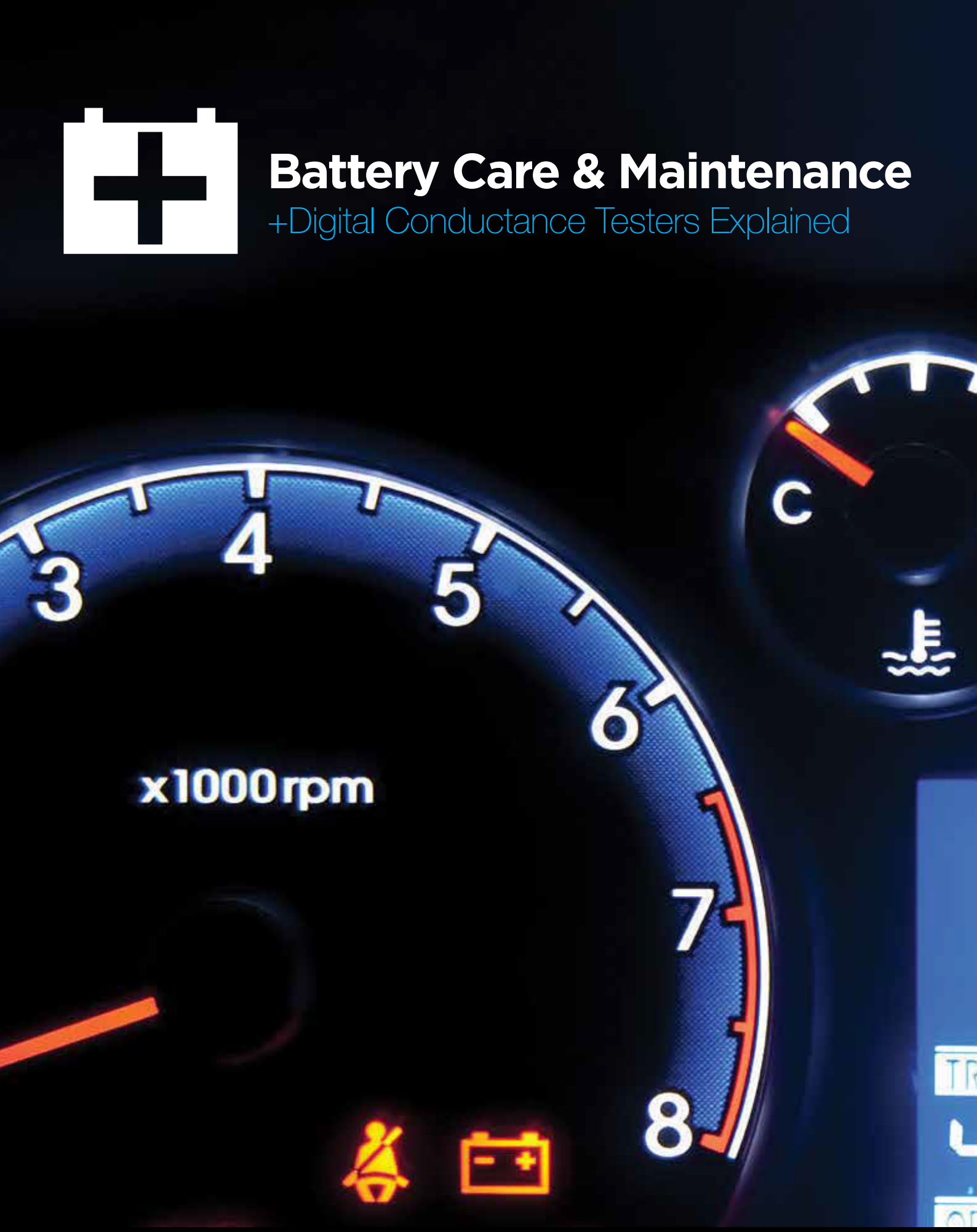
Battery Care & Maintenance

+Digital Conductance Testers Explained



Platinum International Limited
Platinum House, Bailey Road, Trafford Park, Manchester, M17 1SA. Tel. 0845 063 9999
Fax. 0845 063 8888 | sales@platinuminternational.com | www.platinuminternational.com

