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**TECHNICAL JOB
SPECIFICATION**

727/1

REVISION 0

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HIGH PRESSURE (HP) TRANSMISSION SYSTEMS

DC BATTERIES AND CHARGERS

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QUALITY ASSURANCE PAGE

CHANGES LOG

REVISIONS LOG

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REFERENCE DOCUMENTS

- 2006/95/EC LVD
[Low Voltage Directive]
- EU Directive 2006/66/EC Batteries Directive
- 2004/108/EC EMC
[Electromagnetic Compatibility Directive]
- 94/9/EC ATEX
[Equipment Explosive Atmospheres Directive]
- ELOT EN 60027-1
[Letter symbols to be used in electrical technology - Part 1: General]
- ELOT EN 60086
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- ELOT EN 60617
[Graphical symbols for diagrams]
- IEC 60050
[International Electrotechnical Vocabulary]
- EN 60896-21
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1.0 **SCOPE**

Scope of this specification is to furnish the basic criteria for proper selection, sizing, manufacturing and testing of D.C. batteries and chargers.

Unless otherwise specified in the Material Requisition (MR) this specification shall apply to D.C. batteries and chargers for use in substation for control and emergency supply systems, D.C. instrument consumers, etc.

2.0 **GENERAL**

This specification is appropriate for use in conjunction with the Material Requisition. Unless otherwise specified in the Material Requisition, requirements given in this specification shall govern. Should conflict between requirements of this specification and those of the Material Requisition, the later shall govern; in case of doubt, Manufacturer/Vendor shall apply to the Contractor.

Any deviation shall be listed by Manufacturer/Vendor in his bid, with explanation of reasons and advantages of suggested alternative solution.

2.1 **STANDARDS**

Batteries and chargers shall be designed, manufactured and tested in accordance with **ELOT EN 60086**.

Codes and regulations of the Country of origin may be applied, provided that:

- a) Owner' s approval is obtained;
- b) Manufacturer/Vendor declares under his responsibility that the adopted standard is more restrictive of at least equivalent to the applicable **ELOT EN 60086**.

2.2 **UNITS, DEFINITIONS AND DIAGRAMS**

Units, electrical terms and definitions used in this specification, and to be used by Manufacturer/Vendor, shall be in accordance with applicable **ELOT EN** Standards and **IEC** Recommendation; particularly with the following:

IEC 60050

ELOT EN 60027-1

Electrical diagrams shall be with graphical symbols in accordance with **ELOT EN 60617**.

D.C. Batteries and chargers to be installed in Europe shall bear the CE Mark, together with:

- The Certification of Conformity to Electromagnetic Compatibility Directive (2004/108/EC EMC).
- The Certification of Conformity to Low Voltage Directive (2006/95/EC LVD).
- EU Directive 2006/66/EC Batteries Directive
- Other applicable EU Directive.

3.0 BATTERY DESIGN CRITERIA - ACCESSORIES AND MAINTENANCE

Manufacturer/Vendor shall have care to furnish detailed information necessary for the right selection and manufacturing of batteries in order to obtain the highest reliability while keeping expense to minimum, and to study the best installation from operation and maintenance point of view.

Manufacturer/Vendor shall select the best solution and furnish batteries in accordance with mentioned information and the following general requirements, suggesting procedures for check and maintenance.

3.1 BATTERY TYPE AND CONSTRUCTION

D.C. batteries shall be stationary type, suitable for industrial use, either of the following:

- lead acid (lead accumulator),
- nickel cadmium (alkaline accumulator).

Unless otherwise specified in the M/R, battery type and relevant constructive type (negative plate alloy and configuration) shall be selected to conform the specific application, taking into account the economics.

Battery cells shall be closed type with covers sealed to the cell jar or container. Transparent containers shall be used if available.

Batteries shall be interconnected via suitable connectors.

Intercell connectors shall be designed to accept shunting bars to facilitate cell removal for repairing or removal.

3.2 BATTERY SIZING

The following criteria shall be used in defining the appropriate battery capacity and electrical characteristics.

3.2.1 BATTERY CAPACITY

Rated battery capacity to be specified with reference to 10 hours discharge with new battery and 25°C electrolyte temperature.

Unless otherwise specified in M/R, battery capacity shall be sized using one of the following criteria :

- a) by assuming capacity in Ah and discharge time in hours;
- b) by detailing the load profile (current versus time) and including current peaks due to energizing of coils, starting of D.C. motors and alike.

Contractor to select the worst load profile from battery sizing point of view or, in case of doubt, to submit rival load profiles if applicable.

