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**SCHEDULE OF TECHNICAL REQUIREMENTS FOR MANUFACTURING AND SUPPLY OF  
"BOGIE FRAME ASSEMBLY WITHOUT BRAKE GEAR"  
FOR THREE PHASE (WAG-9/WAP-7/WAP-5) ELECTRIC LOCOMOTIVES**

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**SCHEDULE OF TECHNICAL REQUIREMENTS FOR MANUFACTURE AND SUPPLY OF FOLLOWING FOR THREE PHASE ELECTRIC LOCOMOTIVES: -**

**1.0 NAME OF THE ITEM:**

BOGIE FRAME ASSEMBLY WITHOUT BRAKE GEAR OF WAG-9/WAP-7/WAP-5 LOCOS.

**2.0 APPLICATION:**

Used in Three Phase (WAG-9/WAP-7/WAP-5) Electric Locomotives in Indian Railways. The items are to be manufactured as per relevant drawings and specifications.

**3.0 SCOPE:**

The Schedule of Technical Requirements (STR) is issued to serve as a guide to manufactures (called the "firm" hereafter) and should be read in conjunction with the relevant drawings and specifications with latest Revisions / Alterations. The technical requirements are meant to serve as guidelines only and are not exhaustive. The firm should satisfy themselves having complied with the requirements of drawings and STR. List of relevant Drawings/ Specifications is listed as per Annexure -I.

Wherever lacking, existing CLW approved sources must also upgrade their facilities to fulfill the requirements of this STR within a period of one year from date of issue of this STR.

**4.0 GENERAL REQUIREMENTS:**

- 4.1 The firm should have currently valid **ISO-9001 certification issued from NABCB approved body** with the activity desired clearly mentioned in the scope of certification.
- 4.2 A system of regular submission of rejection details of material giving rejection rate, cause of rejection, corrective action taken etc. on quarterly basis should be followed by firm.

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- 4.3 The firm must have system of documentation in respect of rejection at customer end, warranty replacement and failure of item supplied by them during service.
- 4.4 The firm shall have all latest relevant Standards like IS, DIN, BS etc. pertaining to product specification.
- 4.5 The firm shall have system of recording the plant, machinery and control equipments remaining out of service, nature of repairs done etc.
- 4.6 The testing & measuring equipments shall be duly calibrated and the validity of calibration should be current and verified by physically checking the calibration certificate issued by Calibration Agency from whom it was calibrated. Calibration shall be done by NABL accredited labs whose accreditation is valid on the date of calibration.
- 4.7 Firm should have adequately trained personnel and service after sales network.
- 4.8 Whenever there is any change with respect to approved QAP, the same shall be promptly submitted to CLW for approval.

#### 5.0 QUALITY ASSURANCE PLAN (QAP):

The firm shall prepare a quality assurance plan (QAP) before approval is sought and submit the same as part of compliance of this STR. The QAP shall be a comprehensive document covering the following aspects.

- Details of quality control organization of the firm along with key personnel engaged in the QC function.
- Qualification log sheet of the personnel manning the quality control set up.
- Process flow chart indicating process of manufacture of an individual product or for a family of products for which the process is same.
- Details of sub-vendors:
  - The name of item for which sub-vendor is approved.
  - The name of approval agency.
  - Quality manual submitted by sub-vendor to primary vendor.
  - The sub-vendor to have all the requisite infrastructure of manufacturing and testing facilities, preferably under one roof. The sub-

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vendor to broadly meet with all the technical requirements laid down in this STR.

- The primary vendor is following periodical inspection schedule for sub-vendor strictly.
  - ISO certification details of sub-vendor also.
  - The sub-vendor is also liable for assessment by CLW.
- v) Inspection and testing plan of
- a) Incoming material as per format in Annexure-IV , Clause – 2.
  - b) Process (stage inspection) as per format in Annexure-IV, Clause – 3.
  - c) Product (final inspection) as per format in Annexure-IV, Clause -5.
- vi) All the formats used for recording inspection results.
- vii) System of traceability, traceability diagram linking traceability from raw material stage to internal check and finally lot offered for inspection.
- viii) All internal checks to be carried out during manufacturing shall be summarized and furnished. List of documents to be maintained for these internal checks; that need to be signed by Inspecting Official before issue of inspection certificate shall also be furnished.
- ix) **QAP format**  
QAP must be submitted in the form of single document indicating name of the firm and page no. 'X' of 'Y' on each page. Each page should be signed by quality control in-charge. The approved QAP must be a controlled document and a quality record of ISO 9001: 2000 quality control system of the firm. A certificate to this effect shall be provided alongwith the QAP by the firm. The QAP shall be submitted in duplicate.  
Detail of the above aspect are described in the following paragraphs. The QAP shall be approved by CLW and shall form basis of approval process.

## 5.1 QUALITY CONTROL ORGANIZATION

- 5.1.1 The complete organizational set up of the quality control key personnel and official along with their qualification and experience should be furnished.
- 5.1.2 The quality control organization should be headed by a senior level official having degree in engineering who shall directly report to plant in-charge.

