



NATIONAL PETROCHEMICAL COMPANY
STANDARDS

MATERIAL STANDARD
FOR
BATTERY & BATTERY CHARGER

NPCS-MS-EL-09

REVISION : 0

AUGUST 1992



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1 SCOPE

- 1.1 The intent of this standard is to define the minimum requirements for the design, manufacture, testing, packing and supply of station batteries, battery chargers and DC distribution board which shall supply DC control power for switchgear and instrumentation systems.
- 1.2 This standard covers only the general requirements of the batteries, chargers, and DC distribution board. 'The specific requirements of each (charger input voltage, battery voltage, normal loads, emergency loads, circuit breaker operating requirements, etc.) will be given in the material requisition.
- 1.3 In case of conflict between documents listed below, the ones appearing first in sequence of this listing will precede over the following ones:
- a) Purchase order.
 - b) Data sheets.
 - c) Interconnection drawings.
 - d) Requirements of the requisition.
 - e) This material standard.
 - f) Other specifications and standards referred to in the above documents.
 - g) Vendor drawings.
- 1.4 Compliance by the manufacturer with the provisions of this standard does not relieve him of the responsibility of furnishing unit of proper design,, mechanically suited to meet operating guarantees at the specified operating conditions.
- 1.5 Such deviations from this standard which the manufacturer may consider advisable, shall be submitted in writing to purchaser, together with his quotation, in order purchaser may approve or reject such deviations.
- 1.6 Exceptions other than those included in the above mentioned documents shall not be considered.



- 1.7 Vendor shall only supply equipment of proven design and construction, of which satisfactory operation over at least a three years period can be proven in similar service and operating conditions.
- 1.8 All documentation shall be issued, using SI metric system of measurement, according to NPCS-ES-GN-03.
- 1.9 The English language shall be used for all correspondence documents, catalogues, drawings and nameplates.
- 1.10 In the reference numbers of this standard purchaser means National Petrochemical Company of Iran, "NPC".

2 STANDARDS AND CODES

The batteries, chargers and DC distribution board shall be constructed and tested in accordance with applicable portions of the latest below listed standards and codes.

2.1 FOR EQUIPMENT MANUFACTURED IN EUROPE

IEC International Electrotechnical Commission

IEC-76 Power Transformers.

IEC-51 Recommendations for Indicating Electrical Measuring Instruments and Their Accessories.

IEC-86 Primary Batteries.

IEC-144 Degrees of Protection of Enclosures for Low Voltage Switchgear and Control Gear.

IEC-146 Semi-Conductor Converters.

IEC-157 Low Voltage Switchgear and Control Gear.

IEC-158 Low Voltage Control Gear.

IEC-185 Current Transformers.

IEC-186 Voltage Transformers.

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IEC-364 Electrical Installation of Degree for
Protection by Enclosures.

IEC-408 Low Voltage Air Break Switches, Air Break
Disconnectors? Air Break Switch
Disconnectors and Fuse Combination Units.

IEC-529 Classification of Degree of Protection
Provided by Enclosures.

IEC-540 Cables and Mires.

IEC-563 Classification of Electrical and Electronic
Equipment with regard to Protection against
Electrical Shock.

Other relevant IEC Publications, supplemented by this
standard.

VDE 0875 Specification for Radio Interface
Suppression of Electrical Appliance and
System.

2.2

FOR EQUIPMENT MANUFACTURED IN THE USA

NEMA National Electrical Manufacturer's
Association

NEC National Electrical Code

IEEE 450 Maintenance, Testing and Replacement of
Large Lead Storage Batteries.

2.3

For equipment manufactured outside Europe and USA
either of the standards and codes specified in clause
2.1 or 2.2 above shall be met.

2.1

The equipment as a whole may conform with the
national standards of the country of manufacturer,
provided these standards are based on the IEC
recommendations. The vendor shall state in the
quotation the standards to which the equipment
conforms. If these are the national standards,, then
the vendor shall state in the quotation, the
deviations from the above mentioned standards and
codes.



