

## State of charge 12 volt Standard Batteries

Battery state of charge is determined by reading either terminal voltage or the specific gravity of the electrolyte. The density or specific gravity of the sulphuric acid electrolyte of a lead-acid battery varies with the state of charge (see table below). Specific gravity is read with a hydrometer. A hydrometer reading will tell the exact state of charge. A hydrometer cannot be used with sealed, AGM or gel cell batteries.

Voltage meters are also used to indicate battery state of charge. Digital voltmeters provide the accuracy to read the voltage in hundredths and are relatively inexpensive and easy to use. The main problem with relying on voltage reading is the high degree of battery voltage variation through out the day. Battery voltage reacts highly to charging and discharging. As a battery is charged the indicated voltage increases and, as discharging occurs, the indicated voltage decreases. With experience, one can accurately determine state of charge using a voltmeter.

Percentage of Charge	12 Volt Battery Voltage	Specific Gravity
100	12.70	1.265
95	12.64	1.257
90	12.58	1.249
85	12.52	1.241
80	12.46	1.233
75	12.40	1.225
70	12.36	1.218
65	12.32	1.211
60	12.28	1.204
55	12.24	1.197
<b>50</b>	<b>12.20</b>	<b>1.190</b>
45	12.16	1.183
40	12.12	1.176
35	12.08	1.169
30	12.04	1.162
25	12.00	1.155
20	11.98	1.148
15	11.96	1.141
10	11.94	1.134
5	11.92	1.127
<b>Discharged</b>	<b>11.90</b>	<b>1.120</b>

## Technical Support

Making the correct choice of battery for your application is no laughing matter and ensuring that your investment is protected requires careful planning.

### Common mistakes made with battery installations include:

#### Not enough capacity

Skimping on battery capacity is a mugs game. The simple fact is that if you are using 120 Ah per day in your application and you have only 200Ah of battery capacity, you are going to repeatedly damage your batteries. You should never plan to draw down on more than 50% of your battery capacity, and size your system to support that.

#### Incorrect charging

AGM batteries, as with all batteries require a specific charging to avoid damage. Over charging, or punching in too much voltage or amperage will cause runaway chemical reactions outside the design of the battery. ALWAYS use a battery charger designed for charging AGM's. We recommend CTEK battery chargers for the task, or ensure that your installation has a smart charging system with a program for AGM's

#### Flattening batteries

Flattening a battery on the camping trip because the beer MUST be kept cold is going to cost you more than a hangover. All batteries are damaged when flattened, and taken too far will destroy them in one outing. Ensure that the appliances drawing the power, or the circuit has low voltage protection. The humble flood light or cheap car fridge has the ability to take down your investment in one night.

#### Over charging

AGM's while charging create Hydrogen and Oxygen just like most other technologies. The semi sealed, pressurised environment helps contain the H's and the O2's inside the unit, but if the battery is charged too fast, or overcharged the valves will trigger releasing gases and changing the balance of chemicals and once escaped, there will be no topping up, the battery will eventually be useless.

#### Undersized wiring

AGM's typically have good cranking ability, with the Absorbed Power range having excellent cranking characteristics. Engines not starting or under voltage buzzers sounding, this is typically found to be a corroded connection, loose connection, under sized wiring or wiring runs too long. Ensure that your installation takes full account of these issues.

The simple answer to all technical issues is design the entire installation carefully, engaging the know how of a low voltage professional to protect your investment & your satisfaction.



We use & recommend CTEK battery chargers  
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