SCHEDULE OF TECHNICAL REQUIREMENTS FOR MANUFACTURE AND SUPPLY OF CIRCUIT BREAKER WITH/WITHOUT AUXILIARY CONTACTS,CIRCUIT BREAKER BATTERY & SB1 & SB2 FOR THREE PHASE ELECTRIC LOCOMOTIVES AS PER SPECIFICATION No. CLW/ES/3/0037, CLW/ES/3/0096 & CLW/ES/3/0050

ISSUED BY

CHITTARANJAN LOCOMOTIVE WORKS
CHITTARANJAN – 713331
WEST BENGAL

Approved By	Signature
PCEE	

Recommended By	Signature
CEE/DESIGN	

Prepared By	Checked By	Issued By
SSE/Design	SEE/Design	Dy. CEE/D-I

STATUS OF REVISION

Sl. No.	Date of Revision	Page No.	Revision	Reason for Revision
1.	XX.12.2024	ALL	1	STR has been revised incorporating all alterations issued time to time in STR No. CLW/2021/ELDO/E/STR/104

SCHEDULE OF TECHNICAL REQUIREMENTS FOR MANUFACTURE AND SUPPLYOF AC & DC CIRCUIT BREAKER WITH/WITHOUT AUXILIARY CONTACTS AND CIRCUIT BREAKER BATTERYFOR THREE PHASEELECTRIC LOCO :-

1.0 NAME OF EQUIPMENT

AC & DC CIRCUIT BREAKER WITH/WITHOUT AUXILIARY CONTACTS AND CIRCUIT BREAKER BATTERY

2.0 APPLICATION

Used in Three Phase (WAG9H/WAG9/WAP7/WAP5) Electric Locomotives in Indian Railways. The equipments 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 Annexure – I

Wherever lacking, existing CLW/BLW 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 TERMINOLOGY/ABBREVIAYIONS

Abbreviations	Full form/Description
ASE	Automotive Service Excellence
BS	British Standard
CLW	Chittaranjan Locomotive Works
DIN	DeutschesInstitutNormung
BLW	Banaras Locomotive Works
IS	Indian Standard

IEC	International Electro Technical Commission
ISO	International Standard Organization
NABL	National Accreditation Board for Testing and Calibration Laboratories
RDSO	Research Design & standard Organization
VDE	Verband Deutcher Elecktrotechniker
IP	Ingress Protection

5.0 GENERAL REQUIREMENTS

5.1 The firm should have currently valid ISO-9000 certification issued by an approved agency of the International Accreditation Forum (IAF) with the activity desired clearly mentioned in the scope of certification.

5.2 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.

5.3 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.

5.4 The firm shall have all latest relevant Standards like IS, DIN, BS etc. pertaining to product specification.

5.5 The firm shall have system of recording the plant, machinery and control equipments remaining out of service, nature of repairs done etc.

5.6 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.

5.7 Firm should have adequate trained personnel and service after sales network.

5.8 Whenever there is any change with respect to approved QAP, the same shall be promptly submitted to CLW/BLW for approval.

6.0 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 as advised in format available at http://clw.rcil.gov.in/→instruction for vendor approval → QAP format. OR follow the link i.e. https://dlw.indianrailways.gov.in/works/uploads/File for QAP format DLW/ VD/EL/F/04 under QSP.

6.1 Whenever there is any change with respect to approved QAP, the same shall be promptly submitted to CLW/BLW for approval.

7.0 REQUIREMENTS FOR FOUNDRY FACILITIES

Wherever required, it is preferable if the firm has its own RDSO Class 'A' approved captive foundry. In cases where the firms do not have their RDSO Class 'A' approved captive foundry, they should fulfill the following conditions:

- Firm should use castings from RDSO Class 'A' approved foundry
- Firm should furnish undertaking from casting manufacturer showing long term commitment to supply castings to the firm.

Foundry facility is not required for this item.

8.0 REQUIREMENTS OF ELECTRICAL AND ELECTRONICS LAB

Wherever applicable, Firms shall have electrical and electronics labs which should have Dust free, clean and non-humid environment preferably air conditioned. The lab shall have minimum following equipments is addition to equipments mentioned at Annexure – III:

- L, C, R Meter
- Continuity Tester
- Megger- 500 Volt
- Vernier Caliper & Micrometer-min 12 inches
- Oscilloscope min 10 MHz Dual Channel
- Variable Voltage Source AC 440 V/DC 110V

- Variable Current Source both AC-63A& DC-20A
- High Voltage Test kit -5KV
- Digital temperature indicator-300^0 C

9.0 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

- Specification No. 1) CLW/ES/3/0096
  2) CLW/ES/3/0037
  3) CLW/ES/3/0050
- Drawing No. 1) CLW/ES/3/SK-1/0096 TO CLW/ES/3/SK-6/0096
  .
- Standards: IEC 60157-1 P2, IEC 60947-2, IS: 11731 (Part I & II), IEC 61373, IEC 60068

Note: Firm must have all relevant latest Standards.

