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**GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS**

**No. TI/STR/013
(REVISION II)**

**Schedule of infrastructure Requirements
for
Manufacturing, Testing facilities and
Quality Control requirements
for
INSULATING OIL**

**(Specification IS: 12463 and latest RDSO Specification)
(This supersedes all the earlier STRs)**

Dated MAY - 2006

**ISSUED BY
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1.0 SCOPE

- 1.1 This schedule (STR) covers the general requirements of infrastructure / manufacturing facilities and testing equipments for manufacturing and supply of inhibited mineral insulating oil being used in traction power transformers.

2.0 GENERAL INFRASTRUCTURE & MANUFACTURING FACILITIES

- 2.1 Manufacturer should have adequate covered accommodation for storing raw material, finished items awaiting dispatch and carrying out inspection etc. Manufacturer should have system to ensure that product conforms to requirements of specification IS: 12463. The manufacturer should have an effective quality control system to monitor quality control of

- 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 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 during the production with adequate safety precautions. The company must have the safety items like fire extinguishers, safety warning board, shock treatment charts and medical first aid kit in the premises.

- 2.3 The management should organize regular training programs for upgradation of the knowledge and skills of the employee.

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

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

2.6 PLANTS, MACHINERIES AND PROCESS CONTROL

- 2.6.1 The manufacturer shall have the suitable plants / machines / equipments of adequate capacity / rating including the following:

1. Automatic / Manual conveyor belt system for barrel movement
2. Automatic barrel filling arrangement
3. Blanketing arrangement for filled drum with N₂ to avoid the ingress of moisture

4. Hydraulic / Pneumatic cap sealing arrangement
5. Rinsing / cleaning arrangement for empty barrels with oil of same kind prior to filling.

These are required for manufacturing of the Uninhibited and Inhibited Mineral Insulating Oil in different stages as per IS: 12463 and RDSO specifications. It should have the process control flow similar to given in the enclosed Annexure-I.

2.7 TEST FACILITIES

- 2.7.1 The oil manufacturer should have latest / updated laboratory equipment available in its works for testing of inhibited mineral insulating oil as per IS: 12463 in different stages of manufacturing process to ensure the required degree of reliability essential for traction application. These instruments should be calibrated with the standard master instruments accountable to National Physical Laboratory or a similar reputed international agency. Each instrument should have a valid calibration certificate. Essential equipments are listed below;

Essential Test Equipments

1. Apparatus for appearance test.
2. Hydrometers
3. Kinematics viscometer.
4. Interfacial tensionmeter
5. Flash point apparatus
6. Pour point apparatus
7. Titration apparatus
8. Constant temperature Hot Air oven with accessories.
9. Motorised oil test set
10. Apparatus for Dielectric dissipation factor
11. Apparatus for specific resistance
12. Oxidation stability apparatus
13. Apparatus for aging characteristics
14. Spectrophotometer.
15. Karl Fisher Automatic Filtration.
16. S.K. Value test apparatus.
17. Oxidation stability apparatus.
18. Rotating Bomb Test Equipment
19. Spectro-photometer

3.0 QUALITY CONTROL REQUIREMENTS

- 3.1 The firm should have acquired ISO- 9001: 2000 series certificate for the product (Mineral Insulating Oil) for which approval is sought and it should be broadly covered in the scope of the certification for manufacture and supply.

- 3.1 Quality manual as per the recommendations of ISO- 9001 : 2000 should clearly indicate various stages to have control over manufacturing process and testing of prepared / treated insulating oil.
- 3.2 There should exist a system of easy traceability of the product from receipt stage to finished insulating oil ready for delivery.
- 3.3 The manufacturer 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 preventive action.
- 3.4 Quality Assurance Plan for the product detailing various aspects like.
- a) Organizational chart
 - b) Flow process chart
 - c) Stage inspection details
 - d) Various parameters to be maintained to ensure control.
 - e) Policy of disposal of rejected material should be implemented and record of the same is maintained for documentary evidence.
- 3.5 At least diploma holder must be head of the inspection / final control section with 05 years experience in the relevant field.
- 3.6 There exists a quality manual indicating the extent of control over production and testing.
- 3.7 There exists a system of documentation in respect of rejection at customer end and warranty replacement.
- 3.8 System should exist for documentation of the following.
- 3.8.1 Incoming raw material with TC reference of supplier as well as internal test / audit checking from outside agency.
- 3.8.2 Ensure that details regarding stage inspection and test results are available.
- 3.8.3 Ensure that a system exists for calibration of testing & measuring equipment and record is maintained.

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ANNEXURE -I

PROCESS CONTROL FLOW DIAGRAM FOR INHIBITED NEW MINERAL INSULATING OIL