Registered in England number 4397197

PLATINUM
INTERNATIONAL

Battery Care & Maintenance

A) STORAGE

1. Always rotate your stock. Practice FIFO (First In, First Out). Batteries slowly lose their charge and good stock rotation stops the batteries going flat in storage and makes sure that the customer buys a good quality battery.
2. Store batteries in cool, dry, well-ventilated areas.
3. Store batteries in an upright position.
4. Store batteries on racks or on pallets, not on the floor. (Small stones or sharp points on a concrete floor can damage the base of the battery and cause leakage.)
5. Make sure handles are left in the flat (down) position. Upright handles are more likely to be damaged.

B) MAINTENANCE OF STOCK

Wet-Charged Batteries

1. Check the open-circuit voltage of the batteries in your stock every month using a digital voltmeter or a multimeter. If any have a voltage below 12.50V (6.25V for 6V batteries), perform a refresh charge.

C) COMMISSIONING

Wet-Charged Batteries

1. Do not supply a battery to a customer (end-user) if the voltage is below 12.50V (6.25V for 6V batteries). Charge any batteries with voltages below these values.
2. We recommend you check the condition of the battery before selling it using one of the methods described in Section G.

D) ELECTROLYTE LEVELS (ACID LEVELS) IN STOCK

NOTES: PLEASE READ BEFORE ADJUSTING ACID LEVELS

- Do not top up to the maximum level, a battery that needs charging (Levels rise on charging). However, if the levels are below the tops of the separators, top up with distilled or de-ionised water until the separators are just covered.
- Adjust to the maximum level after the battery has stood for at least an hour after charging.
- Never over fill a battery. (The acid may come out of the vent-plugs when the battery is being charged).

1. When the battery is in service, the electrolyte levels should be checked and adjusted to the levels given.
2. Use only distilled or de-ionised water for topping up. (Sulphuric acid should never be used except for the initial filling of a battery.)
3. If the battery has a maximum level line on the side of the container, fill to this maximum level.
4. If there is no maximum line, but there are filling tubes projecting from the bottom of the lid, fill to the bottom of the tubes.
5. If there is not a maximum line nor filling tubes in polypropylene batteries, fill to 7mm (0.25 inches) below the bottom edge of the lid-skirt.
6. If there are no filling tubes in hard-rubber batteries, fill to 15mm (0.5 inches) above the tops of the separators.
7. Sealed batteries do not require maintenance.

E) SELECTING THE CORRECT BATTERY FOR THE APPLICATION

Car And Commercial Vehicle Batteries

1. Select the specified battery from the application section of this catalogue.
2. On 24 Volt systems, or when 2 of 12 Volt batteries are fitted in parallel, both batteries should be replaced at the same time. Failure to do this will result in greatly reduced battery life for the new battery that has been fitted. When batteries are joined in series, the negative terminal of one battery is connected to the positive terminal of the other, giving a total voltage of 24 Volts. The ampere-hour capacity of the system is the same as that of the individual batteries. When batteries are joined in parallel, the positive terminals of the 2 batteries are connected together, and the negative terminals of the 2 batteries are also connected together. The voltage of the system remains unchanged at 12 Volts, but the ampere-hour capacity of the system is double that of the individual batteries.

Leisure Batteries

1. Use the battery with the performance and size recommended by the equipment supplier.
2. We recommend that a leisure battery in a cycling application should be sized so that it is not normally discharged to more than 50% state of charge. This will ensure that the battery gives a good life. For example, a load of 3A for 10 hours will discharge a battery by 30Ah. If this represents 50% state of charge, we would recommend a 60Ah battery.

F) REMOVING BATTERIES AND INSTALLING BATTERIES ON VEHICLES

1. Switch off all electrical loads and remove the ignition key.
2. Disconnect the earth-connector first. (This is normally the negative on modern vehicles). This can result in the loss of memory settings; please refer to the vehicle handbook.
3. Disconnect the live-connector second.
4. Remove the hold-down clamps.

