



भारत सरकार
रेल मंत्रालय

**Government of India
Ministry of Railways**

**SCHEDULE OF REQUIREMENTS
OF
MICROPROCESSOR BASED ELECTRONIC
SPEED CUM
ENERGY MONITORING SYSTEM
FOR AC ELECTRIC LOCOMOTIVES**

**ELRS/STR/SPM/0011(REV.0)
DEC– 2003**

अनुसंधान अभिकल्प और मानक संगठन
मानकनगर, लखनऊ - २२६०११

**RESEARCH DESIGNS AND STANDARDS
ORGANISATION**

MANAKNAGAR, LUCKNOW - 226011

1.0 GENERAL:

- 1.1** In order to monitor the Energy consumed by Electric Locomotive, RDSO formulated a Specification No. ELRS/SPEC/SPM/0002 (Rev 0) in May 1999 for Microprocessor based Electronic Speed Indicating, Recording and Energy Monitoring System for Electric Locomotive. Revision 1 of Specification No. ELRS/SPEC/SPM/0002(Rev1) – September 2003 was issued incorporating certain additions/alterations considered necessary.
- 1.2** The technical requirements mentioned hereunder are meant to serve as a guideline only and should be read in conjunction with the specification.

2.0 DOCUMENTATION:

- 2.1** The firm should have current valid ISO 9000 certification including the subject item under its range of manufacture.
- 2.2** The firm shall maintain list of brought out items along with
- Basis of procurement i.e. specification etc. and assurance that the material is of standard quality.
 - Tests carried out by sub – vendors on bought out items and test certificate for each lot of supply.
 - Test carried out by the firm on the bought items before usage.
 - Sources of procurement with the details of Quality Assurance Plan of these sources.
- 2.3** The firm shall maintain:-
- List of in – house manufactured items.
 - Detailed drawings, jigs & fixtures required and process adopted for these items.
 - Details of the process followed and routine checks observed for assembly of the items
 - Record of shelf life of items like varnish/epoxy resins/chemical etc. used
- 2.4** Testing be done as per specification under component technical staff of firm and documents to indicate his competence be maintained.

3.0 MANUFACTURING:

- 3.1** The equipment manufactured and general assembly shall be according to RDSO Specification No. ELRS/SPEC/SPM/0002 (Latest revision) and the various parts shall be as per Drawings mentioned therein.
- 3.2** All raw materials and finished products should be stored in a neat, clean and dust free atmosphere.
- 3.3** The soldered PCB's shall be tested online on testing jigs before assembly to ensure the proper functioning of the system.
- 3.4** The following apparatus/equipments should be available with the firm:-
- Personal Computer with Printer/Plotter
 - AutoCAD Software Package
 - Micro controller Evaluation Board
 - PC Based Universal Programmer
 - Ultra Violet EEPROM Eraser
 - Soldering Station
 - Wire Stripper
 - Solder Dispensing System
 - Frequency Generator/Wave Generator
 - Test Jig for Online Testing of PCB
 - Dielectric Test Equipment
 - Surge Test Equipment
 - Automatic Voltage Stabilizer
 - Digital LCR Meter
 - Digital Multimeter
 - Non – Contact type Optical Tachometer
 - Digital Frequency Meter
 - Temperature Indicator
 - Cathode Ray Oscilloscope (Storage Type)
 - Environmental Chamber
 - Power Supplies
 - Test bench for Testing Energy Parameters of Energy Cum Speed Monitoring System
 - Test bench for Endurance Testing of Energy Cum Speed Monitoring System

4.0 TESTING:

4.1 The minimum requirement of test facilities at the firm's premises for testing of the equipment shall be as under:-

- Regulated DC Power Supply for Powering up the system.
- Non – Contact type Optical Tachometer
- Test Jig for mounting the Speed Sensor Unit on a Shaft controlled by Regulated Constant Speed Drive.
- Frequency Generator/Wave Generator
- Digital Frequency Meter
- Digital Multimeter
- Digital LCR Meter
- Temperature Indicator
- Dielectric Test Equipment
- Surge Test Equipment
- Personal Computer equipped with Evaluation Software
- Test bench for Testing Energy Parameters of Energy Cum Speed Monitoring System
- Test bench for Endurance Testing of Energy Cum Speed Monitoring System
- Cathode Ray Oscilloscope (Storage Type)

4.2 The capacity/accuracy of the testing and measuring instruments shall be adequate to meet the requirements of the specification.

4.3 All testing equipments should have valid calibration certificate from a **Government approved Test Laboratory.**

4.4 Tests which can not be carried out at Firm's Premises shall be arranged to be carried out at **Government approved Test Laboratory.**