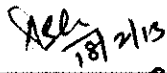
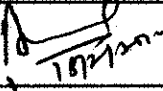
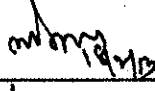
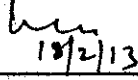



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Name	Designation	Signature	Date	Level
Aman Bhardwaj	SSE/Bogie Design	 18/2/13	18.02.2013	Prepared
Joginder Singh	SME/BD	 18/2/13	18.02.2013	Reviewed
Lalit Kishore	Dy CME/D-3	 18/2/13	18.02.2013	Agreed
Parmanand Singh	CDE	 18/2/13	18.02.2013	Approved

Rev. No.	Details of Changes	Date
01	Typological errors rectified Bogie frame replaced with bogie bolster in clause - 16, 17 and 22.	18.02.2013

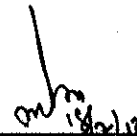
अभिकल्प पुस्तकालय
DESIGN LIBRARY
रेल डिजाइन कारखाना, कपूरथला-144601
Rail Coach Factory, Kapurthala-144601


18/2/13

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18/2/13

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18/2/13

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1. **General:** This specification covers the technical requirements to be complied by the tenderer for manufacture, testing and supply of bogie bolster for FIAT bogie used in mainline coaching stock.
2. **Scope of supply:** The fabricated and machined bogie bolster is to be supplied conforming in all respects to the relevant drawings & specification of tender and this technical schedule.
3. **Eligibility Criteria:**
 - i. The manufacturer shall be an ISO-9001-2000 certified company.
 - ii. The manufacturer shall have prior experience in heavy fabrications and shall furnish the complete details of fabrications done in the past for appraisal at tendering stage.
 - iii. The tenderer shall submit para-wise comments on this specification in his offer. He shall bring out the deviations, if any from the specification & drawing with adequate justification. Failure to do so may result in offer being regarded as technically unsuitable.
 - iv. Firm shall provide list of M&P, past performance, source of steel plate, and sources of steel castings/ forging in his offer.
 - v. The manufacturer shall have adequate manufacturing facilities mentioned in para # 4, a well-equipped laboratory with equipments mentioned in para # 5, also ready for testing of desired tests by inspecting agency from a reputed NABL certified laboratory at his own expenses and technically trained skilled staff mentioned in para # 6 of this specification.
4. **Availability of infrastructure facility at manufacturer's premises in working order:**
 - i. Minimum 3-axis CNC Machining center with probing facility (for reference and inspection), minimum bed size 1.5Mx3.5M suitable for machining of bogie bolster in single setting. Machine should have 3-axis movement in X, Y, Z-axis of milling head for drilling and facing.
 - ii. Pug welding for welding major straight welds of bolster.
 - iii. High definition Plasma or Laser profile cutting machine with capacity up to thickness of 14mm.
 - iv. At least one roll bending machine for spring dome.
 - v. Universal Milling and Beveling Machining facility for edge preparation.
 - vi. Press brake of suitable capacity.
 - vii. Hydraulic press / straightening machine for plates and components.
 - viii. Minimum two MAG welding sets (400A or more) & suitable shielding media.
 - ix. Degreasing/De-rusting facilities.
 - x. Shot blasting plant or equivalent facility for surface preparation in house.
 - xi. Painting facility in house.
 - xii. Level surface table of size 3500 mmX1500mm.
5. **Availability of testing equipments at manufacturers premises in working order:**
 - i. Apparatus to check chemical composition of steel.
 - ii. Universal testing machine of 40T.
 - iii. Impact testing machine
 - iv. Hardness testing machine.
 - v. DPT facility
 - vi. Welding gauges
 - vii. Vernier caliper size 0.5 M with dial gauge accuracy 0.01mm.
 - viii. Bore gauge for different holes in bolster
 - ix. Height gauge
 - x. Digital surface roughness tester.
 - xi. Dry film thickness tester.
 - xii. Thread gauges

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(Facilities mentioned at (i), (ii) & (iii) above, may not be in firm premises, but manufacturer should be ready for carrying out testing from NABL certified laboratory at their own expense as and when required)

6. Requirement of technical trained skilled staff:

- i. Firm should have certified welders for precision & heavy fabrication from Govt. approved /accredited labs.
- ii. **Welder qualifications:** Qualified welders as per EN-287-1 shall be employed for fabrication work as per FIAT's welding procedure specification 22.026 part document 100 03. The welding shall reveal high standard of workmanship. However, if welders employed are qualified to any other international approved standard, prior approval of RCF is to be taken.

