chipping hammers ensuring that they are not blunt. Acid paint removers, flames etc. shall not be used for removing corrosion, paints etc.
- m) **PAYMENT CONDITIONS:** The payment shall be made on the basis of the steel area painted in all respects i.e. painting with one/two primer coats, as required, and one/two top coats, as specified in the schedule of painting, as per specifications and to the satisfaction of the Bridge engineer in charge of the work. No payment shall be made for steel areas as partially painted. The height of work shall be measured with reference to flooring systems of structures.
- n) **PROGRESS OF WORK:** The contractor shall prepare and submit a work schedule, network in CPM, PERT or in any other approved form of scheduling. Network is to serve as a guideline for carrying out the various items of work. Notwithstanding the overall time frame for the completion of whole contract period, it shall be binding on the contractor to complete all works in the scheduled time frame. The program for the completion of major items of work shall be finalized in consultation with the executive engineer in charge of the work who may be required to issue notices to the different departments of the railway and take permissions for carrying out the work as required by the laid down rules, to maintain smooth working of the railway system. The program shall be made and submitted promptly on the award of the work. The program shall be made so as to adhere to the minimum progress of

work as per following table. The program shall be so made and resources to be deputed shall be so decided that there is be sufficient margin for making up of minor slippage. In case there is slippage in adhering to the stipulated progress of work, the contractor shall depute additional resources for carrying out the balance work in the stipulated time. Failure to adhere to the program submitted as below shall render the contractor liable to be rescinded on contractor's risk and cost.

Time Period	Expected minimum progress
0.1 P	Full mobilization.
0.2 P	30 % physical progress of work.
0.3 P	50 % physical progress of work.
0.6 P	80 % physical progress of work.
0.8 P	100 % physical progress of work.
1.0 P	Completion of work and site clearance.

'P' denotes the total time period of completion of the contract from the date of issue of acceptance letter.



पश्चिम रेलवे
Western Railway

Headquarter Office,
Churchgate, Mumbai-20
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No. W85/130(W3) E-413
WR-HQ0ENGG(WBPO)/13/2019

CWM(E/W)SBI
Dy. Chief Engineer(Br/line)DDR
Dy. Chief Engineer(Br/line)BRC
Dy. Chief Engineer(Br/line)ADI

Date :08.07.2022

Sub :Standards and specifications for metalizing

As per Correction slip No. 8 dt. 27.08.2014, to fabrication inspections (IRS-B1-2001) of new steel girder bridges shall be metalized. However, the specifications and standards for metalizing are spread over various Codes and Manuals.

In order to facilitate the work, the relevant extracts of Codes and Manuals have been collated and enclosed herewith for guidance of the field units. The same may be followed while metalizing these steel girders in the bridge line units and also in the Workshops.

Please acknowledge the receipt.

Manjul Mathur
08/07/22
(Manjul Mathur)
Chief Bridge Engineer

Signature of the Tenderer (s)
Date:

Dy. CE (Bridge-Line) DDR, WR
For and on behalf of President of Union of India.

Standards and Specification for Metallizing

Sr. No.	Description	Reference																		
1(a)	<p>Locations:</p> <p>The Bridge falling in area up to 30 km from sea coast (Coastal zone) are considered to be in aggressive corrosive environment. The bridges/ steel structures in these areas are susceptible to severe corrosion, which in turn will warrant frequent maintenance attentions and painting. On Western Railway following sections in divisions are considered to be Coastal Zone.</p> <table border="1"><thead><tr><th>S.No.</th><th>Division</th><th>sections</th></tr></thead><tbody><tr><td>1</td><td>BCT</td><td>CCG-VR-ST</td></tr><tr><td>2</td><td>BRC</td><td>ST-BH, BH-SAMN-DHF, PTD-CBY</td></tr><tr><td>3</td><td>ADI</td><td>MALB-SIOB-GIM-NBVJ-NLY, GIM-KDLP</td></tr><tr><td>4</td><td>RJT</td><td>DAC-NLK, DAC-MALX, HAPA-KNLS-OKHA</td></tr><tr><td>5</td><td>BVP</td><td>VRL-BDDR, WSJ- PBR, TAV- SMNH, TAV-PCC-DVA,RLA-MHV, RLA-PPBR, BVP-SOJN</td></tr></tbody></table>	S.No.	Division	sections	1	BCT	CCG-VR-ST	2	BRC	ST-BH, BH-SAMN-DHF, PTD-CBY	3	ADI	MALB-SIOB-GIM-NBVJ-NLY, GIM-KDLP	4	RJT	DAC-NLK, DAC-MALX, HAPA-KNLS-OKHA	5	BVP	VRL-BDDR, WSJ- PBR, TAV- SMNH, TAV-PCC-DVA,RLA-MHV, RLA-PPBR, BVP-SOJN	Para 3,4, 5 & 5 (a) of PCE circular 73
	S.No.	Division	sections																	
	1	BCT	CCG-VR-ST																	
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	5	BVP	VRL-BDDR, WSJ- PBR, TAV- SMNH, TAV-PCC-DVA,RLA-MHV, RLA-PPBR, BVP-SOJN																	
	<p>Para 218 of IRBM also stipulates Metallizing for locations where girders are exposed to corrosive environment, like girders in industrial, suburban or coastal areas etc. As per ACS-8 dated: 27-08-2014 to Fabrication Specifications (IRS: B1-2001, all New Steel girder bridges shall be metalized.</p> <p>All new steel Girder Bridges (Track Bridge/ROBs and Overhead crossings) shall be metallized. The girders and floor system of all FOBs (excluding columns) should also be metallized. However, complete FOBs constructed in Coastal region shall be metalized.</p>	Para 218 of IRBM and ACS-8 to IRS: B1-2001																		
1 (b)	<p>For the metalized steel structures in corrosive environment, the frequency of painting shall be once in 5 years or later based on the evidence of corrosion in structure. The need for painting of a metalized structure after 5 years shall be decided by Dy.CE/Br/Line in-charge after inspection.</p>	Para 5 (c) of PCE circular 73																		
2.	<p>Metalizing: In metalized protection, Zinc or aluminum is sprayed on the surface prepared by grit / sand blasting. The sprayed metal (zinc or aluminum) is lost by the atmospheric action, while the base metal (steel) remains unaffected.</p>	Para 218/1 of IRBM-1998																		
3.	<p>Surface preparation:</p>																			
3(a)	<p>The surface of steel to be metalized shall be free from oil, grease, bituminous material or other foreign matter and shall provide an adequate key for the sprayed metallic coating. This may be achieved by flame cleaning or by sand blasting. However, the abrasive once used for cleaning heavily contaminated surface should not be reused even though rescreened.</p>	Para 218/1/(i) of IRBM-1998																		
3(b)	<p>The effective life of a coating of anticorrosive paint applied to a steel surface is to a very large extent dependent on how thoroughly the surface has been prepared prior to painting. It is also important to specify clearly the quality of preparation required in each particular case.</p>	Clause 0.2 of IS:9954-1981																		
3(c)	<p>The initial surface to be metalized is described in terms of Rust grade as follow: Rust Grade: The steel surfaces have been grouped into the four grades i.e. A, B, C and D. The appearance of the rust grades shall correspond to the prints designated as A, B, C and D. These surfaces determine the extent of cleaning effort required.</p>	Para 0.3, 3 of IS:9954-1981																		
3(e)	<p>Millscale, rust and foreign matter shall be removed to the extent that the only traces remaining are slight stains in the form of spots or strip. Finally, the surface is cleaned with a vacuum cleaner, clean dry compressed air or a clean brush. It shall then correspond in appearance to the prints designated Sa 2-1/2.</p>	Clause 4.1.2.3 of IS:9954-1981																		
4.	<p>Specifications of Abrasive charge used for Blasting:</p>																			
4(a)	<p>Silica Sand:</p> <p>Silica sand or special crushed slag, flint or garnet is used outdoors where the abrasive cannot be reclaimed and re-used. It should be hard, sharp and angular as might be produced by crushing. Round silica sand or similar materials should never be used.</p>	Clause 4.3 of IS:6586-1989																		

Signature of the Tenderer (s)
Date:

Dy. CE (Bridge-Line) DDR, WR
For and on behalf of President of Union of India.

	River sands which are hard and sharp. The sand shall be free from loam and mud, and it shall be sharp and hard.	Clause 6.2.4 of IS:1477-1971			
	The grain size of sand should be between 600 microns and 1700 microns and a minimum of 40 per cent should be retained on a 850 microns sieve, conforming to IS 460 (Part I): 1985.	Clause 4.3.2(a) of IS:6586-1989			
4(b)	IRON GRIT Crushed chilled iron or steel grit is most commonly used where the abrasives may be reclaimed. Round steel shot grounded grit should never be used. Chilled iron Grit Grade GC-100 to GC-42 should be used.	Clause 4.3.1, 4.3.2 of IS:6586-1989			
	The grit particles shall show good angularity in the form of sharp cutting edges and shall be substantially free from half rounds (viz. shots split into halves)	Clause 2.2, 5.3 and 6.1 of IS: 4683-1968			
	Chilled grit shall conform to IS: 4683 and they are designated by GC standard, which is aperture size of retaining screen in hundredth of millimetres. The particle size shall be determined by testing with the sieves complying to IS: 460- 1962. The proportions retained and passed shall comply with the limits given in the Table-2 attached.				
4(c)	COPPER SLAG Copper slag used as blasting material shall be vitreous amorphous material and shall not absorb water. The material shall be free from corrosive constituents and adhesion impairing contaminants. It shall meet following requirements:		ISO 11127, ISO 11126		
	S.No	Property		Requirement	Test
	1.	Apparent Density		3.3 to 3.9 X 103 Kg/m3	ISO 11127-2
	2.	Hardness		Min 6	ISO 11127-3
	3.	Moisture		Max 0.2%	ISO 11127-1
4.	Size	Particle size 1.4- 2.8 mm; Residue on 2.8 mm sieve- Max. 10%	ISO 11126-3		
5(a)	Blasting:				
	Nozzle position: At right angles to and approximately 22.5 cm. from the surface Nozzle dia: Not exceeding 12 mm The final surface roughness achieved shall be comparable to the reference surface produced in accordance with Annex A of IS:5905 and shall provide an adequate key for subsequently sprayed metal.	Para - 218/1/(i)/b of IRBM-1998			
5(b)	Blasting method: Common blasting methods in use of metal spraying are pressure blasting and centrifugal blasting (airless blasting). While pressure blasting is suitable for manual or mechanized operation, centrifugal blasting is used only as a mechanized system.			Clause 4.4 of IS:6586-1989	
5(c)	Manual Pressure Blasting: Pressure blasting is the process most often used for preparing surfaces prior to metal spraying. It is particularly useful for large area job, work of varied shapes, which have to be treated manually in works blast room. For site work blasting, it is almost universally in use. The air pressure at the grit container should not be less than 4 kg/cm2.			Clause 4.4.1 of IS:6586-1989	
5(d)	Blasting technique: Manual blasting should systematically cover the entire surface to be treated, by traversing the nozzle at a fairly constant speed in straight paths, each succeeding pass partially overlapping the preceding one and exposing clean metal. The nozzle distance when treating materials like steel should be 150 to 250 mm. The angle of blasting is generally 15° to 30° from normal to the blasted surface. The blast nozzle should be replaced when diameter of the orifice has been increased for 25 % by wear.			Clause 4.4.1.1 of IS:6586-1989	
6(a)	Comparing the final prepared steel surface :				
	The final surface roughness achieved shall be comparable to roughness with a reference surface produced in accordance with Annex-A (clause 4.1) of IS: 5905-1989 and shall provide an adequate key for subsequently sprayed metal. The surface prepared by sand or grit blasting should conform to Sa 2-1/2 of IS:9954 i.e. near white metallic surface.			Para 218/1/(i)/c of IRBM-1998 Para 39.2.2 of Specification	

