Understanding the battery specifications

DIN Number 72310 1988

Used to identify battery types, the DIN (German Industrial Standard) Part Number system is traditionally used within Europe, but has now been replaced by ETN number system.
e.g. 560.49

- 1st digit – Voltage
    - 1-2 = 6 Volt Battery
    - 5-7 = 12 Volt Battery
- 2nd & 3rd digits – Nominal capacity
    - 560 = 60Ah @ 20 hour rate
    - 660 = 160Ah @ 20 hour rate
- 4th & 5th digits – The unique code number referencing battery performance and features

ETN Number

The ETN (European Type Number) was introduced to replace the DIN Number during Europeanisation of Battery standards. The ETN is a combination of the DIN numbering system which facilitates the changeover and gives further technical details.

The introduction of the ETN system has led to nearly 2000 part numbers being issued during its formal control period up to 2006 and therefore can lead to added confusion if cross referencing of part numbers is required without the formal number index records. The control of number issue by Eurobat was disbanded in 2006 and subsequently issued numbers are now difficult to understand as no formal central records are kept and issued.
The 9-digit ETN offers additional information to the DIN numbering system.
e.g. 536 046 030

- 1st digit Voltage – 1-2 = 6 volt Battery, 5-7 12 volt Battery
- 2nd and 3rd digits – nominal capacity
    - 560 = 60Ah @ 20hour rate
    - 660 = 160Ah @ 20hour rate
- 4th, 5th and 6th digits – Unique code number
    - 5th and 6th digit can refer sometimes to older battery design and original DIN number (4th and 5th digits)
    - The unique code number gives details of endurance level, cold cranking performance level, vibration level, lid, terminal and clamping parts
- 7th, 8th and 9th digits – Cold Cranking Performance
    - There are 2 different EN ratings: EN1 and the EN2
    - This can cause confusion, as is unclear to the end user which standard is used, especially with the use of digital conductance testers which cannot currently test to both standards.
    - Details to which specification the battery is supplied to is hidden within the unique code number.

Cold Cranking Performance (Amps)

The Cold Cranking Performance (CCA) measures the starting performance of the battery. In simple terms, the higher the CCA, the easier it will be to start the vehicle.

SAE (J537 Jun 1994 American Standard)

This is the starting test according to the SAE (Society of Automotive Engineers). The test specifies that the battery at a temperature of –18°C will deliver a current equal to the Cold Cranking Amps for 30 seconds with the voltage staying above 7.2 volts (3.6 volts for a 6 volt battery).

Although subject to battery design, an approximation of SAE to DIN CCA relationship is:- SAE = (DIN x 1.5) + 40.
Battery performance drops off quickly with temperature, so this test is a good check of a battery's starting ability. With a 10 second voltage of EN rating and its need to support 30 seconds to 7.2V, the SAE test gives a good view of high rate capacity capability of the battery.

DIN (German Industrial Standard at -18°C)

Again, as with SAE, the DIN test is carried out at -18°C. The fully charged battery is discharged to 6V with the rated test current. The voltage must be at least 9.0V after 30 seconds and the time to achieve 6V must be at least 150 seconds.

Although subject to battery design, an approximation of DIN to SAE CCA relationship is:- DIN = (SAE – 40) x 0.66. Since the introduction of modern fuel injected vehicles and the need for fast starting, the DIN standard has lost favour amongst automotive vehicle manufacturers. Nevertheless, it does show a clear relationship with the amount of materials used within the battery, but not startability.

IEC (International Electro Technical Commission) (IEC 60095-1 Nov 2006)

Again, the IEC test is performed at -18°C . After a rest period of up to 24 hours after preparation (according to 6.2 of standard), the battery is placed in a cooling chamber with air circulation at a temperature of -18°C +/- 1°C until the temperature of the middle cell has reached -18°C +/- 1°C. The battery is then discharged according to the standard and is required to meet a voltage of 7.5V after 10 seconds and 7.2V after 30 seconds. the battery is then rested for 20+/-1 seconds after which the battery is discharged at 60% of the original current and is required to meet a voltage of 6V after 40 seconds, in accordance with table 7 of the standard. The IEC standard has a relationship between the SAE and IEN1 standard and for Yuasa batteries the SAE value can be assumed to equal IEC.

EN (EN50342.1A1 Nov 2011 Item 5.3)

The EN test also is performed at -18°C. The EN requirement is however split into two levels: EN1 and EN2.

EN1 – The battery is required to meet a voltage of 7.5V after
10 seconds; and after 10 seconds rest, the battery is further discharged @ 0.6 x original current and is required to complete 73s in the second stage, giving a total combined discharge period of 90 seconds (assume initial period equates to (10s/0.6) 16.7 seconds.
EN2 – The first discharge is the same as EN1, but the second discharge period to 6.0V should achieve 133 seconds, giving a total time of 150 seconds. The discharge current’s ability to meet both designs is very much subject to battery design and can vary from manufacturer to manufacturer and design to design. However, as an overview of our competitor benchmarking work at Yuasa, the relationship between EN1 and EN2 is:-
EN2 = 0.85% to 0.92% EN1
Due to this relationship, we usually display SAE as our standard to minimise confusion.

JIS (D5301: 1999)

The Japanese Industrial Standard test is carried out at -15°C. The automotive batteries are usually tested at either 150A or 300A with different 10s /30s voltage and durability requirement to 6V. For European applications, we believe this does not give as clear a view to the customer of battery startability and is rarely shown and used within the European aftermarket.