7. Raw material:

- i. The chemical composition and mechanical properties of steel plates to be used shall conform to applicable drawings.
- ii. The steel plates to correct chemical composition shall be procured from SAIL or other reputed manufacturers along with their test certificates. These test certificates shall be co-related with the stamping on the plates to be taken up for manufacture prior to commencement of work.
- iii. Wherever test certificates are not available, sample shall be drawn and tested both for chemical composition and physical properties in the presence of Inspecting representative of purchaser.
- iv. All records of physical, chemical and mechanical properties tests shall be made available to Inspecting Agency. All plates to be taken up for manufacture shall be visually checked for surface defects such as cracks, dents, pitting, bend, rust, scales etc. and they shall be free from all these defects. Straightening of the plates shall be done with the help of either straightening machine or Hydraulic press. Hammering shall not be done to straighten the plates.
- v. The firm shall produce ultrasonic test result for steel plates as per ASTM A578 with 100% frequency.

8. Procurement of Major Bought outs:

- i. If required, forging, casting or sub components may be procured / bought out only from approved sources of RDSO/ RCF, Kapurthala.

9. Cleaning, Cutting, Edge preparation and welding:

- ii. Plates shall be inspected for dimensional accuracy. Any distortion that occurs during cutting shall be straightened before tack welding.
- iii. All the plates shall be degreased and de-rusted before commencing manufacturing operations.
- iv. All nicks/cuts on the plates during cutting shall be finish ground before using them for sub-assembly/assembly.
- v. The surfaces and edges to be welded shall be ground smooth and uniform and shall be free from cracks, undercuts, slags, gauges etc. that would adversely affect the quality and the strength of the weld.
- vi. The weld joint dimensions/edge preparation shall be as per the relevant drawing/IS specification.

10. Fixtures and Manipulators: The manufacturer shall prepare at least following fixtures for fabrication & machining and manipulator for down hand welding of bogie bolster at different stages before taking-up the manufacturing (There may be requirements of additional fixtures and manipulators, also):

- i. Bolster top, bottom and web tack welding.
- ii. Bolster full welding fixture having rotating facility for down hand welding.
- iii. Bolster machining fixture.

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11. Welding procedure:

- i. **Shielding gas:** MAG welding process using shielding media gas mixture as per EN 439 M21 (82%Ar +18 % CO₂) OR EN 439 M211 (50 % Ar + 25% He + 25 % CO₂) .
- ii. **Filler metal:** Filler material should be used as per spec. EN440-G3Si1.
- iii. As far as possible, all the weld joints shall be welded in down hand position, manipulators to be used if necessary.
- iv. Weaving bead Technique and Inter-pass cleaning technique shall be adopted by grinding and using wire brushes.
- v. Pug welding to be used wherever possible. Manual MAG welding may be done for the areas which are not accessible.

12. Quality of Weld Joints:

- i. **Visual (By using magnifying glass if required)**
 - a. Weld joints shall have uniform beadings and smooth change over from weld deposited to the parent metal and thorough fusion between adjacent layers of weld metal and between weld metal and parent metal.
 - b. They shall be free from cracks, craters, undercuts, overlaps, porosities, inclusions, blow-holes etc.
 - c. Members distorted by welding shall be straightened by carefully supervised application of heat. The temperature of heating areas shall not exceed 650 degree centigrade. Mechanical method may also be used with application of heat.
- ii. **Dye Penetrant Test :**
All the fillet weld joints shall be subjected to Dye Penetrant Test and all the butt weld joints (100%) shall be subjected to Dye Penetrant Test for detection of weld flaws. The procedure and acceptance standard shall be as per specification no. IS: 5334/3658 respectively.

13. Acceptance Standard

- i. All linear discontinuities are un-acceptable and shall be removed and repaired by chipping or grinding and subsequent welding.
- ii. When defects appear, they shall be rectified and the area shall be re-examined by the same method to verify that they have been rectified completely.
- iii. All test reports of Dye Penetrant Test will be submitted for review to the Inspecting Agency.

14. Shot Blasting: The entire bogie bolster shall be subjected to shot blasting for cleaning of rust, scales, spatters etc. before painting of the bogie bolster.

