



**PERFORMANCE STANDARD FOR
BATTERY CHARGERS FOR ENGINE
STARTING BATTERIES AND
CONTROL BATTERIES
(CONSTANT POTENTIAL STATIC TYPE)**

EGSA 100C, 1997

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EGSA 100C 1997 PERFORMANCE STANDARD FOR BATTERY CHARGERS FOR ENGINE STARTING AND CONTROL BATTERIES (CONSTANT POTENTIAL STATIC TYPE)

1. SCOPE

This standard covers constant potential static battery chargers designed to maintain engine starting and control batteries.

2. REFERENCE STANDARDS

ANSI/IEEE 100-1996	Standard Dictionary of Electrical and Electronic Terms
ANSI/NFPA 70-1996	National Electrical Code
EGSA 101S-1995	Engine Driven Generator Sets Guideline Specifications for Emergency of Standby
EGSA 101G-1995	Glossary of Electrical and Mechanical Terminology and Definitions
ANSI/NFPA 99-1996	Health Care Facilities
ANSI/NFPA 110-1996	Stored Electrical Energy Emergency & Standby Power Systems
UL 1236-1986	Electric Battery Chargers Rev 10/88

3. DEFINITIONS

Ambient Temperature. Ambient temperature is the stabilized temperature of the medium (usually air) surrounding the battery.

Battery Charger. A battery charger is static equipment which is capable of restoring the charge in storage batteries.

Charge. Charge is the conversion of electrical energy into chemical energy within the battery.

Charging Rate. The charging rate of a battery charger is the current expressed in amperes at which the battery is charged.

Constant Potential Charge. A constant potential charge is a charge in which the voltage at the output terminals of the charger is held to a constant value.

Current Limit. Current limit is the maximum output of the charger delivered to a discharged battery and load, usually stated as a percentage of output rating and with nominal input voltage supplied to the charger.

Equalize/Recharge Voltage. The voltage given to a storage battery to insure complete restoration of the active materials on the plates of all the cells.

Float Voltage. The minimum voltage on a battery required to maintain a full charge in the battery (often expressed in volts per cell). The float voltage is a function of the battery type and construction.

Nominal Value. The nominal value is an arbitrary reference value selected to establish equipment ratings.

Overcurrent Protection. Protection of the battery charger against excessive current, including short circuit current.

Short Circuit Current. The short circuit current of a battery charger is the current magnitude at the output terminals, when the terminals are short circuited and with nominal input voltage supplied to the charger.

Valve Regulated Cells. Valve regulated batteries trap the gases produced during charging and recombine them into water. They operate under pressure and are provided with pressure relief valves. Often called sealed because of their inability to added water or electrolyte.

4. RATINGS

4.1 **Output Current.** The continuous duty output current rating must be adequate to supply the engine cranking battery charging current plus all auxiliary load requirements.

4.2 **Output Voltage.** The charger output voltage rating is dictated by the type of battery and the number of cells being charged.

4.3 **Float Voltage.** Float voltage ranges per cell at 77° F (250° C) are:

Lead Antimony	2.15-2.20
Lead Calcium	2.15-2.25
Valve Regulated Lead Acid	2.25-2.30
Nickel Cadmium	1.40-1.45

4.4 **Equalize Voltage.** Equalize voltage ranges per cell at 77° F (250° C) are:

Lead Antimony	2.33-2.35
Lead Calcium	2.30-2.40
Valve Regulated Lead Acid	2.40-2.50
Nickel Cadmium	1.50-1.65

4.5 **Input Voltage.** The AC input ranges for 60 Hertz are:

Normal Voltage	Minimum	Maximum
120	106	127
208	184	220
240	212	254
277	245	293
480	424	508
575	508	600

4.6 **Frequency.** The rated alternating current supply are 50 or 60 Hertz.

4.7 **Ambient Temperature.** Rated ambient temperature range is 32-122° F (0-50° C).

5. CLASSIFICATION

Battery chargers are classified by voltages, current capacity, and suitability for the intended purpose.

