

In general, the test should be conducted as follows:

1. Press the contact prods of the cell tester firmly against the two terminals of a cell (Figure 15-40/4).
2. After a max. load duration of 10 seconds read the voltage indicated by the voltmeter.

Note: If the battery is fully charged and in good condition, the voltage must not drop below 1.8 Volt.

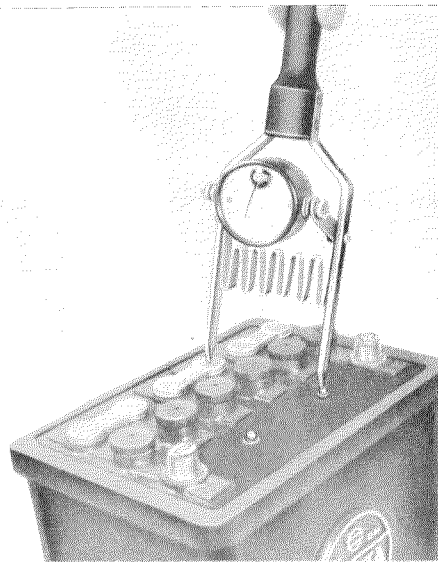


Figure 15-40/4

3. Check all cells in this way.

A more accurate test is the determination of the battery starter current load. To do this, apply a shock load at three times the amperage indicated by the battery rated capacity; after 30 seconds the cell voltage should not drop below 1.6 Volt, while at five times the amperage of the battery rated capacity the cell voltage should not drop below 1.4 Volt.

Note: For this purpose use a constant amperage tester which shows the amperage as well as the voltage simultaneously.

D. Normal Re-charging of Battery

Be sure to recharge the battery if the acid density has dropped to $1.12 = 16^{\circ} \text{ Bé}$ (in the tropics $1.08 = 12^{\circ} \text{ Bé}$), or the voltage of the individual cells has dropped to 1.8 Volt, respectively.

1. Unscrew the filler caps of the individual cells.
2. Check acid level.
If the acid level does not exceed the plates, top up with distilled water prior to charging the battery until the plates are fully covered.

Note: The separators extend beyond the top edge plates by 5 to 10 mm depending on make of battery.

3. Connect battery to charging unit. Clamp the positive cable of the charger to the positive cable of the battery and the ground cable of the charger to the negative pole of the battery.
4. Charge the battery with one tenth of the rated capacity.

Note:

- a) During the charging operation the temperature of the acid must not rise beyond 40° C (in the tropics 45° C). If the acid temperature becomes higher, the charging amperage must be reduced and the charging period extended.
- b) If the battery plates are already sulphated (indicated by a white deposit on the positive and negative plates), the battery cannot be normally charged. The degree of sulphation determines the charging current tolerated by the battery due to the changed counter-voltage. It is therefore a basic rule to charge approx. 1 % of the rated capacity with very low charging current. Increase charging current only with dropping counter-voltage.

- 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° 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.