GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

METHOD STATEMENT FOR FABRICATION OF 45.7 M THROUGH TYPE OPEN WEB GIRDER FOR 25t LOADING DRAWING NO. RDSO B-17181 SERIES

[BS-125]

June, 2018

ISSUED BY

B&S DIRECTORATE
RESEARCH DESIGNS AND STANDARDS ORGANIZATION
LUCKNOW – 226011.

Method Statement for Fabrication of 45.7 m. Through Type Open Web Girder for 25t Loading Drawing No. RDSO B-17181 Series

1.0 Introduction :

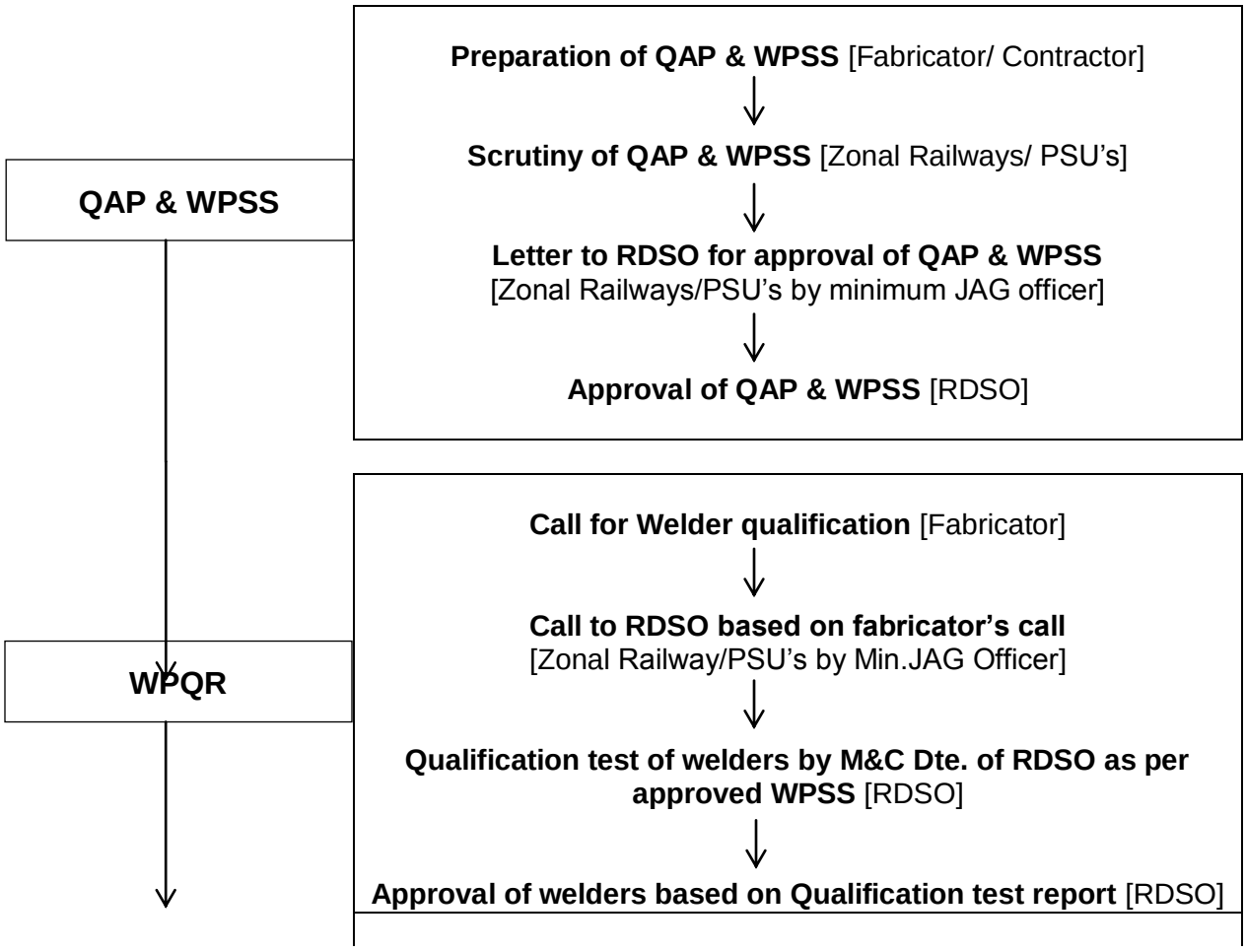
This document contains the guidance regarding the activities involved in fabrication of 45.7 m through type open web girder 25t Loading as per RDSO drawing no. B-17181 series. The fabrication of steel girder bridge is being done by various Railway Workshops as well as through trade. The fabrication is governed by the provisions of:

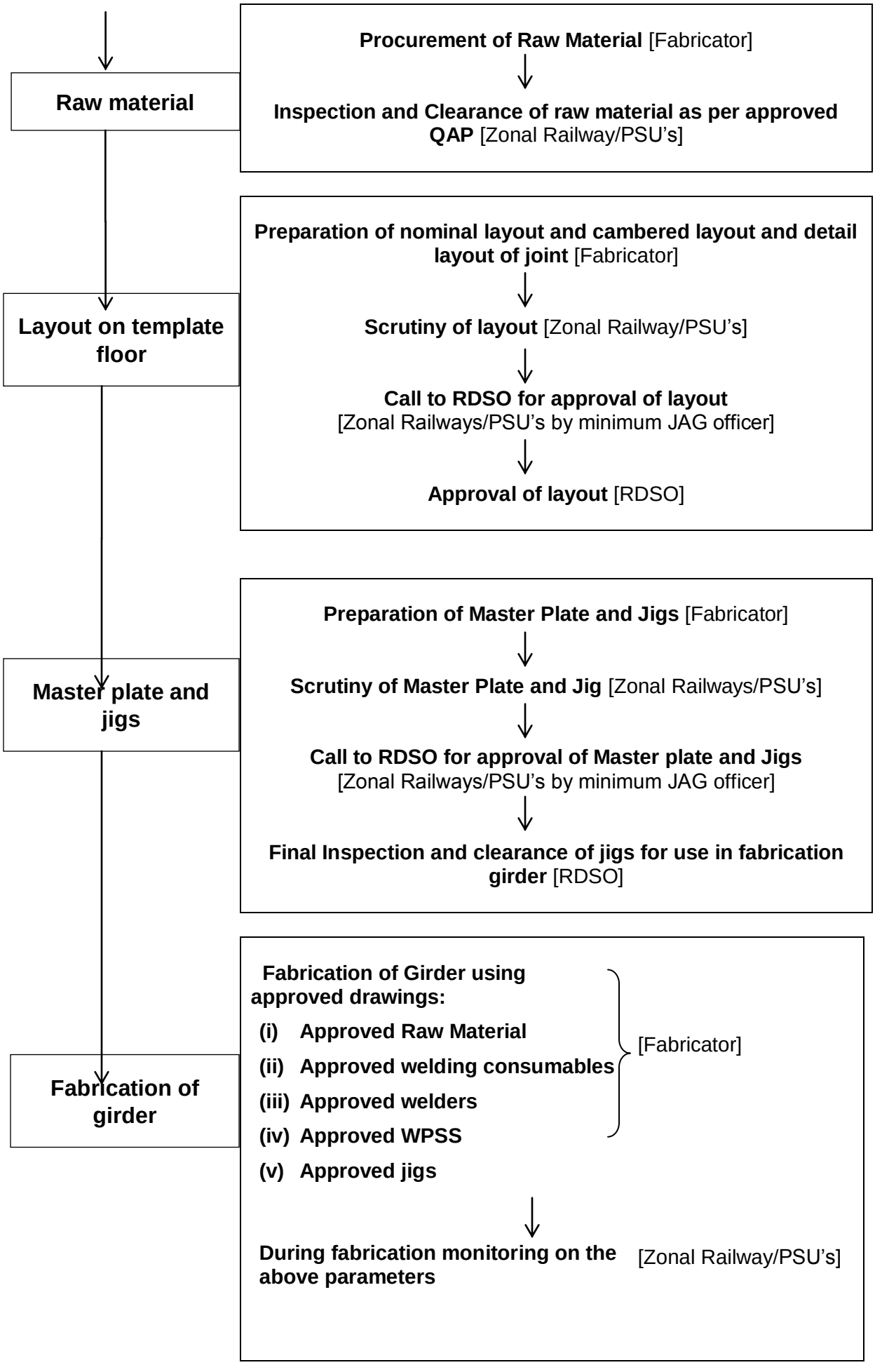
(i) Indian Railway Standard specification for fabrication and erection of steel girder bridges and locomotive turn-tables (B1-2001) (Adopted-1934 Revised 2001).

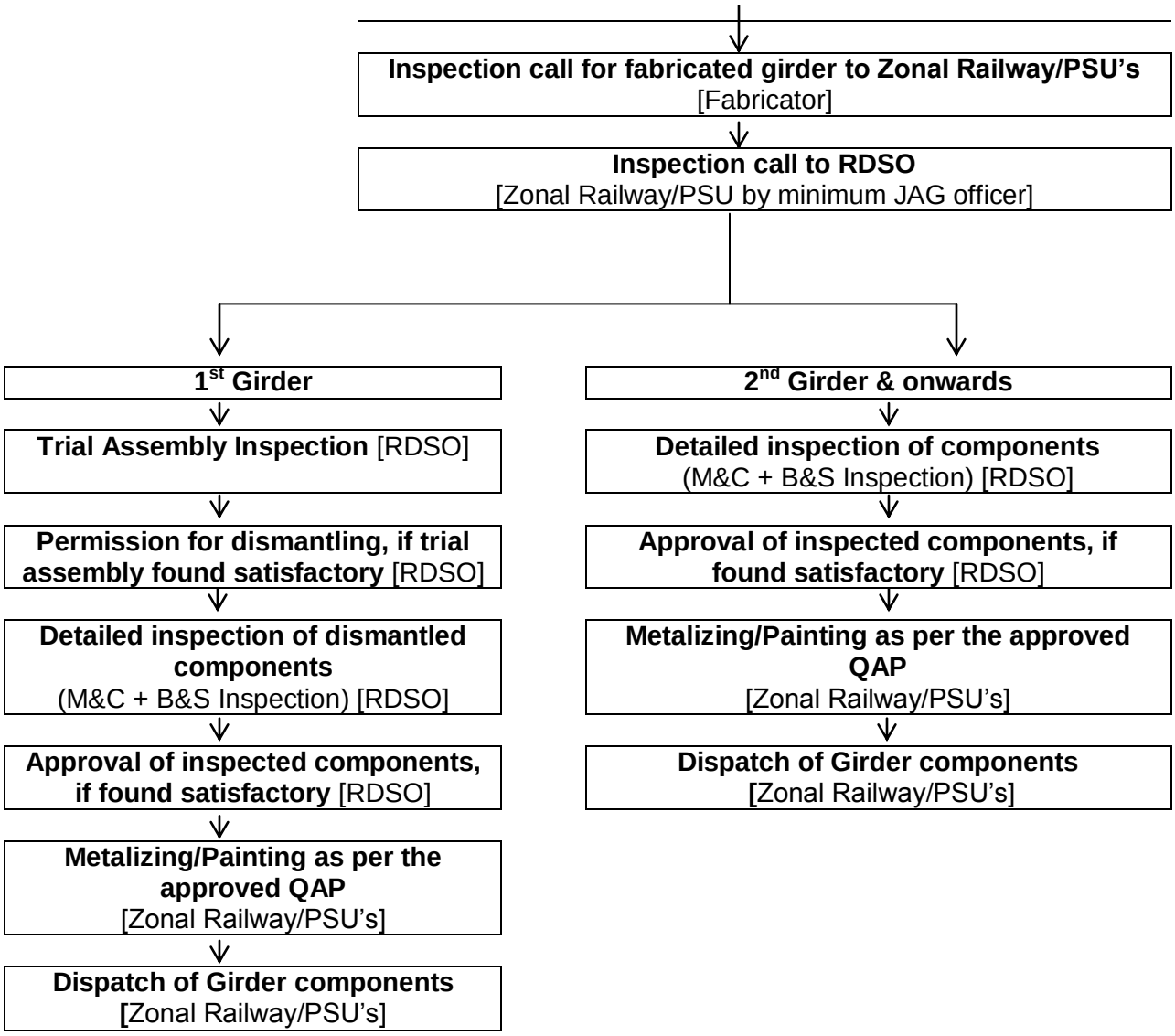
(ii) Indian Railway Standard code of Practice for metal arc welding for structural steel bridges carrying rail cum road or pedestrian traffic (Adopted 1972 Revised 2001).

