

**WATER SUPPLIES DEPARTMENT**

**STANDARD SPECIFICATION E-90-22**

**MANUAL FOR MOTORS OF 100kW & ABOVE  
AND GENERATORS OF 150kVA & ABOVE**

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1. **GENERAL**

This Specification is supplementary to WSD Standard Specification E-90-02 (Manual for Electrical and Instrumentation Equipment) with additional requirements stated below.

2. **REQUIREMENTS OF MANUAL CONTENT**

2.1 **Handling, Installation, Storage and Transit Information**

Any transit clamps or guards on moving parts (e.g. shaft and rotor), protective relays (if any) or instrument against vibration for transport and storage shall be detailed. The method, tools and equipment for lifting of the stator and rotor shall be specified. The method of installation such as foundation and sole plate requirement shall be detailed.

2.2 **Design, Operation and Technical Information**

System design information shall cover the stator and rotor winding, enclosure IP, ventilation, bearing construction and cooling media, drive shaft assembly and coupling, lubrication and cooling protective devices. The data sheets of accessories and auxiliaries equipment such as bearing, winding temperature detectors, space heater, cable box, capacitor, vibration detectors and monitor, electric valve actuator and flow switches where appropriate shall be provided.

For pump motors, the manual shall provide details of the starting frequency limitation, motor and pump torque speed curves (at minimum specified voltage and with delivery valve closed) and motor short-time overload withstand characteristic curves.

For diesel generators, the manual shall provide details of the operational data and settings of protective devices and timers. The permissible operating limits of power factor, over-current and unbalance load shall also be stated in the manual.

2.3 **Maintenance Information**

It shall include :

(a) General

- (i) A schedule of maintenance tools supplied with the contract;

- (ii) A dismantling and re-assembly instruction with '*warning*' or '*caution*' information for the safe maintenance of the equipment;
  - (iii) A stator and rotor rewinding information such as insulation system of coils and inter-coil connection details etc.;
  - (iv) A dry-out method for stator and rotor;
  - (v) A recommended/anticipated polarisation index and tangent delta of windings;
  - (vi) Detailed instructions on balancing a rotor; and
  - (vii) Detailed instructions of removal a rotor from stator.
- (b) Motor
- (i) Detailed instructions on how to maintain the motor bearings including the white metal bearing and insulated bearing if applicable;
  - (ii) Detailed instructions on how to disconnect the earth link and test the bearing insulation of the insulated bearing if applicable; and
  - (iii) Detailed instructions on how to test and calibrate the auxiliary equipment such as embedded winding temperature detectors and monitor, vibration detectors and monitor.
- (c) Diesel Generator
- (i) Detailed instructions on how to maintain the diesel engine; and
  - (ii) Detailed instructions on how to maintain the battery system and other auxiliary equipment.

#### 2.4 Reports and Certificates

Type test certificates or reports called for in the contract shall form part of the manual with the following information:

- (a) Particulars of test including the name and address of testing station, profile of the testing authority, date and time of test, witnessing authority.
- (b) Particulars of equipment tested including the manufacturer and model, rating, test objective and relevant IEC, BS, BSEN Standards and other international standards.
- (c) Description of details and conditions as specified in relevant IEC, BS, BSEN Standards and other international standards to conform test conditions are in compliance with these standards.