Signature of the Tenderer (s)
Date:

Dy. CE (Bridge-Line) DDR, WR
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		B1-2001.
6(b)	<p>Procedure of comparison of prepared surface by making use of the prints in practice.</p> <p>1.0 Hold the book right way up with light coming towards the viewer.</p> <p>2.0 Ascertain the initial condition of the steel by comparing the untreated steel with prints of rust Grades A, B, C or D.</p> <p>3.0 After cleaning the steel, select those pages that show preparation Grades (St) or (Sa) and compare the condition of the steel with the print equivalent to the preparation grades. If necessary, continue the cleaning procedure until the steel surface matches the print.</p>	Clause 5 of IS:9954-1981
7.	Metallizing:	
	The Specifications, procedure and materials used for metalizing with Sprayed aluminium for Bridge girders at sites and in shops is detailed in Appendix VII of IRS B1-2001 (attached), which should be followed. The materials used shall be tested as per the specifications/ codes referred therein.	Appendix VII of IRS B1-2001
8.	Manufacturer's test certificate shall be obtained for every material used for the work like abrasive for blasting, aluminum wire, Etch/wash primer, Zinc chromate paint primer, Aluminum paint.	
9.	SAFETY PRECAUTIONS: The normal precautions against fumes and dust hazards, such as, wearing of masks and proper ventilation should be used. For indoor spraying on smaller jobs, it is preferable to use a spray booth to collect zinc or aluminium powders released during spraying. Any safety measures or precautions suggested by the equipment or paint manufacturer should be observed.	

Signature of the Tenderer (s)
Date:

Dy. CE (Bridge-Line) DDR, WR
For and on behalf of President of Union of India.

Specification for Metallising with Sprayed Aluminium for Bridge Girders

1. Surface Preparation

The surface shall be thoroughly cleaned and roughened by compressed air blasting or centrifugal blasting with a suitable abrasive material in accordance with Clause 3 of IS:6586. Immediately, before spraying it shall be free from grease, scale, rust, moisture or other foreign matter. It shall be comparable in roughness with a reference surface produced in accordance with appendix A of IS:5905 and shall provide an adequate key for the subsequently sprayed metal coating

2. Metal Spraying

The metal spraying shall be carried out as soon as possible after surface preparation but in any case within such period that the surface is still completely clean, dry and without visible oxidation. If deterioration in the surface to be coated is observed by comparison with a freshly prepared metal surface of similar quality which has undergone the same preparation, the preparation treatment should be repeated on the surface to be coated.

The wire method shall be used for the purpose of metallising the diameter of the wire being 3mm or 5mm. Specified thickness of coating shall be applied in multiple layers and in no case less than 2 passes of the metal spraying unit shall be made over every part of the surface. At least one layer of the coating must be applied within 4 hours of blasting and the surface must be completely coated to the specified thickness within 8 hours of blasting.

2.1 Purity of Aluminium

The chemical composition of aluminium to be sprayed shall be 99.5% aluminium conforming to IS:2590.

2.2 Appearance Of The Coating

The surface of the sprayed coating shall be of uniform texture and free from lumps, coarse areas and loosely adherent particles.

2.3 Thickness Of The Coating

The nominal thickness of the coating shall be 150 μ (microns).The minimum local thickness, determined in accordance with procedure given in clause 3.1 below, shall be not less than 110 μ (microns).

3. Shop Painting

Any oil, grease or other contamination should be removed by thorough washing with a suitable thinner until no visible traces exist and the surfaces should be allowed to dry thoroughly before application of paint. The coatings may be applied by brush or spray. If sprayed, pressure type spray guns must be used. One coat of wash primer to IS:5666 shall be applied first. After 4 to 6 hours of the application of the wash primer, one coat of Zinc chrome primer to IS:104 with the additional proviso that zinc chrome to be used in the manufacture of primer shall conform to type 2 of IS:51 shall be applied. After hard drying of zinc chrome primer, one coat of Aluminium paint to IS:2339 (brushing or spraying as required) shall be applied.

4. Site Painting

After the steel work is erected at site a second cover coat of Aluminium paint to IS:2339 (brushing or spraying as required) shall be applied after touching up the primer and the cover coat given in the shop if damaged in transit

5. Method for the Determination of Local Thickness

5.1 Equipment

Any magnetic or electro-magnetic thickness meter that will measure local thickness of a known standard with an accuracy of ± 10 percent.

5.2 Calibration of Instrument

Calibrate and check the meter on one of the following standards(as appropriate):

(i) (Applicable to magnetic and electro-magnetic meters other than the pull-off type)
A soft brass shim, free from burrs, in contact with the grit-blasted surface of the base metal prior to its being sprayed. The thickness of the shim shall be measured by micro meter and shall be approximately the same as the thickness of the coating.

(ii) A sprayed metal coating of uniform known thickness approximately the same as the thickness of the sprayed coating to be tested, applied to a base of similar composition and thickness to the article being sprayed, grit-blasted in accordance with Clause 1.

5.3 Procedure

For each measurement of local thickness, make an appropriate number of determinations, according to the type of instrument used.

With instrument measuring the average thickness over an area of not less than 0.645 cm^2 , the local thickness shall be the result of the one reading.

With instruments having one or more pointed or rounded probes, the local thickness shall be the mean of three readings within a circle of 0.645 cm^2 area.

With meters having two such probes, each reading shall be the average of two determinations with the probes reversed position.

6. Method Of Test For Adhesion

Using a straight edge and hardened steel scribe which has been ground to a sharp 30 degree point, scribe two parallel lines at a distance apart equal to approximately 10 times the average coating thickness. In scribing the two lines, apply enough pressure on each occasion to cut through the coating to the base metal in a single stroke.

7. Inspection

7.1 Determination of Local Thickness

The minimum local thickness shall be determined by the method described above.

7.2 Adhesion

The sprayed metal coating shall be subjected to an adhesion test using the method described above. If any part of the coating between the lines breaks away from the base metal, it shall be deemed to have failed the test

Articles, which have been rejected shall have the defective sections blasted clean of all sprayed metal prior to respraying. Where the rejection has been solely due to too thin a coating, sprayed metal of the same quality may be added provided that the surface has been kept dry and is free from visible contamination.

TABLE 2 GRIT GRADE NUMBERS

(Clauses 2.2 and 6.1)

IS SIEVE DESIGNATION	WIDTH OF APERTURE mm	GRIT NUMBER														
		G-C236	G-C200	G-C170	G-C140	G-C118	G-C100	G-C85	G-C60	G-C42	G-C30	G-C18	G-C09	G-C05		
3.35 - mm	3.35															
2.80 - mm	2.80															
2.36 - mm	2.36	80 10	80 10													
2.00 - mm	2.00		80 10													
1.70 - mm	1.70			80 10												
1.40 - mm	1.40				80 10											
1.18 - mm	1.18					75 10										
1.00 - mm	1.00						75 15									
850-micron	0.850							75 15								
710-micron	0.710								70 15							
600-micron	0.600									70 15						
500-micron	0.500	None pass, except 2 percent, Max allowed for fines														
425-micron	0.425									70 15						
355-micron	0.355										65 20					
300-micron	0.300											65 20				
180-micron	0.180												60 25			
90-micron	0.090															

Note - When IS sieves are not available, equivalent BS or ASTM sieves specified in Appendix A may be used.

IS : 4683 - 1968

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Safety Precautions:-

- a) The normal precautions against fumes and dust hazards, such as wearing of mask and proper ventilation should be observed.
 - b) Any warning printed on containers by the paint manufacturer should be strictly observed and the user should consult him in all cases doubt regarding health and fire hazards arising from the use of product.
 - c) Grit Blasting, Metalizing and painting operations should be carried out in dry weather conditions, painting should not be done during damp or rainy weather.
 - d) Painting or sprayed coating should be applied without undue delay and contamination of sprayed surface with oil, grease, dirt should be removed before application of first coat of paint i.e. primer.
 - e) The painting surface shall be free from flaking, peeling, cracking and blistering or any other form of paint film failure.
 - f) Adequate precautions should be taken for operator safety particularly during grit blasting and aluminium spraying.
1. **Item No. 041070/72:** Providing and fixing various size HTS holding down bolts conforming to relevant Codes/Specification in concrete column or in other structures with proper nuts, bolts, washers/plates, grouting of holes with cement or epoxy concrete with all material, labour, T&P as a complete job.

The Supplying and fixing the holding down bolts with nuts and washer including threading and bolting complete as per site requirement and direction of the site engineer in charge shall be paid under this item only. The rate includes all labour, material, tools and plants etc.

6.1 Minimum embedded length of HD bolts should be minimum 280 mm.

6.2 HD bolts shall be 28 mm and 370 mm length with nut and round washer of 32 dia. hole.

6.3 HD bolts/Anchor bolts shall be galvanized and surface shall be roughened with suitable tools.

6.4 Grouting of HD bolts in concrete bed block as per site requirement and as per the instruction of site engineer.

2. **Item No. 041080:** Supplying, Fabricating and fixing access ladders, inspection platforms, Trolley refuges etc., on bridges with structural steel conforming to IS:2062 including welding / bolting, priming painting with one coat of ready mixed paint of Zinc Chromate (IS:104) with DFT of 25-30 microns followed by one coat of Zinc Chrome Red Oxide (IS:2074) with DFT of 25 microns with all material, labour, T&P as a complete job.

Note: Painting shall be paid separately under relevant item.

3. **Item No. 041340/43:** Delaunching of existing and Launching & fixing of new girder/slab in exact location of all type of steel/PSC girders/Slabs available at site, during block, complete job including lifting to any height as per site requirement, provision of approaches, and placing of released material away from bridge stream or roads as the case may be. **Note:** Payment under this item shall be made for the total weight of girder removed and newly launched girder.

Item No. 041343: Delaunching of existing Structural steel plate girders / slabs and Launching New Structural steel plate girders

- 1. Contractor has to submit the scheme of girder launching and de-launching for approval of competent railway authority.
- 2. De-launching shall be done under traffic block or as decided by competent authority.
- 3. Before de-launching existing trolley refuge, central pathway etc. shall be removed.
- 4. Before de-launching bed plates of all span shall be cut and girder put on wooden block of sufficient size and thickness to match the level of span and approach under this item only. Nothing will be paid extra.

