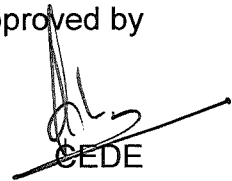


STR No. RCF/EL/0021- Rev-A (2020)

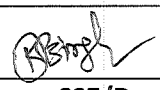
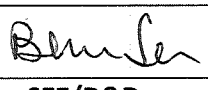
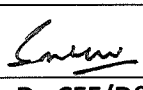
**SCHEDULE OF TECHNICAL REQUIREMENTS
FOR
PUMP EQUIPMENT WITH CONTROLLER**

S. No.	Details of Amendments	Revision	Page No.	Reasons of Amendment
1	STR REVISED	A	-	UPDATED

Approved by



CEDE

RCF/EL/0021 REV.-A (2020)	11.11.2020			
STR no.	Date	SSE/Dev	SEE/D&D	Dy.CEE/D&D

Page 2 of 11	Effective From : 11.11.2020	STR No. RCF/EL/0021- REV.-A (2020)
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SCHEDULE OF TECHNICAL REQUIRMENTS FOR MANUFACTURING OF PUMP EQUIPMENT WITH CONTROLLER

1.0 Forward:

This Schedule of Technical Requirements (STR) specify minimum essential Machinery, Plant and Testing Instruments required for manufacturing of **Pump Equipment With Controller** for LHB type coaches and shall also be read in conjunction with the relevant Standards/ Specifications /Drawings.


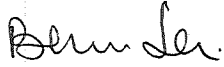

- 1.1 The firm should satisfy himself about having complied with the technical requirements of the Standards/ Specification/Drawings and other Infrastructure, Testing Facilities requirement as per STR before applying for Registration/Assessment as per relevant STR.
- 1.2 The firm should have currently valid **ISO-9001** Certification including the subject item under its range of manufacture.
- 1.3 Firm is advised to regularly visit RCF website and get themselves updated on changes being made from time to time in STR/Specifications/Drawings.
- 1.4 Every Item shall be numbered /marked for identification traceability and analysis. The following details shall be imprinted on the number plate of each unit.
 - a) Serial Number
 - b) Year and month of manufacture, P.O. reference
 - c) Name of the item
 - d) Name of firm

2.0 FACILITIES:

Information shall be furnished for **Pump Equipment with Controller** to relevant Standards/Specification/drawing to no. **EDTS-186 (latest)** as per details required in the following Annexure's:-

2.1 ANNEXURE-I

It contains essential M&P infrastructure required for preparation of **Pump Equipment with controller**. It however does not specify the capacity and quantity of the various items of equipment/components, the quantity/capacity of the M&P being dependent upon the manufacturing requirement. The firm should also have the facility for storing the Raw Material, Finished Product so as to maintain them in a healthy condition.

RCF/EL/0021 REV.-A (2020)	11.11.2020			
STR no.	Date	SSE/Dev	SEE/D&D	Dy.CEE/D&D

2.2 ANNEXURE-II

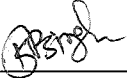
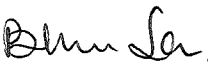

It contains all Testing Facilities required. Record of calibration of all measuring apparatus shall be maintained and made available on demand.

2.3 ANNEXURE-III

It contains Quality Assurance Plan for implementation by the firm. It will also be pre-requisite for a firm to submit QAP for according approval for supply of equipment. The major points, which are essentially required to be covered, shall be included therein.

2.4 ANNEXURE-IV

It contains the requirements to be fulfilled for establishing the credentials or the service network so that reliability of the equipment is ensured.

RCF/EL/0021 REV.-A (2020)	11.11.2020			
STR no.	Date	SSE/Dev	SEE/D&D	Dy.CEE/D&D

2.1 ANNEXURE-I :**DETAILS OF ESSENTIAL INFRASTRUCTURE**

The following facilities/machinery & plant are considered necessary for the manufacture of quality and reliable product.

(A) Foundry :- (OPTIONAL)

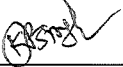
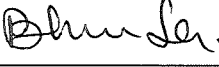

1. Induction Furnace/Cupola Furnace to Cast Motor Body, End Shield, Bracket etc.
2. Silicon, Carbon Analyzer.
3. Mould and Core Hardness Tester.
4. Green Compression Strength Tester.
5. Moisture Tester.
6. Permeability Tester.
7. Sieve Shaker.
8. Sand Rammer.
9. Clay Washer.
10. Chemical Lab./ Spectro Analyzer to Test Cast Iron, Stainless Steel.

(B) Machinery & Plant for Cast items:-

1. CNC Turning Machine. (OPTIONAL)
2. CNC Centre Lathe Machine. (OPTIONAL)
3. Milling Machine.
4. Drill Machine.
5. Grinding Machine.
6. Shot Blast Machine. (OPTIONAL)
7. Capstan Machine.
8. Key-Way Cutting Machine.

