

WATER SUPPLIES DEPARTMENT
STANDARD SPECIFICATION E-88-05
POWER SUPPLY EQUIPMENT FOR TELEMETRY SYSTEMS

1 **GENERAL**

1.1 **Extent of Supply**

This Standard covers the provision of power supply equipment for use with telemetry systems.

In general, the equipment shall include the following :-

- (a) Battery of maintenance free sealed lead-acid cells
- (b) Battery charger with both float and boost charging facilities
- (c) Panel enclosure for both (a) and (b)
- (d) Interconnecting cables between (a) and (b)

1.2 **System Operation**

The system shall operate from a 220 V 50 Hz single-phase power supply. Unless otherwise specified, the output voltage of the battery supply shall be 24V d.c.

The equipment supplied shall include all sub-units and components to form a complete system. The equipment shall be suitable for operation from 0°C to 40°C with a relative humidity up to 90%.

2 **DESIGN**

2.1 **Battery Cells**

Battery cells shall be of maintenance-free sealed lead-acid type. Cell containers shall be made of moulded translucent plastic and resistant to impacts and corrosive attack by the electrolyte.

The battery capacity shall be capable of powering the required telemetry equipment continuously for 5 hours with a 20% safety margin taking into account all various derating factors. The minimum battery life at 20°C shall be 10 years for continuous float charging and 150 charge/discharge cycles.

The minimum battery capacity for service reservoir type installation shall be 30Ah.

2.2 Battery Charger

2.2.1 Performance

The battery charger shall be designed to be suitable for process plant operation under critical environment in meeting with the relevant electromagnetic compatibility (EMC) and safety standards.

Battery chargers shall be of solid state type and shall comprise a power supply transformer, rectifiers, float and boost charger control equipment, alarm detection equipment, output load voltage control equipment and the accessories.

The float charger shall be rated such that following a mains supply failure and a normal continuous discharge for 5 hours, the battery shall be replenished to 50% of its nominal ampere-hour capacity within a 5-hour charging period.

The boost charger shall be rated such that following the same discharge conditions, the battery shall be replenished to 75% of its nominal ampere-hour capacity within a 5-hour period.

The charger output voltage shall be maintained within $\pm 1\%$ of present voltage irrespective of $\pm 6\%$ mains voltage variation, $\pm 2\%$ frequency variation, or 0 to 100% load current variation and 5°C to 40°C in ambient temperature. Ripple voltage shall be limited to 5% V_{rms} of nominal voltage at maximum current.

The charger shall not be switched to boost charging mode automatically. The boost charging mode shall be selected by manual means only.

During boost charging, the charger shall return to float charging mode automatically after a preset time or when a preset battery voltage is reached, or manually by the operation of a float charge selector/pushbutton.

2.2.2 Facilities for Chargers

The following features shall be included in the chargers :-

(a) Protection

The charger shall be protected against the following abnormal situations :-

- (i) Output short-circuit/overcurrent
- (ii) Charger temperature high
- (iii) Output overvoltage
- (iv) Accidental polarity reversal

(b) Alarms and Indications

The following alarms/indications shall be provided for the charger :-

- (i) Charger temperature high
- (ii) Output voltage high/low
- (iii) Charger on
- (iv) Mains on

One changeover volt-free contact shall be provided for the common alarms of items (i) and (ii) above.

(c) Control Devices and Instruments

The following shall be provided with the chargers :-

- (i) Mains On/Off switch
- (ii) Boost/Float charge selector switch
- (iii) Ammeter, charger output
- (iv) Voltmeter, load output

2.2.3 Design of Electronic Circuitry

Maintenance and fault finding on the equipment shall be facilitated by the provision of fault-locating routines, test points and indicators on the function boards, and by an assembly technique that allows rapid replacement of components or sub-assemblies.

3 CONSTRUCTION

3.1 Panel Enclosure

The enclosure shall be fabricated with sheet steel of 2 mm thickness or otherwise specified in the Particular Specification, with separate compartments for both the battery and the charger suitable for wall-mounting. The entire enclosure surface shall be applied with chemical rust inhibitor, rust resisting primer coat and top coat to give good corrosion protection.

The panel shall be designed for natural ventilation with an ambient temperature of up to 45°C and a degree of protection of IP54 to IEC 60529.

The indicators, instruments and control switches detailed in Clause 2.2.2 shall be flush-mounted on the panel front.

Cable entry to the panels shall be through gland plates mounted at the bottom of the panels.

3.2 Battery Cells

The polarity of each terminal shall be clearly marked by engraving, stamping or pressing into the cell container top beside the terminal. The wording shall be permanent and the use of coloured washers around the terminals as the sole means of polarity identification shall not be accepted.

4 INSPECTION AND TESTING

4.1 Inspection and Testing in Manufacturer's Works – General

The completely assembled power supply equipment shall be inspected and tested in the telemetry equipment manufacturer's works with test reports submitted for approval before delivery of the equipment.

4.2 Test Requirements

The tests shall clearly demonstrate that the equipment fully complies with the performance detailed in this Standard and the Particular Specification.

The Contractor shall provide all test equipment and facilities necessary to perform these tests. Test equipment for calibration purposes shall have been calibrated and certified by a recognised calibration authority not earlier than 12 months prior to the test.

The minimum requirements for the tests are listed below :-

- (a) Demonstration of the manual adjustable range of charger output voltage under float and boost charge respectively.
- (b) Demonstration of the operation of all protective devices.
- (c) Operational checks of all alarms and indication facilities.

4.3 Site Commissioning Test

A site commissioning discharge test shall be conducted by the Contractor to verify the rated capacity of the supplied battery.

The Contractor shall replace any cells or components that are found not to comply fully with the specification during this test. The continuous output current used for this commissioning test shall be the rated value at the 5-hour discharge rate.