Manufacturer/Vendor to calculate required battery capacity.

3.2.2 RATED VOLTAGE

Rated voltage :

- a) maximum voltage shall not exceed 110% of rated voltage with fully charged battery;
- b) minimum voltage at the end of discharge shall not be less than 90% of

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rated voltage.

The minimum value of cell voltage at the end of the discharge shall not be less than:

- 1,80 V per element for lead acid accumulators,
 - 1,00 V per element for alkaline accumulators.
- c) minimum dynamic voltage during transient phenomena, even if such phenomena occur at the end of the discharge time, shall not be less than 80% of rated voltage.

3.3 SHORT CIRCUIT CAPABILITY AND OVER CURRENT PROTECTION

Manufacturer/Vendor to specify short circuit capability referred to terminals of the battery at the following conditions:

- battery charged,
- battery at the end of the discharge.

Resistance of connections shall be considered.

The battery shall be protected by overcurrent devices with rating of not less than 150 percent and not more than 200 percent of the maximum operating load applied to the battery.

3.4 INSTALLATION

Batteries shall be installed in clean dry separate room where ambient air temperature shall not be less than +5°C and more than 40°C.

Ventilating or pressurizing systems shall be used where necessary.

Battery cells having containers of other than suitable insulating material shall be assembled and located using insulating supports.

Manufacturer/Vendor to furnish information relevant space availability and/or preferred solution.

Manufacturer/Vendor to study the rack structure (two step, two tier etc.) on the basis of the electrical solution (selected type and number of battery element).

Racks to be included in the supply.

Cables to be arranged in such a manner to avoid strain on battery terminals. Stored battery shall be housed in sealed enclosure on otherwise protected against movement, injury and moisture.

Reliable separation between cells shall be provided to prevent contact between terminals of adjacent batteries and of the battery terminals with other metal parts.

3.5 ACCESSORIES AND INSTRUCTIONS FOR MAINTENANCE

Unless otherwise specified in the Material Requisition (M/R), the battery shall be supplied with at least the following accessories:

- one shunting bar
- two spare gears
- two densimeters
- two thermometers
- one zero - center voltmeter 3 V D.C.

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Manufacturer/Vendor to suggest any other equipment necessary for maintenance.

Manufacturer/Vendor to give information relevant suggested time interval between normal maintenance operations and time interval between successive equalizing charges to be applied related with the established floating voltage at which battery stabilized.

Any other specific instruction of the manufacturer, to be supplied by Manufacturer/Vendor.

4.0 BATTERY CHARGERS - DESIGN CRITERIA

Unless otherwise specified in the M/R battery chargers shall be static with adjustable automatic regulation.

4.1 CHARGER TYPES, REGULATION AND CONTROL DEVICES

Manufacturer/Vendor to select the best solution between magnetic amplifier and phase modulated systems on the basis of special requirement and economics.

Depending on the selected batteries, the regulation type shall be one of the following:

- a) chargers for lead - acid batteries shall have adjustable automatic voltage control for recharging, equalizing and floating operation;
- b) chargers for nickel - cadmium batteries shall have adjustable constant current control for initial charge and adjustable automatic voltage control for floating operation up to the end of charge and equalizing operation.

Chargers shall be equipped with all necessary meters and control device for the proper operation.

Unless otherwise specified in the M/R, at least the meters for the following shall be included.

- A.C. supply voltage
- D.C. voltage
- D.C. output and battery current (2 scale bidirectional meter)

4.2 CHARGER SIZING

The following criteria shall be used in definition battery charger rating and characteristics.

Charger rated power shall be adequate to supply specified D.C. loads plus the largest of the following power demand:

- a) 8 hour battery recharge requirements starting from discharged conditions;
- b) equalizing charge rate.

To consider decreasing of battery efficiency, charger rating shall be at least 10% greater than necessary.

Contractor to furnish necessary information relevant D.C. loads to be supplied. Manufacturer/Vendor to contact manufacturer of batteries for the proper charger sizing.

Battery chargers shall be supplied from 3 phase or single phase sources.

Voltage and frequency variations shall be considered within the limits specified under "normal" and "exceptional" conditions in the General Electrical Specification.

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The quality of the d.c. voltage shall take care of battery requirements and of specified D.C. load requirements.

4.3 **INSTALLATION**

Manufacturer/Vendor to give information relevant to the installation of the equipment. Chargers to be located near batteries to keep cables as short as possible.

5.0 **TEST**

Routine test as per applicable standard.