5. Girder fitted with track structure shall be isolated with adjoining span by cutting the rail by hack saw and kept fish plated. Before de-launching fish plated joint shall be opened for removal of girder from existing substructure. The payment for the making cut and hole shall be done under relevant item.
6. The existing steel girders shall be de-launched and stacked properly at both end approach clearing river bed in suitable location within 500m of bridge approach (Br. 287) free of cost as decided by the engineer in charge and all material shall be handed over to SSE(B)-BL after completion of complete de-launching work.
7. Any work required for successful de-launching of existing girder as per approved de-launching scheme shall be done at contractor's cost. Nothing will be paid extra.
8. All the released P.Way materials like wooden sleepers/Channel Sleepers, rails, pathways, hook bolts & Fittings etc. should be transported by his own vehicle at nominated place as required by Railway with proper accountal and payment shall be paid under relevant USSOR item.
9. Cutting of girders in to suitable length can be allowed for the purpose of de-launching / transportation from river bed to the approach area of bridge. Unless otherwise specifically stated, the detailed scope of work of this item shall be deemed to include the cost of the above mentioned works including cost of T & P, Equipments, consumables, cranes, jacks, derricks, supervisors, labours, all temporary works etc. complete as required for the successful completion of the work at contractor's cost.
10. The existing central gang pathway chequered plate will be removed from old girder and same will be re-fixed on new girder.
11. Stage of payment :

Stage-I : On de-launching and lowering the spans on river bed & shifting at suitable location.	70 % of the accepted rate of the relevant Item
Stage-II : After removing P.Way materials from released girder, transportation the same to nearest nominate place and stacking/counting released girder.	Remaining 30% of the accepted rate of the relevant Item

4. **Item No. 041290: Removing of existing bed plate from existing bed block, supply, fabrication and erection of new bed plate of approved sizes in exact position over bed block of pier/abutments by giving full and even bearing, setting them on the layer of free flow no shrinkable grouting compound, scrapping or chipping of bed block, if required, fabrication and fixing of holding down HTS bolts of suitable sizes along with nuts, washers etc., drilling holes of required size, grouting of holes by epoxy mortar after fixing holding down bolts. Total work to be done during traffic block. Cost of holding down HTS bolts shall be paid extra under relevant item for supply of HTS holding down bolts.**

Item No. 041292: More than 12.20 M and up to 18.30 M clear span

5. **Supply of HTS holding down bolts with nuts, washer etc.**
6. **Item No. 052060 : Providing and inserting nipples of size 12 to 20 mm dia. with approved fixing compound after drilling holes for grouting as per Technical Specifications including subsequent cutting/removal and sealing of the hole as necessary after completion of grouting.**
7. **Item No. 052070: Grouting of masonry/concrete by injection process duly sealing of cracks, through nipples complete as per Technical Specification and procedure given in IRBM Para No 209 including necessary admixture. (Cement will be paid extra)**

Item No. 052073: Epoxy Grout

8. **Item No. 052080: Applying epoxy mortar over leached, honey combed and spalled concrete surface and exposed steel reinforcement complete as per Technical Specification with average thickness of 10mm including priming coat, mortar plaster and seal coat of epoxy.**

9. Item No. 19100: Dismantling Works

Item No.191010: Dismantling existing track on girder bridges including guard rails and foot path etc., cutting existing SW panels / LWR, if required into free rails of not less than 12 meter length and leading all released materials to nominated place within 50m of bridge approaches and stacking the released materials clear of infringements, as per direction of Engineer-in-Charge. Note: Rail cutting and drilling shall be paid separately.

Item No.191011: Under Traffic Block Conditions

10. Item No. 192050: Complete Track Renewal on Bridge with Steel Channel/H-beam sleepers as per approved drawings including leading of running and guard rails, sleepers and fittings, bending of guard rails, drilling of holes, cutting of rails etc. and leading the released rails, sleepers & fittings near bridge approaches under traffic block as directed and making track structure fit for normal speed.

11. Item No. 211200: Hiring of machinery for minor miscellaneous works for short duration including operator/driver, fuel, lubricants and consumable. The contractor shall arrange all statutory permits as required by rules and regulations prevailing in the area of work. Payment shall be made for actual working hours at site.

Item No. 211201: JCB Backhoe Loaders 3DX Plus or similar with minimum 1.10 cum bucket capacity.

12. Item No. 211170: Galvanization of Railway's Chequered Plates, Channels, Plates, Angles, and I-Section by hot dip process with Zinc Coating and mass of Zinc coating shall not be less than 705 g/sqm and galvanization thickness shall not be less than 100 microns including necessary surface preparation as per Clause-4 of IS:2629-1985. Galvanization shall be done as per IS:2629-1985 and IS:4759-1996 with Zinc conforming to IS:209-1992, duly taking all the measures for safeguarding against embrittlement of hot-dip galvanised iron and steel products as per IS:6158-1984 with all contractor's labour, material, tools, plant, all lead, lift and crossing of tracks etc. complete and as directed by the Engineer in-charge.

13. Item No. 194020: Providing and fixing of flared portion of guard rails of any rail section over PSC sleepers including fixing of with all fittings, including leading of rails and fittings, squaring and adjusting spacing of sleepers as required, providing nose blocks duly cutting wooden blocks supplied by railways and fixing it with bolts of 16mm dia as directed complete and finished as per RDSO's approved drawing. Note: 1.One set consists of LH & RH side rails of one end.

2.Required P.Way fittings will be supplied at SSE stores depot.

14. Item No. 194030: Drilling holes 25mm to 40mm dia. with drill twist in the foot of guard rails for fixing guard rails on bridge as directed.

15. Item No. 195040: Supplying & fixing Gang pathway of MS /Stainless Steel chequered plates between guard rails on un-ballasted deck bridge for gang pathway, overlapping at regular intervals of 2m to 2.5m with bolts duly drilling holes in chequered plate, as directed on new bridge or replacement of existing gangway on old bridge including removal of old chequered plates and stacking near approaches of bridge clear from all infringement. Note: Overlapping of chequered plates shall not fall in between sleepers.

Item No. 195043: Anti skid Stainless steel chequered plate conforming to latest IS: 6911, ISS Symbol 409 M, minimum 6mm thick (excluding bead height) with flat bottom and top pattern conforming to IS: 3502, 1A with bead height of minimum 0.8 mm - on New Bridges as per RDSO drawings.Item No.

16. 211020: Erection or removal of temporary Engineering Indicator Board or any other board at specified locations without causing infringement to track etc. complete and as directed.

Item No.211021: For erection.

17. Item No. 211022: For removal.

18. Item No. 161040: Drilling holes of 16 mm to 32 mm dia. with Rail Drilling machine including chamfering with appropriate chamfering tools in all types of rail section with contractor's tools & plants, equipment, consumable with all lead & lift etc. complete, as directed by Engineer in-charge. Rail Drilling Machine will be as per RDSO specification No. TM/SM/3, dated 24.04.1991.

Item No. 161041: Outside track.

1. Released guard rails with released fittings shall be brought to the nominated location as per direction of Engineer in charge.
2. The guard rail shall be fixed on the H-beam sleeper by proper marking, and drilling of holes by drill machines. No hole shall be allowed to be done by gas cutting.
3. New fittings for the fixing of guard rail shall be supplied through separate item.
4. Joints of guard rail shall be square and fish plated by fish bolts (bolts and plates to be supplied by railway)

19. Item No. 161042: On running track.

20. Quick cutting with abrasive rail cutter of all types of rail sections including wear resistant, head hardened rails up to 110 UTS, with contractor stools & plants, equipment, consumable with all lead& lift etc. complete as directed by Engineer in-charge. Abrasive Rail Cutter will be as per RDSO Specification No. TM/SM/1 (Rev. 01 of 2012) with latest status of RDSO; Rail Cutting Wheel Abrasive Disc will be as per RDSO Specification No.TM/SM/2(Rev. 01 of 2020)

60 Kg - 110/90 UTS - Outside Track

21. 60 Kg - 110/90 UTS - On Running Line

SPECIFICATION OF STEEL ITEMS

REINFORCEMENT STEEL (TMT BARS) AND STRUCTURAL STEEL

1. All Reinforcement Steel (TMT Bars) and structural Steel shall be procured as per specifications mentioned in BIS's documents-IS: 1786 and IS: 2062 respectively. Independent tests shall be conducted, wherever required, to ensure that the materials procured conform to the specifications.
2. Steel shall be procured only from those firms, which are established, reliable, indigenous and Primary producers of steel, having integrated steel plants (ISP), using iron ore as the basic raw material and having in-house iron rolling facilities, following by production of liquid steel and crude steel, as per Ministry of Steel's guidelines e.g., "SAIL/TISCO/JINDAL/RINL/ ESSAR / IISCO".
3. However, only certain isolated sections of structural steel, not being rolled by ISPs, can be procured from the authorized re-rollers of ISPs or authorized licensee of BIS having traceability system and who use billets produced by ISPs.
4. The steel procured shall be reasonably free from cracks, surface flaws, laminations, rough and imperfect edges and all other harmful defects. Steel sections, shall be free from excessive rust, scaling and pitting and shall be well protected. The decision of the Engineer regarding rejecting any steel section on account of any of the above defects shall be final and binding.
5. Structural steel work shall conform to the requirement as specified in Indian Railway Unified Standard Specifications (Works and Materials) Vol. I & II.
6. Necessary purchase bill along with test certificate for steel shall be obtained and submitted to the Engineer in Charge. Steel without the test certificate from approved laboratory/Engineering college shall not be used in the work. Certified copy of the same shall be submitted to Divisional Office along with running bills/final bills. Steel shall be tested for Tensile strength and bend test as per IS: 1599 as specified in Indian Railway Unified Standard Specifications (Works and Materials) Vol. I & II.

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7. Quantity for this item shall be calculated as per nominal weight of steel section for the length actually used in the work. No payment will be made for the wastage and the contractor will be allowed to take away the scrap and excess steel away from site.
8. The contractor shall be responsible for getting the measurement of steel entered in to steel register and signed by the Engineer in charge of the work before concreting is done to avoid dispute regarding quantity of steel used in the work.
9. The rates quoted for this item is deemed to be inclusive of the cost of binding wire and no separate payment shall be admissible for the same.
10. The steel shall be kept by the contractor under his custody at the site of work and Railway will not be responsible for any theft thereof.
11. The quantity so payable under relevant item shall be restricted to the quantity as per approved plan/drawing and decision of the Engineer in Charge in this regard shall be final and binding upon the contractor.

Additional specifications;

1. Quality Control:
Steel procured by the contractor for the work shall be conforming to IS 2062 2011, Grade 'A/BO/BR'. A test certificate as regard the quality of the steel shall be produced by the contractor from its manufacturers/reputed testing company. If the test certificate is not produced, Railway may get the testing done at contractor's expenses.
One number independent laboratory test for the metallurgical and structural properties of steel shall be conducted at government engineering college/ reputed institutions at contractor's cost for every 30 MT, or part thereof, of supply of steel under this item. The first test shall be carried out only if supply exceeds 20 MT. However, if there is any doubt regarding the quality of the steel as applied to be used by the contractor, the sample of the steel may be sent to the CMT Workshop, North Western Railway and Ajmer for the testing at the Railway's cost.
One-month time shall be made available to Railway in case testing is to be got done by Railway. The Railway on the basis of such certificates, as produced by the Contractor, or as per testing got done by Railway, shall decide the suitability of steel. Only after this, the steel shall be allowed to be used in the works. Any steel that fails in such test(s) shall be promptly removed by the contractor from the site of work.
2. The scope of this item includes supply of steel, transportation to the site of work, cutting to proper shape and size, handling at site etc including contractor's own material, T&P, consumables, labour, temporary arrangements, scaffolding etc. The rate is inclusive of all taxes, levies, duties etc leviable on the same as per government rules.
3. Rolled materials before being laid off or worked, must be made straight. If straightening or flattening is necessary, it shall be done by methods that will not damage the material. Material with kinks and bends shall be rejected. Gas cutting will be permitted only with the approval of AEN (B) in charge of the work based on skill of the workers and methodology adopted. The decision of AEN (B) in charge in this regard will be final & binding on the contractor. In case gas cutting is permitted, the edges of steel member shall be required to be ground to proper size and shape. Gas cutting shall be done in the thin members taking adequate care to ensure that the plates do not lose shape due to overheating.
4. The steel supplied shall be cut to size & profile as required as per the site requirement, which can be decided by joint inspection and as directed by the Engineer-in-charge of the work.
5. The rate for the item included all taxes, levies, octroi, royalty, transportation, fabrication, handling, tools, plant, M & P etc. for bringing the steel to site and fabricating by cutting to correct shape and size as per requirement of work.

