

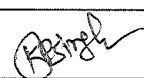
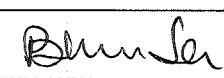
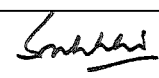
STR No. RCF/EL/0005- REV.-A (2020)

**SCHEDULE OF TECHNICAL REQUIRMENTS FOR
DRY TYPE TRANSFORMER UPTO 5 KVA FOR
LHB TYPE COACHES**

S.No.	Details of Amendment	Revision	Page no.	Reasons for Amendment
1	STR Revised	A	-	UPDATED

Approved by


CEDE

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**Schedule of Technical Requirements for Manufacturing of
Dry type 5 KVA Transformer for LHB Type Coaches**

1.0 Forward:

This Schedule of Technical Requirements (STR) specify minimum essential Machinery, Plant and Testing Instruments required for manufacturing of Dry Type **5KVA Transformer** for LHB type coaches and shall also be read in conjunction with the relevant Standards/ Specifications /Drawings.

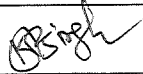
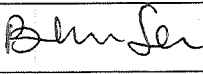
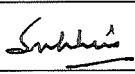
- 1.1 The firm should satisfy himself about having complied with the technical requirements of the Standards/ Specification/Drawings and other Infrastructure, Testing Facilities requirement as per STR before applying for registration/assessment as per relevant STR.
- 1.2 The firm should have currently 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 **Dry Type 5KVA Transformer for LHB Type Coaches** to relevant Standards/Specification/Drawing to no. **EDTS-366 (latest)** as per details required in the following Annexure's:-

2.1 ANNEXURE-I

It contains essential M&P infrastructure required for preparation of **Dry Type 5KVA Transformer for LHB Type Coaches**. 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 and Finished Product so as to maintain them in a healthy condition.

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2.2 ANNEXURE-II

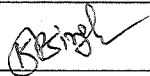
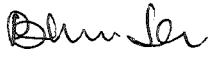

It contains all Testing Facilities required. Record of Calibration of all measuring apparatus shall be maintained and made available on demand.

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.

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2.1 ANNEXURE-I :

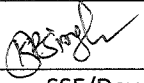
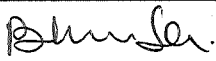
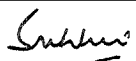
DETAILS OF ESSENTIAL INFRASTRUCTURE

The following facilities/Machinery and Plant are considered necessary for the manufacture of quality and reliable product:

1. CNC Fabrication Facility for Enclosure. **(Optional)**
2. CNC Hydraulic Press. **(Optional)**
3. CNC Lathe Machine (bed size 3mt min). **(Optional)**
4. Machine for Slitting Transformer Sheets to Smaller Width. **(Optional)**
5. Machine for Cutting and Stacking of Transformer Lamination. **(Optional)**
6. Automatic Coil Winding Machine.
7. Conductor Wrapping Machine. **(Optional)**
8. Sheet Bending Machine. **(Optional)**
9. Punching Machine. **(Optional)**
10. Milling Machine.
11. Drilling Machine.
12. Pipe Bending Machine.
13. Tig/Mig Welding Set.
14. Power Saw.
15. Bed Plate.
16. Crimping Tools of adequate capacity.
17. Grinding Machine.
18. Trolleys for Carrying Material with in Workshop.
19. Small working tools.
20. Fixture for Seasoning of Winding Coils.
21. Clamping Fixtures for Winding.
22. Vacuum Pressure Impregnation (VPI) Plant.
23. Dry Heat Chamber/Oven of Adequate Size for Drying of Winding.
24. Soldering/Brazing Facilities.

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) alongwith 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.

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2.2 : ANNEXURE-II :

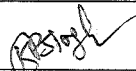


ESSENTIAL MEASURING INSTRUMENTS FOR TESTING :

The following instruments are considered necessary for testing purpose:-

1. H.V. Tester.
2. Power Analyser.
3. Harmonic Analyser.
4. Ratio Meter.
5. Surge Tester.
6. Milli-Voltmeter.
7. Megger (500/1000 Volt DC).
8. Adequate nos. of Analogue/Digital Type Meters.
9. Ammeter, Voltmeter, Watt Meter of Various Ranges.
10. Digital Thermometers.
11. Laser Gun to Measure Temperature.
12. Complete Test Bench for measuring different Parameters.
13. Multi Channel Temperature Scanner (min. 12 Channels).
14. Vernier calliper 0-150 mm.
15. Micrometer, Digital Stop Watch, Thermocouples, Dial Gauge etc.
16. Facility for Temperature Rise Test.
17. Load bank for Testing Transformer Suitable upto 7KW.
18. Noise level (dB) Meter.
19. Test Facility for Water Proofness (IP). **(Optional)**
20. Weighing machine.

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.

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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.

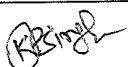
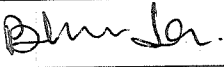
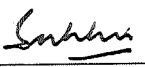
4. Quality Control Process:

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.

(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.

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(iii) The supplier shall carry out 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:-

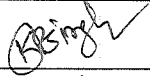
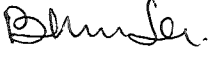

The manufacturer shall have adequate Testing Facilities to carry out various tests on the Raw Material, Stage Inspection and inspection of the Finished Product.

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.

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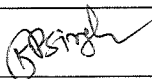
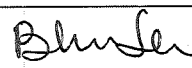
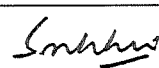
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2.4: ANNEXURE-IV

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.

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