

The American Boat & Yacht Council, Inc.

# ABYC

**Setting Standards for Safer Boating**

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***TA-27 BATTERIES AND BATTERY CHARGERS***

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## **TA-27 BATTERIES AND BATTERY CHARGERS**

### **BACKGROUND**

*This technical information report provides educational material regarding batteries and battery chargers for boats. By understanding the characteristics of the various battery types and battery chargers, the reader can properly select and maintain the on-board battery system. This report excludes the less commonly used battery types and battery management techniques. The reader is also cautioned to gather more information from the manufacturer of the battery and battery charger, using this report as a guideline and not as an exclusive source for all information needed for a specific system on a boat.*

### **INTENT**

This technical information report contains information applicable to boats utilizing marine batteries and non-rotating permanently installed marine battery chargers.

### **DEFINITIONS**

For the purposes of this technical information report, the following definitions apply:

**Cold Cranking Amp (CCA):** Battery cold cranking performance rating - The discharged load, in amperes, that a new, fully charged battery at 0°F (-18°C) can deliver for 30 seconds and maintain a voltage of 1.2 volts per cell or higher (7.2 volts for a 12-volt battery).

**Marine Cranking Amp (MCA):** Also cranking performance (also referred to as marine cranking amps @ 32°F, or MCA @ 32°F) - The discharged load, in amperes, that a new, fully charged battery at 32°F (0°C) can continuously deliver for 30 seconds and maintain a voltage equal to or higher than 1.2 volts per cell (7.2 volts for a 12-volt battery).

**Battery Reserve Capacity:** The number of minutes a new, fully charged battery at 80°F (27°C) can be continuously discharged at 25 amperes and maintain a voltage of 1.75 volts or higher per cell (10.5 volts for a 12-volt battery or 5.25 volts for a 6-volt battery).

**Battery Bank:** Two or more storage batteries connected in series to provide higher voltage, or in parallel to provide increased capacity.

**Storage Battery:** A group of cells permanently electrically inter-connected and contained in a case.

### **BATTERIES**

**Lead Acid Batteries:** A lead acid battery is made up of positive plates (lead dioxide PbO<sub>2</sub>), electrolyte (water and sulfuric acid H<sub>2</sub>SO<sub>4</sub>) and sponge lead (Pb) negative plates. During discharge of a lead acid battery, an electrochemical reaction occurs within each cell, converting material on both the positive and negative plates to lead sulfate (PbSO<sub>4</sub>) and changing the electrolyte into water (H<sub>2</sub>O). During charging, active materials are converted back to their original states of lead dioxide, lead and sulfuric acid.

#### **Types of Lead Acid Batteries**

A. **Vented Lead Acid** (also called “wet” lead acid or “flooded” lead acid) batteries: These are the most commonly used batteries. These batteries have (flooded) liquid electrolyte (H<sub>2</sub>SO<sub>4</sub>). During charging, when the positive and negative plates have returned to their original chemical states the battery is considered fully charged. Any additional charging current breaks down water in the electrolyte into oxygen and hydrogen. These gasses percolate up through the electrolyte and escape through the vents into the surrounding atmosphere. The electrolyte level declines and can be replenished by adding distilled water to the electrolyte.

B. **Sealed Valve Regulated (SVR)** [also known as Valve Regulated Lead Acid (VRLA)]: These batteries have immobilized electrolyte and each cell has a one-way self-resealing valve in the vent.

There are two types of SVR batteries:

1. **Gelled Electrolyte:** These batteries have a silica gel/acid mixture as immobilized electrolyte.