

# **SPECIFICATION FOR FABRICATED ITEMS FOR ELECTRIC LOCOMOTIVES.**

**SPECIFICATION No. CLW/MS/3/154 ALT.3**  
**ISSUE DATE: 27.06.2011.**

**ISSUED BY:**

**DY. CHIEF ELECTRICAL ENGINEER/D-III  
CHITTARANJAN LOCOMOTIVE WORKS  
P.O. CHITTARANJAN – 713331**

**DIST. BARDHAMAN (WEST), WEST BENGAL (INDIA)**

PREPARED BY	CHECKED BY	APPROVED BY
SSE/DRG&DGN (M)	SSE/DRG	DY. CEE/D/CONV

**ALTERATION RECORD SHEET**

ALT. No.	DATE	DESCRIPTION	REASON	SIGNATURE
1	06.01.2015	Para 9(ii) added	To protect both internal and external threads of all fabricated items. (This cat. amendment to be done as per note no- eldd/ 3610/m. s.fab, dt-15.12.14 duly approved by CEE/Loco dt-26.12.14	S/d- 12.01.2015
2	12.10.2022	Tolerance in waviness of Side Wall Panels is mentioned $\pm 3\text{mm}$ in para 5.3	To restrict waviness of M/C room Side Wall Panel	S/d- 14.10.2022
3	22.08.2025	Latest WPS as per ISO 15609-1:2019 are added at Annexure-A.	CME/Loco's L/No. Mech/loco/072/(QMS) dated 12.05.2025	

Specification have been digitized and all alterations have been incorporated

PREPARED BY	CHECKED BY	APPROVED BY
SSE/DRG&DGN (M)	SSE/DRG	DY. CEE/D/CONV

**TABLE OF CONTENTS**

SL. No.	Description of contents	Page No.
1	Scope	4
2	General	4
3	Climatic And Environmental Conditions	4
4	Technical Requirement	4-5
5	Manufacture	5
6	Inspection	6
7	Supply of Documents	6
8	Labeling	6
9	Packaging & Delivery	6
10	Annexure-A	7

PREPARED BY	CHECKED BY	APPROVED BY
SSE/DRG&DGN (M)	SSE/DRG	DY. CEE/D/CONV

**SPECIFICATION FOR FABRICATED ITEMS FOR ELECTRIC LOCOMOTIVES.****1. SCOPE:**

This Specification covers the requirement of design, quality assurance plan, manufacturing, testing, inspection and supply of fabricated items for Passenger / Freight Electric Locomotives for Indian Railway.

**2. GENERAL:**

Average life of electric locomotive is 35 years. So, precaution in manufacturing process of its shell and fabricated items should be taken to keep its strength & integrity intact throughout its life. Fabricated items are various sub-assemblies of loco. Hence, fabrication of these items with standard raw materials, to correct specification and quality is of paramount importance.

**3. CLIMATIC AND ENVIRONMENTAL CONDITIONS:**

- (i) Maximum Atmospheric temperatures: 80°C
- (ii) Humidity: 60% to 100% saturation during rainy season.
- (iii) Rainfall: Very heavy in certain areas.
- (iv) Coastal area: Extremely dusty, humid and salt laden atmosphere.
- (v) Vibration: As per IEC-77.

**4. TECHNICAL REQUIREMNT:****4.1. Raw material control:**

- 4.1.1. In raw material purchase document, manufacturer's name, the specification and grade of the material should be clearly mentioned. If for any material, CLW or RDSO approved source exists, the same shall be adhered to.
- 4.1.2. The manufacturer should maintain a ledger containing details of quantity purchased, quantity consumed and quantity in stock against each type of raw material used in a particular item. This ledger should be produced to the inspector of CLW during routine inspection of the item.
- 4.1.3. Hardware items are to be procured from approved sources of CLW/RDSO.
- 4.1.4. Plates of thickness above 12 mm should be subjected to ultrasonic test for detecting sub-surface flaws wherever specified or suggested by CLW.

**4.2. Jig, Fixture, Templates:**

- 4.2.1. Jig, Fixture, templates are to be used to maintain the geometry of the fabricated assembly and to ensure correct fitment and interchangeability.
- 4.2.2. If the item is manufactured in CLW also, then design of jig & fixture should be same or close to CLW's design/practice.
- 4.2.3. Jig, Fixture, templates should be calibrated maintaining all the records as per ISO norms. Templates for checking mounting holes should be brought to CLW for verification purpose.

PREPARED BY	CHECKED BY	APPROVED BY
SSE/DRG&DGN (M)	SSE/DRG	DY. CEE/D/CONV

### 4.3. Welding:

4.3.1. Welding consumables are to be procured from approved sources of RDSO.

4.3.2. ~~Process and Welders shall be qualified from NABL approved lab for each type/size of welded joints.~~

Welding shall be performed only by qualified welder, certified as per AWS D.1.1/ISO 9606/IS-817/IS-7310 for high standard workmanship. The manufacturer should maintain a ledger for booking of qualified welders against each sub- assembly and assembly of a particular item.