This method statement is prepared for helping the field engineer associated with execution of the fabrication work. These guidelines are just to facilitate and not to supersede the codes related to fabrication of steel bridge girder as given above. In case of any difference in this document and the above two mentioned codes, the provisions in the codes shall prevail.

2.0 Flow Chart of activities involved in fabrication :




Raw material
Procurement of Raw Material [Fabricator]
Inspection and Clearance of raw material as per approved QAP [Zonal Railway/PSU's]
Layout on template floor
Preparation of nominal layout and cambered layout and detail layout of joint [Fabricator]
Scrutiny of layout [Zonal Railway/PSU's]
Call to RDSO for approval of layout
[Zonal Railways/PSU's by minimum JAG officer]
Approval of layout [RDSO]
Master plate and jigs
Preparation of Master Plate and Jigs [Fabricator]
Scrutiny of Master Plate and Jig [Zonal Railways/PSU's]
Call to RDSO for approval of Master plate and Jigs
[Zonal Railways/PSU's by minimum JAG officer]
Final Inspection and clearance of jigs for use in fabrication girder [RDSO]
Fabrication of girder
Fabrication of Girder using approved drawings:
(i) Approved Raw Material
(ii) Approved welding consumables
(iii) Approved welders
(iv) Approved WPSS
(v) Approved jigs
[Fabricator]
During fabrication monitoring on the above parameters
[Zonal Railway/PSU's]



Note: 1. In the flow chart authorities competent to do a particular activity has been indicated in bracket i.e. [ ] against each activity.

2. PSUs indicate the Indian Railways PSUs which are engaged in rail or road cum rail steel girder fabrication such as DFCCIL, RVNL, IRCON and KRCL.

3.0 The activities involved in the fabrication of steel girder with inspection can be broadly divided under following three heads:

3.1 Prefabrication Stage:

(i) Approval of Quality Assurance Plan. (QAP)

(ii) Scrutiny of Welding Procedure System.(WPSS)

(iii) Welders Qualification Records.(WQT or WPQR)

(iv) Inspection and Clearance of Raw Material.

(v) Inspection of Layout an Template Floor.

(vi) Inspection of Jigs and Fixtures with Master Plate.

3.2 During Fabrication

(i) Use of Approved Raw Material.

(ii) Use of Approved Welding Consumables

(iii) Use of Approved Welders.

(iv) Use of Approved Welding Procedures and Parameters.

(v) Fabrication with Approved set of Jigs

(vi) Radiographic Inspection of Butt Welds

3.3 After Fabrication:-

(i) Inspection of Welds.

(ii) Structural and Dimensional Inspection.

(iii) Trial Assembly (First Girder) and Components Inspection.

(iv) Dismantled component inspection after dismantling of trial assembly for first girder.

(v) For 2nd onwards component inspection and welding inspection only.

4.0 Approved Drawing to be used for fabrication:

Field/Workshop Engineer associated with fabrication should have all the relevant drawings, Codes & Specifications with latest Correction Slips prior to the start of work. On the basis of structural drawings, fabrication drawings should be prepared by fabricator.

5.0 Quality Assurance Plan (QAP) of Steel Girder Fabrication:

5.1 To ensure the proper quality of fabrication, Quality Assurance Plan (QAP) is prepared. QAP must indicate stage-wise manufacturing process covering various steps, tests, checks & their frequency, sampling plan, authority for grant of clearance etc. for all activities from inspection and testing of raw material to trial assembly and erection.

5.2 The QAP must cover following aspects:

(i) Brief Details of project

(ii) Contract Agreement No.

(iii) Loading Standard

(iv) Governing Specification

(v) Drawing references

(vi) Roles and responsibilities of various agencies involved in fabrication, erection & inspection.

A sample QAP for 45.7m.welded open web girder is given at Annexure-I of this document. QAP is to be scrutinized and approved by the inspection agency i.e. RDSO. QAP should be signed by fabricator and Railway Officials [Minimum JAG Level] before submission to RDSO (In three sets).

5.3 Field Engineer should ensure that work is carried out strictly as per the approved QAP and no deviation takes place from QAP. All the stages should be studied in detail, prior to start of work. Following important things to be kept in mind while preparing QAP:

- **B&S:**
  - (i) Material used is as per codal provision of IRS-B1 and the testing of material and its inspection details, type of records to be maintained and acceptance criteria of the test mentioned is as per codal provision.
  - (ii) HSFG bolts as per the IRS-B1 and BS-111 with latest revision.
  - (iii) Manufacturing process – IRS-B1 check and inspecting authority records.
  - (iv) Trial assembly stage properly defined or
  - (v) Dimension inspection and final clearance
  - (vi) Painting as per provisions of IRS B1.
- **M&C:**
  - (i) Welding consumables.
  - (ii) Welding methodology like baking of electrode flux, pre heating, current condition, sequence of welding, run on and run off etc. is as per codal provision, record maintenance and the inspecting and approving authority.
  - (iii) Testing method for different type of weld, its record, acceptance

6.0 Welding Procedure Specification Sheet (WPSS)

As per RDSO drawing no. B-17181 series there are 26 nos. of joints for which WPSS is to be prepared details of which is given in Annexure-II B. For each of these joints, the WPSS is to be prepared as per the Performa given in Annexure-II A. WPSS should be signed and stamped by fabricator and Railway (Minimum JA Grade officer) before submission to RDSO for approval of WPSS (In three sets).

WPSS is process sheet indicating plate/section used, welding process, type of joint, welding consumables quality, welding parameters, acceptance standard, tests applicable etc. Field Engineer should ensure that welding is carried out as per approved WPSS. It is to be ensured that welding consumables to be used are from approved source and a proper record of their consumption is maintained. A sample Performa for record keeping of consumables is enclosed as Annexure–III.

7.0 Welding Procedure Qualification Records (WPQR)

WPQR is the document indicating approval of various welders who are to be deployed for carrying out welding work for fabrication. It contains name of the welder with photograph; qualification; experience; welding parameter; qualification tests and records for each welding process and joint.

WPQR should be signed by fabricator and Railway Officials before sending for approval of RDSO (Annexure-IV). Based on the inspection call from Zonal Railways/ PSUs (Minimum JA Grade officer) tests are conducted by RDSO official from M&C Directorate for qualifying the welders and then approval is

granted through WPQR. Field engineer should ensure that welding is done only by approved welders for the type of welding for which he is approved and no deviation takes place.

8.0 Raw Material

Raw Material Steel has to be as per Para 8 of IRS B1:2001, recently revised vide Correction Slip No.5 dated 30-08-2013 (Annexure-V). In majority of case where service temperature does not fall below 0^0C steel grade designation is E-250 Quality "B0" as per Para 8.2 of IRS B1:2001.

Passing of raw material is done on the basis of visual inspection and lab test reports for mechanical properties, chemical composition, ultrasonic examination, Charpy Impact Test etc. HSFG bolts and other consumables like paint etc. should also be got tested from Government/ NABL/ NABCB Lab as per relevant codes/specification. All the required test should be got done through independent Government/ NABL/ NABCB Labs and compared with the mill test certificate results given by the supplier before passing the material for use. Material test certificate register must be maintained by fabricator as per Annexure available in IRS: B1-2001(Appendix-I, Performa-7) and signed by railway representative as well as fabricator.

All angle/channel, rolled section to be used for open web girder fabrication shall be checked for rolling tolerance as stipulated in IS:1852.

In addition to above visual inspection shall be done to ensure that steel is free from surface defects like pitting, laminations, imperfect edges, twist, other harmful defects etc. and recorded in the register.

While cutting the plates or other section the heat/cast mark should be transferred to all cut members while using these members for fabrication. Proper record of heat mark should be maintained/ correlating it with the components of girder.

9.0 Item requiring attention before fabrication of girder

9.1 Layout on template floor is to be checked for following:

(i) Field engineer has to ensure that the template floor is level.

(ii) Nominal and camber layout are drawn with the calibrated steel tape. The certificate of calibration from an authorized agency should be kept in record.

(iii) Squareness, diagonal measurement of layouts is also checked.

(iv) It should be remembered that tape should not be changed during the various stages of measurement.

(v) Running measurement should be recorded with a long tested tape having minimum length suitable for half span/full span measurement as per the case.4 lbs. pull is to be applied for stretching the tape. Suitable device should be used for this purpose.

9.2 Inspection of Jigs and Master Plates:

Master Gussets should be checked on nominal layout and transfer of all intersection line/ points to be done with great care and accuracy. If gussets are

symmetrical then 1/4th or half hole marking is to be done and same will be transferred to complete the gusset marking. Dimensional Inspection of Jigs and Master Plates used in manufacture of girder should be done very carefully as per drawing to ensure accuracy.

It should be remembered that Jigs of main members of the open web girders are fabricated on the camber length with the adoption of the field holes at nominal length layout through master gussets.

9.3 Detailed Layout of joints is drawn as per drawing on 1:1 scale on a level ground to be checked for:

(i) Any infringement of rivets/ HSFG bolts, adjoining edges etc.

(ii) Position of holes in master plates for jigs as per layout.

(iii) The bore of bushes shall initially have tolerances of - 0mm to + 0.1mm. Fairing of bushes with holes of master plate shall conform to tolerances of – 0.13mm using a 'GO' gauge of 0.13mm less than hole diameter. Bushes of jigs during service should be maintained within acceptable limit (D+0.4mm) which shall be checked at regular intervals.