(C) Machinery & Plant for Motor:-

1. Coil Winding Machine.
2. Vacuum Pressure Impregnation (VPI) Plant.
3. Fixture of Seasoning of Coils.

RCF/EL/0021 REV.-A (2020)	11.11.2020			
STR no.	Date	SSE/Dev	SEE/D&D	Dy.CEE/D&D


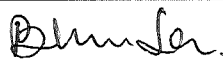

4. Heat Chamber / Oven of adequate Size for Drying of Winding.
5. Dynamic Balancing Machine.
6. Hydraulic Press for Pressing of Stator and Rotor.
7. Cylindrical Grinding Machine.
8. Soldering/ Brazing/Crimping Facilities.
9. Machine for Cutting/ Stacking of Core Laminations.
10. Punching Machine.

(D) Machinery & Plant for Controller:-

1. Aluminium Die Casting for Controller Housing. (OPTIONAL)
2. PCB making & Soldering Facility (PCB should Glass Epoxy with antifungal & anti corrosive treatment). (OPTIONAL)
3. Microprocessor Based Programming Kit.

(E) Essential fabrication facilities:-

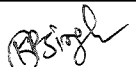
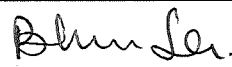

1. Shearing Machine.
2. Bending Machine.
3. Grinding Machine.
4. Drill Machine.
5. Hacksaw / Band Saw.
6. Bench Vice.
7. Working Table.
8. Small Working Tools.
9. Crimping Tools.
10. Electric Welding / Mig Welding Machine.
11. Cable Marking System of approved Make.
12. Powder Coating Facilities. (Optional)
13. Trolleys for Carrying Material In Workshop.
14. Weighing Machine.

RCF/EL/0021 REV.-A (2020)	11.11.2020			
STR no.	Date	SSE/Dev	SEE/D&D	Dy.CEE/D&D

Page 6 of 11	Effective From : 11.11.2020	STR No. RCF/EL/0021- REV.-A (2020)
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Note:-

1. All the above facilities are considered **ESSENTIAL** at the Developmental Stage and shall be got verified by RCF representative before considering the firm as a Developmental Source. However facilities for **"OPTIONAL"** items can be **"OUTSOURCED"** from ISO certified manufacturer only.
2. An undertaking (MoU) along-with Valid ISO certificate, M & P details and QAP of the Sub Vendor with whom MoU made for the availability of **"OPTIONAL"** facilities shall be submitted Duly Signed & Stamped.
3. RCF representative may visit the premises of such **"OUTSOURCED"** Sub vendor for Physical Verification compliance to the STR.

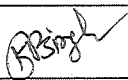
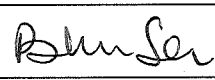
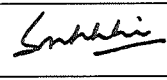
RCF/EL/0021 REV.-A (2020)	11.11.2020			
STR no.	Date	SSE/Dev	SEE/D&D	Dy.CEE/D&D

2.2 ANNEXURE-II :

ESSENTIAL MEASURING INSTRUMENTS FOR TESTING

The following instruments are considered necessary for testing purpose:-

1. PWM Supply having $\pm 15\%$ Ripple content.
2. 415V $\pm 5\%$, 3 phase 50Hz Power Supply.
3. DC Source (0-200 V DC).
4. Volt Meter.
5. Ampere Meter.
6. Wattmeter.
7. HV tester.
8. Frequency Meter.
9. Noise Level (dB) Meter.
10. Vernier Caliper.
11. Micro-Meter.
12. Complete Test Bench for Testing Electrical Parameters.
13. Measuring Tape (3 meter).
14. Weighing Machine.
15. Speedometer (Max. 3000 RPM).
16. Coating Thickness Gauge.
17. Megger (Min. 20M Ω).
18. Digital Thermometer.
19. Energy Meter.
20. Power Factor Meter.
21. Dielectric Tester.
22. Ripple Tester.
23. Moisture Tester.
24. Hydrostatic Tester.
25. Flow Meter.
26. Vacuum and Pressure Gauge.
27. Suction and Discharge Facility.

RCF/EL/0021 REV.-A (2020)	11.11.2020			
STR no.	Date	SSE/Dev	SEE/D&D	Dy.CEE/D&D

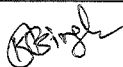
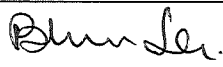

Page 8 of 11	Effective From : 11.11.2020	STR No. RCF/EL/0021- REV.-A (2020)
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28. Dust chamber to test the ability of Motor against dust & dirt as per IS 4691:1985 (Optional).

29. Protection- IP55 to test pump against Spraying Water& water jet as per IS4691:1985 (Optional).

NOTE: 1.). ALL THE ABOVE FACILITIES ARE CONSIDERED **ESSENTIAL** AT THE DEVELOPMENTAL STAGE AND SHALL BE VERIFIED BY RCF REPRESENTATIVE BEFORE CONSIDERING THE FIRM AS A DEVELOPMENTAL SOURCE.