4.3.3. Welding to be done properly according to IS:813 with proper grade of electrode. Proper edge preparation to be done for welded joints wherever necessary as indicated in drawing.

4.3.4. a) For welded joints, internal inspection is to be done in the following three stages:

(i) **Before Welding:** it covers details in edge preparation, root gaps, mechanical properties of electrode, surface condition of wire electrode, Jig, Fixture, Clamps etc.

(ii) **During Welding:** It covers details in pre-heating temperature (if necessary), composition and diameter of wire electrode used and warming up to ensure freedom from moisture, welding process, current setting and polarity, welding speed and weld sequence, number of run, thermal treatment before, during and after welding etc. Full compliance to qualified process is to be ensured.

(iii) **After Welding:** It covers details in size of weld, appearance bead, edges of weld (fusion, no-overlap, no undercut), penetration and fusion (full), slag formation (full coverage and easily removable), free of spatters.

b) **Testing:** Ultra-sonography testing is to be carried out for checking quality of welded joints wherever specified. Other welded joints are to be checked by D. P test/Magnetic particle test to confirm the welding quality.

c) MIG welding shall be essentially adopted in all cases. ~~Argoshield-51 gas shall be used for shielding.~~ Shielding gas to be used as specified in the respective WPS (Annexure-A) to provide effective shielding during welding for better stability of welding joints. Any other shielding medium shall be used only with prior approval of CLW.

d) For rectification of welding defects, removal of weld material shall be done by gauging electrode only. In no case gas cutting should be adopted.

e) All the above points are to be recorded / maintained periodically by quality control department and must be reflected in their QAP.

4.3.5. Finished assembly should be free from cracks, flaws, lamination, rough surface, imperfect edge and other harmful defects.

4.3.6. All sharp edges, burrs and slag to be removed.

4.3.7. Welding Procedure Specifications (WPS) shall be followed during welding operation as mentioned in Annexure-A.

### 5. MANUFACTURING:

5.1. Before proceeding to manufacture discrepancies if any is to be brought to the notice of Dy.CEE/D-III/CLW/CRJ. Only after his clearance, the firm should proceed manufacturing.

5.2. Surface flatness of steel sheets/plates should be within permissible limit. After Oxy-cutting/ Shearing/Punching operation sheets/plates shall be subjected to appropriate rolling machines before fabrication.

PREPARED BY	CHECKED BY	APPROVED BY
SSE/DRG&DGN (M)	SSE/DRG	DY. CEE/D/CONV

- 5.3. In side wall manufacturing, checking of waviness of side wall is essential. Flatness of side wall panel sheet is to be maintained by using proper fixture/clamp to avoid distortion at the time of welding and mis-handling the job. For getting good finish, process of blow torch/spot heating method to be adopted. Waviness of the side wall panels will not be allowed beyond  $\pm 3$  mm.
- 5.4. After fabrication, grease, oil, dust, surface contamination, weld spatter, slag to be removed before painting.
- 5.5. Surface preparation to be done by sand blasting, if not possible at least chemical/mechanical cleaning should be done prior to application of primer.
- 5.6. Wherever mentioned in the drawing, the fabricated item to be coated with primer / paint to RDSO specification No. M&C/PCN/100/2006 **2018 or Latest**. In case of conflict in the specn. and drg., drawing will prevail. Paints used shall be RDSO/CLW approved and of the shade as specified in specification. Other national reputed brands can also be permitted with prior approval of CLW.
- 5.7. For extra large fab items all curvilinear cut- outs is to be made using CNC Profile cutting machine.
- 5.8. The cut-outs in sheet-metal works to be made by nibbling m/c or Jig punching or laser profile cutting. No manual or oxy-cut cut outs are permissible.

## 6. INSPECTION:

- 6.1. Nominated representative of CLW may be deputed to manufacturer's premises for stage inspection at any time.
- 6.2. Any defect noticed during inspection should be rectified / replaced immediately otherwise the material will be rejected.
- 6.3. Different types of test i.e. chemical, physical, welding test etc to be conducted and test certificate by NABL approved laboratory to be submitted during inspection.
- 6.4. Cost of all the tests are to be borne by the manufacturer. Railway reserves the right to carry out testing of samples at their own laboratory or National Accredited Laboratory at Railway cost.
- 6.5. For chemical and physical test of raw material, the sample may be collected from the whole lot of raw material/cut piece of finished product/finished product itself with proper sealing in presence of the nominated representative of CLW. Test of the sample to be done at RDSO/ NABL approved laboratory or laboratory at CLW/Chittaranjan under Dy. CC&M.

## 7. SUPPLY OF DOCUMENTS:

Following documents are to be supplied during prototype inspection of the item.