9.4 Certification of Jigs and Master Plates:

Stamping of Master Plates by the inspection official should be ensured prior to their use. The jigs should be checked by fabricator and field engineer from time to time for their wear and tear for maintaining accuracy during work.

10.0 Item requiring attention during fabrication of girder

10.1 Field/Workshop engineer should keep a watch and maintain proper record for as per Appendix-I of IRS B1-2001 to ensure following:

(i) Use of approved raw material: Only raw material cleared originally to be used during fabrication.

(ii) Use of approved welding consumables: Type of consumables, source, quality, approval status, grade, suitability for fabrication as per WPSS etc. to be frequently checked and recorded.

(iii) Use of approved welders: Checking of welders certificate, records, skill and procedure adopted for welding as per WPSS

(iv) Use of approved WPSS & welding parameters: Checking welding parameters and equipment used for correctness of joint preparation etc.

(v) Use of Approved set of Jigs & Fixtures: To permit the interchangeability of the components and ensure pre-stressing in open web girders and to avoid distortion, it should be ensured that only approved Jigs & fixture are used and proper clamping arrangement are provided in jigs/fixtures.

10.2 Important checks for tack welding:

(i) Check that top & bottom flange plate are perfectly perpendicular with reference to web throughout the length of I Section.

(ii) Check the squareness i.e. 90^{o} angle between flange & web of top and bottom flange plate to avoid out of squares flanges.

(iii) Check with filler gauge throughout the length of top & bottom flange connection for uniform contact throughout the web plate.

10.3 Points requiring attention during full welding:

(i) Thorough cleaning of tack welded member should be done with appropriate tool like wire brush, before starting full welding. Minimum width of 75mm throughout the length shall be cleaned to ensure that the surface is free from dust, mill scale, grease, oil and paint to ensure sound quality of weld.

(ii) Full welding shall be carried out in flat position with SAW process as per sequence mentioned in WPSS/WPQR using manipulator/special welding fixture.

(iii) The sequence of welding shall be shown in WPSS/WPQR marked as 1, 2, 3 & 4 in the order of welding.

(iv) Welding should be done in proper sequence.

(v) Minor welds/ Inaccessible location welds shall be made by CO_2welding or other type of welding as per approved WPSS.

10.4 Good Working practice for prevention of distortion in welded girders:

(i) By pre-bending of flange plate of welded girder using appropriate fixture.

(ii) By clamping the flange plate to fixture.

11.0 Item requiring attention after fabrication of girder

(i) Stacking of component should be proper and shipping marks properly stenciled on component for identification.

(ii) Visual Exam of Welds: Quality of weld, uniformity of weld bead, size of the weld, weld defects e.g. under cut, blow hole, porosity, spatter, crack etc. should satisfy para 31 and Appendix C of welded bridge code.

(iii) Metallographic and NDT Exam of Fillet Welds: Macro etching on girder, run-on, run-off tabs for ensuring proper weld quality, Dye penetrant examination etc. should be arranged by fabricator, for independent inspection.

(iv) Structural and dimensional inspection: Dimensional check should be carried out by field engineer to ensure conformance to drawing dimensions including diagonal checks for squareness etc. before offering girders for final inspection.

12.0 Trial Assembly

First span is always trial assembled to check whether fabrication process is proper or require any correction in jigs, workmanship or procedures to ensure regular quality output. Following important parameters are checked during trial assembly:-

12.1 Camber:

Camber shall be checked while the girder is supported on the nodal points on camber jacks and after releasing jacks i.e. for residual camber with girder resting on bearing ends only. The camber measurements should be done with appropriate leveling instrument.

12.2 Dimensional check:

a. Overall length
b. Bearing centers
c. Height
d. Truss center
e. Center to center distance of rail bearers
f. Center to center distance of panel points
g. Squareness
h. Alignment of the girder
i. Fairing of holes
j. Verticality
k. Infringement, if any
l. Butting of compression flange.

Checklist for trial assembly of first girder of 45.7 m span, 25t Loading as per RDSO drawing no. B-17181 Series is given as Annexure – VIII. In case the dimension given are based on the drawing and the tolerance in the dimension should be as per the Appendix 'B' of IRS- B1.

13.0 Component Inspection of first span

Detailed inspection of dismantled components of trial erected span is carried out to see the integrity of components. There should not be any elongation of holes, tearing of edges, edge/end finishing or other defects after dismantling of trial assembly.

14.0 Component inspection of 2nd span onwards

Once fabrication process is found satisfactory i.e. all steps from para 4.0 to 12.0 are proved during trial assembly and its component inspection, then only components of 2nd span and onwards should be fabricated with the approved sets of jigs, the tested WPSS and WPQR as laid out in steps earlier. Field engineer should do the components inspection and ensure all record are available before giving final inspection call to inspecting authority. All components should be checked by internal quality control team of fabricator as well as zonal railways/PSU'S as per the checklist given as annexure IX of this document and all the significant defects should be removed before giving the inspection call to RDSO. After ensuring this, inspection call to RDSO should be given by zonal railways duly certifying the above as per the certification given in annexure VI of this document.

After inspection by RDSO (B&S as well as M&C team) the inspection certificate will be issued, if components offered found satisfactory.

Annexure-I

SAMPLE QUALITY ASSURANCE PLAN FOR

45.7 m Welded Open Web Girder (25T Loading-2008) as per RDSO's Drg. No. RDSO/B-17181 Series

Name of project ……
……

Manufactured by ……
Workshop Address……..

SN	Component/ Operations	Characteristic Check	Frequency & type of check	Reference Document	Fabricators Quality Control	Inspection details		Type of Record	Acceptance criteria	Remarks
						Inspecting Agency	Extent of inspection			
1	2	3	4	5	6	7	8	9	10	11
1.0	Raw Material									
1.1	**Steel Plates, Structural Section**	Identification and correlation with Mill Test Certificate from Supplier e.g., SAIL, TISCO, IISCO etc.	As per Mill T.C. and tests required by RDSO from Govt./NABL/NABCB approved lab	Challan, Mill T.C.	Verification of reference document	**…… Railway**	100%	Fabricator's record	Plates: IS 2062-2006, Gr. E 250 B0, 12mm & above thick. Plates are fully killed &normalizePd or control cooled. Sections IS 2062-2006, Gr. E 250 B0/A	
		Physical condition i.e., Pitting, rusting, straightness, rolling defect, etc.	Visual	-	Complete visual inspection	**…… Railway**	100%	Fabricator's Record	IS 2062-2006	-

Signature of
Fabricating Agency

Signature of
Railway Representative

Approval of RDSO

1	2	3	4	5	6	7	8	9	10	11
		Mechanical Test as per IS 2062-2006 UTS, YS, % El, Bend test,	Lab Test at appvd. Laboratory	-	Lab Test Report	**…… Railway**	-	-	IS 2062-2006 Gr. E 250 B fully killed & normalized or control cooled	**Raw matl. Clearance shall be by Zonal Railway**
		Charpy test at 0^0C for plates of thks. 12mm and above	-Do-	-	-Do-	**…… Railway**	Heat/Cast no. section wise as per IS 2062-2006	-	-	-
		Chemical Analysis as per IS 2062-2006	-Do-	-	-Do-	**…… Railway**	-Do-	-	Table 1, along with Note No. 2 of IS 2062-2006, Gr. E 250 B	
		Ultrasonic test for 12mm & above thi. Plates, as per IS 4225 or ASTM-SA 435/435M	By ASN Level II operator	-	Lab Test Report	**…… Railway**	100%	-	IS 4225 or ASTM SA 435/435M	
		Dimensions	Measurement	Challan	Measurement of Dimension	**…… Railway**	100%	Fabricator's Record & Zonal Railway Records		
1.2	**HSFG Bolts & Nuts**	**a) Dimensions**	Visual/ Measurement	Challan	Verification of Reference Document	**…… Railway**	As per requirement	-	IRS B1-2001 and BS-111 (Rev. V)	
		b) As per specn. **Mechanical & Chemical**	Lab test at Govt. appvd. Lab	Manufacturer's Test Certificate	-Do-	**-Do-**	-Do-	-Do	-Do	

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Fabricating Agency

Signature of
Railway Representative

Approval of RDSO

1	2	3	4	5	6	7	8	9	10	11
1.3	**Welding Consumables**	As per specification and as approved by RDSO	Any test as required	Challan., Manufacturer's Test Certificate	Verification of Reference Document	**…… …. Railway**	As per requirement	Fabricator's Record	-	**Consumables should be of RDSO appvd. Brand**
2.0	**Manufacturing Process**									
2.1	**Lay out of Components & Joints** **a) Normal**	Dimension	Measurement with calibrated steel tape & gauges	Approved Drawing	Measurement of Dimension	**RDSO**	100%	Iinspection Report of Inspection Official	Relevant IS/IRS Codes & Approved Drawings	**Clearance by RDSO**
	b) Jigs & Templates	Dimension, Intersection lines, pitch, gauge, dia. Of Holes & No. of holes	Measurement with calibrated steel tape & gauges	Approved Drawing	Measurement of Dimension	**RDSO**	100%	Record of Jigs & fixtures as per proforma issued by RDSO	IRS B1-2001	**Clearance by RDSO**
	c) Cutting, Straightening, Edge preparation	Dimension, Freedom from defect	Visual/ Measurement	Inspection Report of Inspection Official & Fabricator's Record	Visula& Measurement of dimension	**…… Railway**	100%	Inspection Report of Inspection Official & Fabricator's Record	IRS B1-2001, IS 1852-85	
3.0	**Welding:**									
	a) WPSS	Review of WPSS	Verification	IRS B1-2001 IS 9595-96 WBC-2001	Verification of Reference Document	**RDSO**	100%	Fabricator's Record	IRS B1-2001 IS 9595-96 WBC-2001	**Only RDSO certified welders to be engaged in the job.**
	b) WPQR	Witnessing of established WPSS Witnessing of Welder Qualification test	Visual, DT & NDT at approved lab	As per code requirement	Verification of Reference Document	**RDSO**	100%	WPQR Sheet to be recorded in presence of RDSO Rep.	IS 7310(I)-74	

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Railway Representative

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1	2	3	4	5	6	7	8	9	10	11
	c) Preheating	Measurement of Temperature	Visual with thermal Chalk	As per approved WPSS	Verification of Reference Document	**……. Railway**	Random	Inspection Report of Inspection Official & Fabricator's Record	IRS B1-2001	
	d) Baking of Electrode, Flux	To have moisture free Electrode & Flux	Visual Check of Electrodes & beating	As per Manufacture's recommendations	Verification of Reference Document	**……. Railway**	100%	Inspection Report of Inspection Officials & Fabricator's Record	IRS B1-2001	
	e) Selection of correct Electrodes & Flux	Reference to WPSS, IRS Class, etc.	Visual	As per approved WPSS	Verification of Reference Document	**…….. Railway**	100%	Inspection Report of inspection official & Fabricator's Record	As per list of vendors approved by RDSO	
	f) Current Condition	Measurement of Amp. & Voltage	Visual with Ammeter & Voltmeter	As per approved WPSS	Verification of Reference Document	**……. Railway**	Random	Inspection Report of Inspection Official & Fabricator's Record	IRS B1-2001	
	g) Sequence of Welding	To control distortion	Visual	As per approved WPSS	Verification of Reference Document	**……. Railway**	Random	Inspection Report of Inspection Official & Fabricator's Record	IRS B1-2001	
	h) Provision of Run-on & Run off Plates	To avoid crater defects	Visual	As per IRS B1-2001	Verification of Reference Document	**……. Railway**	100%	Inspection Report of Inspection Official & Fabricator's Record		