Marine Cranking (MCA)

This Marine cranking test is based on SAE CCA requirement but carried out at the higher temperature of 0°C, usually indicated on batteries as CA (Cranking Amps) or MCA (Marine cranking Amps) rather than CCA (Cold Cranking Amps). The cranking current (CA/MCA) is typically 25% higher than the corresponding SAE CCA marked battery. It is advised that this should be checked with respect to any Marine related cranking current enquires.

The number of automotive battery standards in the world market’s are numerous. Yuasa currently use the SAE CCA standard as a norm, giving a clear, balanced representation of battery cranking performance between startability and starting endurance.

According to EU1103: 2010 Capacity Marking Directive, Yuasa use capacity (20 hour) and EN1 CCA as specified in standard EN50342.1 A1 2011. Please note, due to algorithm issues in existing impedance testers on the market, all testing on Yuasa batteries should follow the old SAE algorithm (not EN or IEC as ranges are still specified against obsolete versions of the standard).

Reserve Capacity Minutes (EN50342.1 A1 Nov 2011 Item 5.2)

The Reserve Capacity is the amount of time in minutes that a battery at 25°C can deliver a current of 25 Amps until the voltage drops to 10.50V (5.25V for a 6-volt battery).

25 Amps represents a typical electrical load on a car under normal running conditions, so the Reserve Capacity gives an indication of the time that a vehicle with a normal electrical load will run with a broken alternator or fan-belt. This is a good, practical test.

Obviously, the more electrical accessories you turn off, the further you can drive the car.

Reserve Capacity was originally used to give an indication of the capacity of the battery if the then charging system (dynamo) failed and the duration of driving time left after charging warning light first appeared. With the greater dependability of modern vehicle charging systems the direct usefulness of reserve capacity to the automotive user has dropped, but does show the relative drop off in battery performance as the discharge current is increased.

Ampere-Hour Capacity at 20 Hour Rate (Ah) (EN50342.1 A1 Nov 2011 Item 5.1)

The Ampere-Hour Capacity measures the total amount of electricity stored in a battery.

An Ampere-Hour represents the amount of electricity when a current of 1 Ampere passes for 1 hour.

The Ampere-Hour Capacity varies with the rate at which the battery is discharged; the slower the discharge, the greater the amount of electricity that the battery will deliver.

The Ampere-Hour Capacity is the amount of electricity that a battery will deliver during 20 hours before the voltage falls to 10.50V. For example, a 60Ah battery will deliver a current of 3A for 20 hours.

Recommended Charge Rate (Amps)

This is the recommended current for charging batteries with a constant-current charger.

For more details, see Section G of ‘All You Need To Know About Batteries’.

Dimensions – Length (mm)

This is the dimension over the longest part of the battery, including the hold-down if fitted.

Dimensions – Width (mm)

This is the dimension over the widest part of the battery, including the hold-down if fitted.

Dimensions – Height (mm)

This is the overall height of the battery to the tops of the terminals if these are proud of the lid.

Weight with Acid (kg)

This is the average weight of the battery as supplied.

Cell Layout

Cell layout and polarity diagrams can be found in the ‘diagrams’ tab on each Yuasa battery product page. Alternatively, the battery’s datasheet can be downloaded.

Terminal

Information about the type of terminal fitted to the battery can be found in the 'technical specification' tab as well as the 'diagrams' tab.

Container Features

Again, information about container hold-downs and other features can be found in the 'diagrams tab' on each Yuasa battery product page.

Handles

Information about whether the battery is fitted with carrying handles can also be found in the 'technical specification' tab.

End-Venting

There are now several batteries in the range that have end-venting, rather than the normal venting through the individual vent-plugs.

Information about whether the battery is fitted with end-venting at the negative end can be found in the 'technical specification' tab.
The battery is fitted with a gassing outlet according to EN60095-2 + EN50342.2 2007 item 5.5.3 and Figure 10 to allow remote venting of the battery.

State of Charge Indicator

A clever floating ball and prism device fitted to one cell of the battery to give a quick visual guide to battery state of charge and electrolyte level within the battery. If concerns are noted, it should be used as advice to seek further engineering support.

Lid Features

An indication of lid design feature which may be specific to vehicle fitment:-

- Block – T shaped lid feature to give recessed area for terminals, and for European types this is sufficient for top clamping according to IEC 60095-2 and EN50342.2 007 item 5.5.1.
- Flat – Flat lid feature with no raised plugs which could interfere with manufacturers top clamp frame.
- Raised plugs – Raised vent plug design sitting above the top face of the lid.

Semi-Traction Features

These make the battery suitable for applications in which there is some cycling (e.g. vehicles with tail-lifts).

GS Yuasa Automotive Online Battery Look Up Tool

GS Yuasa endeavour to incorporate the most up to date and accurate information into the online battery look up tool. We gather the OE data and compare this information against the batteries in our range. We then output a match between original battery fitted by the vehicle manufacturer and the GS Yuasa battery range.

Inevitably there might be marginal differences in CCA and Ah between what was originally fitted and the battery in our range. The very small differences involved will not have a detrimental effect to the electrical system within the vehicle.

Notes
Throughout the life of any Lead Acid vehicle battery the capacity will slowly reduce due to aging effects and usage. At the end of battery life, the lack of capacity and subsequent drop in voltage may cause electrical error codes. When a new battery is fitted any error codes caused by the old battery could remain. When the vehicle is then presented to a garage, an assumption might be made that the new battery has caused the problem. Small variances in Ah between OE and aftermarket batteries will not cause electrical problems of this nature.

Battery standards such as EN50342.1, allow for variances in actual Ah and the label rating, to account for variances in manufacturing. These differences will be evident in OE batteries as with any after market battery.