2). THE OPTIONAL TESTING FACILITIES MENTIONED ABOVE CAN BE **"OUTSOURCED"** FROM A GOVT./NABL ACCREDITED LAB FOR TESTING PURPOSE.

RCF/EL/0021 REV.-A (2020)	11.11.2020			
STR no.	Date	SSE/Dev	SEE/D&D	Dy.CEE/D&D

2.3 ANNEXURE-III

QUALITY ASSURANCE PLAN (QAP)

The QAP shall be got approved from RCF and proper record shall be maintained.

1. Organization:-

The firm shall submit the Organizational Chart along with the Qualification and Experience of key persons in management involved in Quality Assurance Programme. Being a manpower intensive job the following technical staff must be employed during developmental stage:

- ITI with min. 02 years experience or non ITI with min. 05 years experience.
- Supervisors staff with min. graduate in Electrical Engg. with 02 years experience or diploma holder in Electrical discipline with min. 05 years experience.

2. Documentation:-

The manufacturer shall maintain all necessary documents and data that will help him to have consistency in producing quality product.

3. Purchase of Raw Material:-

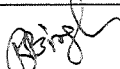
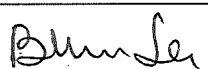
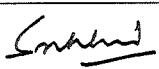
Raw Material/equipment shall be procured only from well proven/approved sources, conforming to the relevant Standards/Specifications/Drawings. The critical components shall be procured from ISO-9001 certified vendors only.

4. Quality Control Process:

Screening of critical components shall be carried out In Process Inspection as a Quality Control Measure.

5. Inspection and Testing:

- (i) **Receiving Material:** The manufacturer shall ensure that incoming material is not used for processing until it has been inspected or otherwise verified as conforming to the Specified requirements. Verification shall be in accordance with Quality Plan or laid down Documented Procedures.

RCF/EL/0021 REV.-A (2020)	11.11.2020			
STR no.	Date	SSE/Dev	SEE/D&D	Dy.CEE/D&D

(ii) **In Process Inspection and Testing:** Inspect, Test and Identify Product as required by the Quality Assurance Plan or Documented Procedures evolved on the basis of RCF Specification (the latest) and other relevant Specification/Standards.

(iii) The supplier shall carryout all final tests and inspection in accordance with the quality plan or documented procedures evolved on the basis of RCF specification and specified standard to complete the evidence of conformance of the Finished Product.

6. Testing /Measuring Instruments:

The instrument and equipment used for testing and inspection shall be of the required accuracy and shall have valid **calibration certificate from Govt./NABL certified lab**. The Calibration Record should be maintained and shall be produced at the time of inspection & shall be included in QAP document/test reports.

7. R&D Organization:

The firm shall indicate the organizational structure of their R&D wing along with qualification of the personnel. Firm should have at least one Engineering Graduate, R&D Engineer with experience of more than 05(five) years in the field of Electrical/Mechanical/Chemical/Polymer Engineering.

8. Laboratory Test House:-

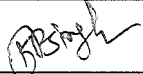
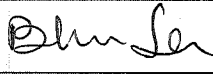
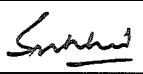
The manufacturer shall have adequate Testing Facilities to carry out various tests on the Raw Material, Stage Inspection and inspection of the Finished Product.

9. Quality Audit:

The manufacturer shall regularly send the sample for testing in recognized National Testing Institutions/NABL Approved Labs for counter checking the characteristics and to ensure quality level of their product.

10. Handling/Storage/Delivery:


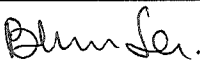

The manufacturer shall have proper and adequate facilities for Handling & Storage of Raw Material and Finished Product. The supplier shall control, packing presentation including compliance of FIFO (First In First Out) and marking process so as to ensure conformity to the Railway requirements.

RCF/EL/0021 REV.-A (2020)	11.11.2020			
STR no.	Date	SSE/Dev	SEE/D&D	Dy.CEE/D&D

2.4: ANNEXURE-IV**REQUIREMENTS FOR ESTABLISHING THE CREDENTIAL**

It contains the requirement to be fulfilled for stabilizing the Credentials so that Reliability of the Product/ Equipment is ensured.

1. The firm should have capability to attend failures at RCF and at Zonal Railways/Field Units of each Region widely spread across the Country with positioning of Qualified, experienced team of Engineers with minimum of 05 years experience in Electrical Engineering should be available so that they can investigate/attend the reported failures within the specified time limits as **"IS ON WHERE BASIS"** in the Zonal Railways/ Depots/ Field Units.

RCF/EL/0021 REV.-A (2020)	11.11.2020			
STR no.	Date	SSE/Dev	SEE/D&D	Dy.CEE/D&D