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1	2	3	4	5	6	7	8	9	10	11
4.0	**Inspection of Welding**	a) For Fillet Welds: Visual, D.P.Test Fillet Size, Penetration, Leg Length, Throat thickness, etc. b) For butt Welds RT/UT tests, as applicable	Visual, Gauge & Macro Etching.	Approved Drg. & WPSS	Visual Inspection & Verification of dimension by gauges	**RDSO**	100%	Fabricator's Record	Relevant IS/IRS Code, Approved Drg. & WBC-2001	**Clearance by RDSO**
5.0	**Trial Assembly**	**a) Camber on Jack b) Dead Load deflection c) Dimension d) Fairness of holes e) Temporary fasteners f) Imfringement g) Butting of compression edges**	Visual & Dimensional	Approved. Drg.	Complete dimensional check of Control Assembly	**RDSO**	One complete span	Inspection Report of Inspection Official & Fabricator's Record	IRS B1-2001	**Clearance by RDSO**
6.0	**Final Clearance**	Component completeness	Visual Dimensional & Structural	Stage clearance Record	Verification of Stage clearance Record	Day to day inspection by Railways and final inspection by RDSO	Girder fabrication with approved Jigs-100%	Inspection Report of Inspection Official & Fabricator's Record	IRS B1-2001	Initial inspection by Railways and final Clearance by RDSO

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Approval of RDSO

SN	Component/ Operations	Characteristic Check	Frequency & type of check	Reference Document	Fabricators Quality Control	Inspection details		Type of Record	Acceptance criteria	Remarks
						Inspecting Agency	Extent of inspection			
1	2	3	4	5	6	7	8	9	10	11
7.0	**Surface preparation by Shot Blasting & Metalizing**	Surface condition after blasting	Visual checking with reference to surface preparation	Approved Fabrication Drawing & IRS B1-200	Verification of stage clearance records	W.Railway	100% by fabricator & Random by Railway	Fabricators record	IRS B1-2001 AppendixVII IS: 6586 IS: 5905 IS: 2590.	Clearance shall be given by Zonal Railway
		Surface finish after Metalizing	Visual checking	-Do-	-Do-	W.Railway	-Do-	-Do-		
		DFT checking	Measurement	-Do-	-Do-	W.Railway	Minimum one reading per M2	Measurement Record		
8.0	**Cleaning & Painting**	Surface condition before painting	Visual checking with reference to surface preparation	Approved Fabrication Drawing & IRS B1-200	Verification of stage clearance records	W.Railway	100% by fabricator & Random by Railway	Fabricators record	IRS B1-2001 AppendixVII IS: 6586 IS: 5905 IS: 2590.	Clearance shall be given by Zonal Railway
		Surface finish after painting	Visual checking	-Do-	-Do-	W.Railway	-Do-	-Do-		
		DFT checking	Measurement	-Do-	-Do-	W.Railway	Minimum one reading per M2	Measurement Record		

Note: 1. During fabrication as per approved QAP, stage wise records to be maintained by the fabricator which can ascertain the approved raw material and consumables, approved welding consumables, approved welders, approved set of jigs are being used. The Railway/PSU representative should check all such records and necessary sign/certification should be done by the authorized Railway representative during fabrication at regular intervals. On completion of the work, fabricator should handover the original copy of such record to the concern Railway/PSU for safe custody.

2. During fabrication, internal inspection to be done by Railways to ensure that only RDSO approved welders carry out welding as per approved WPSS, work is as per dimensional tolerances and other quality aspects and should satisfy itself before sending Inspection call to RDSO for Trial Assembly or components Inspection.

Signature of Fabricating Agency

Signature of Railway Representative

Approval of RDSO

Annexure-II A

APPENDIX – V of IRS B1
(Ref. Clause 26)

Proforma for Welding Procedure Specification Sheet

Name and address of Fabricator:

Welding procedure specification No

1. Weld joint description:

2. Base Metal :

3. Welding Process :

4. Welding position :

5. Welding consumables:

5.1 Electrode/wire Class :

Dia :

Drying method:

5.2 Flux Class :

Type:

Drying method:

5.3.1 Shielding gas:

6.0 Base Metal preparation:

6.1 Joint design details:
(Give sketch showing arrangement of parts, welding groove details, weld passes & their sequence etc.)

6.2 Joint preparation:

7. Welding current: Type:

Polarity:

8. Welder qualification:

9 Welding parameters and technique:

9.1 Welding Parameters:

Weld Pass No.	Electrodes/ wire dia.(mm)	Current (amp)	Arc Voltage (volt)	Wire feed speed (m/min)	Travel speed (m/min)	Electrical stickout (mm)	Gas flow rate (litre/min.)
1	2	3	4	5	6	7	8

9.2 Welding sequence and technique:
(Give sketch showing sequence and direction of welding).

10. Provision of run in and run-off tabs:

11. Cleaning of weld bead before laying next weld bead:

12. Root preparation before welding other side of groove weld:

13 Preheating and inter pass temperature:

14 Peening

15 Post weld treatment:

16 Rectification of weld defects:

17 Inspection of weld.

18. Any other relevant details

Prepared by

Signature_____

Designation _____

Date _____

(for& on behalf of Fabricator).

Annexure-II B

Nos. of joints in 45.7 m 25t Loading as per RDSO Drawing No. B-17181 Series for which approval of WPSS is required as per proforma given in Annexure II (A)

SN	Component	No. of component	Description	Weld Size
A.	**End Raker (L_0 - U_1)**	1.	Web Plate (16 mm) to Flange Plate (20 mm)	6 mm Fillet
		2.	Top Plate (20 mm) to Web Plate (16 mm)	6 mm Fillet
		3.	Flange Plate (20 mm) to Batten & Lacing Plate (10 mm)	6 mm Fillet
B.	**Top Chord (U_1-U_2& U_2 – U_3)**	4.	Web Plate (12 mm) to Flange Plate (10 mm)	6 mm Fillet
		5.	Top Plate (12 mm) to Web Plate (12 mm)	6 mm Fillet
		6.	Flange Plate (10 mm) to Batten & Lacing Plate (10 mm)	6 mm Fillet
C.	**Top Chord (U_3-U_4)**	7.	Web Plate (16 mm) to Flange Plate (20 mm)	6 mm Fillet
		8.	Top Plate (16 mm) to Web Plate (16 mm)	6 mm Fillet
		9.	Flange Plate (20 mm) to Batten & Lacing Plate (10 mm)	6 mm Fillet
D.	**Bottom Chord (L_0 - L_1 & L_1 -L_2)**	10.	Web Plate (12 mm) to Flange Plate (16 mm)	6 mm Fillet
		11.	Flange Plate (16 mm) to Batten Plate (10 mm)	6 mm Fillet
E.	**Bottom Chord (L_2 – L_3 & L_3 –L_4)**	12.	Web Plate (20 mm) to Flange Plate (25 mm)	6 mm Fillet
		13.	Flange Plate (25 mm) to Batten Plate (10 mm)	6 mm Fillet
F.	**Verticals**	14.	Web Plate (10 mm) to Flange Plate (12 mm)	6 mm Fillet
G.	**Diagonal (U_1 – L_2)**	15.	Web Plate (16 mm) to Flange Plate (12 mm)	6 mm Fillet
		16.	Flange Plate (12 mm) to Batten Plate (10 mm)	6 mm Fillet
H.	**Diagonal (U_3 – L_2 & U_3 – L_4)**	17.	Web Plate (12 mm) to Flange Plate (10 mm)	6 mm Fillet
		18.	Flange Plate (10 mm) to Batten & Lacing Plate (10 mm)	6 mm Fillet
I.	**Cross Girder**	19.	Web Plate (20 mm) to Flange Plate (25 mm)	12 mm Fillet
		20.	Web Plate (20 mm) to End Plate (16 mm)	10 mm Fillet
J.	**Corner Bracket**	21.	Web Plate (10 mm) to Flange Plate (10 mm)	12mm & 5 mm Fillet
K.	**Stringer**	22.	Web Plate (10 mm) to Flange Plate (20 mm)	10 mm Fillet
L.	**Portal Girder**	23.	Web Plate (10 mm) to Flange Plate (10 mm)	6 mm Fillet
M.	**Sway Girder**	24.	Web Plate (10 mm) to Flange Plate (16 mm)	6 mm Fillet
N.	**Top Lateral Bracing**	25.	Web Plate (10 mm) to Flange Plate (10 mm)	6 mm Fillet
O.	**End Diaphragm**	26.	Web Plate (10 mm) to Flange Plate (10 mm)	10 mm Fillet

Annexure-III

Performa for maintaining Register for consumable:

Date	Detail of Item with manufacturer name	Weather item is approved by RDSO (Yes/No)	Manufacturer test certificate detail.	Quantity received	Quantity consumed	Quantity balance	Sign of site supervisor

Annexure-IV

Proforma for Welding Procedure Qualification Record

NAME AND ADDRESS OF FABRICATOR

1. Description of weld joint:
2. Welding procedure specification no.:
3. Name of welder:
4. Date of preparation of test piece:
5. Dimensions of test piece:
6. Base Metal:
7. Welding Process:
8. Welding position:
9. Welding Current: Type:

   Polarity:

10 Weld joint design details:

11 Welding consumables:

11.1 Electrode/wire Class:

Dia:

Brand:

11.2 Flux Class:

Type:

Brand:

11.3 Shielding gas:

12. Welding parameters:

Weld pass No.	Electrode wire dia (mm)	Current (amp)	Arc voltage (volt)	Wire feed speed (m/min.)	Travel speed (m/min.)	Electrical stick out (mm)	Shielding gas flow rate (lit/min.)
1	2	3	4	5	6	7	8

13. Preheating and interpass temperature:

14. Results of Qualification Tests:

Test	Specimen No.	Result.
1	2	3
Non-destructive tests:		
i) Visual examination:		
ii) Dye penetrant test:		
iii) Magnetic particle test:		
iv) Radiographic/Ultrasonic test:		
Destructive tests:		
i) Macro-examination:		
ii) Hardness survey:		
iii) Fillet weld fracture test:		
iv) Transverse tensile test:		
Tensile strength		
Yield Stress		
Location of fracture		
v) All-weld tensile test:		
Tensile strength		
Yield Stress		
Elongation %		
vi) Guided bend test:		
Root bend test		
Face bend test		
Side bend test		
vii) Any other tests:		

Signature _____

Designation _____

Date _____

(for& on behalf of Fabricator).

