

## Introduction

This training course deals with GS Yuasa battery testing and warranty handling.

It will provide you with information on battery testing equipment and warranty handling.

The course consists of the following modules:

- GS Yuasa warranty conditions
- Visual inspection of battery
- Testing methods & equipment

Each module has its own training video, downloadable resources and some will be followed by a short multiple-choice test.

Once you have completed all modules there will be a final test to check your understanding and knowledge.

Once passed you will earn a certificate for the completion of this course.

## Module 1 - GS Yuasa Warranty Conditions

All batteries sold by GS Yuasa batteries have a warranty against premature failure due to manufacturing or material defects for a period of 12 months.

Most distributors and retailers will offer a longer warranty; however, this is administered independently of GS Yuasa.

In the event of a warranty claim, the battery must be returned to the original seller with proof of purchase.

Subject to a visual inspection and testing by the seller, the battery will be exchanged free of charge if deemed to have failed under warranty.

There are several points that must be taken into consideration when dealing with a warranty claim:

The seller has the right to test, and if necessary, charge the battery before agreeing to a claim against the warranty.

This does not affect the statutory rights of the customer in any way.

The warranty is subject to GS Yuasa Battery Sales (UK) Ltd.'s terms and conditions of sale.

The warranty is only valid for the purchaser of the battery and is in no way transferable.

The warranty starts from the date of purchase of the original battery.

If the battery is subsequently replaced under warranty the new battery is subject to the warranty sold with the original battery.

This is not renewed or extended because of the replacement.

GS Yuasa's recommend market warranties are based on battery type, technology, specification and application.

These can be adjusted to suit each distributor's internal warranty conditions.

There are also a range of exclusions to the manufacturer's warranty based on battery use in high abuse applications.

The GS Yuasa battery warranty does not cover failure resulting from wear and tear, misuse and negligence either before or during use. Examples of this are:

- Sulphation
- Undercharging
- Deep cycling
- Overcharging
- Physical damage
- And incorrect battery application

## Module 2 - Visual Inspection of Battery

Before carrying out any tests a visual check must be made.

Begin by checking that it is the correct specification and technology battery for the vehicle using the appropriate GS Yuasa Battery Look-up.

Then check that the purchase date falls within the warranty period and the unique ID number on the recharge label is the same as the one recorded on the original proof of purchase.

The warranty is deemed invalid if the recharge label has been removed as there is no way to tell if this battery is the one originally purchased

If the battery complies put on the appropriate personal protective equipment and carefully examine the battery for signs of the following conditions that will invalidate the warranty:

- Electrolyte leaks
- External damage
- Swollen battery container walls
- Terminal damage or corrosion
- Overfilling
- Or cloudy and discoloured electrolyte

Check the battery for signs of any external damage which may also be the cause of electrolyte leaks.

A swollen battery may be a sign that it has been left in a discharged state for extended time periods, resulting in permanent damage caused by sulphation.

It may also be a result of overcharging which causes heat and pressure to deform the battery case.

Check the battery terminals and surrounding area for signs of any damage caused by incorrect lead connection.

Examples of this are terminal clamps forcibly removed or installed and incorrectly tightened.

Both can cause serious damage.

If the battery is not a sealed type, check for signs of acid leakage.

Overfilling when in service can cause electrolyte to leak during normal operation.

This is because the electrolyte heats and expands during charging.

On non-sealed types remove the battery filling plugs and check for cloudy or discoloured electrolyte, which indicates overcharging or excessive vibration in service.

If any of these conditions are found during inspection the warranty claim should be rejected as the battery has failed due to in-service abuse.

## Module 3 - Testing Methods & Equipment

Traditionally testing has been carried out using techniques and equipment that pose a serious Health & Safety risk.

These include:

Hydrometer and refractometer testing that require potentially hazardous electrolyte samples to be removed from each cell and analysed.

High rate discharge and drop testing which requires the battery to be fully charged and then excessively discharged.

This causes damage during testing and generates dangerous sparks and heat.

GS Yuasa do not recommend the use of these methods due to the inaccuracy of the test results and health and safety dangers.

GS Yuasa recommend using a conductance tester for all warranty and standard battery tests.

As such we offer a range of easy to use and accurate conductance testers.

Conductance testing measures both the state of charge and state of health of a battery.

Firstly, the tester displays the state of charge as a voltage reading.

To measure the state of health a fixed frequency AC pulse is introduced into the battery through the positive terminal.

The resulting signal measured at the negative terminal is then used in a calculation against a fixed algorithm.

The amount of cold cranking amps remaining and therefore the battery's state of health is then displayed.

Conductance testers are usually also capable of detecting cell defects such as short circuits, open circuits and low acid concentrations.

If a battery is in good condition, fully charged and has encountered low levels of wear its state of health will be good.

This battery will start the engine and meet the vehicles electrical demands.

If it is completely discharged its state of charge will be low, but it's state of health will still be high.

This means that after recharge all its cold cranking amps will be available.

Every time the battery is cycled it loses a small amount of its rated cranking performance specification.

These losses can never be recovered and over time its state of health deteriorates and its performance is reduced.

These losses accumulate, and as the battery reaches the end of its service life it can still be fully charged but will have a low state of health.

This means that due to the performance deterioration the battery is no longer fit for purpose.

If the battery has passed the visual inspection process carrying out a conductance test will establish if the battery has failed internally due to a manufacturing or material defect.

The wording of the results displayed on the conductance tester vary depending on its manufacturer and a number test results are possible.

Only if the tester indicates BAD CELL should the battery be replaced under the GS Yuasa warranty conditions we previously described.

There may be other variations of the BAD CELL decision depending on the tester manufacturer.