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## 5.2 **INCOMING MATERIAL**

- 5.2.1 A complete bill of material indicating all input material items required for manufacturing of the products, governing specification and their sources of supplies as approved by the firm should be furnished.
- 5.2.2 Raw material shall be procured from CLW/RDSO approve sources wherever applicable or from reputed suppliers if no CLW/RDSO source is specified. Documentary proof of purchase and test certificate of each component shall be maintained and produced.
- 5.2.3 Record of each sub-supplier clearly showing the quantity purchased and rejected as well as cases of late delivery, if any shall be kept.
- 5.2.4 Incoming raw material shall be 100% inspected by Quality Control Department of the firm for any defect and deviation. The test results of incoming raw material with references to test certificate issued by the supplier and the results of internal tests carried out by the firm for verification may be submitted as part of QAP.

## 5.3 **PROCESS OF MANUFACTURING:**

- 5.3.1 Complete process flow chart covering all steps of process of manufacture for an individual product (or for a family of product if the process is same), including the process flow of outsourced activities along with its integration with main process, shall be clearly enlisted as part of QAP.
- 5.3.2 The following details of machine used for all the steps of machining operations should be included.
- Make, model and commissioning date of the machine.
  - Accuracy.
  - Details of machining operations.
- 5.3.3 Machining process should be such that all critical dimensions are final. Vague language like available or will install is not acceptable.
- 5.3.4 Details of jigs and fixtures used during manufacture should be furnished along with the manufacturing process wherever used.

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5.3.5 List of typical Machinery & Plant, testing and measuring instruments required for manufacture is mentioned in Annexure – II. The list is for general guidance only and manufacturing operation shall be submitted and got approved by the firm as a part of QAP.

#### 5.4 **INSPECTION AND TESTING PLAN:**

5.4.1 Testing setup should be available in the firm's own premises capable of testing the equipments as specified in the relevant technical specification.

5.4.2 Complete Inspection and Testing Chart covering all steps of process of manufacture for an individual product including final inspection should be clearly enlisted as part of QAP.

5.4.3 The following details of Testing/measuring instruments/equipments/tools/jigs/fixtures used for all the steps of measurement and testing operations should be included:

- Make and Model of the equipment
- Name of the manufacturer
- Accuracy
- Capacity or Range
- Date of Calibration
- Due date of calibration
- Agency of Calibration

Vague language like available or will install is not acceptable.

5.4.4 The accuracy and capacity of the testing and measuring equipments shall be adequate to meet the requirements of the specification and drawing.

5.4.5 Stage inspection detailing inspection procedure, inspection parameters and method of testing / test procedure including sample sizes for destructive and non-destructive testing. Record of test results of stage inspection should be available and furnished.

5.4.6 List of typical Testing and measuring instruments required for manufacture is mentioned in Annexure – III. The list is for general guidance only. However, the

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specific Testing & measuring instruments, gauges used by the firm will also form part of QAP and shall be submitted.

#### 5.5 **FORMAT TO BE SUBMITTED WITH QAP**

Format to be submitted with QAP is enclosed as Annexure-IV. Firms shall fill these formats keeping in view para 5.0.

#### 5.6 **STORAGE FACILITY**

- Adequate dust free, clean and non-humid environment for storage of raw material and finished product separately.
- Adequate dust free, clean and non-humid environment for product assembly area.
- Adequate stacking / handling tables and racks in above storage area.

#### **ANNEXURE - I**

##### **LIST OF DRAWINGS, SPECIFICATIONS AND STANDARDS**

Drawing No.
1209-01.112-001 Alt. 1 (or latest) ----- For WAG-9
1209-01.212-183 Alt. 1 ( or latest) -----For WAP-7
IA011-00159 Rev.8 (or latest) -----For WAP-5

##### **Specification for material:**

IS:2062:2011, Gr.-C, IS:2062, Gr.-B, IS:2062, Gr.-A/Gr.-B, IS:5517, DIN2448 St. 52, DIN7603, IS:2062:2011, IS:8500, Fe 540 Gr.-B, IRSM-41, IS:1079, IS:2500

Specification for DPT: IS:3658 (or latest)

Specification for UST: ASTM A435/IS:4225 (or latest)

Specification for painting: RDSO Spec. No. M-6C/PCN/100/2009 (or latest)

Specification for Welding Rod (Wire): AWS A5.18, ER 70S4, IRSM-46 (or latest)

- All Specification of Raw Materials and Testing should be as per latest version.

