1. SPECIFICATION FOR BATTERY AND BATTERY CHARGER

1.1 Battery

1.1.1 General

a) The battery shall be Lead Acid / Sealed Maintenance Free type with Planate or tubular positive plates. The battery should confirm to IS : 1651

b) The plates shall be designed for maximum durability during all service including high rate of discharge and rapid fluctuation of load.

1.1.2 Construction

a. Each cell shall be assembled in the heat resistant, shock absorbing, robust, clear glass or hard rubber container with float type level indicator.

b. The cells shall be supported on porcelain insulator fixed on the rack with adequate clearance between adjacent cells.

c. The cell terminals posts shall be provided with connector bolts and nuts, effectively coated with lead to prevent corrosion.

d. Separator between plates shall permit free flow of electrolyte. Separator shall be wood or other acid resisting materials. Proper arrangement to keep the end plates in position shall be furnished.

e. Sufficient sediment space shall be provided so that the cells will not have to cleaned out during normal life.

f. Lead or lead coated copper connectors shall be furnished to connect up cells of battery set.

g. Positive and negative terminal posts shall be clearly and indelibly marked for easy identification.

h. Lead coated bent copper plate, tubular copper lugs, teakwood clamp, bolts, nuts, washers, etc. shall be furnished for connection of outgoing aluminum conductor’s cables.

i. The battery shall be shipped uncharged with the electrolyte furnished in a separate non-returnable container. 10% extra electrolyte shall be furnished to cover spillage during transit or erection.
1.1.3 Racks

i) The racks for supporting battery cells shall be constructed of suitable size M.S Angle / CRCA Sheet steel frame of self-supporting type with multi tier arrangement of batteries.

ii) Numbering tags for each cell shall be attached on the racks.

1.1.4 Fittings And Accessories

Each battery shall be furnished complete with the following:-

1. First charge of electrolyte plus 10% extra
2. M.S / Sheet Steel racks with 3 coats of anti acid paints
3. Stand insulators 5% extra.
4. Cell insulators plus 5% extra
5. Cell inter connectors and end take-off
6. Lead-coated connection hardware plus extra
7. Cell numbering tag with fixing arrangements
8. Teak wood cable clamps with hardware
9. Two (2) extra cell
10. One (1) inter connector bolt wrench
11. One (1) hydrometer Syringe
12. One thermometer with specific gravity correction scale
13. One (1) Cell testing Voltmeter with leads
1.2 Battery Charger

1.2.1 General

a) The charger shall be natural air cooled, solid-state type with full wave, fully controlled, bridge configurations.

b) The charger shall be provided with automatic voltage regulation, current limiting circuitry, smoothing filter circuits and soft start feature.

c) Voltage shall be step less, smooth and continuous.

d) The charger shall be self-protecting against all A-C and D-C transients and steady state abnormal currents and voltages.

e) Voltage setters shall be provided for setting the output of the float boost charge. Setting shall be independent of each other so that setting of one voltage shall not require resetting the other.

f) There shall be separate transformers for float and boost charger.

g) Charger A-C input and D-C output shall be electrically isolated from each other and also form panel ground.

1.2.2 Construction

a) The charger shall be free-standing, floor mounted with sheet steel enclosure with all access from the front.

b) The panel shall conform to the degree of protection IP 42 minimum thickness of the sheet metal used shall be 2 mm.

c) Access doors shall be with concealed hinges and neoprene gaskets. Ventilating louvers shall be covered with fine wire mesh

d) All equipment within the panels shall be arranged in the modular units and laid out with sufficient space for easy maintenance

e) Switches, meters, relays etc. shall be flush mounted on the front of the panels. Nameplates of the approved size and type shall be provided for all circuits and devices.

