

Characteristics and Fault Diagnosis

Manbat lead acid automotive batteries are built to the highest standards. They are manufactured, in most cases, to correspond with vehicle manufacturer's requirements and specifications.

Nevertheless, it is important to understand that:-

A wet battery is 'alive'. Whether it is in service or in storage it has a finite life span. If stored in a wet (filled) condition all batteries will slowly self-discharge. The higher the ambient (storage) temperature the greater the rate of self-discharge.

To ensure that batteries are not allowed to discharge to the point where they are either damaged (sulphated) or so that they are incapable of starting the vehicle or operating equipment, regular voltage checks should be made (monthly).

Batteries with a voltage of 12.4v or below should be recharged. Recharging must not be effected by the means of a rapid charger. Ideally a recharge rate of $\frac{1}{10}$ th of the battery's capacity should be applied for up to 12 hours. At the end of this period, a fully charged battery will read over 12.65v and all cells should be gassing freely. Remember if a battery has vent plugs, these should always be removed before charging.

Battery problems - Non-manufacturing faults

Sulphation:

If a battery is allowed to stand in a discharged state for an excessive amount of time, a chemical reaction takes place, which can permanently impair performance - this is sulphation. Sulphation can be seen as a fine white/grey coating on the plates. In most cases this signifies irreversible damage and the battery will not be serviceable. This damage can occur either in storage or if the battery is installed in a vehicle (or equipment) that is not used for a period of time, for example a tractor, motorcycle, or boat. Even a car or truck that is stored with the battery connected can still damage the battery in this way. This is because there is a permanent drain on the battery from the clock, alarm etc. As a result the level of charge in a battery falls, and after a period of time sulphation will build up on the plates.

The sulphation (lead sulphate) hinders the chemical reaction between the acid (electrolyte) and the active mass (lead compound) in the plates and prevents the battery from operating as normal. This is not a manufacturing fault.

Wear and Tear:

During the charge and discharge cycle, material from the battery plates (active mass) is in motion, through the electrochemical reaction that produces electricity. Every time the battery goes through a charge and discharge cycle, a small amount of the active mass is lost from the plates. Because the ultimate life of a battery depends on so many factors, it is impossible to stipulate a minimum/maximum life expectancy. This process of normal ageing through the charge and discharge cycle will eventually cause the battery to lose capacity, and it will come to the point where the battery can no longer start the vehicle/equipment. This is not a manufacturing fault.

A battery only has a finite number of cycles (x) it can go through before it loses its capacity to perform. Vehicles with high usage such as taxi's, minicabs, trucks, and buses will often subject the battery to its x number of cycles but over a much shorter time. As a result, batteries on these vehicles can display the above symptoms after 12-24 months. This is not a manufacturing fault.

Deep cycling

As mentioned above, every time a battery goes through a charge and discharge cycle a small amount of the material from the plates is lost. If a battery is subjected to deep discharging (i.e. over 40%) and then rapid charging, this process is accelerated. Additionally, if during the recharge the battery is not adequately compensated for the discharge cycle, the battery will quickly exhibit loss of performance. Even after recharging the voltage will be low (under 12.4v) but the cells will generally give even readings. This is not a manufacturing fault.



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Overcharging:

If the regulator is not set properly, then the battery can be subjected to an excessive charge. If left unchecked the battery will overheat and will start to evaporate the electrolyte. The overcharging will cause the accelerated break up of the active mass on the plates and the battery will lose performance. This is generally obvious from the examination of the battery - the acid levels will be very low, and quite often a black coating will be visible on the filler caps. This is not a manufacturing fault.

Physical damage:

If the battery is fitted incorrectly, if the connector leads are hammered onto the terminals, or if the leads are not properly fastened, the battery will have obvious damage to the casing or the terminals. This is not a manufacturing fault.

Incorrect application:

The batteries recommended by Manbat are those equal to or above the original equipment specification. Fitting a smaller or less powerful battery will result in a shorter service life and earlier failure, which will generally manifest itself as deep cycling/premature wear and tear. This is not a manufacturing fault.

Battery problems - Manufacturing faults

Due to the high demands of the OEM market, and taking into account the technical and manufacturing standards adhered to by Manbat, the rate of genuine manufacturing faults is negligible.

Short circuit/dead cell:

Typically seen in a battery with a short (under 12 months) service life. One cell will show a dramatically lower specific gravity (SG) reading than the others. The affected cell will boil visibly under a high rate discharge test. In some cases it may also be visible as a sulphated cell (see above). The remaining cells will show a good SG reading of 1.26 or over.

Internal Break:

The battery will have good SG readings but no voltage.

Summary

Provided the right battery, in the right condition is used for the right application, the number of battery problems encountered will be minimum. All batteries have a finite life span, which is governed by the conditions under which the battery operates. Battery failures caused by sulphation, wear and tear, or deep cycling are not manufacturing faults and are not covered by the Manbat guarantee.

It is important to remember that under normal operating conditions, a battery cannot become discharged on its own. The reason for this discharge is normally attributable to:-

- Malfunctioning alternator, regulator, or starter motor
- Slipping fan belt
- Electrical fault
- Excessive use of electrical consumers - car phones, air conditioning etc
- Long standing time without recharge
- Boot light/glove box malfunction
- Vehicle lights being left on

If a battery is consistently used/left in a discharged condition, it will eventually reach a condition where even a prolonged recharge will not return to its original condition. This is classified as deep discharge/undercharging and is not a manufacturing fault.

If a battery is continuously deeply discharged by, for example, stop start motoring and heavy use of the car phone, air conditioning etc, and is then not adequately recharged, it will lose its performance relatively quickly. This is called deep cycling/wear and tear and is not a manufacturing fault.