Preparation Of A Battery For Fitting

1. Check that the battery has the correct polarity for the vehicle.
2. Check that the battery has the correct height for the vehicle. (If a battery is too high, it can short out on the bonnet or the bottom of a seat, or it can damage the bonnet).

3. It is good practice to place the old and new battery side by side to compare polarities, hold-downs and performance levels. Some batteries have hold-downs at both the sides and ends. Only the ones used for securing the battery on the vehicle need to be checked.
4. Check that the battery is clean and dry.
5. Check that the vent plugs or manifolds are firmly in position.
6. Check that the battery has a voltage of above 12.50V. If not, charge the battery or use another that has a voltage above 12.50V.
7. Ensure the 2 terminal caps are still fitted at this stage.

Preparation Of The Vehicle

1. Clear away any items on the battery tray, which might damage the battery. (Placing a heavy battery on a piece of sharp grit can puncture the bottom of the battery).
2. Check that the connectors, the hold-down clamps and the tray are clean and corrosion free. (If there is any corrosion, hot water will instantly remove this). If there is severe corrosion, which might affect the stability of the battery or has affected other parts of the engine compartment, have the vehicle checked by an authorised distributor.
3. Check that the alternator drive belt tension is correct. Refer to the vehicle handbook or service manual.
4. It is recommended that the electrical system and particularly the charging system of the vehicle be checked to make sure it is operating correctly. Refer to the vehicle handbook or service manual.

Installing The Battery

1. Fit and tighten the hold-down clamps. These should be tight enough to secure the battery and not allow it to move. DO NOT OVER TIGHTEN.
2. Connect the live-connector first to the correct battery terminal (normally the positive) after removing the terminal cap. DO NOT OVER TIGHTEN.
3. Connect the earth-connector to the other terminal after removing the terminal cap. DO NOT OVER TIGHTEN.
4. Place the 2 terminal caps on the old battery that has been removed from the vehicle to avoid the possibility of short-circuits.
5. Replace onto the new battery any components that have been taken from the old battery such as exhaust tubes, vent elbows, terminal covers, removable hold-down strips etc.
6. The use of petroleum jelly is not necessary on modern polypropylene batteries, but there is no disadvantage in using it. Smear lightly on the terminals. It is still recommended for hard rubber batteries.
7. For non-automotive applications, install the battery in line with the equipment suppliers recommendation.

G) CHARGING OFF-VEHICLE

NOTES: PLEASE READ BEFORE CHARGING BATTERIES

- Do NOT charge a battery if its temperature is below 3 degrees C as the electrolyte may have frozen.
- Charging the battery on the vehicle is not recommended.
- Refer to the relevant section about removing the battery from the vehicle.
- Sealed vehicle batteries should be charged only on constant potential chargers or smart chargers. Do not charge on constant current chargers or boost chargers. Sealed vehicle batteries do not allow any access to the electrolyte and so cannot be topped up. There are no removable vent-plugs or manifolds. The battery is able to vent gases through breathing holes, and so it is not strictly sealed.
- A new, unused battery with a voltage below 11.00V should be scrapped and not charged.

General Procedure

1. Check the electrolyte levels in all the cells. If these are below the tops of the separators, top up with distilled or de-ionised water to the tops of the separators. Do not fill to a higher level before charging, but adjust the levels after charging.
2. If you are using a constant-current charger or boost charger, remove the vent-plugs or manifolds before charging. There is no need to remove the vent-plugs or manifolds if you are using a constant-potential or a smart charger.
3. Check that the charger is switched off.
4. When fitting the charger to the battery, connect the positive lead to the positive terminal and the negative lead to the negative terminal.
5. Switch on the charger. See below for the correct charging conditions depending on your type of charger.
6. Stop charging if the battery begins to gas freely (some gassing is normal during the last stages of charging) or if the battery temperature rises above 50 degrees C.
7. Switch off the charger .
8. It is good practice to wait for about 20 minutes for the gases to clear before removing the leads from the battery, as some chargers remain live and can cause a spark.
9. Check the electrolyte levels in all the cells and top up if necessary.
10. Refit vent-plugs or manifolds if these have been removed.
11. Wash the battery with hot water and dry it.
12. Note: Many customers severely underestimate the amount of time necessary to charge a flat battery. This results in customers returning batteries, saying that they have charged the battery but that it is not holding charge.