1.2.3 Charger Equipment

a) All power diodes and control rectifiers shall be silicon type. Rectifier transformer shall be dry type, double wound, with copper conductor and class B insulation.

b) Blocking diodes shall be fully rated and redundant so that failure of a single diode shall not incapacitate the system in any way.

c) Isolating switches shall be heavy-duty, load break type, operated by
external handle with provision for padlocking in ON or OFF position.

d) Change over switch shall be 3 position, 4 pole, and load break type with 2 No+ 2 NC auxiliary contacts.

e) Contactor shall be air-break type with thermal overload relays being in built single-phase prevent or.

f) Fuses shall be HRC type and arranged for easy replacement. Semi conducting device fuses shall be fast acting.

g) Indicating lights shall be low-watt filament type with series resistor. Both lamps and lens shall be replaceable from the front.

h) Meters shall be 96 x 96 mm switchboard type, 250 deg scale, antiglare glass, + 2% accuracy with zero adjuster on the front.

1.2.4 Alarms

a) One (1) ten-point alarm facia shall be provided on charger panel, complete with proper actuating devices, circuitry and legends.

b) The arrangement shall be such that, on occurrence of a fault the corresponding window will light up and stays lighted until the fault is cleared and reset button is pressed.

c) Each time a window lights up, a master relay will get energized to provide group alarm signals for remote panel.

d) Following minimum annunciation shall be provided

1) A.C. supply failure *
2) D.C. voltage low*
3) D.C. voltage high*
4) D.C. system ground*
5) Charger overload*
6) SCR fuse blown
7) Filter fuse blown
8) D.C. output fuse blown
9) Alarm points marked with an asterisk(*) shall have electrically separate set of contacts wired up to the terminal block
10) Alarm contact shall be rated 1A at 110 V D.C and 5 A at 240 V AC.
1.2.5 Outgoing Feeders

   a) Each outgoing feeders shall be provided with double pole switch and with HRC fuses.

   b) Outgoing feeders shall be located in separate module forming part of charger panel with separate cable alley for terminating outgoing cables

1.2.6 Lamp/Space Heaters/Receptacles.

   i) The charger panels shall be provided with:
      - Internal illumination lamp with door switch
      - Space heater with thermostat control

   ii) Lamp, heater circuits shall have individual switch

      fuse units Requirements:

<table>
<thead>
<tr>
<th>A)</th>
<th>BATTERY</th>
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<tbody>
<tr>
<td>i) Type</td>
<td>Lead acid</td>
</tr>
<tr>
<td>ii) Nos. of cells per Battery</td>
<td>55</td>
</tr>
<tr>
<td>iii) Battery nominal voltage</td>
<td>110 Volts</td>
</tr>
<tr>
<td>iv) Ten hour rating to 1.85 Volt/cell at 27 deg.C</td>
<td>100Ah</td>
</tr>
<tr>
<td>v) Proposed method of working :</td>
<td></td>
</tr>
<tr>
<td>a) Float charging (normal)</td>
<td>2.15 Volts per cell</td>
</tr>
<tr>
<td>b) Boost charging</td>
<td></td>
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<tr>
<td>(After complete discharge)</td>
<td>2.75 Volts per cell (Maximum)</td>
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<tr>
<td>vi) Mounting</td>
<td>Wooden racks.</td>
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<thead>
<tr>
<th>B)</th>
<th>BATTERY CHARGER</th>
</tr>
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<tbody>
<tr>
<td>i) Charger</td>
<td>Float &amp; Boost</td>
</tr>
<tr>
<td>ii) Float charging current</td>
<td>25A.</td>
</tr>
<tr>
<td>iii) Type</td>
<td>Solid state</td>
</tr>
<tr>
<td>iv) A.C. Input supply</td>
<td>220 V, 1 phase, 50 Hz</td>
</tr>
<tr>
<td>v) Ripple content in charger dc output</td>
<td>1%</td>
</tr>
<tr>
<td>vi) Outgoing feeder 10 Nos</td>
<td>Each consisting of double pole switch fuse of 32A</td>
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### APPROVED MAKE OF MATERIAL

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Materials</th>
<th>Manufacturer/Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Batteries SMF Type</td>
<td>Exide</td>
</tr>
<tr>
<td>2.</td>
<td>Battery Charger</td>
<td>Universal / Abhay Electric/AMARAJA</td>
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