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(Railway Board)

INDIAN RAILWAY STANDARD SPECIFICATION FOR FABRICATION AND ERECTION OF STEEL GIRDER BRIDGES AND LOCOMOTIVE TURN-TABLES

Fabrication Specification (IRS:B1-2001)

ADOPTED – 1934
REVISED – 2001

ADDENDUM & CORRIGENDUM SLIP NO. 5 Dated 30-08-2013

(i) Existing Para 0.3.3 is to be replaced as under:

Para 0.3.3

RDSO's Specifications:

M&C/PCN/102/2009	Epoxy zinc phosphate primer.
M&C/PCN/103/2011	Epoxy micaceous iron oxide.
M&C/PCN/109/2009	Polyurethane red oxide.
M&C/PCN/110/2006	Polyurethane aluminium.
M&C/PCN/111/2006	High build Epoxy paint.

(ii) Existing Para's 8.1, 8.2, 8.3 and 8.4 are to be replaced as under:

8.1 IS:2062, Quality "A" Grade Designation E250 as rolled semi-killed or killed shall be used for foot-over bridges and other structures subjected to non-critical loading.

8.2 IS:2062, Quality "B0" Grade Designation E250 fully killed and with normalizing/ normalizing rolling/ controlled rolling where service temperature does not fall below 0^0C, shall be used for welded/riveted girders subjected to Railway loading. Plates less than 12mm thick need not be with normalizing/ normalizing rolling/ controlled rolling.

8.3 IS:2062, Quality "C" Grade Designation E250 fully killed and with normalizing/ normalizing rolling/ controlled rolling ensuring impact properties at (-) 20^0 C shall be used for sub-zero temperature areas for welded/riveted girders subjected to Railway loading. Plates less than 12mm thick need not be with normalizing/ normalizing rolling/ controlled rolling.

NOTE: 1. In case Rolled Steel Section confirming to **IS:2062 Quality "B0" or "C"** are not available in market, CAO(C)/CBE may permit use of steel confirming to **IS:2062 Quality "BR"** on case to case basis by satisfying himself about non availability of quality "B0" or "C".

2. In case Rolled Steel Section confirming to **IS:2062 Quality "BR"** is also not available in market, CAO(C)/CBE may permit use of steel confirming to **IS:2062 Quality "A"** on case to case basis, by satisfying himself about non availability of quality "BR".

8.4 High tensile steel shall comply in all respects with the requirement of **IS:2062 Grade Designation E 410 Quality B0 or C** (copper bearing quality) for the welded work.

(iii) Existing Para 39.2.3.(b) is to be replaced as under:

Para 39.2.3(b)

Finishing Coat

Two finishing coats of red oxide paint to IS:13607 with colour/shade to be specified by Zonal Railway or of any other approved paint shall be applied over the primer coats. One coat shall be applied before the fabricated steel work leaves the shop. After the steel work is erected at site the second finishing coat shall be applied after touching up the primer and the finishing coat if damaged in transit.

Note: (i) The colour/shade of finishing coat should be generally maching with the Smoke Grey colour/shade No. ISC 692 mentioned in IS:5-2004.

(ii) The coloure/shade can be changed by CBE as per the local reqirements.

BY ORDER

(A.K.Dadarya)
Executive Director(B&S)

LUCKNOW

Dated: 30-08-2013

Annexure-VI

टेलीफोन/Tele:DOT-2450398(O) 2455012(Res.)
Rly.-42120(O) 43120(Res.)
फैक्स/Fax:91-0522-2450398
E-mail: edbsrdso@gmail.com

सत्यमेव जयते

भारत सरकार–रेल मंत्रालय
अनुसंधान अभिकल्प और मानक संगठन
लखनऊ– 226011
Government of India-Ministry of Railways
Research Design & Standards Organisation
Lucknow- 226011

No. CBS/INSP/WBG

Dated: 10-04-2015

Chief Bridge Engineer:

1. Central Railway, Mumbai CST-400 001.
2. Eastern Railway, Fairlie Place, Kolkata-700 001.
3. East Central Railway, Hazipur-844 101.
4. East-Coast Railway, Bhubaneshwar-751 016.
5. Northern Railway, Baroda House, New Delhi-110 001.
6. North-Central Railway, Allahabad-211 001.
7. North Eastern Railway, Gorakhpur-273 001.
8. North-Western Railway, Jaipur-302 001.
9. Northeast Frontier Railway, Maligaon, Guwahati-781 061.
10. Southern Railway, Park Town, Chennai-600 003.
11. South Central Railway, Rail Nilayam, Secunderabad-500 371.
12. South East Central Railway, Bilaspur-495 004.
13. South Eastern Railway, Garden Reach, Kolkata-700 043.
14. South-West Railway, Hubli-580 023.
15. Western Railway, Mumbai-400 020.
16. West-Central Railway, Jabalpur-482 001.

Sub: Fabrication – Inspection of Steel Bridge Girders.

Ref: 1. This Office letter of even number dated 12-09-2013.
2. Para 27 of IRS :Welded Bridge Code.

****

RDSO has been entrusted to undertake the inspection of Steel Bridge Girders as per Para 27 of IRS: Welded Bridge Code.

In order to ensure proper Quality of the fabrication work of the Steel Bridge Girders, Quality Assurance Plan (QAP) is finalized among the user Zonal Railways, Fabricating Agency and RDSO, accordingly the responsibility to ensure different quality checks from pre-fabrication to post fabrication stages are stage wise indicated clearly.

Some cases have come to notice, where Railways are not diligently following the inspection on their part as per approved QAP during fabrication of Steel Bridge Girders.

In order to ensure the Quality of Steel Bridge Girders while offering the girder to RDSO for final inspection it is desired that an undertaking by Railway Officer should be submitted:-

Undertaking by Railway Officer (minimum JAG Officer):- It is certified that-

(i) Steel used for welded Bridge Girders components is of weldable quality is IS: 2062 Gr.B0 fully killed and fully normalized, which has been inspected & approved by the Railways.

(ii) Fabrication has been done with the help of approved Jigs.

(iii) Entire welding was done by approved welders using approved welding procedures (WPSS) and welding consumables.

(iv) Fabrication work has been inspected by our internal quality control/inspection organization including the welding and riveting. All significant defects have been rectified and final dimensions are within tolerances.

Kindly convey to all concerned officials that Inspection call without above undertakings will not be considered.

10/4/15

(A.K.Dadarya)
Executive Director(B&S)
For Director General

Copy to –

I. Chief Administrative Officer (Constn.):
   1. Central Railway, ChhatrapatiShivaji Terminus, Mumbai –400 001.
   2. Eastern Railway, Fairlie Place, Kolkata-700 001.
   3. East Central Railway, MahendruGhat, Patna-800 004.
   4. East-Coast Railway, Bhubaneshwar-755 001.
   5. Northern Railway, Kashmere Gate, Delhi- 110 006.
   6. North-Central Railway, Allahabad-211 001.
   7. North-Eastern Railway, Gorakhpur- 273 001.
   8. N.F. Railway, Maligaon, Guwahati-781 011.
   9. North-Western Railway, Near Jawahar Circle, Maliviya Nagar Jaipur-302 006.
   10. Southern Railway, 183, EVR Periyar, High Road Egmore, Chennai -600 008.
   11. South Central Railway, Rail Nilayam, Secunderabad-500 371.
   12. South East Central Railway, Bilaspur-495 004.
   13. South-Eastern Railway, Garden Reach Kolkata-700 043.
   14. South-Western Railway, 18, Basaveshwara (Millers) Road, Bangalore-560 046.
   15. Western Railway, Churchgate, Mumbai-400 020.
   16. West-Central Railway, Jabalpur-482 001.

II. Chief Workshop Manager/Dy. Chief Engineer/Executive Engineer(Bridge Engineering Workshops):-
   1. Central Railway, Manmad.
   2. E.C. Railway, Plant Depot., Mughalsarai.
   3. Northern Railway, Jalandhar.
   4. Northern Railway, Charbagh, Lucknow.
   5. N.E.Railway, Gorakhpur Cantt.
   6. N.F. Railway, New Bongaigaon.
   7. Southern Railway, Arakkonam.
   8. South Central Railway, Lalaguda.
   9. South Eastern Railway, Sini.
   10. Western Railway, Sabarmati.

III. Managing Director, Rail Vikas Nigam Ltd., Plot No. 25 1st Floor, B-Blok, August Kranti Bhawan, Bhikaji Cama Place, New Delhi-110066.

IV. Managing Director, Dedicated Freight Corridor Corporation of India Ltd., 5th Floor, Pragati Maidan, Metro Station Building Complex, New Delhi – 110001.

10/4/15

(A.K.Dadarya)
Executive Director(B&S)
For Director General

Annexure-VII

PROFORMA -I

Check List for Fabrication-Inspection of Steel Girders

1. Fabrication Code: IRS Welded Bridge Code
2. Fabrication Specification: IRS:B1-2001
3. Fabrication Guideline: RDSO Report No. BS:110
4. HSFG Bolt Guideline: RDSO Report No. BS:111
5. Approved drawing No. ----------
6. Components of QAP

(i) Raw Materials
(ii) Welding consumables
(iii) HSFG Bolts (Bolts, Nuts, Washers and ferrules)
(iv) Manufacturing process (Refer BS-110)
(v) Nominal/ Camber layout on template floor
(vi) Jigs/fixtures (layout and jigs not required fabrication is to be done by CNC system)
(vii) Welding activities and inspection (WPSS,WPQR and WPDS)
(viii) Welding by approved welders
(ix) Trial Assembly (First Girder)
(x) Detailed component inspection and clearance thereof.

7. Raw material

(i) Steel to IS: 2062 quality BO fully killed and normalized.
(ii) Heat mark on plates and name manufactures
(iii) Mill Test Certificate available or not/Properties satisfactory or otherwise
(iv) Test report from NABL if any
(v) Visual inspection
(vi) Rolling and cutting tolerance as per IS:1852
(vii) Any dispensations from competent authority i.e. CAO(C)/CBE for change of quality of steel or in drawing.

8. HSFG Bolt

(i) Material Specification

(i) (a) Bolt : IS:3757

(b) Nut: IS: 6649 and

(C) Washer: IS: 6623

(ii) Test report (Manufacture)

(iii) Test report, NABL, if any

9. Approval of Template Floor Layout (not applicable if CNC machine is used)

(a) Nominal Layout

(b) Camber Layout

(c) Approval of master plates

(i) Gusset Plates on nominal layout

(ii) Members on camber length

(iii) Distance over intersection points

(iv) Transference of intersection linins

(v) Symmetry and inter changeability

(vi) Pitches/Gauge lines w.r.t intersection points.

(vii) Dia of holes and No. of holes.