ANNEXURE – II

LIST OF MACHINERY AND PLANT

Sl. No.	Name of Machinery & Plant	Capacity / Rating	Remarks	Essential/ Optional Facility
1	Milling machine or CNC M/c	Min Bed Length 3 Ft	For all turned parts	**Optional
2	Grinding machine	Min ½ HP	To providing smoothness	Essential
3	Drilling machine	Min 2 mm-10 mm	For drilling purpose	Essential
4	Bench vice	Min. 3 inch Jaw length	To hold the material tightly	Essential
5	Soldering station	Suitable for making the subject item	For fixation cable terminal	Essential
6	Hydraulic or Hydro Pneumatic Press	Min. 5 Ton	For bending, forming purpose	**Optional
7	Power Press	Min 50 Ton	Formation of different metallic structure in the Contactor, punching and Contacts making	**Optional
8	Hand Shearing machine or CNC M/c	Min. shearing capacity of 5mm	For cutting purpose	Essential
9	Jig & Fixture for different operation & measurement	Suitable size	For accurate measurement, fitment and assembly of item	Essential
10	Brazing Equipments	Up to 250 Amps	For brazing of Silver tips into Phosphor Bronze Contact	Essential
11	Clean and Dust Free Assembly Area	Min 100 Sq. Ft	For assly. of Circuit Breaker	Essential
12	Riveting Arrangement	Suitable for making the subject item	For riveting purpose	Essential
13	Coil winding M/c	Minimum 2 ½ inch round	For winding of Coil	**Optional
14	Laser Marking M/c	Min. 20 watt, 230 V, 1 phase 2 Amp	For preparation of rating plate	**Optional
15	Screen Printing M/c	Standard Capacity	For printing of rating , type no. etc. on the body of contactors	**Optional
16	Phosphating Chamber	Suitable size	For Phosphating of Contact Tip	**Optional
17	Injection Molding M/C	Min. Mould capacity of 200 gm	For molding purpose	**Optional

** Optional activity means the facility is actually essential but can be out sourced from CLW/RDSO/BLW approved vendors or ISO certified firm and documentary evidence of same should be produced.

Prepared By	Checked By	Issued By
SSE/Design	SEE/Design	Dy. CEE/D-I

ANNEXURE – III

LIST OF MEASURING AND TESTING EQUIPMENTS

Sl. No.	Name of Measuring & Testing	Capacity / Rating	Remarks	Essential/ Optional facility
1	Digital Multimeter	4 ½ digit	For measurement of milli volt drop, current, voltage, resistance etc.	Essential
2	Endurance test set up with counter	Min 20000	Electrical Endurance	Essential
3	Three phase Current injector	Min. 70 Amps at 440 V AC	For functional checking of AC Circuit Breaker	Essential
4	Single phase Current injector	Min.20 Amps at 250 V DC	For functional checking of DC Circuit Breaker	Essential
5	Three phase Current injector	Min.80 Amps at 250 V DC	For functional checking of Circuit Breaker Battery	Essential
6	Breaking Capacity test set up	30 KA at 440V AC	For AC Circuit Breaker	** Optional
		30 KA at 250 VDC	For DC Circuit Breaker	** Optional
		15 KA at 250VDC	For Circuit Breaker battery	** Optional
7	Vibration and shock test set up	As per IEC 61373		** Optional
8	Flammability test set up	As per IS 11731 Pt. I&II	For flammability test of non-metallic parts in the Contactors	** Optional
9	Damp Heat & Dry Heat test set up	As per IEC 60068		** Optional
10	Environmental Test Chamber	-20^0C to 70^0C and 60% Humidity		** Optional
11	IP Degree of Protection	As per requirement of IEC 60529		** Optional

**Optional activity means the facility is actually essential but may be carried out only from NABL accredited lab or any other Govt. of India authorized laboratory and documentary evidence of same should be produced.

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)	(f)
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)

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)

(ii) Proposed Jig & Fixture

Sl. No.	Process/ Activity	Work Instruction Ref.	Jig & Fixture Drg. Ref	In-house/ outsource
(a)	(b)	(c)	(d)	(e)

Prepared By	Checked By	Issued By
SSE/Design	SEE/Design	Dy. CEE/D-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 Format No.	Action in case of rejection
(g)	(h)	(i)	(j)

5. Product Control

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

Inspection Agency	Record Format No.	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)

Prepared By	Checked By	Issued By
SSE/Design	SEE/Design	Dy. CEE/D-I

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/BLW/Others
(a)	(b)	(c)	(d)

Note:- For Firm's guidance , firm may follow the detailed QAP format as given below:
[http://clw.rcil.gov.in/→ instruction for vendor approval → QAP format].