6. Unit of measurement is taken as metric tons.
7. Paying quantity shall be worked out as under:
8. Payment against the item shall be made only on the basis of sectional weight of members as per steel table and as per dimensions of fabricated steel members (i.e. cut to the size items) without any deduction for holes made in the members as per drawing.
9. Nothing shall be paid for the unused waste pieces of steel sections etc which shall be the property of the contractor.
10. The scope of work for this item includes the field drilling of holes 21.5mm to 25mm in diameter in the new members to be fabricated, which requires high precision marking and drilling. For this, the contractor will have to prepare proper size template, jig and fixture to ensure that no mismatching of holes at the time of replacement/erection occurs. For ensuring best possible accuracy, very competent concerned staff and required tool and plant will have to be deployed.
11. For the purpose of making jig/template, the contractor shall be required to make a sample component, where direct measurements are not possible due to obstructions by sleepers, stiffeners etc, the sample component made shall be paid for by weight under relevant item or supply of steel even when the same is not inserted in the girder due to inaccurate holes/ dimensions. The member fabricated shall be the property of the railway after the work is completed.
12. Proper care shall be taken in fabrication and drilling of holes so that excessive drifting is not required for insertion of turn bolts. Fabricated item shall be checked for dimensional accuracy on gauge made specifically for this purpose against this item and certified by the site in charge of the work prior to availing of block for replacement. Fabricated items not conforming to dimensional tolerances specified shall be rejected.
13. Reaming of holes for the purpose of matching of holes shall not be permitted.
14. Holes for rivets and bolts shall be drilled to conform to provision of IRS B1 and clause 10 of ARE: 7215. All holes, except as stated hereunder, shall be drilled to the required size or sub-punched 3 mm less in diameter and reamed thereafter to the required size. Thickness of the material for sub-punching shall not be greater than 16 mm. All matching holes for rivets or bolts shall register with each other so that a gauge of 0.8 mm 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. When the number of members to be riveted in an assembly exceeds three or the total thickness is 90 mm or more, the holes shall be drilled or reamed in position after assembly, except when steel bushed jigs are used. The parts shall be firmly bolted together during such block drilling and taken apart for removal of burrs after drilling work. The payment shall be made in such a case considering the complete thickness of drilling as plate of one thickness only.
15. No holes shall be made by gas cutting process.
16. Fabricated components, which do not comply with the above-mentioned dimensional tolerances, are liable to be rejected including with recovery of cost of the material.
17. Drilled out material shall become the property of the contractor.

If, however , the holes are made out of proper location, the girder members shall be assessed for the loss of strength as a result of the bad workmanship and any reaming for riveting, and spicing etc required for the member so damaged shall have to be done at contractor's cost only and nothing extra shall be paid for the same. The decision of the engineers in charge and the railway's design office in this matter shall be final and binding in this respect.

18. Making of holes by gas cutting in the girder or its components is strictly prohibited.

19. Drilled out material shall become the property of the contractor.
20. THE TOTAL PAYABLE QUANTITY IS WORKED OUT ON THE BASIS OF WEIGHT OF FINISHED FABRICATED NEW MEMBER ONLY.
21. NOTHING EXTRA SHALL BE PAID FOR RELEASED/ ANY OTHER COMPONENT TO BE HANDLED DURING THE EXECUTION OF WORK.
22. Nothing extra shall be paid for the putty, paints etc consumed as per the detailed scope of work and nothing extra shall be paid for carting of released material from the bridge site to the bridge approach. Painting work is to be carried out as per specifications for painting work. Chequered plate shall confirm to IS: 3502, the method of measurement for chequered plate shall be as per actual average weight of samples.

For steel confirming to IS:2062, Gr. 'A' requirement as per relevant concerned item shall be followed.

item No. 041080,

A) Stage I : progressively on submitting the original purchase bill, manufacturer's approved laboratory's test certificate and bringing the structural steel to the site of the work after excluding likely wastage in steel brought to site	Payment at the rate of 45% of the accepted unit rate of relevant item of tender, against indemnity Bond.
NOTE: - (1) No payment to be made initial independent test laboratory certificate regarding chemical composition is obtained. (2) The contractor will have to submit an indemnity bond to indemnify railway against any loss of damage to the material. The complete responsibility for safekeeping and custody of such materials will be on contractor and railway will not have any responsibility on this account for loss or damage. The contractor shall make good any loss or damage to material.	
B) Stage II: Progressively on complete fabrication of steel structures and erection of the same on the bridge as per railway's drawing and directions of site engineer in charge.	Payment at the rate of 45% of the accepted unit rate of relevant item of tender.
C) Stage III: Progressively on completing painting work if any.	Payment at the rate of 10% of the accepted unit rate of relevant item of tender.

ITEM WISE SPECIFICATION FOR SCHEDULE "B" (DSR Vol-I 2023):

22. Item No. 1.1.11 : Steel (up to 5 KM)

(Beyond 5 KM up to 10 KM per KM)

(Beyond 10 KM up to 20 KM per KM)

(Beyond 20 KM per add. KM)

23. 4.1.2: Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level : 1:1½:3 (1 Cement: 1½ coarse sand (zone-III) derived from natural sources : 3 graded stone aggregate 20 mm nominal size derived from natural sources)

24. 4.3.3: Centering and shuttering including strutting, propping etc. and removal of form work for : Columns, piers, abutments, pillars, posts and struts

Signature of the Tenderer (s)

Date:

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25. 5.2.2: Reinforced cement concrete work in walls (any thickness), including attached pilasters, buttresses, plinth and string courses, fillets, columns, pillars, piers, abutments, posts and struts etc. above plinth level up to floor five level, excluding cost of centering, shuttering, finishing and reinforcement: 1:1.5:3 (1 cement : 1.5 coarse sand(zone-III) derived from natural sources : 3 graded stone aggregate 20 mm nominal size derived from natural sources)
26. 15.3: Demolishing R.C.C. work manually/ by mechanical means including stacking of steel bars and disposal of unserviceable material within 50 metres lead as per direction of Engineer - in- charge.
27. 15.18: Dismantling steel work in built up sections in angles, tees, flats and channels including all gusset plates, bolts, nuts, cutting rivets, welding etc. including dismembering and stacking within 50 metres lead.

ITEM WISE SPECIFICATION FOR SCHEDULE "C" (NS Item)

28. **Item No. NS/1:** Providing 2.1 KVA contractor's own generator sets on hiring basis for lighting, grinding, auguring, and other purposes during night for 8 hours shift on hiring basis. The rate is inclusive of all contractor's labour for operation, manning, transportation of D.G. set and its accessories from depot to site of work and back with all leads and lifts with contractor's own transportation arrangements with fuel required for operation of generator sets, focus arrangements of 3 to 4 Nos. 500 watt halogen lamps with fittings with lead wires of 50 meters with each focus, consumables, spares, other tools and plants, taxes etc., complete as per the instruction of engineering - charge at site.
29. **Item No. NS/2:** Fabrication, supplying and fixing H Beam sleepers with fittings and fixtures as per RDSO drawing No.B1636/4, 5 & Revision with Latest alteration or approved Drawing supplied by Railway and specification complete including supply and riveting of canted bearing plates. The rate shall be inclusive of 25mm Nylon cord reinforced Elastomeric Pad and all cost for preparing and supplying H beam from (ISHB) from standard rolled section conforming to IS-2062 Gr B including supplying complete set of required fittings and fixtures duly galvanized as per specification and transporting the sleepers from Contractor's workshop to bridge site/Railway depot including loading, unloading and stacking with all lead, lift, decent, crossing of obstruction, nallah, track etc., drilling/rehandling and other incidental works etc. as may be required and including all taxes, duties, octroi, royalty and inspection charges as may be leviable complete in all respect as per special/standard conditions. Note:- (a) IS HB-200 sleepers should be made of standard rolled section conforming to IS- 2062 Grade B beam and MS plates to IS 2062 Grade B. (b)Galvanizing should be done after welding of MS pad plate to H-Beam sleepers. (c) The elastomeric pads of steel sleepers shall be procured from RDSO approved source only and by RDSO/RITES and used only after RDSO/RITES certification. The list of RDSO approved firms can be ascertained at the time of execution. (d) The fittings of H-Beam steel sleepers shall be inspected by RDSO certification. Contractor has to arrange for inspection at their own cost. (e) Painting of top flange of the girder shall be carried out with one coat of red lead and two coats of red oxide (As per Railway specification) with the contractor's own labour, tools, materials etc(f) The rate shall be inclusive of removing of existing sleepers. (g) Additional plates if required, including welding and galvanizing etc to maintain the rail level to be provided and no extra payment shall be made in this account. (h) Quantity for PVC for steel supply purpose to be taken as 159 Kg per sleeper the General PVC clause (Other than steel and cement) will be applicable for 60% of the rate.
- Fabrication, supplying and fixing of H -Beam sleepers with all fittings & fixture as per RDSO Drawing No B 1636/4 5, 6 & RH-1122 with latest alteration or approved drawing with supply and riveting of canted bearing plates.
 - Manufacture and supply of H-Beam sleepers with complete set of galvanised matching fittings.
 - Riveting of the MS canted bearing plate on the sleeper.

- Galvanizing of H-Beam sleepers, all fittings and fixtures, consisting of mild steel conforming to IS:2062 Gr-B.
- Transportation of H-Beam sleeper and fittings to the bridge site.
- Temporary arrangements if any to maintain rail levels during progress of work.
- Transportation, sorting and stacking of released sleepers, at the depot of the PWI/ BRI in-charge of the work or any other suitable place decided by the Engineer.
- Providing and fixing tie angle at sleeper ends.
- Maintenance of track on bridges, till handing over.

Tenderer's is/are advised to study the Tender Documents and the Drawings carefully before tendering for the work. Tenderer's shall also acquaint himself/themselves with the local conditions, nature of work and all other matters pertaining thereto. The work involved is of a very specialized nature & may vary substantially for each bridge depending upon the span, type of girder etc. Tenderer's is/are advised to visit the site of works and carefully study all the implications and problems involved in the fabrication & erection work.

