

**STR No.ELRS/STR/PFAS/0009**

**GOVERNMENT OF INDIA  
MINISTRY OF RAILWAYS**

**SCHEDULE OF TECHNICAL REQUIREMENTS**

**FOR**

**PRE-MACHINED FORGED ARMATURE HEAD**

**FOR**

**TAO-659 TRACTION MOTORS**

**OF**

**ELECTRIC LOCOMOTIVES**

**JULY, 2003**

**ISSUED BY  
ELECTRICAL DIRECTORATE  
RESEARCH DESIGNS & STANDARDS ORGANISATION  
MANAK NAGAR, LUCKNOW – 226 011.**

## **SCHEDULE OF TECHNICAL REQUIREMENTS FOR PRE-MACHINED FORGED ARMATURE HEAD FOR TRACTION MOTOR**

### **1. General :**

1.1 Indian Railways are procuring Pre-machined Forged Armature Head for Traction Motor type TAO-659 as per RDSO drawing nos. SKEL4537 (Armature Head for TAO-659 traction motor –Bigger dia shaft) and SKEL-4538 (Armature head for TAO-659 traction motor – smaller dia shaft). The Schedule of Technical Requirements mentioned hereunder is issued to serve as a guide to the manufacturers (called “the firm” hereafter), and should be read in conjunction with the above said drawings. The firm should satisfy themselves having complied with the requirements of the drawings and the Schedule of Technical Requirements. The Technical Requirements are meant to serve as guideline only and are not exhaustive.

1.2 The firm should have currently valid ISO-9000 certification including the subject item under its range of manufacture.

### **2. Raw Material :**

2.1 Raw material shall be purchased from reputed suppliers. Documentary proof of purchase and Test Certificate of chemical composition, hardness, ultrasonic test etc. for each batch shall be maintained and produced.

2.2 A record of each sub-supplier clearly showing the quantity purchased and rejected, as well as cases of late delivery, if any, shall be kept.

### **3. Manufacturing :**

3.1 List of M&P required shall be as per Annexure-I. The list does not specify the capacity and quantity of various M&P which may vary according to the manufacturing capacity of the individual firm.

### **4. Testing :**

4.1 The firm shall have a Test laboratory having all facilities to carry out Physical and Chemical testing of raw materials, forgings and finished products. The laboratory should be headed by a qualified technical personnel directly responsible for quality of testing.

4.2 List of testing facilities to be maintained in firm’s laboratory shall be as per Annexure-II. The accuracy and capacity of the testing and measuring equipment shall be adequate to meet the requirements of the Specification.

4.3 The testing and measuring equipment shall be duly calibrated and the validity of calibration should be verified by checking the calibration certificate issued by the Calibration Agency from whom it was calibrated.

4.4 Meticulous record of testing for various stages (raw material/ forging/finished product) for each batch of production shall be maintained.

## ANNEXURE-I

### Details of Machinery & Plants.

Following minimum Machinery and Plants are required for manufacturing the armature head for TMs.

#### (A) Forging Shop

- i) Hammer of sufficient capacity.
- ii) Heating furnace with temperature controller and recorder.
- iii) Jib crane
- iv) Mobile crane
- v) Weighing machine
- vi) Hacksaw machine

#### (B) Heat Treatment Plant

- i) Furnace with temp. controller and recorder
- ii) Oil Quenching Tank
- iii) Air Quenching with blowers
- iv) Jib Crane with two tonne hoist.

#### (C) Machine shop

- i) Lathe machines
- ii) Shaper
- iii) Milling machine
- iv) Radial Drilling Machine
- v) Pillar Drill
- vi) Bench Grinding Machine
- vii) Hand Grinder
- viii) Jib Crane with 2 tonne hoist.
- ix) Generating Set

**Testing Plant**

1. Destructive Testing:

- i) Impact Testing machine
- ii) Hardness testing machines
- iii) Notch making equipment with profile projector
- iv) Universal Testing machine.
- v) Microscope
- vi) Polishing machine
- vii) Grain Flow Checking

2. Non-Destructive testing :

- i) Ultrasonic Flaw Detectors
- ii) Magnetic Particle Flaw Detector
- iii) Dye Penetrant Testing Kit.
- iv) Surface Roughness Comparator
- v) Surface Finish Comparator

3. Complete Chemical Analysis Set-up.

4. List of Measuring Instruments :

- i) Vernier Caliper
- ii) Vernier Height Gauge
- iii) Micrometer
- iv) Inside Micrometer
- v) Dial Indicator with magnetic stand
- vi) Slip gauge box
- vii) Surface Plate
- viii) Electronic Thickness Gauge