

- c) The charging is completed if cell voltage and acid density do not increase within one hour. If the battery is fully charged, the cell voltage must be 2.6 to 2.7 Volt.

**The voltage must be measured while the charger is in operation.** When the charger is switched off, the battery voltage drops to the normal cell voltage of 2 to 2.2 Volt.

In a fully charged battery the acid density must be  $1.285 = 32^\circ \text{ Bé}$  (in the tropics  $1.23 = 27^\circ \text{ Bé}$ ). The acid density must be meas-

ured with the acid at the specified level (see Section A).

- d) **During the charging operation the charging room should be well ventilated. Do not use open lights. Danger of explosion due to formation of oxyhydrogen.**
5. Disconnect the charger and check again the acid level.

**Note:** Wash off splashed or split acid with water or neutralize it with soda solution or ammonium chloride. Dry the battery.

### E. Re-charging of Battery with Rapid Charger

In urgent cases discharged batteries can be charged with a considerably higher amperage than the normal charging amperage. A lot of time is saved this way, because the rapid charging will only take approx. half an hour. Rapid charging, however, should not be made the rule and should only be used **on sound batteries, which have been used in service, but never for the initial charging of a battery.** A rapid charge should in all cases be followed by a normal charge after a short period of operation, in order to form the plate completely. Check the condition of the battery before the beginning of rapid charging. It is useless to charge defective batteries with this method, because the damage to the battery will only be made worse. Only repairing or the installation of a good battery will help in these cases.

The modern rapid chargers on the market are automatically controlled. The amperage and the duration of charging is controlled in such a way that overcharging and overheating of the battery will be safely avoided. Strictly adhere to the operational instructions for the respective charger employed.

### F. Putting new Batteries into Operation

New batteries are generally delivered empty. Initial charging of the battery should be carried out according to the instructions supplied with the battery.

The following directions are valid as a rule:

1. Unscrew the filler caps and fill the cells with chemically pure accumulator acid with a specific gravity of  $1.285 = 32^\circ \text{ Bé}$ .

The acid level should be 10 mm above the top edge separators and 15 mm above the top edge plates.

2. Then put the battery aside for 5 to 6 hours, so that the plates have sufficient time to soak up the electrolyte.

**Note:** The acid level will drop somewhat during this period. Prior to begin of the charging operation be sure that the acid level is above top edge plates, top up with acid of same gravity, if required.

3. Charge the battery with 5% of the rated capacity or less until the voltage of each cell increased to 2.5–2.7 Volt during the charging and all cells are gassing lightly.
4. Measure the temperature of the battery acid periodically. Reduce the charging rate if the temperature rises above  $40^\circ \text{ C}$ .
5. After the completion of the charging check the acid density (specific gravity  $1.285 = 32^\circ \text{ Bé}$  at  $+20^\circ \text{ C}$  to  $+27^\circ \text{ C}$  acid temperature) and correct, if required.

If distilled water or acid must be added, re-charge the battery for a short period to make sure that the liquid is uniformly mixed.

6. Close the filler holes with filler caps 2 hours after the completed charging at the earliest, possibly even later than that. Wash off the spilt acid with water or neutralize it with soda solution or ammonium chloride. Dry the battery.

## G. Laying-up of Battery

If the battery will not be used for a longer period, treat the battery as described below:

1. Charge the battery according to instructions (see Section C).
2. Apply acidproof grease to the terminals and cell connectors.
3. Store the battery in a cool and dry room but protected against freezing.
4. Discharge the battery and charge it again

once a month. Never overcharge the battery. Charge it only so much that all cells are gassing lively. Check acid level.

5. Before each third re-charging discharge the battery first to 1.75 Volt per cell and then charge again.

**Note:** A battery filled with acid must never be stored uncharged, because the plates will become unserviceable after a short period due to oxidation!