Lithium Ion Batteries

Information for MHYC Members - September 2025

Australian Sailing has recently carried out a review of the use of new technology (primarily Lithium Ion) batteries on racing yachts. Whilst the report was prepared for the National Safety Committee, and has not been widely circulated, the key findings are of use to yacht owners (and to Safety Auditors) for both Cruising and Racing yachts.

Please regard the following information as non-official advice to assist in preparing boats (not as official requirements).

In summary, the recommendations are:

- **Battery Selection and Compliance to Standards**
  It is key that all batteries used in yachts comply with the AS IEC 62619 standard. There are some cheap, non-standard certified, batteries available but only those meeting this standard should be approved for use in yachts. Owners should verify that their lithium system has a Battery Management System (BMS). Most newer batteries have these integrated into the battery itself and do not require and external BMS.

- **Battery Installation**
  Lithium ion Batteries (LiB) should be installed according to the general wiring standard AS/NZS 3000 and more specifically AS/NZS 3004.2 which covers electrical installations for marinas and recreational boats. The batteries should be housed in a dry area that is not subject to temperature extremes. This is not a job for amateur electricians, and installation should be by an experienced marine electrician.

- **Battery Operation**
  Batteries should only be charged by the charger recommended/provided by the battery supplier and alternative chargers should not be used. It is imperative that a LiB be operated and controlled by the appropriate Battery Management System recommended for that battery or incorporated into the battery itself.

- **Battery Maintenance**
  Manufacturers generally recommend that the lifetime of a LiB will be optimised by keeping them in the 20-80% charge state and avoiding charging or discharging extremes. Regular battery inspection to ensure that area is dry and there are no obvious signs of battery deformation should be undertaken.

Background

Batteries provide a critical source of power on yachts for:

- Engine starting and house power.
- Electric motors and demountable motors on smaller yachts
- New technology in navigation and communications
- Portable devices from crew

Typically, lead-acid batteries (of various types – sealed or AGM) are the most common type of battery technology currently used. However, lithium-ion batteries (LiB) are becoming increasingly common today as they provide the power to many devices that we use in our everyday lives.

There are several different Li-based chemistries that are used in batteries, each with their individual properties of electrical performance, cost, lifespan and safety. These include:

- Lithium manganese cobalt oxide
- Lithium nickel cobalt aluminium oxide
- Lithium iron phosphate
- Lithium cobalt oxide
- Lithium manganese oxide
- Lithium titanium oxide

The Australian Sailing report examined each of these (without giving much detail) and concluded that the two safest of these were Lithium Iron Phosphate (LFP) and Lithium Titanium Oxide (LTO), of which LFP was preferred on the basis of cost and performance advantages (it is interesting to note that many of the automotive electric vehicle manufacturers seem to be transitioning to LFP as well).

Advantages of LiB

a. For given amount of stored energy, up to three times lower in weight.
b. Can be charged and discharged much faster than their AGM equivalents.
c. Can tolerate higher levels of discharge compared to AGM batteries.
d. Can accommodate a higher number of charging cycles.
e. Have a very low self-discharge rate.

Disadvantages of LiB

a. Higher initial cost but given the more tolerant charging characteristics and higher number of possible charging cycles, lifetime cost may not be that different to AGM's.
b. Can overheat (thermal runaway) and need to be controlled by an effective battery management system (BMS) to oversee all aspects of the battery operation.
c. Can be problematic to extinguish a fire from an overheated battery.

LiB Fires

There has been a lot of concern about the possibility of LiB battery fires, including the possibility of thermal runaway (a given cell overheating leading to heating of adjacent cells) that can lead to a fire in the worst case which may be difficult to extinguish.

In my opinion, this is no worse than for traditional lead-acid batteries, with a recent case of a boat being delivered by a MHYC member catching fire and sinking off the coast within 10 minutes due to a lead acid battery fire.

In large ship installations, the batteries are usually housed in a sealed compartment which may also have some form of extinguishing system but that is not the case in a typical yacht. The CSIRO recommended locating any LiB such that they could be readily disconnected and dumped overboard in a fire situation.

Clearly, the best strategy is to avoid a fire in the first place through proper product selection, professional installation and ongoing battery maintenance/inspection. Gas monitoring, to detect any battery off-gassing, is also an option to consider.

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