15. Painting: Immediately after shot blasting, the bogie bolster shall be coated with epoxy primer & painted with High Build Epoxy paint as per RCF specification no. MDTS-166.

16. Machining of Bolster:

- i. Machining of bogie bolster shall be done on 3-axis CNC machining centre as indicated in para 4 (i).
- ii. Bogie bolster should be suitably fixed on Machining center using proper fixture in such a way that machining shall be done in single setting to achieve the dimension tolerances and the surface roughness as per drawing of tender. Tolerance for un-toleranced dimensions should be followed as per IS:2102 (medium).
- iii. Single setting means that a particular reference is taken by probe and machining is completed according to that reference taken and the program fed without any change in bogie bolster position.

Prepared by *[Signature]*

Reviewed by *[Signature]*

Agreed by *[Signature]*

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17. **Stage inspection:** The stage inspection shall be carried out by manufacturer as indicated below and records should be made available to the inspecting agency:

- i. Stage inspection of major sub-assemblies consisting of:
 - a. Bogie bolster Assembly before machining.
 - b. Inspection of bogie bolster complete after machining.
- ii. The Purchaser/Inspecting Agency shall have access at all reasonable times to the works where bogie bolster is manufactured and material is stored and shall have the right to inspect die, jig and fixtures and measuring instruments being used by the manufacturer. All the facilities, labour, appliances, gauges, measuring instruments etc. necessary for testing and inspection shall be provided by the manufacturer free of cost.
- iii. Dimension Control Charts, Chemical and mechanical properties test certificates, Magnetic Particles Test Certificates, DPT and stage inspection reports etc. shall be supplied along with the Bogie bolster - to the purchaser.

18. **Dimensions and Tolerances:**

- i. All dimension/tolerances shall be as per details given in the drawings.
- ii. Detailed dimension control charts/sheets shall be prepared for each bogie bolster in which measurements of critical dimensions shall be recorded and kept for evaluation and verification by the inspecting agency.
- iii. All the un-toleranced dimensions shall be in accordance with IS: 2102 (Medium).
- iv. Gauges, fixtures and templates and accurate measuring instruments shall be used to ensure the correctness of the dimensions.


19. **Quality Assurance Plan:** A Quality Assurance Plan which outlines the various stages and processes including inspection in order to obtain a Quality product shall be submitted to RCF, Kapurthala or Purchaser for approval. QAP shall be prepared on the lines as indicated in MDF00014. This shall be done and got approved by CDE/RCF, Kapurthala before undertaking manufacture of pilot sample.

20. **Pilot sample approval:** Manufacturer should get two samples approved from CDE/RCF, Kapurthala before start of series manufacture and bulk supply.

21. **Code of Practice for Quality Control and Inspection:**

- i. The manufacturers shall furnish to the purchasing/inspecting authorities information in respect of quality control systems in force at their works on various materials used in the manufacture of components.
- ii. The manufacturers shall furnish to the Purchasing/Inspecting authorities the details of tests and inspection records and other relevant records as required under the quality control systems in force.
- iii. These records and reports shall be maintained by the Competent Technical Authority of the manufacturer and shall be open to examination by the Purchasing/Inspecting Authorities at all reasonable time.
- iv. Purchasing/Inspecting Authorities at their discretion may draw samples of products at any stage of production for conformity tests either at the works of the manufacturer 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. If any of the re-test samples do not conform to the requirements, the entire lot/batch shall be rejected.


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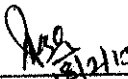
22. **Identification Marking:** Each bogie bolster shall be stamped with an easily visible identification indicating the bogie bolster serial number, year of manufacture and manufacturer's name to facilitate identification/correlation with the inspection/test results.


23. **Packing:**


- i. All machined surfaces shall be applied with suitable rust preventive, which shall prevent it from corrosion & oxidation for a minimum period of one year of storage.
- ii. The packing shall be such that all the machined surfaces shall be properly protected against rubbing/impact/scratches with other bogies or with mode of transportation i.e. wagon/truck/trailers etc.

24. **Warranty:** The manufacturer shall warrant the bogie bolster for a period of 3 years from the date of supply, for material, manufacture and workmanship as regards trouble-free and satisfactory service performance. If any defects are noticed during service with regards to manufacture/welding quality of the bogie bolster, action shall be taken by the supplier to carry out any repairs/rectification or replacement at his cost. The decision of the purchaser in this regard shall be final.

.....X.....


18/2/13
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