Battery Care & Maintenance (cont...)

Open-Circuit Voltage And High Rate Discharge Testers

1. Measure the open-circuit voltage of the battery using a digital voltmeter or a multimeter. To obtain a stable voltage, the battery should not have been used or charged for a minimum of 12 hours before checking the voltage.
2. If the voltage is below 12.50V, charge the battery in accordance with the section above.
   NOTE - this type of tester will only give an accurate result on a fully charged battery. A common mistake is to use this type of tester on a discharged battery, and to judge that battery is faulty if a cell is seen to boil. A boiling cell on a flat battery does not mean that the battery is faulty.
3. Apply a load equal to half the SAE CCA cold cranking Amps for 15 seconds. Observe the voltage during this time and record the voltage after 15 seconds. You will find the CCA in the battery specifications section of the catalogue or on the label. Use an approved, calibrated tester.
4. If the voltage after 15 seconds is stable and above 9.60V, the battery is in a satisfactory condition with no faults.
5. If the voltage is below 9.60V after 15 seconds and is falling rapidly, the battery should be replaced. If it falls very slowly this indicates a discharged battery, recharge and re-test.

H) CHECKING BATTERY PERFORMANCE

ELECTRONIC TESTERS USING CONDUCTANCE TECHNOLOGY
Please refer to page 115.

Drop Testers

1. Drop testers have 2 spikes that are pressed into the tops of the battery terminals and a simple voltmeter to check the discharge voltage.
2. We do not recommend these testers as:
   - They are potentially unsafe to use as most types produce a spark when the spikes are first pressed into the terminals, which could result in an explosion.
   - The discharge rate is similar for all sizes of battery, and so they do not give a good indication of battery condition.
   - They give misleading results on discharged batteries.

I) MAINTENANCE IN SERVICE

General

1. Always refer to the information contained in the handbook or brochure supplied with the vehicle or equipment.

Definition Of Maintenance-Free

1. Some starter batteries for cars and commercial vehicles conform to the relevant sections of BS EN 60095-1: 1993 Amendment A12; 1999 for maintenance free characteristics. This means that in normal vehicle applications in temperate climate operation, it is not necessary to add de-ionised water.
2. Some batteries are designed to be topped up with de-ionised water if water should be lost owing to, for example, a charging system fault, prolonged operation in hot climates, excessive off-vehicle charging etc.
3. NOTE - the term maintenance free applies only when the battery is used in an approved automotive or commercial vehicle application.

Definition Of Low Maintenance

1. Low maintenance batteries in normal vehicle applications in temperate climate operation need water addition only at yearly intervals.
2. Some batteries are designed to be topped up with de-ionised water if water should be lost owing to, for example, a charging system fault, prolonged operation in hot climates, excessive off-vehicle charging etc.
3. NOTE - the term low maintenance applies only when the battery is used in an approved commercial vehicle application.

Battery Maintenance In Automotive Applications

1. Carry out the checks below at the recommended vehicle service intervals.
2. Check the electrolyte level and top up with de-ionised water if necessary. See section above for details about how to do this. (As explained above, it should not be necessary to add water unless the battery has encountered exceptional conditions).
3. Check that the battery is clean and dry and that the vents are not obstructed.
4. Check that the terminal-connectors and the hold-down clamps are securely connected and corrosion free.
5. If the battery is on a vehicle that is not to be used for an extended period (more than 1 month), disconnect it from the vehicle. Refer to Section G for information about removing the battery from the vehicle. Modern cars have electrical accessories that slowly discharge the battery even when the ignition key has been removed. Some accessories such as alarms, trackers and phones can cause a battery to become discharged in a few weeks.
6. Fully charge the battery before storage and give it a refreshing charge every 3 months. See G on page 119.

