



GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

TI/STR/013

(Revision- III)

Schedule of Technical Requirements
For
Approval of vendors for supply of
Inhibited Mineral Insulating Oil

(Specification IS: 335 Type II and RDSO Requirements
And IEC: 60296 and RDSO Requirements)

ISSUED BY

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1.0 SCOPE

This schedule (STR) covers technical requirements to assess the manufacturing and testing capability of firm for supply of Inhibited Mineral Insulating Oil being used in Traction Power Transformers and Transformers and Power Converters of 3 phase drive electric Locomotives in Indian Railways.

2.0 GENERAL INFRASTRUCTURE AND MANUFACTURING FACILITIES

2.1 The firm should have adequate covered accommodation for the purpose of effective storage of inward raw material, and the finished product awaiting dispatch and prototype/routine inspection and testing. The Firm should have system to ensure that products conform to requirements of Railway. The firm should have an effective quality control system to monitor quality control of the

- Inward raw material
- Stage inspection at various stages.
- Inspection of the finally prepared inhibited mineral insulating oil to ensure the compliance of requirements as laid down in the relevant specification.
- Rejection record of non-compliance of oil to the specified requirements.

2.2 The firm should have a clean and pollution free environment, should be taking adequate safety precautions during the production. The company must have items like fire extinguishers, safety warning board, shock treatment charts and medical first aid kit in their premises.

2.3 The relations with the workers should be harmonious and regular employee training programs should be scheduled by the management should organize regular training programs for up-gradation of the knowledge and skills of the employees.

~~The suppliers who have gained experience of at least 05 years regarding supply of inhibited mineral insulating oil for power transformer of similar ratings as used in traction installations of Indian Railways with documentary evidence of satisfactory performance from user shall be eligible for procurement of STR (Schedule of Technical Requirements) and application form TIF-0001.—~~

2.4 A unique and distinct Name of Product/Brand name is required to be embossed along with the place of manufacture on each and every Barrel to facilitate identification of product for monitoring its performance in service.

2.5 Plants, Machinery and Process Control

The firm shall have the suitable plants/machines/ equipment's of adequate capacity/ rating including the following:

- i. Automatic/Manual conveyor belt system for barrel movement.
- ii. Automatic Barrel Filling arrangement.
- iii. Blanketing Arrangement for filled drum with N₂ to avoid the ingress of moisture.
- iv. Hydraulic/Pneumatic cap sealing arrangement.
- v. Rinsing/Cleaning arrangement for empty barrels with oil of same kind prior to filling.

These are required for manufacture of the Inhibited Mineral Insulating Oil in different stages as per IS: 335 and IEC: 60296 and latest RDSO's requirements. ~~It should have the process control flow similar to given in the enclosed Annexure 'A'~~

2.6 Testing facilities

The ~~oil manufacturer~~ firm should have latest/updated laboratory equipment available in its works for testing of inhibited mineral insulating oil as per IS: 335 and IEC: 60296 in different

stages of manufacturing process to ensure the required degree of reliability essential for traction application. These instruments should be calibrated with standard master instruments accountable to National Physical Laboratory or a similar reputed international agency. Each instrument should have a valid calibration certificate. Test equipment's are listed below:

Test Equipments:

A- For the Oil as per IS: 12463 and IEC: 60296 both

- i. Apparatus for Appearance Test
- ii. Hydrometers
- iii. Kinematics Viscometer
- iv. Interfacial Tension meter (IFT)
- v. Flash Point Apparatus
- vi. Pour Point Apparatus
- vii. Titration Apparatus
- viii. Constant Temperature Hot Air Oven with accessories
- ix. Motorised Oil BDV Test Set
- x. Apparatus for Dielectric Dissipation Factor
- xi. Apparatus for Specific Resistance
- xii. Oxidation Stability Apparatus
- xiii. Apparatus for aging Characteristics
- xiv. Spectrophotometer
- xv. Karl Fisher Automatic Filtration
- ~~xvi. S.K. Value Test Apparatus~~
- ~~xvii. Oxidation Stability apparatus~~
- ~~xviii. Rotating Bomb Test Equipment~~
- ~~xix. Spectrophotometer~~

B- For the Oil as per IEC: 60296 only

- i. Equipment for Measurement of Aniline Point.
- ii. Equipment for Measurement of Carbon Type Composition %Ca, %Cp, %Cn

3.0 QUALITY CONTROL REQUIREMENTS

- 3.1 The firm should have acquired ISO-9001:2000-series certification for the product for which approval is being sought and it should be broadly covered in the scope of the certification of manufacture and supply.
- 3.2 Quality Manual as per the recommendations of ISO-9001:2000 should clearly indicate various stages to have control over manufacturing process and testing prepared/treated insulating oil.
- 3.3 The system of easy traceability of the product from raw material stage to finished product stage should be available.
- 3.4 The ~~manufacturer~~ firm should have a system of monitoring the complaints ~~received from the user end for the insulating oil already supplied to transformer manufacturers or railways. The complaints made by the customer should be identifiable to the various manufacturing stages and linking the complaint for possibilities of laps at particular stage to take corrective and corrective action~~ in the format given in RDSO's Guideline for preparing Quality Assurance Plan.
- 3.5 ~~Quality assurance plan for the product dealing various aspects like-~~
 - ~~a) Organisation Chart~~
 - ~~b) Flow process chart~~
 - ~~c) Stage inspection details~~

~~d) Various parameters to be maintained to ensure quality control~~

~~e) Policy of disposal of rejected material should be implemented and record is maintained for documentary evidence~~

Quality assurance plan in accordance with RDSO's guideline should be available. Quality Assurance Plan shall be approved by RDSO.

- 3.6 At least a diploma holder must be the head of the inspection / testing / final control section with 5 years' experience in the relevant field.
- 3.7 Quality manual of the firm indicating the extent of control over production and testing should be available.
- 3.8 There exist a system of documentation in respect of rejection at the customer and its warranty replacement.
- 3.9 System should exist for documentation of the following.
- i. Incoming raw material with the TC reference of suppliers as well as internal test/Audit checking from outside agency.
 - ii. Details regarding stage inspection and test results.
 - iii. Details regarding the final testing and dispatch to the customer in proper packed condition.
 - iv. System for calibration of testing and measuring instruments.