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GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

SCHEDULE OF TECHNICAL REQUIREMENTS

FOR

PRE-MACHINED FORGED ARMATURE SHAFTS

FOR

TAO-659 TRACTION MOTORS

OF

ELECTRIC LOCOMOTIVES

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ISSUED BY
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SCHEDULE OF TECHNICAL REQUIREMENTS FOR PRE-MACHINED FORGED ARMATURE SHAFT FOR TRACTION MOTOR

1. General :

1.1 Indian Railways are procuring Pre-machined Forged Armature Shaft for Traction Motor type TAO-659 as per BS.970, Part 3, 1991 grade 826 M 31, Condition 'V' (called "the Specification" hereafter). 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 Specification. The firm should satisfy themselves having complied with the requirements of the Specification 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 required 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 which 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 shafts 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) Piller Drill
vi) Bench Grinding Machine
vii) Hand Grinder
viii) Jib Crane with 2 tonne hoist.
ix) Generating Set

ANNEXURE – II

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