Battery Maintenance In Non-Automotive Traction And Deep Discharge Application

1. Typical applications are lawnmowers, electric wheelchairs, caravans etc. The Leisure battery range is recommended for these applications; standard vehicle batteries are not suitable.
2. Ensure that the battery is always kept in as high a state of charge as possible. Always re-charge immediately after use.
3. Check the electrolyte levels on a regular basis dependant upon use. Charging batteries regularly on a non-vehicle charging system may result in a higher rate of water loss.
4. Check that the battery is clean and dry and that the vents are not obstructed.
5. If the battery is not to be used for an extended period (more than 1 month), fully charge it before storage, and give it a refreshing charge every 3 months.

Battery Maintenance In Non-Automotive Float Applications

1. Typical applications are motor generators, stand by applications etc. The Leisure/SLA/GEL battery range is recommended for these types of applications; standard vehicle batteries are not suitable.
2. Batteries used in these applications should be charged every 2 years or more frequently (Continuous charging, even from a well-controlled charging system, will result in internal degradation of the battery. This could result in the battery not giving its predicted output when required even though the battery appears to be fully charged).
3. Ensure that the battery is always kept in as high a state of charge as possible without causing excessive overcharge. Always recharge immediately after use.
4. Check the electrolyte levels on a regular basis dependant upon use, but not less frequently than monthly. Charging batteries continuously on a nonvehicle charging system may result in a higher rate of water loss.
5. Check that the battery is clean and dry and that the vents are not obstructed.
6. If the battery is not to be used for an extended period (more than 1 month), fully charge it before storage, and give it a refreshing charge every 3 months.
7. Best practice is to define a regular maintenance routine and to record the results. This should include such variables as the amount of de-ionised water added to each cell, specific gravities in each cell, battery voltage etc.

Use Of Battery Additives

1. We do not recommend the use of battery additives.
2. The use of these invalidates the guarantee.

Digital Conductance Testers Explained

The electrical performances given on a battery's label provides information as to its ability to supply sufficient current to start the engine and to run the various electrical loads. The rate are in accordance with EN 50342 the specification for lead acid starter batteries.

The Cold Cranking Amps (CCA) is relevant to the current required to turn the engine over (particularly in cold conditions when a battery needs to work harder).

The Ampere hour capacity or reserve capacity measures the stored energy available for ancillary equipment and periods of inactivity of the vehicle.

There are various national and international standards which are used to illustrate the batteries ability to perform as required and perform the tasks they are designed for.

As clearly visible from the later text there are very strict and specific tests to which the batteries must comply with.

There are many testers now available within the automotive industry which claim to be able to evaluate batteries to these specifications and supply results in accordance with these specifications and in many cases these are relatively low cost (£200 - £300) per unit.

None of these testers carries out the specific test requirement. The testers work on either the impedance or internal resistance of the battery. The testers then rely on the use of an internal algorithm (developed by the manufacturer and different in every case) which attempts to compare the impedance to state of health. Then to use this to estimate the batteries potential CCA or available capacity.

Most testers require the battery to be in a fully charged condition to give the most accurate reading, when a battery is in a partial state of charge (as most batteries are) it is more difficult to assess the battery "Performance rating" as these testers claim to.

These Readings Are Often Misleading Due To The Following:

- Battery temperature is crucial when testing. None of the testers assess battery temperature (Some claim to have temperature compensation but this is generally not graduated and relies on user estimates).

  Different battery manufacturers make batteries in different ways (grid technology and design, separator material and manufacturer etc); this creates different impedance and internal resistances for the same battery rating. Testers ideally need to be calibrated to specific battery suppliers. True battery capacity and CCA can only be assessed by carrying out the tests as laid out in the EN (European Norm) JIS (Japanese industrial Standard) or SAE (US society of Automotive Engineers) specifications at the specified temperatures and currents listed.