PROFORMA -II

Check List for Fabrication-Inspection of Steel Girders

Proforma-I completed or not (further inspection to be done after completing activities mentioned in proforma-II)

1. Use of approved raw material

2. Fabrication with approved of jigs or CNC

3. Welding
   - (i) Scrutiny of WPSSs (Done or Not)
   - (ii) Approval of WPQRs (Yes or No)
   - (iii) Welding Parameters during welding (WPDS) maintained or not
   - (iv) Welding done by Approved welders (Yes or No)
   - (v) Use of approved welding consumable (Yes or No)

     Electrode: IRS: M/28

     Wire & Flux: IRS: M/39

     Co_2wire: IRS: M/46
   - (vi) Internal checks of welding
     - (a) Visual, weld size, throat thickness, weld profile
     - (b) DPT/MPT and Macro Etching
     - (c) Ultrasonic/Radiography Testing

PROFORMA -III

Check List for Fabrication-Inspection of Steel Girders

Proforma-II completed or not (further inspection to be done after completing activities mentioned in proforma-II)

Fabrication Process as per BS: 110 report

1. Finished Product
   - I. Welding inspection (done or due)
     - (a) Visual, weld size, throat thickness, weld profile
     - (b) DPT/MPT and Macro Etching
     - (c) Ultrasonic/Radiography Testing
   - II. Use of approved set of jigs/CNC system
2. Structural and Dimensional Inspection (as per drawing)
   - I. Trial Assembly (1^{st} girder)
     - (a) Parameters to be checked
       - (i) Camber on Jack
       - (ii) Dead Load Camber
       - (iii) Dimension
       - (iv) Fairness of holes
       - (v) Temporary fasteners
       - (vi) Infringement, if any
       - (vii) Butting of compression edges
     - (b) Camber (on jack and residual) to be recorded in case of open web girders Measurements as per drawing of components.
3. Surface Preparation (IS:9954)
4. Metalizing/Painting of girder as per para 39 of IRS;B1 (Sa $2\frac{1}{2}$ to IS:9954)

Annexure-VIII

Inspection of first trial erected span of 45.7m Welded Open Web Girder 25t loading as per RDSO Drg No BA-17181 series.

First span of 45.7m Welded Open Web Girder 25t loading as per RDSO Drg No B-17181series was inspected by RDSO inspection team.The girder was assembled with the help of service bolts and drifts. All bearing points were supported on camber jacks and intermediate points also. The following observations are as under:

SN	Description	Required Dimension (mm)	Observations (mm)	Remarks
1	Overall length	47850		
2	C / C bearing	47240		
3	Truss centre	5400		
4	Height of girder at center	8117.5		
5	C/C of panel point	5905		
6	C/C rail bearer	1900		
7	Alignment of girder	-		
8	Fairing of holes	-		
9	Verticality	-		
10	Infringement If any	-		

Instrument used:

Camber on Jack

SN	Panel Point	Required (mm)	Observed (mm)	
			LHS	RHS
1	L0	0.00		
2	L1	16.5		
3	L2	29.5		
4	L3	40.0		
5	L4	42.0		
6	L5	40.0		
7	L6	29.5		
8	L7	16.5		
9	L8	0.00		

Camber without Jack (Residual Camber)

SN	Panel Point	Required (mm)	Observed (mm)	
			LHS	RHS
1	L0	0.00		
2	L1	13.33		
3	L2	23.82		
4	L3	32.32		
5	L4	33.54		
6	L5	32.32		
7	L6	23.82		
8	L7	13.33		
9	L8	0.00		

Annexure-IX

Name of Product :- End Raker **25t Loading -2008** **Span No.:-**

Shipping Mark :- 1-1x **X 45.7m. Span** **Drg. No. : - RDSO/B-17181 series**

Qty. Required :- 4 Nos. **(WELDED THROUGH TYPE)**

S.N	Description				
	A-SECTION				
1.	Side Plate 542x16x9451				
2.	Bott. Flange Plate 150x20x				
3.	Top Flange Plate 642x20x9026				
4.	Batten Plate 480x10x518				
5.	Lacing Plates 65x10x542				
6.	Diaph. Plate 450x10x572(4 nos)				
	B- DIMENSIONS				
1.	Intersection 9630				
2.	Top Plate Length 9026				
3.	Overall Length 9451				
4.	Box width 610				
5.	Distance between group of holes				
6.	Web 1st Row 7582				
7.	Web 5th Row 7862				
8.	Top flange inner 8361				
	Bracket hole inner site @ U1 1313				
	Relation at L0 42				
	at U1 39				
	C-FIELD HOLES (23.5mm ø)				
1.	Web @ L0 40+40				
2.	Web @ U1 (Inner) 40+40				
3.	Portal connection hole @ U1 (Inner) 06 (21.5)				
4.	Top flange @ L0 14				
5.	Top flange @ U1 36				
	D – GAUGE APPLY				
1.	Web @ L0 Profile				
2.	Web @ U1 Profile				
3.	Top flange @ U1 65				
4.	Top flange @ L0 40				
5.	Slop Gauge 1				

Name of Product :- TOP CHORD U1-U3(END) **25t LOADING -2008**

Shipping Mark :- 2-2x **X 45.7 M. Span** **Span No.**

Qyt. Required :- 4 Nos. **(WELDED THROUGH TYPE** **Drg. No. :- RDSO/B-17181 series**

S.N.	Description				
	A-SECTION-				
1.	Top flange Plate 642x12x11928				
2.	Side Plate 542x12x11928				
3.	Bottom Flange Plate 150x**10**x11928				
4.	End Batten Plate 516x10x605				
5.	Int. Batten Plate 516x10x395				
6.	Lacing Angle 75x50x8x576				
7.	Diaph. Plate 450x10x580 (2 Nos.)				
	B- DIMENSIONS				
1.	Intersection 5909+5909 = 11818.				
2.	Overall Length = 11928				
3.	Box Width = 610				
	Distance between group of holes.				
4.	Top flange Plate U1-U2 4913.5/5113.5				
5.	Top Flange Plate U2-U3 5009.5/5409.5				
6.	Web U1-U2 4993.5				
7.	Web U2-U3 5139.5/5781.5				
	Relation Top Flange Plate @ U1 22				
	@ U3 14				
	Bottom Flange Plate @ U3 14				
	C- FIELD HOLES (23.5 ø)				
1.	Top flange Plate @ U1 U2 U3				
	42 46 23				
2.	Web @ U1 U2 U3				
	46+46 30+30 40+40				
3.	Bottom flange Plate @ U3 4+4.				
	D- GAUGE APPLY-				
1.	Top flange Plate @ U1 56				
	@ U3 50				
2.	Web @ U1 Profile.				
	@ U3 64.				
3.	Bottom Flange @ U3 50				

Name of Product :- TOP CHORDS (MIDDLE) (U3-U5) 25t Loading -2008

Shipping Mark :- 3. **X 45.7m. Span** **Span No.:-**

Qty. Required :- 2 Nos. **(WELDED THROUGH TYPE)** **Drg. No. :- RDSO/B-17181 series**

S.N.	Description				
	A-SECTION				
1.	Top Flange Plate 642x16x11818				
2.	Side Plate 542x16x11818				
3.	Bott Flange Plate 150x20x11818				
4.	End Batten Plate 516x10x605				
5.	Int. Batten Plate 516x10x395				
6.	Lacing Angle 75x50x8x576				
7.	Diaph. Plate 450x10x572(2 Nos.)				
	B-DIMENSIONS.				
1.	Intersection 5909+5909 = 11818.				
2.	Top Plate length = 11818.				
3.	Overall Length = 11818.				
4.	Box width = 610.				
	Distance Between group of holes.				
5.	Top Flange plate U3-U4/ U4-U5 5009/5409				
6.	Web U3-U4/U4-U5 5139				
7.	Relation Top & Bott. Flanges @ U3. 14 @ U5. 14				
	C-FIELD HOLES (23.5 mm ø)				
1.	Top flange @ U3 U4 U5 23 46 23				
2.	Web @ U1 U2 U3 40+40 30+30 40+40				
3.	Bottom Flange @ U3 4+4 @ U5 4+4				
	D- GAUGE APPLY				
1.	Top Flange @ U3&U5 50.				
2.	Web @ U3&U5 64.				
3.	Bottom Flange @ U3&U5 50.				

Name of Product : BOTTOM CHORD (END) **25t Loading -2008**

Shipping Mark :- 4-4x **X 45.7m. Span** **Span No.:-**

Qty. Required :- 4 Nos. **(WELDED THROUGH TYPE** **Drg. No. :- RDSO/B-17181 series**

Sr. no.	Description				
	A- SECTION				
1.	Side Plate 542x12x12115				
2.	Top & Bottom Flange Plate 150x16x12115				
3.	End Batten 516x10x605				
4.	Int. Batten 516x10x395				
5.	Diaph. Plate 450x10x580(4nos)				
	B- DIMENSIONS				
1.	Intersection 5905+5905 = 11810				
2.	Overall Length = 12115				
3.	Box Width = 610				
	Distance Between Group of Holes.				
4.	Web L0-L1 = 4895.				
5.	Web L1-L2 = 4775.				
6.	Top flange L0-L2 = 11065				
		Inner	Outer		
7.	Bottom Flange L0-L1	4900	5330		
8	Bottom Flange L1-L2	4945	5425		
	Relation – Top Flange @ L0		80.		
	@ L2		25.		
	Bottom Flange @ L0		5.		
	@ L1/L2		20.		
	C- FIELAD HOLES (23.5 mm ø)				
1.	Web @ L0	L1	L2		
	41+41	26+26	38+38		
2.	Top Flange @ L0	L1	L2		
	3+3		11+11		
3.	Bottom Flange @ L0	L1	L2		
.	5+2	12+6	6+3		
	D- GAUGE APPLY.				
	Web @ L0 45. L2 80				
	Top Flange @ L0 125.				
	Top Flange @ L2 55.				
	Bottom Flange @ L0 50.				
	Bottom Flange @ L2 60				

Name of Product :- BOTTOM CHORD (Int.) L2-L4 25t Loading -2008

Shipping Mark :- 5 – 5X X 45.7m. Span Span No.:-

Qty. Required :- 4 Nos. (WELDED THROUGH TYPE) Drg. No. :- RDSO/B-17181 series .

S. N.	Description				
	A- SECTION				
1.	Side Plate 542x20x11810				
2.	Top & Bott. Flange Plate 150x25x11810				
3.	End Batten 516x10x605				
4.	Int. Batten 516x10x395				
5.	Diaph. Plate 450x10x564 =4				
	B- DIMENSIONS				
1.	Intersection 5905+5905 = 11810.				
2.	Overall Length = 11810.				
3.	Box Width = 610.				
	Distance Between Group of Holes.				
4.	Web L2-L3 = 4775.				
5.	Web L3-L4 = 4885.				
6.	Top Flange L2-L4 = 10275.				
7.	Bottom Flange L2-L3/ L3-L4 4945/5425				
8.	Relation Top Flange @ L2 & L4 = 25. Bottom Flange @ L2& L4 = 20.				
	C- FIELD HOLES (23. 5 ø)				
1.	Web @ L2 = 38+38				
2.	Web @ L3 = 26+26.				
3.	Web @ L4 = 33+33.				
4.	Top Flange @ L2 = 11+11				
5.	Top flange @ L4 = 10+10				
6.	Bottom Flange @ L2 = 6+3.				
7.	Bottom flange @ L3 = 12+6.				
8.	Bottom Flange @ L4 = 6+3.				
	D- GAUGE APPLY				
1.	Web @ L2 = 80.				
2.	Web @ L4 = 80.				
3.	Top Flange @ L2 = 55.				
4.	Top Flange @ L4 = 55.				
5.	Bottom flange @ L2 = 60.				
6.	Bottom Flange @ L4= 60.				