6. APPLICATION DATA

Factors to consider when specifying a battery charger are:

- 6.1 **Voltage Variations.** AC line voltage variations may require the battery charger to include automatic AC line compensation to insure proper charging voltage.
- 6.2 **Constant Voltage.** The battery charger must maintain voltage at the battery terminals and in addition may be required to supply current for continuous or intermittent loads.
- 6.3 **Auxiliary Equipment.** Auxiliary equipment which does not tolerate the voltage drop that occurs during engine starting will require a separate, isolated batter.
- 6.4 **Recharge Time.** Recharge time should be considered when sizing a battery charger.
- 6.5 **Temperature Correction.** Valve regulated batteries may require temperature corrected DC output (-2.5 MV/ C/cell lead acid or -3.0 MV/ c/cell nickel cadmium).
- 6.6 **Filtering.** Valve regulated batteries may require filtering.
- 6.7 **Malfunction Alarm.** Battery charger malfunction is best detected by low DC voltage alarm relay set to alarm, below the charger output voltage but above the open circuit voltage of the battery. Current failure alarm relays can false due to low float currents of fully charged batteries.
- 6.8 **Automatic Equalizing.** Fully automatic equalizing based on battery voltage is required wherever routine maintenance can not be guaranteed and especially for nickel cadmium batteries.

7. TYPICAL PERFORMANCE SPECIFICATIONS

- 7.1 **Type.** The battery charger shall be solid state, current limited, constant potential device whose output potential is regulated by sensing the battery voltage.
- 7.2 **Capacity.** The charger shall deliver full rated capacity to a discharged battery with a line variation as shown in 4.5.
- 7.3 **Float Voltage.** The output float voltage shall be maintained within plus or minus 1% of the nominal setting.
- 7.4 **Equalize Voltage.** The output equalize voltage shall be maintained within plus or minus 2% of the normal setting.
- 7.5 **Equalize Switch.** A device shall be provided to change the output voltage from float to equalize.
- 7.6 **Voltage Adjust.** Controls shall be provided to adjust the voltage over the range specified in 4.3 and 4.4.
- 7.7 **Back Drain.** The back rain from the battery shall not exceed So ma with the loss of AC input.
- 7.8 **Overcurrent Protection.** The battery charger shall be self-protected and the output current shall be limited to a safe value under cranking load.
- 7.9 **Surge Protection.** Surge protection shall be provided to protect the rectifier from line and load transients. The input and output circuits shall be protected.
- 7.10 **Ammeter.** An ammeter shall be provided to indicate the output current.
- 7.11 **Voltmeter.** A voltmeter shall be provided to indicate the DC output voltage.
- 7.12 **Safety.** The charger design and manufacture shall satisfy the performance and safety codes of UL 1236.

8. OPTIONAL ACCESSORY SPECIFICATIONS

- 8.1 **Low Voltage Alarm.** A low DC voltage alarm device shall be actual on low DC voltage output.
- 8.2 **High Voltage Alarm.** A high DC voltage alarm device shall actuate when the charger output voltage exceeds the preset alarm setting.
- 8.3 **Power failure Alarm.** An AC Power Failure Device shall actuate on loss of AC input.
- 8.4 **Summary Alarm.** A summary alarm relay shall actuate on loss of AC input or loss of charger output or charger output exceeds high voltage alarm setting.
- 8.5 **Diagnostic Lights.** Diagnostic lights shall be provided to indicate AC power, charger in equalize mode, low DC voltage alarm, or high DC voltage alarm.

- 8.6 **Manual Equalize Timer.** A manual equalize timer shall be provided. When manually activated this timer will place the battery charger in the equalize mode. At the end of the time period the timer will automatically return the charger to the float mode.
- 8.7 **Automatic Equalize Timer.** A fully automatic equalizing charger shall be provided. This charger shall sense battery voltage and when required will automatically switch to the equalize mode and completely recharge the battery.

9. INSTALLATION

- 9.1 **Wiring.** The battery charger wiring shall be sized to minimize voltage drop.
- 9.2 **Clearances.** Adequate clearance shall be provided to allow convection cooling of the charger.
- 9.3 **Auxiliary Loads.** All auxiliary loads should be connected to the battery buss and not to battery terminals or charger terminals.
- 9.4 **Code.** The charger shall be installed in accordance with the National Electrical Code, ANSI/NFPA 70-1996.

10. MAINTENANCE

Periodic inspection, dust and dirt removal, and connection tightening shall be scheduled.

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