  Any tester using an algorithm to try and match actual readings will have difficulty in producing accurate and consistent performance data in an instant test with no loads applied.
- These testers do not actually discharge the battery at all, so no current is drawn
- These testers do not actually discharge the battery, so no end voltage can be measured and no period of time elapses
- The test only lasts a few seconds
- The battery temperature is not at -18C, it could be anything from below zero up to 40C

The equipment required to test these correctly to the above ratings costs in excess of £25,000, the two main suppliers being Bitrode and Digatron.

It is advisable to refer to the document 'EN 50342'which explains in great detail the rigorous tests that the batteries must comply with in order to be classified with regards to CCA Ah Capacity and reserve capacity all of which are relevant to a batteries state of health.

Digital Conductance Testers Explained *(cont...)*

Essentially these testers have been developed as a tool to assess if a battery has failed totally or can be recovered to continue in service. The intended use being "end of life assessment" not as a goods inwards check. The readings of CCA and capacity are at best estimates.

Users of these testers have sometimes complained that new batteries do not appear to achieve the CCA performance that is on the label (according to the tester read out).

- Electronic Conductance testers were NOT developed to test new and unused batteries.
- They have been specifically developed to assess the condition of USED batteries, and to establish if a battery has some useful life left or is at or close to failure.
- The aim was to determine quickly and with no skill if a battery is capable of continuing useful service or if it's at the end of its useful life.
- Why cannot new batteries be tested like used batteries? New and unused batteries have not always achieved their operating conductance level at the point of delivery; this creates a problem for the electronic tester.
  EN 50342 requires a number of charges and discharges are carried out, to assess a battery's performance. This is also the case when assessing any new battery. Basically all batteries require "Conditioning" prior to testing.
- Batteries at the point of delivery have necessarily been in storage for various lengths of time thus the state of charge will be quite variable. State of charge is a crucial part of the instruments algorithm the battery has to be in a known condition.

Different manufacturing operations and different battery designs will create different states of charge for the same voltage. This makes assessing battery condition and performance potential, with variable constructions and states of charge, very difficult. A Conductance tester can normally confirm that a battery is unserviceable. Their ability to assess the real performance of a battery is limited for the many reasons stated.
Any "CCA READING" given by one of these testers should at best be considered only as a guide to actual performance.
It is our experience that when testing a batch of batteries with these testers that the results appear to be "VARIABLE". Some show the batteries as OK, some will be low, and rather strangely some will be high. And if the same tests are performed on the same batteries a few hours later, different results are often obtained.

It is unlikely that batteries will perform at levels significantly in excess of the label ratings. It is not in the manufacturer's interest to underrate a battery.

The equipment that any good battery supplier would recommend for the testing of batteries is:

- A voltmeter to check open circuit voltage.
- A variable high rate discharge tester to check the products ability to supply a high current to replicate that required by the starter motor applying a real load to the battery.
- A hydrometer to check the specific gravity and condition of the electrolyte.
- A good quality charger to enable discharged units to be correctly and fully recharged .

With these 4 pieces of kit it is possible, with some training, to confirm that batteries are either fully charged and serviceable, discharged and requiring recharge or further testing, or service abuse not covered by warranty or have unusually failed due to a manufacturing defect.

Please Note: Whenever you are using any testing equipment, please ensure you are using the correct safety equipment, such as eye protection goggles.

S.A.E.

Society Of Automobile Engineers) Uk Norm
-18ºC
Time = 30 sec
End voltage = 1.2 vpc (7.2 volts)

E.N.

(European Norm) New European Accepted Standard
-18ºC
Time = 10 sec + Total Time at 60% of CCA = 90 secs
End voltage = 1.2 vpc (7.2 volts)
End Voltage = 1.0 vpc (6 volts)

D.I.N

(Deutsche Industrie Nationale)
-18ºC
Time = 30 sec + Total Time = 90 secs
End voltage = 1.5 vpc (9 volts)
End Voltage = 1.0 vpc (6 volts

I.E.C.

(International Electrotechnical Commission)
-18ºC
Time = 60 sec
End voltage = 1.4 vpc (8.4 volts)

C.A.

(American BCI standard)
Also known as M.C.A (Marine Cranking Amps)
0ºC
Time = 30 sec
End voltage = 1.2 vpc (7.2 volts)