Name of Product;- VERTICAL U1-L1 **25t Loading -2008**
Shipping Mark :- 6-6X **X 45.7m. Span** **Span No.:-**
Qty. Required :- 4 Nos. **(WELDED THROUGH TYPE** **Drg. No. :- RDSO/B-17181 series**

Sr. No.	Description				
	A- SECTION				
1.	Web Plate 586x10x6690				
2.	Flange Plate 200x12x6690				
	B-DIMENSIONS				
1.	Intersection = 7601.				
2.	Overall Length = 6690.				
3.	Box Width = 610.				
	Distance Between Group of Holes.				
4.	Flange (Inner Side.) = 5734.				
5.	Flange (Outer side) = 5969.				
	C- FIELD HOLES (23.5 mm ø)				
1.	Flange @ U1 12+12.				
2.	Flange @ L1 16+12.				
	D- GAUGE APPLY				
1.	Fla. @ U1 = 75 (Profile)				
2.	Flange @ L1 = 46				
3.	Common Gauge = 110.				
4.	Sway connection common gauge =80.				

Name of Product;- VERTICAL U2-L2 **25t Loading -2008**

Shipping Mark :- 7 **X 45.7m. Span** **Span No.:-**

Qty. Required :- 6 Nos. **(WELDED THROUGH TYPE)** **Drg. No. :- RDSO/B-17181 series**

S. N.	Description						
	A- SECTION						
1.	Web Plate 586x10x6964.5						
2.	Flange Plate 200x12x6964.5						
	B-DIMENSIONS						
1.	Intersection = 7602.5						
2.	Overall Length = 6964.5						
3.	Box Width = 610.						
4.	Distance Between Group of Holes.						
5.	Flange (Inner Side.) = 6038.5						
6.	Flange (Outer side) = 6273.5						
7.	Sway Bracket Hole (Inner Fl. @U2)=954.						
	C- FIELD HOLES (23.5 mm ø)						
1.	Flange @ U2 12+12.						
2.	Sway Connection inner side 4+4 (21.5)						
3.	Flange @ L2 16+12.						
	D- GAUGE APPLY						
1.	Flange @ U2 = 45.						
2.	Flange @ L2 = 46						
3.	Common Gauge = 110.						
4.	Common Gauge @ Sway = 80.						

Name of Product;- VERTICAL U3-L3 25t Loading -2008

Shipping Mark :- 8 X 45.7m. Span Span No.:-

Qty. Required :- 4 Nos. (WELDED THROUGH TYPE) Drg. No. :- RDSO/B-17181 series

S.N.	Description				
	A- SECTION				
1.	Web Plate 586x10x6963				
2.	Flange Plate 200x12x6963				
	B-DIMENSIONS				
1.	Intersection 7601				
2.	Overall Length 6963				
3.	Box Width 610.				
	Distance Between Group of Holes.				
4.	Flange (Inner Side.) 6037				
5.	Flange (Outer side) 6272				
6.	Outer to Outer Hole 6872				
7.	Sway Bracket Hole				
	(Inner Flange @U3) = 954.				
	C- FIELD HOLES (23.5 mm ø)				
1.	Flange @ U3 12+12.				
2.	Sway connection inner side 4 (21.5)				
3.	Flange @ L3 16+12.				
	D- GAUGE APPLY				
1.	Flange @ U3 = 45.				
2.	Flange @ L3 = 46				
3.	Common Gauge @ U3&L3 = 110.				
4.	Common Gauge @ Sway Bracket = 80.				

Name of Product;- DIAGONAL U1-L2 25t Loading -2008

Shipping Mark :- 9 X 45.7m. Span Span No.:-

Qty. Required :- 4 Nos. (WELDED THROUGH TYPE Drg. No. :- RDSO/B-17181 series

Sr. No.	Description				
	A- SECTION END DIAPHRAM				
1.	Box 400x16x8962.5				
2.	Inner Plate 100x12x8962.5				
3.	End Batten 480x8x538				
4.	Int. Batten 240x8x538				
	B-DIMENSIONS				
1.	Intersection 9623.5.				
2.	Overall Length 8962.5.				
3.	Box Width 610.				
	Distance Between Group of Holes.				
4.	1st Row in Web. 7784				
5.	4th Row in Web. 7632				
	C- FIELD HOLES (23.5 ø)				
1.	Web @ U1 28+28.				
2.	Web @ L2 31+31.				
	D- GAUGE APPLY.				
1.	Web @ L2 Profile.				
2.	Web @ U1 Profile.				

Name of Product;- DIAGONAL L2-U3 **25t Loading -2008**

Shipping Mark :- 10 **X 45.7m. Span** **Span No.:-**

Qty. Required :- 4 Nos. **(WELDED THROUGH TYPE)** **Drg. No. :- RDSO/B-17181 series .**

Sr. No.	Description				
	A- SECTION				
1.	Web Plate 400x12x8997				
2.	Flange Plate 100x10x8997				
3.	End Batten 380x8x538				
4.	Lacing Flats 65x8x571				
	B-DIMENSIONS				
1.	Intersection = 9630.				
2.	Overall Length = 8997.				
3.	Box Width = 610.				
	Distance Between Group of Holes.				
4.	1st Row in Web. 7943				
5.	4th Row in Web. 8173				
	C- FIELD HOLES (23.5 ø)				
1.	Web @ L2 23 + 23				
2.	Web @ U3 20 + 20				
	D- GAUGE APPLY.				
1.	Web @ L2 Profile.				
2.	Web @ U3 Profile.				

Name of Product;- DIAGONAL U3-L4 **25t Loading -2008**

Shipping Mark :- 10A **X 45.7m. Span** **Span No.:-**

Qty. Required :- 4 Nos. **(WELDED THROUGH TYPE)** **Drg. No. :- RDSO/B-17181 series .**

Sr. No.	Description				
	A- SECTION				
1.	Web Plate 400x12x8993				
2.	Flange Plate 100x10x8993				
3.	End Batten 380x8x538				
4.	Lacing Flats 65x8x571				
	B-DIMENSIONS				
1.	Intersection 9626.				
2	Overall Length 8993.				
3.	Box Width 610.				
	Distance Between Group of Holes.				
4.	1st Row in Web. 8171				
5.	4th Row in Web. 8170				
	C- FIELD HOLES (23.5 ø)				
1.	Web @ U3 20+20.				
2.	Web @ L4 17+17.				
	D- GAUGE APPLY.				
1.	Web @ U3 Profile.				
2.	Web @ L4 Profile.				

Name of Product;- CROSS GIRDER **25t Loading -2008**

Shipping Mark :- G1, G2 & G3 **X 45.7m. Span** **Span No.:-**

Qty. Required :- = 2, 4, & 3 NOS. **(WELDED THROUGH TYPE)** **Drg. No. :- RDSO/B-17181 series**

Sr. No.	Description									
	A- SECTION									
1.	Web Plate 925x20x4726									
2.	T. & Bott. Flange 450x25x4726									
3.	Stiff. Angle 75x75x10x925									
4.	Stiff. Plate 310x16x790									
5.	End Plate 400x16x975									
6.	**Pad plate(for G1 only) 305x12x455**									
	B- DIMENSIONS									
1.	Intersection = 5400.									
2.	Overall Length over end Plate = 4758.									
3.	Height = 975.									
	Distance Between Group of Holes.									
4.	Top Flange = 4460/4640.									
5.	Bottom Flange = 4466/4626.									
	C- FIELD HOLES (23.5 mm ø)									
	G1 G2 G3									
1.	End Plate 31 28 32									
2.	Stiff. Plate 22/22 22+22 22+22									
3.	Top Flange 4+4 4+4 4+4									
4.	Bottom Flange 8+8 8+8									
	D- GAUGE APPLY.									
1.	Top Flange 59 (Common 160)									
2.	Bottom Flange 66 (Common 120/320)									
3.	Stiff. Plate @ Top 150 Odd Gauge.									
4.	End plate @ Top 70 (Common 110)									
5.	End @ Bottom 91 (Common 160/320)									
1. 2.	**Pad plate(for G1 only) 305x12x455 nos holes at top for 22mm dia turned bolts where End Bracket is provided.**									

Name of Product;- STRINGER **25t Loading -2008**

Shipping Mark :- S **X 45.7m. Span** **Span No.:-**

Qty. Required :- 16 NOS **(WELDED THROUGH TYPE)** **Drg. No. :- RDSO/B-17181 series .**

Sr. No.	Description								
	A- SECTION								
1.	Web Plate 750x10x**5853**								
2.	Top & Bottom Flange **450**x20x**5853**								
3.	Stiff. Angle 100x100x**10**x750								
4.	End Stiff. Angle 150x150x**12**x750								
	B- DIMENSIONS								
1.	Intersection = 5905.								
2.	Overall Length over Cleats = **5853**								
3.	Height over Flange = 790.								
	Distance Between Group of Holes.								
4.	Bottom flange 1st Row 1836/2181/1836=5853								
	4th Row 2087/1679/2087=5853								
5.	Spacing of stiff. Angle 1891.5/2070/1891.5								
	Bent cleat holes at left side when stand								
	C- FIELD HOLES (23.5 mm ø)								
1.	Web with End cleat 11+11.								
2.	Other Side of End Cleat (11+11) + (11+11)								
3.	Int. stiff. Angle 10+10								
4.	Diaph. Connection Holes 5+5.								
5.	Bent cleat hole @ left 3.								
	Bottom flange 4+4.								
	D- GAUGE APPLY								
1.	End Cleat Top & Bottom 95 (Common 120)								
2.	Int. Stiff. Angle Diaph. Connection Odd Gauge 60/225.								
	Notch from Top 175/185								

Name of Product;- PORTAL BRACING GIRDER **25t Loading -2008**

Shipping Mark: - PB **X 45.7m. Span** **Span No.:-**

Qty. Required: - 2 NOS **(WELDED THROUGH TYPE)** **Drg. No. :- RDSO/B-17181 series .**