- (i) Valid ISO Certificate for fabricated items
- (ii) Approved QAP
- (iii) Internal Inspection Report as per QAP
- (iv) Calibration certificate
- (v) Documents regarding source/spec. and grade of raw material and hardware items used.

## 8. LABELING:

Manufacturer shall provide a label on each item containing its name in casting and month & year of manufacture in punching at a location visible from outside.

## 9. PACKAGING AND DELIVERY:

- (i) Suitable arrangement for packaging and transportation the item is to be made by the manufacturer to avoid distortion and damage.
- (ii) Filling of standard grease into taped and external threads and after that provide a suitable threaded cap (PVC made) to all the tapped holes & external threads respectively.

PREPARED BY	CHECKED BY	APPROVED BY
SSE/DRG&DGN (M)	SSE/DRG	DY. CEE/D/CONV

**ANNEXURE-A****FOR WPS**

Sl. No.	WPS No.	Material Specification	Thickness in mm	Joint Type and Weld Type
1.	WPS/CLW/BD/135/BW/PA/01 DT.25/03/2025	E250C as per IS:2062	1.5 to 6	Square Butt Weld
2.	WPS/CLW/BD/135/BW/PA/02 DT.25/03/2025	E250C as per IS:2062	3 to 24	Single 'V' Butt Weld
3.	WPS/CLW/BD/135/BW/PA/03 DT.25/03/2025	E250C as per IS:2062	22.5 to 90	Double 'V' Butt Weld
4.	WPS/CLW/BD/135/BW/PA/04 DT.25/03/2025	IRMS M41 Gr.I (Hot rolled)	1 to 4	Square Butt Weld
5.	WPS/CLW/BD/135/BW/PA/05 DT.25/03/2025	IRMS M41 Gr.I (Hot rolled)	3 to 12	Single 'V' Butt Weld
6.	WPS/CLW/BD/135/BW/PC/06 DT.25/03/2025	E250C as per IS:2062	3 to 24	Single 'V' Butt Weld
7.	WPS/CLW/BD/135/BW/PA/07 DT.25/03/2025	E410C as per IS:2062	3 to 24	Single 'V' Butt Weld
8.	WPS/CLW/BD/135/BW/PA/08 DT.25/03/2025	E410C as per IS:2062	20 to 80	Double 'V' Butt Weld
9.	WPS/CLW/BD/135/FW/PA/09 DT.25/03/2025	E410C as per IS:2062	≥5	T Fillet (Full Penetration)
10.	WPS/CLW/BD/111/FW/PB/10 DT.25/03/2025	E250C as per IS:2062 # AISI 304	3 to 32 # 3 to 40	Tee Fillet Weld
11.	WPS/CLW/BD/135/BW/PC/11 DT.25/03/2025	E250C as per IS:2062	22.5 to 90	Double 'V' Butt Weld
12.	WPS/CLW/BD/135/BW/PC/12 DT.25/03/2025	IRMS M41 Gr.I (Hot rolled)	1 to 4	Square Butt Weld
13.	WPS/CLW/BD/135/BW/PC/13 DT.25/03/2025	IRMS M41 Gr.I (Hot rolled)	3 to 12	Single 'V' Butt Weld
14.	WPS/CLW/BD/135/BW/PC/14 DT.25/03/2025	E410C as per IS:2062	3 to 24	Single 'V' Butt Weld
15.	WPS/CLW/BD/135/BW/PC/15 DT.25/03/2025	E410C as per IS:2062	20 to 80	Double 'V' Butt Weld
16.	WPS/CLW/BD/135/FW/PC/16 DT.25/03/2025	E410C as per IS:2062	≥5	Tee Fillet (Full Penetration)
17.	WPS/CLW/BD/135/BW/PF/33 DT.29/03/2025	E250C as per IS:2062	1.5 to 6	Square Butt Weld
18.	WPS/CLW/BD/135/BW/PF/34 DT.29/03/2025	E250C as per IS:2062	3 to 24	Single 'V' Butt Weld
19.	WPS/CLW/BD/135/BW/PF/35 DT.29/03/2025	E410C as per IS:2062	3 to 24	Single 'V' Butt Weld
20.	WPS/CLW/BD/135/BW/PF/36 DT.29/03/2025	E410C as per IS:2062	20 to 80	Double 'V' Butt Weld
21.	WPS/CLW/BD/135/FW/PB/37 DT.29/03/2025	E410C as per IS:2062	≥5	Tee Fillet (Full Penetration)
22.	WPS/CLW/BD/135/FW/PF/38 DT.29/03/2025	E410C as per IS:2062	≥5	Tee Fillet (Full Penetration)
23.	WPS/CLW/BD/135/BW/PA/39 DT.29/03/2025	AISI/SAE 304 # AISI/SAE 304	1.5 to 6	Square Butt Weld

PREPARED BY	CHECKED BY	APPROVED BY
SSE/DRG&DGN (M)	SSE/DRG	DY. CEE/D/CONV