Energy1 Batteries

Abbreviated Maintenance & Installation Manual

Energy1 Batteries
AGM Thin Plate Technology
Maximum Power to Weight and Size

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THE CARE AND FEEDING OF THIN PLATE PURE LEAD (TPPL) BATTERIES

With innovative design and by improving both the manufacturing methods and the purity of the components in the batteries, a group of battery scientists and engineers were able to produce advanced high quality thin plate pure lead (TPPL) AGM batteries. These revolutionary batteries are up to 25% lighter while occupying 40% less space than standard AGM or flooded batteries of equivalent capacity.

The Energy1 Advanced AGM batteries have very low self discharge rates and have a shelf life of two years. When discharged at a rate of C/3 (C = amp-hr capacity of the battery) to as much as an 80% depth of discharge, they have a lifespan of over 500 cycles. As a further benefit of this technology, Energy1 Advanced AGM batteries can be charged, with a temperature compensated, constant voltage source, at a rate equal to C. As an example, an Energy1 E1-480 battery with a rated 250 amp-hour capacity can be charged with a temperature compensated, constant voltage source of 250 amps.

The Energy1 Advanced AGM batteries are sophisticated, ruggedly built batteries that can provide many years of reliable service if they are properly cared for.

Energy1 Battery Installation and Maintenance[1 2]

Installation Energy1 batteries can be installed in any position except inverted. To aid in eliminating heat build up, it is recommended that the batteries be installed with a minimum of 10 mm (0.4 inches) between adjacent batteries to allow air circulation. Similarly, if the batteries are mounted in a battery box, vent holes in line with the air gaps between the batteries should be provided.

When torquing the terminal fasteners, be especially careful to torque to the value printed on the battery case. The female terminals are carefully engineered to provide a three part seal between the environment and the battery internals. Over-torquing these terminals can lead to breaking the seals and allowing air to enter the battery internals - a condition that is detrimental to the battery's performance, and should failure occur, is not covered under the battery warranty.

Charging. Note that Reference 1 specifies a constant voltage charging source and further recommends temperature compensation if the ambient temperature of the batteries varies from the standard 25°C (77° F). Let's take these two requirements one at a time.

A constant voltage charging source means that for the majority of the charging cycle, the voltage is held constant while the charging current naturally decreases in response to the electrochemical reaction of the battery. Modern, three step battery chargers accomplish this during the absorption phase of the charging process and downshift to a lower float voltage when the charging current decreases to 2 to 3 % of the battery's capacity. A rudimentary shop type charger does not generally have these features and is not recommended for charging any AGM batteries.

Due to the electrochemical reaction that takes place inside a battery during charging, the charging voltage required for a cold battery is higher than that required for a warm battery. The relationship for Energy1 batteries is ± 0.024 VDC/°C (±24 mVDC/°C) as adjusted from the industry standard 25° C (77° F). As an example, Energy1 recommends a nominal absorption voltage of 14.70 VDC at 25° C (77° F) and a nominal absorption voltage of 14.46 VDC at 35° C (95° F). This latter figure is arrived at as follows:

Absorption voltage @ 35° C = Absorption Voltage @ 25° C – (10° C x 0.024 VDC/° C)
= 14.70 VDC – (0.24 VDC)
= 14.46 VDC

Once again, modern three step battery chargers usually have a temperature compensating probe that is generally placed on the negative post of the battery that is expected to be the warmest battery.

The Energy1 batteries need to be charged with the following nominal values to ensure that the batteries are operating optimally (voltages given are at 25° C (77° F)):

Nominal Absorption Voltage = 14.70 VDC
Nominal Float Voltage = 13.50 VDC

As with all lead acid batteries, do not allow the Energy1 batteries to remain in a deeply discharged state for any length of time. Once discharged, immediately bring the depleted batteries back up to a full charge using the parameters and procedures outlined above. Also understand that Energy1 batteries perform better in a marine house bank application if they are periodically cycled to at least 30% depth of discharge and then fully recharged.

Discharging. As with all lead acid batteries the rate of discharge is a factor in how much energy can be provided by a battery or battery bank. To this end, it is recommended that the end of discharge voltage (EODV) should be a nominal 10.5 VDC. Many modern inverter and inverter/chargers have this value set as the default.

Capacity Testing. Capacity testing can be accomplished using industry standard methods. Use of a high frequency conductance tester will yield unreliable results due to the inherently low internal resistance of Energy1 batteries.

Summary. This document is the result of significant field experience and study of the two references. It should be adequate for the knowledgeable installer to install Energy1 batteries and provide an appropriate charging source. These are sophisticated, rugged and reliable batteries that require a minimum of care to provide years of service.