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## ANNEXURE - II

**LIST OF MACHINERY AND PLANT**

Sl. No.	Name of Machinery & Plant	Capacity/ Rating	Purpose	Essential/ Optional**
1.	Oxy cutting/profile cutting machine	Upto 60mm thickness of plate	For profile cutting of plates	Essential
2.	Rolling machine	Bed width -1 m Thickness up to 22mm Bed length = 3m min.	For straightening of plates	Essential
3.	CNC Milling M/c	Standard	Machining of small components	Essential
4.	Plano Milling Machine	Bed size: Min. Length: 6.5m, Width: 3 m Height: 1m	For machining of Bogie. Min. 6m length is acceptable with suitable attachment	Essential
5.	Drilling machine	Arm length-1m	For drilling holes in different location in bogie	Essential
6.	Bending Machine/hydraulic press	300 ton capacity 22 mm thick	For plate bending	Essential
7.	MIG Welding Machine	0-400 Amps	For fabrication of bogie components and its assly.	Essential
8.	EOT crane	10 ton min.	For shifting of bogies	Essential
9.	Grinding Machine	5" to 9"	For finishing purpose	Essential
10.	Welding Manipulator	Standard size suitable for bogie	To weld at Up-side down position and vertical position.	Essential

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11.	Heat treatment furnace /chamber	Length-7m, Width-2.5m, Height-1 m	For stress relieving of Bogie Frame	Essential
12.	Sand Blasting	Suitable for entire bogie length	For removing of scaling after heat treatment	Essential
13.	Surface table	Size: 7m x 4m	For measurement of dimensions at leveled condition	Essential
14.	Painting Booth	Standard size with compressor at least 20 kgf pressure	For primer painting of bogies	Essential
15.	Working space	Min. 50m x 10m	For fabrication of bogies	Essential

\*\* Optional activity of machinery and plant facility may be outsourced. However, sub-vendor is also to be assessed.

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## Annexure-III

List of Measuring & Testing Equipments

Sl. No.	Name of Measuring & Testing Equipments	Capacity / Rating	Essential/ Optional *
1.	Dial Gauge Digital	As per drawing	Essential
2.	Vernier caliper	Different sizes	Essential
3.	Height Gauge	Standard	Essential
4.	Digital Weight Machine	3500 kg	Essential
5.	Steel Tape	3 m	Essential
6.	Tri Square	Standard	Essential
7.	Angle Protector Digital	Standard	Essential
8.	Spirit Level	Standard	Essential
9.	Hardness Testing Machine	Standard	Essential
10.	Surface Roughness Testing Machine	Standard	Essential
11.	Dye Penetration test set up	Standard	Essential
12.	Physical Laboratory	Standard	Essential
13.	Chemical Laboratory	Standard	* Optional
14.	Ultrasonic Test/Radiographic Test set up	standard	* Optional
15.	<b>Co-ordinate measuring Machine</b>	<b>Bed size: Min. Length: 6.5m, Width: 3 m Height: 1m</b>	<b>Essential</b>

\* Optional measuring & testing facility may be outsourced but outsourced firm should be Govt. Approved / RDSO Approved Lab.

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## ANNEXURE - IV

**FORMATS TO BE SUBMITTED WITH QAP:****1. Organization specific to the product:**

Description	Name of person with contact no.	Qualification	Experience	
			Field	Year
(a)	(b)	(c)	(d)	(e)
Design in - charge				
Production in - charge				
Quality Inspection in-charge				

**2. Incoming Material Control:**

Subject / Product / Process	Sample size & its frequency of Inspection	Parameter for inspection	Mode of Inspection Equipments used	Acceptance Limit/criteria/specified value as per Drg/Spec.
(a)	(b)	(c)	(d)	(e)

Document Reference	Record Format No.	Action in case of rejection
(f)	(g)	(h)

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### 3. Process Control:

(i) Proposed M&P

Sl. No.	Process/ Activity	Work Instruction Ref.	Machine Details					In-house / Out source
			Lead parameter	Make	Model	Comm. Dt.	Accuracy	
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)

### 4. Stage Inspection /Test Plan:

Subject / Product / Process	Instrument / Jig & Fixture test bench used	Inspection stage	Parameter for inspection	Sample size & its frequency of Inspection	Document Reference
(a)	(b)	(c)	(d)	(e)	(f)

Acceptance Limit/criteria/specified value as per Drg./Spec	Inspection Agency	Record No	Format	Action in case of rejection
(g)	(h)	(i)		(j)

### 5. Product Control:

Subject / Product / Process	Instrument / Jig & Fixture test bench	Parameter for inspection	Sample size & its frequency	Document Reference	Acceptance Limit/criteria/specified value as
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	used		of Inspection		per Drg./Spec.
(a)	(b)	(c)	(d)	(e)	(f)

Inspection Agency	Record No.	Format	Action in case of rejection
(g)	(h)		(i)

#### 6. Calibration Plan:

Instrument Description	Serial No.	Make	Model	Year of procurement	Capacity / Range	Accuracy	Periodicity of Calibration
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)

Calibration Agency	Record Format No.
(i)	(j)

#### 7. Approved Sources for Raw Materials / Consumables

Raw Material / Consumable	Specification / Standard	Source with Address	Whether Source is controlled by CLW / RDSO / Others
(a)	(b)	(c)	(d)

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