Supply of fitting & component item from RDSO approved sources (From RDSO vendor lists) Tenderer(s) should have a covered workshop of adequate area with the machinery (listed below) and facilities for fabrication and testing to execute works of this nature. The testing facilities should be adequate to conduct tests prescribed in the respective IRS Specifications:

- Profile Gas Cutting machine.
- Punching machine.
- Shaping machine.

Welding Generator & Equipment for Arc Welding of adequate capacity.

1 Code of practice and Specifications:

- 1.1 The abbreviations mentioned elsewhere for Standards, Specifications, Codes of Practice, Drawing etc shall be considered to have the following meanings.

IS : Bureau of Indian Standards.

IRS: Indian Railway Standard Specifications and Codes of Practices. GCC: Western Railway General Conditions of Contract – 1998

RDSO: Research, Design and Standard Organization (Ministry of Railway)

- 1.2 Any reference made to any of the Standard , Specifications, Codes of Practice, Drawing etc, issued by any of the Organization mentioned under Clause 1.2.1 above, should be taken to be a reference to the latest version/ revision of the same and shall include all the ERRATA/ Corrections made in the same from time to time.
- 1.3 In case of any contradiction between provision in the Special Specifications laid down hereunder and in the specifications and codes which have been referred to, the former shall prevail and that in all cases the decision of the Engineer shall be final and binding on the Contractor.
- 2 All matters and Specifications not expressly provided for or specified in the tender documents for this work, shall be in accordance with Western Railway, General Conditions of Contract- 1998 and Works Hand Book, Vol. I & II, corrected up to date and the contractor shall be bound by them for the due performance of the contract.
- 3 In the event of any provision not being covered by Contract Conditions, Western Railway specifications, General Conditions of Contract , IRS specification etc, reference may be made to the relevant IS, BS and ASTM specifications in that order. If these are also silent, the work shall conform to sound engineering practices and in case of any dispute arising out of the interpretation of the above, decision of the Engineer shall be final and binding on the contractor.

Signature of the Tenderer (s)
Date:

Dy. CE (Bridge-Line) DDR, WR
For and on behalf of President of Union of India.

- 4 Wherever the terms Engineer- in – charge appears in these specifications it shall mean “Engineer” as defined in the G.C.C. Similarly the work Department shall mean “Railway” as defined in the G.C.C.

1. MEASUREMENT :

- 1 All measurement shall be made in the metric system. Different items of works shall be measured in accordance with the procedures set forth in the relevant sections read in conjunction with G.C.C. and Special Conditions of the contract.
- 2 All measurement and computations are as per RDSO drawing.
- 3 In recording dimensions of work the sequence of length, width and height/ depth/ thickness shall be followed.

2. FABRICATION H-BEAM SLEEPERS:

1. **Fabrication of H-Beam Sleeper as per RDSO Drawing No B 1636/4R,5,6 & all associated drawings with latest alteration or approved drawings.**

2. CODES & SPECIFICATIONS:

The materials and workmanship shall be to the following specifications and code of practice (latest versions of specifications/code of practice to be used).

Indian Railway Steel Bridge Code as corrected up to date. IRS: Welded Bridge Code (1972).

IRS: Indian Railway Specification, B-1: 1979, Fabrication and erection of steel Girder Bridges. IS: 2062-1992: Specification for structural steel, weldable. IS:9595-1980: Recommendation for metal ARC welding of carbon and carbon manganese steel.

IS: 75-1973: Specification for linseed oil, raw and refined.

IS: 77-1976: Specification for linseed oil, boiled, for paints.

IS: 102-1962: Specifications for ready mixed paint, branding, red lead, non-setting priming.

IS: 123-1963: Ready Mixed paint, brushing, finishing semi gloss.

IS:133-1961: For fabrication & erection of steel structures (new girder bridges).

IS:814-1991: Covered electrodes for manual metal arc welding of carbon and carbon manganese steel.

IS: 816-1969: Code of practice for use of metal arc welding for general construction in mild steel.

IS: 1149-1982: High Tensile steel rivet bars for structural purposes.

IRS: H-5 Code for Rivets.

IS: 1148-1982: Hot Rolled Steel Rivet Bars (up to 40 mm diameter) for structural purposes.

IS: 2155-1982: Cold forged solid steel rivets for hot closing (6 to 16 mm Dia)

IRS: H-5 For Bolts and Nuts.

2. MATERIALS:

1. All materials for the work should pass test or/and analysis prescribed by the specifications mentioned above and as laid down in the succeeding paragraphs or to such other recommended specifications as the Railway shall have authorized as equivalent there to or in absence of such authorized specifications such tests and analysis as Railway shall specify.
2. All raw materials shall be obtained from recognized producer or their authorized representatives and the contractor shall submit Test Certificates for the materials so obtained to the satisfaction of the Railway.
3. Any approval given by the Railway in consequence of such tests, analysis or suppliers certificate shall in no way limit or interfere with the absolute right of the Railway to reject the whole or portion of such materials supplied, which in the judgment of the Railway do not comply with the conditions of contract. The decision of the Railway in this regard shall be final and conclusive for all purposes.

4. TEMPLATES / JIG & FIXTURES :

The contractor shall make his own arrangements at his own cost for the templates Jigs & Fixtures as may be required. Railway will not supply any steel in this connection, nor will any payment be done on this account. The templates used throughout the work shall be of steel of similar category as for the member and of tested quality.

5. **FABRICATION:**

1. **FLATTENING AND STRAIGHTENING**

All steel materials, plates and structural shall have straight edges, flat surface and free from twist. If necessary, they shall be cold straightened or flattened by pressure before being worked or assembled unless they are required to be of curvilinear form. Pressure applied for straightening or flattening shall be such as it would not injure the material and adjacent surface or edges shall be in close contact or at uniform distance throughout. Flattening and straightening under hot condition shall not be carried out unless authorized and approved by the inspecting officer.

CUTTING:

Except where otherwise indicated all plates and sections shall be cut mechanically both in case of mild steel and high tensile steel work. Plates may be cut to shape and channel and other sections cut to length with mechanical method. No gas cutting should be done.

2. **DRILLING:**

1. Holes for rivets and bolts shall be drilled to conform to clause 10 of IS:7215. All holes, shall be drilled to the required size of sub-punched 2mm less in diameters and reamed thereafter to the required size. Thickness of the material for sub-punching shall not be greater than 16 mm. All matching holes, for rivets or bolts shall register with each other, so that a gauge of 0.8 mm less in diameter than the holes can pass freely through the members assembled for leveling or bolting in the direction at right angle to such members.
2. All holes for turned and fitted bolts shall be drilled undersized by 1mm and after assembly exceeds three or the total thickness is 90mm or more, the holes shall be drilled or reamed in position after assembly except when seal bushed jigs are used. The parts shall be firmly bolted together during such block drilling and taken a part for removal of burrs after drilling.
3. Holes in angle runners may be punched full size, provided the thickness of the materials does not exceed 13mm.
4. All punching and sub-punching shall be clear and accurate and all drilling from burrs.
5. No holes shall be made by Gas cutting process.

3. **WELDING:**

1. 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.
2. All welding work shall be carried out in accordance with the provisions of INDIAN RAILWAY STANDARD WELDED BRIDGE CODE 1972 or latest.
3. **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.
4. **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 test shall be at the expense of the contractor.
5. The contractor shall provide all welding consumables at his own cost. Electrodes shall conform to IRS specification M-28. The wire flux combination for submerged arc welding shall conform to IRS specification M-39. The welding shall be procured from supplier borne on RDSO's approved list. Manufacturer's test certificate for each lot of welding consumable shall be submitted to the Engineer for verification.
6. 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.
7. **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' of grooved joints the edges shall be prepared with an automatic flame torch in two phases following a bevel cut with grounding pass or by machining.

8. The welding surfaces shall be smooth, uniform and free from files, notches or any other defects which may adversely affect welding and shall be free of loose scale, rust. Grease, paint moisture or any other foreign material.
9. **Welding procedures:** The welding procedure shall be so arranged that the distortion and shrinkage stress are reduced to minimum and the welds meet requirement and quality specified. It should suit the details of the joints as indicated in the drawings and the position at which welding has to be carried out. Working procedure shall cover the following:
 - Type and size of Electrodes.
 - Current and for automatic welding arc voltage.
 - Length of run of Electrode, or for automatic welding speed of travel.
 - Number and arrangement of runs in multi run welding.
 - Position and set up of parts. Preparation and set up of parts.
 - Welding sequence.
 - Pre or post heating.
 - Any other relevant information.
10. The General welding procedure for each type of weld shall be submitted in writing to the Engineer for approval before the work is taken up. Where required by the Engineer, the welding trial shall be carried out on representative samples of materials to be used in the work.
11. The welding procedure shall be approved by the Engineer based on the welding procedure trial. Approval of the welding procedure shall not relieve the Contractor, of his responsibilities for correct welding and minimizing distortion of the finished structure. No departure from the approved welding procedure shall be made without the prior approval of the Engineer.
12. All tack welds shall be of the same quality and size as the first run of the main weld. It shall fuse completely with the ends of the tack welds to form a regular profile.
13. The position of welds required for temporary attachment shall be approved by the Engineer before the work starts. The temporary attachments shall be removed without damage to the parent metal, which shall be finished smooth by grinding.
14. The welds shall be inspected for compliance as per provisions of IRS: Welded Bridge code. Radiographer/ultrasonic testing shall not, normally, be required.
15. Any weld found defective shall be cut by using either chipping hammer or gauging touch in such a manner that adjacent material is not injured in anyway.
16. Planning of the welds involving deformation of the surface whether during de-slugging operation or thereafter shall not be allowed.
17. Fusion faces and surrounding surfaces within 50mm of welds shall be free from all mill scale and free from oil, paint or any substances 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 deposition of specified size of weld or be the cause of defects.
18. 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 the same shall be carried out by sharing, chipping, gas cutting or flame gauging, where no gas cutter or hand gauging is employed the blow pipe or gauging below pipe shall be properly guided.
19. 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 focused weld of the specified leg length.
20. After making each run of welding, all slag shall be thoroughly removed and the surface cleaned.
21. **Quality of welding:** The weld metal as deposited, including tack weld, if to be incorporated, shall be free from cracks, slag inclusion, porosity, cavities and other de-position faults. The weld steel shall be properly

fused with the present 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.

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

4. RIVETING:

1. Riveting shall be done in accordance with IRS : B1 - 1979.
2. The dimensions on the drawings refer to the diameters of the rivet holes and their finished rivets. Rivets shall completely fill the hole and shall be machine driven wherever possible by means of Pressure or Percussion Rivets of approved design. The rivets shall be made to relevant specification. The rivets hole shall be 1.5 mm greater than the diameter of the rivets being used. The clearance i.e. the difference in diameter between the rivets measure under head before being heated and rivet hole shall not be less than 0.75 mm (1/32inch). The shanks shall be made of a length sufficient to fill the hole thoroughly and to form the head.
3. The rivets shall be at the proper heat and in no case shall one tip be hotter than the head. Rivets less than 10mm(3/8 inch) diameter may be driven cold.
4. Gauge required for checking rivets dimension and contours shall be provided by the contractor for the use of the inspecting officer.
5. Before riveting is commenced, all works shall be properly bolted up so that the sections riveted are in close contact through out. Driven rivets when struck sharply on the head with a 110 grams riveting test hammer shall be free from movement and vibrations.
6. Drifts may be used for drawing light members into position but their use on heavy members should be restricted to securing them in their correct position. In no case shall drifting be allowed to such an extent that holes are distorted.
7. All loose and burnt rivets and rivets with cracked, badly formed, eccentric or deficient heads, shall be cut out and rivets shall also be cut out when required for the examination of work. The actual method of cutting out shall be approved by the Engineer. Re-cupping and caulking shall in no circumstances be resorted to.