Sr. No.	Description				
	A- SECTION.				
1.	Web Plate 522x10x4758				
2.	Top & Bottom Flange Plate 200x10x4758				
3.	Stiff. Angle 75x75x10x522				
4.	End Cleat 200x125x12x492				
	B-DIMENSIONS.				
1.	Inter section = 5400				
2.	Overall length. = 4758				
3.	Box width = 542				
	Distance between group of holes				
4.	Top Flange = 4578				
5.	Bottom Flange=639/2@95=190/3100/2@95=190/639				
6.	Drain holes – 879/650/1700/650/879 – Out Side.				
	C- FIELD HOLES (23.5 mm ø)				
1.	Web 7+7 (23.5 mm Ø)				
2.	End Cleat Flange (11+11) + (11+11)				
3.	Top Flange 2+2 (21.5mm Ø)				
4.	Bottom flange 6+6.(21.5mm Ø)				
5.	Drain Holes 4 (20.0 mm Ø)				
	D- GAUGE APPLY				
1.	Top Flange 90 (Common 120)				
2.	Bottom Flange (Common 90)				
3.	End Cleat T&B 41 (Common 160)				

Name of Product;- SWAY BRACING **25t Loading -2008**

Shipping Mark :- SB **X 45.7m. Span** **Span No.:-**

Qty. Required :- 5 NOS **(WELDED THROUGH TYPE)** **Drg. No. :- RDSO/B-17181 series**

Sr. No.	Description					
	A- SECTION					
1.	T/B Flange plate 160x16x4742 Web plate					
2.	530x10x4742					
3.	End Cleat 100x100x10x530					
4.	Stiff. Angle 75x75x10x530					
5.						
6.						
	B- DIMENSIONS					
1	Intersection = 5400.					
2.	Overall Length (over cleats) = 4742.					
3.	Height = 562.					
	Distance Between Group of Holes.					
4.	Web @ End Cleat = 4638					
5.	Top Flange = 4518.					
6.	Bottom Flange 649/105/3250/105/649 = 4758					
	C- FIELD HOLES					
1.	Top Flange 4+4 (21.5 mm dia)					
2.	End Cleat @ Flange 5+5 (23.5 mm dia)					
3.	Bottom flange 4+4 (21.5 mm dia)					
4.	End Batten 20+20 (17.5 mm dia)					
	D- GAUGE APPLY					
1.	Top Flange 52 (Common 80)					
2.	End Cleat Top 86 Bottom 66					
3.	Bottom Flange. Common 80					

Name of Product;- TOP LATERAL BRACING (long) 25t Loading -2008

Shipping Mark :- LT 1 X 45.7m. Span Span No.:-

Qty. Required :- 6 NOS (WELDED THROUGH TYPE) Drg. No. :- RDSO/B-17181 series

Sr. No.	Description						
	A- SECTION						
1.	Flange 200x10x7030						
2.	Web 100x10x7030						
	B- DIMENSIONS						
1.	Intersection = 8005.						
2.	Overall Length = 7030.						
	Distance Between Group Of Holes.						
3.	Flange 1st Row 3250.5 /3349.5 2nd Row 3349.5 /3250.5						
4.	Offset Cut – 109 (Both Side in Stagger)						
	C- FIELD HOLES (23.5 mm ø)						
1.	Flange 4+4+4 = 12.						
	D- GAUEG APPLY						
1.	ED 40 (Common 120)						

Name of Product; - TOP LATERAL BRACING (short) 25t Loading -2008

Shipping Mark: - LT 2 X 45.7m. Span Span No.:-

Qty. Required: - 12 NOS (WELDED THROUGH TYPE) Drg. No. :- RDSO/B-17181 series

S. N.	Description												
	A- SECTION												
1.	Flange 200x10x3399.5												
2.	Web 100x10x3399.5												
	B- DIMENSIONS												
1.	Intersection = 4002.5												
2.	Overall Length = 3399.5												
	Distance Between Group Of Holes.												
3.	Flange 1st Row 3199.5												
	2nd Row 3090.5												
4.	Offset cut at one end = 109.												
	C- FIELD HOLES (23.5 mm ø)												
1.	Flange 4+4												
	D- GAUEG APPLY												
1.	ED 40 (Common 120)												

Name of Product;- BOTTOM LATERAL BRACING

(long) END PANNEL **25t Loading -2008**

Shipping Mark :- LB 1 (changed) **X 45.7m. Span** **Span No.:-**

Qty. Required :- 2 NOS **(WELDED THROUGH TYPE)** **Drg. No. :- RDSO/B-17181 series**

Sr. No.	Description				
	A- SECTION				
1.	Star Angle 100x100x**10**x6960/7020				
2.	Batten 145x10x210				
	B- DIMENSIONS				
1.	Intersection = 8002.				
2.	Overall Length = 7140.				
3.	Offset at both side = 180/120.				
	Distance Between Group of Holes				
4.	Connection Holes 1st Row 3057.5/2997.5				
	2nd Row 2937.5/3057.5				
5.	Relation Bent Plate Holes from Centre				
	Gusset Holes Both side =				
	C- FIELD HOLES (23.5 mm dia.)				
1.	Connection Holes 1st Row 7 + 4 +6				
	2nd Row 6 + 4 + 7				
2.	Stringer Connected Bent Plate (5+5) + (5+5)				
	D- GAUGE APPLY				
1.	ED 40 (Common 130)				
2.	Profile @ both extended angle pit line				

Name of Product; - BOTTOM LATERAL BRACING

(Short) END PANNEL 25t Loading -2008 Shipping Mark: -

LB 2 X 45.7m. Span Span No.:-

Qty. Required: - 4 NOS (WELDED THROUGH TYPE) Drg. No. :- RDSO/B-17181 series

Sr. No.	Description				
	A- SECTION				
1.	Star Angle 100x100x10x3270				
2.	Star Angle 100x100x10x3450				
3.	Batten 145x10x210				
	B- DIMENSIONS				
	Intersection = 4001.				
1.	Overall Length = 3450.				
2.	Offset at one side = 180.				
	Distance Between Group of Holes				
3.	Connection Holes 1st Row 2439				
	2nd Row 2559				
4.	Relation Bent Plate Holes from Centre				
	Gusset Holes = 798.				
	C- FIELD HOLES (23.5 mm ø)				
1.	Connection Holes 1st Row 7 + 5				
	2nd Row 5 + 7				
2.	Stringer Connected Bent Plate Holes 5 + 5				
	E- GAUGE APPLY				
1.	ED 40 (Common 130)				
2.	Profile @ One extended angle pit line.				

Name of Product;- BOTTOM LATERAL BRACING

LONG (L1-L2) 25t Loading -2008

Shipping Mark: - LB 4 X 45.7m. Span Span No.:-

Qty. Required: - 2 NOS (WELDED THROUGH TYPE) Drg. No. :- RDSO/B-17181 series

Sr. No.	Description				
	A- SECTION				
1.	Star Angle 100x100x**10**x6976				
2.	Batten 145x10x210				
	B- DIMENSIONS				
1.	Intersection 8002				
2.	Overall Length 7156				
3.	Offset at both side 180				
	Distance Between Group of Holes				
4.	Connection Holes 1st Row 3185.5/3005.5 2nd Row 3065.5/3125.5				
5.	Relation Bent Plate Holes from Centre Gusset Holes Both Side.				
	C- FIELD HOLES (23.5 mm ø)				
1.	Connection Holes 1st Row - 5+4+5 2nd Row - 5+4+5				
2.	Stri. Connected Bent Pl.Holes. (5+5)+(5+5)				
	E- GAUGE APPLY				
1.	ED 40 (Common 130)				
2.	Profile One site @ 4+4 holes extended angle pit line & short angle toe line.				

Name of Product;- BOTTOM LATERAL BRACING

SHORT (L1-L2) PANEL. 25t Loading -2008

Shipping Mark :- LB 5 **X 45.7m. Span** **Span No.:-**

Qty. Required :- 2 NOS **(WELDED THROUGH TYPE)** **Drg. No. :- RDSO/B-17181 series .**

S. N.	Description				
	A- SECTION				
1.	Star Angle 100x100x**10**x3338				
2.	Star Angle 100x100x**10**x3458				
3.	Batten Plate. 145x10x210				
	B- DIMENSIONS				
1.	Intersection 4001				
2.	Overall Length 3458				
3.	Offset at one side 120				
	Distance Between Group of Holes				
4.	Connection Holes 1st Row – 2778 2nd Row - 2898				
5.	Relation Bent Plate Holes from Centre Gusset Holes.				
	C- FIELD HOLES (23.5 mm ø)				
1.	Connection Holes 1st Row 5+5 2nd Row 5+5				
2.	Stringer Connected Bent Plate Holes. 5+5				
	D- GAUGE APPLY				
1.	ED 40 (Common 130)				
2.	Profile one site @4+4 holes extended angle pit line & short angle toe line.				

Name of Product;- BOTTOM LATERAL BRACING

LONG PANEL L2-L3 & L3-L4 25t Loading -2008 Shipping Mark :-

LB 7 X 45.7m. Span Span No.:-

Qty. Required :- 4 NOS (WELDED THROUGH TYPE Drg. No. :- RDSO/B-17181 series .

Sr. No.	Description				
	A- SECTION				
1.	Star Angle 100x100x**10**x6916				
2.	Batten Plate. 145x10x210				
	B- DIMENSIONS				
1.	Intersection 8002				
2.	Overall Length 7036				
3.	Offset at both side 120				
	Distance Between Group of Holes				
4.	Connection Holes 1st Row – 3125.5/3005.5 2nd Row – 3005.5/3125.5				
5.	Relation Bent Plate Holes from Centre Gusset Holes Both Side**.**				
	C- FIELD HOLES (23.5 mm ø)				
1.	Connection Holes 1st Row – 3+4+3 2nd Row - 3+4+3				
2.	Stringer Connected Bent Plate Holes. (5+5)+(5+5)				
	E- GAUGE APPLY				
1.	ED 40 (Common 130)				

Name of Product;- BOTTOM LATERAL BRACING
(SHORT) PANEL L1-L2, L2-L3&L3-L4 25t Loading -2008
Shipping Mark: - LB 8 X 45.7m. Span Span No.:-
Qty. Required: - 10 NOS (WELDED THROUGH TYPE Drg. No. :- RDSO/B-17181 series

S. N.	Description										
	A- SECTION										
1.	Star Angle 100x100x**10**x3278										
2.	Star Angle 100x100x**10**x3398										
3.	Batten Plate. 145x10x210										
	B- DIMENSIONS										
1.	Intersection 4001										
2.	Overall Length 3398										
3.	Offset at one side 120										
	Distance Between Group of Holes										
4.	Connection Holes 1st Row – 2838 2nd Row - 2718										
5.	Relation Bent Plate Holes from Centre Gusset Holes.										
	C- FIELD HOLES (23.5 mm ø)										
1.	Connection Holes 1st Row 5+5 2nd Row 5+5										
2.	Stringer Connected Bent Plate Holes 5 + 5										
	E- GAUGE APPLY										
1.	ED 40 (Common 130)										

1. **END BRACKET (EB-EBx) – 4 nos.**
2. **CORNER BRACKET (43) - 14 nos.**
3. **END DIAPHRAM (35) - 4 nos.**