2.5 The testing and certification by following authorities are acceptable where relevant. Other authorities may be considered subject to client approval,

- a) European Organization for Testing and Certification under CENELEC Administration (EOTC).
- b) Underwriters Laboratories Inc. (UL)
- c) Electrical Equipment Certification Services (EECS).

3 GENERAL REQUIREMENTS

The battery charger shall be of constant voltage, self-regulating, Silicon controlled rectifier type designed to continuously supply DC power to float type batteries and supply the Load simultaneously.

3.1 ARRANGEMENT

The DC power supply system shall consist of:

- One battery charger set to supply the design DC load and maintain the battery fully charged.
- One battery set with adequate capacity for supply the design required load.
- Power distribution panel equipped with automatic molded case circuit breakers.

3.2 BATTERY CHARGER OPERATION

3.2.1 The static battery charger shall be fed from the mains AC supply and provide rectified, filtered and stabilized DC voltage to charge and float charge the battery with simultaneous supply to the load.

3.2.2 The output of the battery charger shall either rapid charge the battery alone, or continuously float charge the battery and simultaneously supply the power requirements of the load. In the event of failure of the AC mains supply to the battery charger, the battery shall, without interruption, take over and supply the power requirements of the load for not less than the time specified in the requisition.



3.2.3 In certain cases where a large load is required for a short. period of time, the charger and the battery shall participate to satisfy the load requirements.

3.2.4 The battery charger shall be capable of powering a direct current load directly with -the battery eliminated.

3.2.5 Each battery charger shall be suitable for operation in parallel with one or more identical units, that may have unsynchronized supplies.

3.3 SAFETY AND RELIABILITY

3.3.1. 'The battery charger shall be designed to minimize any risk of short circuits and to ensure personnel and operational safety under all conditions of operation, inspection and maintenance.

3.3.2 All component material used in the construction of a battery charger shall be fire resistant and non-flame propagating.

3.3.3 Electrolytes, e.g. for capacitors, shall be non-toxic and totally free from poly-chlorinated biphenyls.

3.4 ELECTRICAL SUPPLY SYSTEM

3.4.1 The AC supply to the battery charger may be single phase or symmetrical three-phase with a nominal voltage and frequency as what will be indicated in the requisition. The waveform of the input voltage, with battery charger disconnected, will be sinusoidal. The input supply variations shall be limited under steady state conditions to:

- Nominal system voltage : $\pm 10\%$.
- Nominal system frequency: $\pm 5\%$.

3.4.2 In addition to the above variations, the input voltage may be subject to transients, comprising voltage depressions up to 20% of the nominal voltage during motor starting, and to voltage interruptions during system short circuits. Transient high-frequency voltages of 2 KV peak, may also be superimposed on the input voltage as a consequence of system switching operations, etc.



3.5 SERVICE AND ENVIRONMENTAL CONDITIONS

3.5.1 The batteries and chargers will be installed in safe area in substation rooms which will be ventilated and air conditioned to provide clean, dust free air; ambient temperature will be within the limits of IEC 439.

3.5.2 Climate conditions, design temperatures, relative humidity, atmospheric details and altitude will be specified in the requisition. The batteries and chargers shall stand these conditions while in transport, storage, installation and an upset of air conditioning.

4 PERFORMANCE REQUIREMENTS

The operational requirements specified below, shall be satisfied:

4.1 BATTERY FLOAT-CHARGE OPERATION

4.1.1 The rated output current of the battery charger shall be the current corresponding to the maximum load in KW as what will be specified in the requisition divided by the nominal DC system voltage, plus the current required to charge the battery from the partially discharged condition to 80% capacity in 15 hr. Service factors, temperature compensation and charger efficiency shall be applied as necessary for determination of the charger capacity.

4.1.2 The rectifier steady-state DC output voltage variations shall be controlled to within $\pm 0.5\%$ of the set value.
This corresponds to the battery float-charge voltage during load variations between zero and the rated output current of the CC supply unit and during steady-state input voltage and frequency variations referred to in Clause 3.4.

4.1.3 The floating voltage ranges per battery cell at an ambient temperature of 25°C shall be:

- a) 2.15 to 2.25 Volt/cell for lead acid batteries.
- b) 1.35 to 1.45 Volt/cell for Nickel-Cadmium batteries.