5. TRIAL ASSEMBLY OF TRACK:

1. Before taking up mass production of any type of sleeper, production of 20 sleepers shall be taken up and the dimension thereafter shall be checked by means of assembling a test track, 13 mtrs long. The rails for linking of the trial track shall be made available, on loan basis by Railway, free of charge, at a point convenient to the Railways. Transport of the rails from this point to the contractor's workshop and returning the same to the point of collection shall be done by the contractor at his own cost.

6. GALVANIZING:

1. Galvanizing of H- Beam sleepers with M.S. fittings shall be done by hot dip process with zinc conforming to IS: 4759 – 1984 & IS:2629 –1985, latest version, and/or any other relevant IS code.
2. All the mild steel fittings and fixtures have to be galvanized at the contractors cost before use.
3. Thickness of Galvanizing should be checked by digital Elco-Meter and should be at least 100 micron, with a tolerance of (+/-) 5 micron. Thorough visual checking should be done to see that proper galvanizing has been done.

7. INSPECTION AND TESTING:

1. Inspection of the H-beam sleepers should be done at following stages:
 1. Inspection of the raw material procured by the manufacturer for fabrication of steel H-Beam sleepers.
 2. A copy of the test certificate issued by the steel manufacturer should be called for and kept on record to ensure that the steel being used is as per relevant IS/IRS Code.
 3. If the Engineer so desires, he may depute an inspector to the fabrication shop of the supplier to ensure that all the steel is as per the certificate and is free from defects like corrosion, dimensional inaccuracies and damages in handling.

4. Rivets should be checked for dimensional accuracy and certificate of their conforming to relevant standards and specifications IS – 1148 should be called for and kept on record.
2. **When 10% of the sleepers in the order or a substantial quantity have been fabricated and are ready for galvanizing:**
 1. Sleepers would be inspected at the manufacturer's workshop by deputing an inspector to see that:
 2. The sleepers are being manufactured properly, as per drawings with specific reference to dimensional accuracy.
 3. They are free from kinks, bends and misalignment of components.
 4. All welded joints would be checked for their dimensional accuracy with weld gauges.
 5. All welds should be visually checked, with a magnifying glass of magnification power of 10, to be free of defects and of proper thickness. Weld metal as deposited, including tack welds if any, shall be free from cracks, slag inclusion, porosity, cavities and other defects. The weld steel should be properly fused with parent metal. The surface of weld shall have a uniform consistent appearance.
 6. Sleepers failing in visual test for welds should be rejected unless Dye Penetration Test/Ultrasonic test conducted on such welds prove that the weld is of sound quality.
3. **Contractor shall subject 100% sleepers to the tests listed under para 4.1.1 and 4.1.2 above and kept records of test results. These should be made available to the Engineer for scrutiny before permitting a sleeper from being laid in track.**
4. **On receipt of the sleepers at site:**
 1. All the sleepers should be inspected for:
 2. Dimensional accuracy with particular reference to gauge and cant at rail seat.
 3. Quality of Galvanising, whether it has been done as per specifications.
 4. Damage like kinks and bends that may occur during transport and handling etc. is within reasonable limits.
 5. All MS grooved cover plates should be covered with a certificate of conforming to IS-2062. These should be checked to ensure that:
 6. Thickness, dimensions and size of groove are as per drawings.
 7. These are free of bends and are sitting perfectly, without rocking, on a plane surface.
 8. All steel strips connected with the plates are welded properly and are of proper size.
 9. Contractor should arrange to conduct bend test on at least of 0.5% of completed sleepers with sleepers being subjected to highest MBG axle load.
 10. The contractor shall provide necessary gauges to facilitate the measurements of dimensions, hole diameter etc.
5. **PAINTING:**
 1. All steel work shall be given one coat of paint with Red lead primer as per IS: 102 before dispatch from shop but after the sleepers have passed the inspection tests.
6. **FITTINGS:**
 1. Steel H-beam sleepers involve a large number of track fittings for fixing the rail on to the sleeper. A list of fittings is enclosed. It should be ensured that the fittings are from RDSO approved supplier, wherever specified. These should conform to specifications and standards as per RDSO Drawing.
 2. Availability of all fittings should be ensured before taking up the work of sleeper replacement.
7. **LINKING OF TRACK OVER GIRDER BRIDGES:**

For linking of track on girders the provisions in the IRPWM-1986, IRICEN publication on quality control in the track linking, track circulars issued by CE/Western Railway shall be followed.

 1. Linking of track on girders with steel H-beam sleepers shall be as per instructions/notes mentioned in RDSO's DRG.No.B-1636/R,1636/R1&1636R2 and in any other drawings mentioned in the contract documents elsewhere, as decided by the Engineer. Steel channel sleeper shall be laid at spacing as decided by the Engineer-in-charge. Spacing of sleepers at joints should be as specified in IRPWM and approved by Engineer. 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.
 2. All works, which may affect the safety of Railway working, shall only be done under traffic blocks and

written authority and also under the direct supervision of the Engineer-in-charge at site or his authorized representative for the said a bridge. The contractor shall in consultation with the Engineer decide the sequence of work required to be done for efficient provision of h beam sleepers. A suitable speed restriction will be imposed by the Engineer-in-charge or his authorized representative at the work site. This will depend upon availability of Engineering time allowance.

3. Works has to be executed in the running traffic condition or under the traffic blocks. These will be made available as per the convenience of the Railway depending on the position of the trains. Blocks and caution orders will be taken and cancelled by the authorized Railway official only.
4. The existing track on the bridge is to be dismantled including guard-rails running rails and bridge timbers. New H beam sleepers are to be fixed as per Drawings. The track is to be re-linked over the H beam sleepers with the same running and guard-rails using fittings and fixtures supplied by the Contractor.
5. Before placing the sleeper on the girder, sleeper seat portion shall be thoroughly scrapped, cleaned and painted with one thick coat of red lead(IS:102). No payment will be made for this separately and the cost will be considered as covered in the item for supply and fixing of Steel H-beam. Application of coat of red lead shall be made only after the scrapping has been certified to be satisfactory by the Representative of the Engineer-in-charge.
6. Design of guard -rails shall be as per para 275(ii) of IRPWM, 1986. The end of the guard rails, at either end, should be bent vertically and buried and a piece of timber fixed on the end, as per standard drawings of Western Railway, to prevent entanglement of hanging loose couplings.
7. The steel H –Beam sleepers shall be fastened to the girders with the hook bolts and nuts duly connected with ISA: 75X75X8mm angle runners through the hook bolts for the entire length of the girders as per RDSO drawing.
8. Rails and guardrails shall be fastened to sleeper as per RDSO's Drg. No. RDSO/T-5454 and T/5455 - 4562 for rail fastening arrangement on girder bridges with steel H beam sleepers.
9. For snap head rivet girders grooved Elastomeric pad plate of appropriate thickness shall be used between H-Beam sleepers and the top flange of girder for clearing the rivet heads, curtailment of flange plate and adjustment of cross level. This shall be paid for separately under related item of the schedule.
10. **Fixing of Elastomeric Pads:**
 - 10.1 The specifications for supplying and fixing elastomeric pads are described at Annexure-II of these special conditions. Surface of the elastomeric pad to be bonded shall be cleared by gently rubbing with fine emery cloth for the purpose of removing any superficial layers or extraneous matters such as wax. Care shall be exercised during rubbing so that the surface of the rubber pad is not damaged.
 - 10.2 Surface of the plate to which the elastomeric pad is to be bonded shall be cleaned free from dirt, oil, grease, rust mild scale or any other extraneous matters. Elastomeric pads shall be joined with the girder plate using Poly-chloroprene based self curing adhesive such a Dunlop B-708 of M/s. Dunlop India Ltd. or RLIO Bond of M/s. Goodyear India Ltd. or DENDRITE P0-A5 of M/s. Dhandras Chemical Enterprise Pvt. Ltd., Fevicol SB-97 of M/s. Nabula Chemical Pvt. Ltd. or similar type, approved by Engineer.
 - 10.3 The adhesive shall be applied in thin layers uniformly spread both on the surface of the elastomeric plate and girder plate to be bonded. 10 to 15 minutes shall be allowed before jointing the two surfaces, after application of adhesive, so as to allow solvent to evaporate. The elastomeric pad shall be joined in position with the MS plate and wherever practicable roller pressure shall be applied from one end so as to avoid air entrapment/gap.
11. Threads of hook bolts and rails / sleepers fastening bolt should be oiled with black oil.
12. The year of laying H- Beam sleepers and serial number span wise shall be painted at a suitable location in accordance with para 273 (iv)(c) of IRPWM/86 The cost of the same shall be deemed to be included in the overall cost of the tender. 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.

13. Railway may supply Dip lorries free of hire-charges, if available, as per the convenience, for transportation of the materials. To ensure safe running of traffic, dip lorry should only under the supervision of Railway competent supervisor. Cost of carrying of materials and protection of Dip lorries by trained staff will have to be borne by the contractor.
 14. Contractor has to arrange for adequate number of skilled workers and competent supervisors for the execution of this work, making optimum utilization of the speed restriction and the traffic block. The safety of workmen during dismantling, transporting and linking of the track over the girders will be the sole responsibility of the contractor.
- 8. RELEASED MATERIALS:**
1. Joint survey prior to execution of work will be carried out by the concern PWI/BRI and Contractor to assess the quantity of released materials. The survey report will be submitted duly signed by the concerned PWI/BRI and Contractor duly approved by the concern AEN along with final bills.
 2. Released small fittings Bridge Timbers and worn-out rails(if any etc. will have to be transported by the contractor to the nearest store depot of PWI/BRI and payment for the same will be done by concerned item.
 3. Concerned PWI/BRI and contractor will jointly maintain proper accountal of the released materials.
 4. At the depot, all released material should be sorted out as serviceable and unserviceable, as directed by Engineer and stacked separately by the contractor, at his cost.
 5. Responsibility for watch and ward of the released materials will be on the contractor, till these are transported and handed over to Engineers representative at the nominated depot.
1. **Fabrication, galvanizing, supplying and fixing of H –Beam sleepers with all fittings & fixture as per RDSO Drawing No B 1636/4R,5,6 & RDSO-T/8759 TO RDSO-T/8765 and other associated drawings with latest alteration or approved drawing with supply and riveting of canted bearing plates .**
 2. **The rates are including of all cost of preparing supplying and fixing of H beam .**
 3. **The ISHB from standard rolled section confirming to IS 2062 Gr B including supplying complete set of required all fittings and fixtures duly galvanized as per specification.**
 4. **The transportation of the sleeper from contractor's workshop to bridge site/Railway depot including loading unloading and stacking with all lead, lift de3scent crossing of obstruction , nallah, tracks etc. handling/re-handling .**
 5. **The rate shall be inclusive of 25 mm Nylon cord reinforced Elastomeric Pad and all cost for preparing and supplying H beam from (ISHB) from standard rolled section confirming to IS 2062 Gr B including supplying complete set of required fittings & fixture duly galvanized as per specification and transporting the sleepers from contractor's workshop to bridge site/Railway depot including loading unloading and stacking with all lead lift descent crossing of obstruction, nallah, track etc ,handling/re-handling and other incidental works etc as may be required and including all taxes duties, octroi royalty and inspection charges as may be leviable complete and other incidental works etc as may be required.**
 6. **Take Trial for one Bridge and checked the parameter if found successful then apply for other bridges**
 1. **Per Set Steel H –Beam sleeper Fittings**

Sr.No.	Description	Drg No	Per sleeper quantity required (In No)
1	28 mm dia. 350mm long hook bolt with double nut.	B-1636/5	4
2	Single coil spring washer for 28 mm dia. Hook bolts.	IS-3063	12
3	Elastomeric pad (300x25/30x305)	B-1636/5	2
4	GR pad 10 mm thick.	T-5199	2
5	Tapered washer.	T-5161	4
6	Tapered washer.	T-5162	4
7	GR pad 6 mm thick.	T-5163	4

Signature of the Tenderer (s)
Date:

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For and on behalf of President of Union of India.

8	Bolt & nut.	T-5164	4
9	Single coil spring washer	T-10773	4
10	Tapered split pin	suitable	8
11	Rail seat assembly	RDSO/T-8759,8760,8761	2
12	Special liner.	T-8762, T-8763	4

Note: Above are approx quantity of fittings per sleeper are for reference only . However fittings should be as per Drg. No RDSO/B 1636/4R & 5, RDSOIT- 5197 to RDSOIT 5200, RDSO/T 5155 to RDSOIT 5164, or other drawings issued at the time of execution or added / amended shall be followed along with all specification as mentioned on drawing and or as directed by the engineer. Drawing for rail seat assembly for zero toe load fastening system for 60 kg (uic) rail on h-beam steel sleepers for bridges (BG) shall be followed as per drawings issued by RDSO-LKO.

Stage of Payment: NS/2

A) Stage I: progressively on submitting the original purchase bill, manufacturer's approved laboratory's test certificate, inspection of material and fabricated sleepers by railway and supplying the fabricated galvanized steel H-Beam sleepers Along with fittings to the site of work.	Payment at the rate of 45% of the accepted unit rate of relevant item of tender, against indemnity Bond.
NOTE :-(1) No payment to be made before initial independent test laboratory certificate regarding chemical composition and other testis obtained.(2)The contractor will have to submit an indemnity bond to indemnify railway against any loss or damage to the material. The complete responsibility for safekeeping and custody of such materials will be on contractor and railway will not have any responsibility on this account for loss or damage. The contractor shall make good any loss or damage to material.	
B) Stage II: Progressively on fixing of the H-beam sleepers, fitting, guard rails, main rails on new girder as per railway's drawing and directions of site engineer in charge.	Payment at the rate of 45% of the accepted unit rate of relevant item of tender.
C) Stage III: Progressively on correcting all deficiency and relaxing the speed to normal sectional speed.	Payment at the rate of 10% of the accepted unit rate of relevant item of tender.

STANDARD SPECIFICATION FOR 25mm THICK NYLON CORD REINFORCED ELESTOMERIC PAD FOR STEEL CHANNEL SLEEPERS

1 SCOPE :

1.0 This standard covers the requirements, methods of sampling and tests for 25mm thick Nylon Cord Reinforced Elastomeric pad thereafter referred to as 'Reinforced Elastomeric Pad' for use with H –Beam sleeper for bridges . The reinforced elastomeric pads are subjected to compression and shear forces, both static and dynamic, under extreme climatic conditions prevailing all over the country.

Description &Specification for Elastomeric Pad:

Sr. No	Description of Materials Fittings & Fixtures	Specifications
1	Elastomeric Pad(300x 25 / 305x 30)	Specification for nylon chard reinforced pad. No. RDSO/M&C/RP - 197/03

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Date:

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Elastomeric pad is to be purchased from firms who are approved by RDSO

2.0 REQUIREMENTS :

2.1 Materials

2.1.1 Rubber

The rubber compound used for the manufacture of reinforced elastomeric pads shall be based on polychloroprene elastomer suitably compounded so as to conform to the requirements as specified in clause 2.5.1.

2.1.2 Nylon cord

The nylon cord shall conform to the requirements as specified in clause 2.5.2. The cords shall be suitably treated to ensure proper adhesion between the rubber and cord as specified in this standard.

2.2 Construction:

- 2.2.1** There shall be four layers of treated Nylon cord placed cross wise to each other in the regular section i.e. thickness of 25mm. The thickness of the rubber on the top and bottom of the pad shall be minimum 4mm and between the reinforcement minimum 3mm. Care shall be exercised to avoid displacement and exposure of the cords during vulcanization.

2.3 Workmanship and Finish :

- 2.3.1** The reinforced elastomeric pads shall have clean-cut sides. The surface of the rubber shall be smooth, free from porosity, blow holes and other moulding defects.

2.4 Dimensions and Tolerances :

- 2.4.1** Dimensions and tolerances shall be as per the relevant drawings. Unless otherwise specified, a tolerance of +/- 5.00mm on the length + 0/-2 on the width and +0.5mm / -0.0 on the thickness shall be permitted.

2.5 Physical properties of rubber, Nylon cord and reinforced elastomeric pad.

2.5.1 TEST :

Hardness and compression set tests shall be carried out from the finished product. All other tests shall be carried out from the prepared test slabs (Approx. 4-5mm thick) using the same compound and vulcanized to the same degree. The method of tests shall be as laid down in the respective appendices and shall comply with the requirements stipulated in the specification. General procedure and conditions of the tests shall be as per IS:3400 without any infringement upon special conditions laid down in the respective appendices of this specification.

Physical properties of rubber:-

Properties		Value	Test method as per Appendix
i)	Hardness (Shore 'A') min.	60	A
ii)	Tensile strength (kg/cm ²)		
	a) Before ageing, min.	140	B
	b) After ageing at 100 +/- 1° C for 96 hours +0 / -2 min.	125	
	c) Percentage retention after ageing min.	85	
iii)	Elongation at break (%)		
	a) Before ageing, min.	250	B
	b) After ageing at 100 +/- 1° C for 96 hours +0 / -2 min.	185	
	c) Percentage retention after ageing min.	70	
iv)	Modulus (relaxed) at 100% elongation (kg.cm ²)		

	a) Before ageing	20.35	C
	b) Percentage change after ageing at 100 +/-1°C 96 +/-2	+30	
V	Compression set (%) subjected to 50% compression at 100	30	D
vi)	Tension set (%) subjected to 50% stretch at 100 +/-1°C for 24 +/-2 hrs. max.	25	E

Note For the purpose of confirming / co-relating the composition of the rubber test slabs with that of the finish product, inspecting / purchasing authorities may at their discretion shall perform the following tests both on the test slabs and the products and shall comply with the requirements as given under :-

- a) Polymer identification : Identical
- b) Specific gravity : The results shall be within +/- 0.02.
- c) Percent Ash : The results shall be within +/- 1.0.
- d) Swelling by volume percent : The results shall be within in reference fuel 'B' at +/- 5
27 +/- 1°C for 24 +/-2 hrs.

2.5.2 Nylon cord :

The nylon cord shall be of style 1260/2 and the physical properties of the treated cord shall conform to the following requirements:-

Sr. No.	Properties	Values	Method of tests
1	Denier (gms/9000 metres)	240	IS:491 Part I
2	No. of ends/inch	24 +/-2	IS:1963
3	Thickness (mm), min.	0.75	IS:4910 part VIII
4	Load at break (kg), min.	16	IS:4910 part II
5	Elongation at break (%) max.	20	IS:4910 part II
6	No. of twists/m	380/400	ASTM-B-885 M

2.5.3 Adhesion between the cord and rubber :-

Adhesion between the cord & rubber (H-Pull test) tested in a manner ASTM-D-2138 shall be 10kgf, min.

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The peel adhesion, tested as per IS:3400 with test specimen of 20mm width cut from the reinforced elastomeric pad shall be 4.00 kgf. Min.

2.5.4 Breaking load :

The breaking load of the reinforced elastomeric pad tested as per IS: 3400 at a machine speed of 300 mm/minute on test specimen of 25 + 0.5 mm width and 10mm approximately thick (the pad sliced into half the thickness from the mid rubber layer so that the specimen has two layers of reinforcement) , but from the reinforced elastomeric pad shall be 425 kgf. Min. (mid value of 5 test specimen arranged in decreasing order) and not less than 400 kgf. for any individual test specimen.

2.5.5 Load deflection characteristics: The test shall be conducted as per Appendix “F” and the deflection at a load of 15 tonne shall be 1.5 to 2.0 mm.

3 LOT SIZE, SAMPLING & CRITERIA FOR CONFORMITY:

- 2.1** For the purpose of inspection, 1000 numbers of reinforced elastomeric pads or parts thereof, in case ordered quantity is not a multiple of 1000 numbers, shall constitute a lot. Five numbers of reinforced elastomeric pads shall be selected at random from each lot and out of these a maximum of three may be subjected to destructive tests as required for conducting various tests specified. However, any deviation in the distribution of the samples for different tests shall be at the discretion of the inspecting / purchasing authority.
- 2.2** Should the sample fail to meet with the requirements of the tests of clause 2, the tests shall be repeated in the same manner with double the number of samples from the same lot comprising two sets of tests, should any of set of the tests fail to meet the requirements, the entire lot represented by these test samples shall be rejected.
- 2.3** In the event of rejection of the entire lot, after the retest, the lot offered for inspection shall be made unusable in the presence of inspecting / purchasing authority.

4 DIMENSIONAL CHECK :

The reinforced elastomeric pads complying with requirements of clauses 2 & 3 shall be arranged in lots of 1000 or part quantity thereof.

Minimum 2% of reinforced elastomeric pads subject to a maximum of 5% shall be checked for dimensions and tolerances stipulated in the drawing.

If any of the sample reinforced elastomeric pads do not conform to the dimensions and tolerance as stipulated in the drawing, twice the number of samples taken for check earlier, shall be checked, should any of these samples fail to meet the requirements of dimensions, the lot represented by these samples shall be rejected and or otherwise, the batch shall be accepted.

If the reinforced elastomeric pads do not meet the stipulations of clauses 4.2 & 4.3, the manufacturer shall resubmit the quantity of reinforced elastomeric pads after sorting out the defective pieces. The quantities so offered shall meet the requirements of clause 4.2 & 4.3.

5 MARKING :

Each reinforced elastomeric pad shall bear the following in 0.8mm raised letters/figures placed in a recess on one of its surfaces :-

- (a) **Manufacturer's initial or trade mark as approved by the purchaser.**
- (b) **Last two digits of the year of manufacture along with the quarter of manufacture.**
- (c) **Drawing number.**

6 PACKING :

The reinforced elastomeric pads shall be packed placed flat one upon another in stout wooden boxes to avoid any damage in transit. The packing inside the box should be such that no displacement of pads occurs during transit. The boxes shall be sealed and labeled bearing :-

- (a) **Name of the supplier.**

- (b) **Order No. & Date.**
- (c) **Period of manufacture.**
- (d) **Consignee.**
- (e) **Quantity.**

DETERMINATION OF HARDNESS :

APPENDIX ' A '

1. **No. of test specimens.**
Three reinforced elastomeric pads shall be selected for hardness measurements.
2. **Apparatus.**
Shore 'A' Durometer.
The hardness shall be measured at a distance of atleast 1cm from the side of the reinforced elastomeric pads. Five measurements shall be taken at different places on each of the pads; which is it self-resting on a very smooth rigid surface.
3. **Report.**
The lowest of the readings obtained shall be taken as results to be taken into account.

APPENDIX ' B '

DETERMINATION OF TENSILE STRENGTH & ELONGATION AT BREAK.

1. **No. of test specimens.**
Ten test specimens of the type shown in fig. I shall be cut from the test slabs. Gauge length for the purpose of measuring percent elongation shall be 50mm.

Five test specimens shall be chosen for conducting tests before ageing and the balance of the five test specimens after ageing at $100 \pm 1^{\circ}\text{C}$ for $96 \pm 0/-2$ hrs. in an air oven.
2. **Report.**
The results to be taken into account both before and after ageing shall be the third in each series of five measurements arranged in order of decreasing values.

APPENDIX ' C '

DETERMINATION OF MODULUS (RELAXED) AT 100% ELONGATION.

1. **No. of test specimens.**
Six test specimens of the type shown in fig. I shall be cut from the test slabs. Gauge length for the purpose of measuring percent elongation shall be 50mm.
Three test specimens shall be chosen for conducting tests before ageing and the balance of the three test specimens after ageing at $100 \pm 1^{\circ}\text{C}$ for $96 \pm 0/-2$ hrs. in an air oven.
The test specimens shall be stretched upto 100mm at a speed 450-600mm/min. and then allowed to return to the normal position at the same speed. Immediately after the first stretching, the test specimen shall be stretched to 100% of its gauge length i.e. 100mm at a same speed and the load recorded.
2. **Report.**
The results to be taken into account before and after ageing shall be the second in each series of three measurements arranged in order of decreasing values.

APPENDIX ' D '

DETERMINATION OF COMPRESSION SET % SUBJECT TO 50% COMPRESSION.

1. **No. of test specimens.**
Three round specimens, one each from three reinforced elastomeric pads shall be cut having a diameter 37mm.
The test specimens shall be compressed in a compression device up to 50% of its original thickness (T_0) by using spacers and the assembly shall be kept at $100 \pm 1^{\circ}\text{C}$ for $24 \pm 0/-2$ hrs. in an air oven. The

specimens shall be removed from the device after 30 minutes on removal from the oven. The thickness of the test specimen (Tr) shall be measured between 24-48 hrs. on removal from the oven.

2. **Report**

Compression set % shall be calculated from the following formula :- $\text{Compression set\%} = (T_o - T_r) / T_o \times 100$

The results to be taken into account shall be the second in the series of three measurements arranged in order of decreasing values.

APPENDIX 'E'

DETERMINATION OF TENSION SET % SUBJECT TO 50% STRETCH.

1. **No. of test specimens.**

Three test specimens of the type as shown in fig. I shall be cut from the test slabs. The gauge length for the purpose of measuring the tension set shall be 50mm.

The test specimens shall be stretched in a suitable stretching device up to 50% of the gauge length of 50mm and then assembly kept in an oven at $100 \pm 1^\circ\text{C}$ for 24 ± 2 hrs. The test specimens shall then be removed from the device after 30 minutes on removal from the oven. The deformation occurred over the gauge mark (Lr) shall be measured between 24-48 hrs. on removal from the oven.

2. **Report.**

Tension set % shall be calculated from the following formula:- $\text{Tension set \%} = (L_r - 50) / 50 \times 100$

The results to be taken into account shall be the second in the series of three measurements arranged in order of decreasing values.

APPENDIX 'F'

LOAD COMPRESSION TEST :

1. Two number of samples to be tested per lot. The sample size will be same as the pad offered for inspection. The loaded area of the pad is $75 \times 75 \times 150\text{mm}$ (reference drawing : Annexure 'B', Sheet No. 3 Item No. 830).

2. **Apparatus :**

Compression testing machine: Capacity 50 tonne suitably fitted with two dial gauges capable of reading $1/100^{\text{th}}$ of mm.

3. **Test condition.**

Test shall be carried out at $27 \pm 2^\circ\text{C}$ and at relative humidity $65 \pm 5\%$.

4. **Test method.**

The test specimen shall be placed between two rigid metal plates, the surface of which shall be smooth, The top plate shall be of such design so that the load is supplied on the area $(75 \times 75) \times 150\text{mm}$ and not on the projected profile at the center and on the edges, when the top plate is placed on the pad, the outer surface of both the top and bottom plate shall be parallel. A piece of '0' number emery paper shall be inserted between the test specimen and the bottom plate. The measurement of thickness variation shall be carried out by means of two dial gauges of least count 0.01mm attached with hydraulic press and located in the middle of the shorter sides of the test specimen.

Two consecutive loading of 15T shall be applied before any deformation readings are taken. A load of 100kg. shall be then applied and the dial gauges shall be adjusted for '0' reading. A load of 15T then applied and dial gauge reading shall be recorded. The deformation to be considered for report shall be average of the readings taken from two dial gauges, which shall not differ more than 0.2mm for a given load.

5. **Report.**

The average of the readings of the dial gauges shall be considered and shall be within the specified limit for both the two specimens.

APPENDIX 'I'

CODE OF PRACTICE FOR QUALITY CONTROL AND INSPECTION OF RUNNER AND PLASTIC COMPONENTS.

1. THE SYSTEM :

The manufacturers shall furnish to the purchasing / inspecting authorities information in respect of quality control system in force at their works used in the manufacture of components.

2. RECORD, TESTS & SAMPLING :

The manufacturers shall furnish the purchasing / inspecting authorities the details of tests and inspection records and other relevant records as required under the quality control systems in force. These records & reports shall be maintained by the competent Technical authorities of the manufacturers and shall be open to examination by the purchasing / inspecting authorities at their discretion may draw samples of materials used in the manufactures and products at any stage of production for conforming tests either at the works of the manufacturers or in an approved laboratory. In case the samples do not conform to the requirements of the specification double the number of samples from the same lot/batch shall be drawn for re-tests. Should any one of the re-test samples does not conform to the requirements, the entire lot/batch shall be rejected.

3. APPROVED MANUFACTURERS :

The manufacturer should have complete manufacturing & quality control facilities as per specification at their works.

For reasonable quality assurance, it is desirable that the components are procured from manufacturers approved by Research Designs & Standard Organization (RDSO), Lucknow or by any other agency as assigned by the purchasing authority, based on evaluation of the components as per specification, manufacturing & quality control facilities and quality / assurance programme. However, such approval does not guarantee the supply of consistent quality of material / components & therefore, every lot offered shall be subjected to inspection and testing as per the specification.

The approved manufacturers shall be subjected to periodical re-appraisal (Periodicity for each component shall be assigned by the approving authority). In case of withdrawal of any manufacturing & quality control facilities provided at the time of re-appraisal are not conforming to the specification the manufacturers are liable to the withdraw from the approved list. The approving authority reserves the right to withdraw the manufacturers from the approved list without assigning any reason.

The consignee may also periodically arrange testing if so desired, at RDSO or in an approved laboratory for confirmatory tests within six months from the date of receipt of the supplies, in their original packing. In case of samples do not conform to the specifications, the consignee may at their discretion suspend the manufacturer for further supply and the fact brought to the notice of approving / inspecting authorities for appropriate action.

Note: In case of any typographical error, conditions as prescribed in the original conditions shall be

- 30. Item No. NS/4: Assembling of fabricated Steel girders on bearings at site with crane/derrick / any other approved means at site on sub structure with labour, equipment, T&P including site bolting with all temporary arrangements, scaffolding etc. with contractors. Rate includes drifts, service bolts, Holding down bolts etc. as per drawings.**

Note: Payment for HSFG bolts used if any will be made separately under relevant item.

- 31. Item No. NS/5: De-launching of existing Structural steel side pathway and Launching New/existing Structural steel side pathway.**

Note: Payment under this item shall be made for the total weight of SIDE PATHWAY removed and newly launched side pathway.

- 32. NS/6: Supply of Aluminium paints in two containers**

- 33. NS/7: Supply of Red oxide Zinc Chromate primer**

CHECK LIST
(Before starting the work)

Name of work:

Location:

Duration of work: From To

S.No		Yes	No
1	Contractor's supervisor identified/selected. Who is going to be site in charge?		
2	Training imparted to contractor's supervisor & certificate issued		
3	Work site inspected by construction's supervisor/other departments supervisors along with contractors supervisor		
4	Pre-caution to be taken, identified and listed		
5	Plan of work drawn out by contractors supervisor in consultation with Railway's supervisor		
6	Plan of work, brought to the knowledge of open line AEN/IOW & PWI		
7	Before start of work, proper line marking/Barricading done at site of work		
8	Men deputed for protection of track along with safety equipment		
9	Caution order issued for the train drivers in case work is being done within 6 mts of center of running track		
10	Drivers of vehicles/machinery being used have been identified		
11	Drivers of vehicles/machinery briefed about the safe working		
12	Sufficient lighting provided at site of work for night working		
13	Infringements checked		
14	Sectional (open line) AEN/PWI/IOW have satisfied themselves regarding safety arrangement		
15	Availability of walkie - Talkie sets for communications.		

Signature of Open Line's
Supervisor

Signature of Construction's/
Other department's supervisor
Date:

Signature of the Tenderer (s)
Date:

Dy. CE (Bridge-Line) DDR, WR
For and on behalf of President of Union of India.

Signature of the Tenderer (s)
Date:

Dy. CE (Bridge-Line) DDR, WR
For and on behalf of President of Union of India.

CHECK LIST
(While work is in progress)

Name of work:

Location:

Duration of work: From..... To.....

Date of Inspection:

S.No		Yes	No
1	Does the contractor's supervisor have the certificate		
2	Does the knowledge of contractor's supervisor on safety of track & work site is up to the mark		
3	Is Railway's supervisor of const. Organization/other department's available at site		
4	Is knowledge of railway's supervisor O.K.		
5	Is lime marking/Barricading done?		
6	Are adequate safety precaution taken		
7	Are communication facility (walkie – Talkie sets) available at site		
8	Are only identified drivers driving the vehicle/machinery?		
9	Is whole work site safe for working of men/vehicle & train		
10	Are adequate lighting arrangement done at site?		
11	Are adequate protection equipment available at site?		
12	Is caution order to trains being issued?		
13	Are train drivers following the enforced temporary speed restrictions?		
14	Has work permit been taken for working in Electrified territory/station yards (P&C areas)		

Signature of Inspecting Officer
Designation.....

Signature of the Tenderer (s)
Date:

Dy. CE (Bridge-Line) DDR, WR
For and on behalf of President of Union of India.

EPFO – Certification given by firm in respect to labour deployed will be assumed to be correct. If during the execution of work, labour exceed more than minimum stipulation as per labour act, necessary action should be taken by firm under intimation to Railway. If the certificate found to be incorrect an appropriate action has not been taken then Railway reserved the right to take appropriate action against the firm.

END OF DOCUMENT