

BATTERIES:

How Is a High Tech Lithium-Iron Phosphate Battery Different Than a Lead Acid Battery?

Content Courtesy of EarthX Motorsports

Just as computers have replaced typewriters and letters in the mail, lithium-iron batteries are replacing lead acid batteries. Lead acid batteries were invented in 1859 and are the oldest type of rechargeable battery on the market. The lead acid battery is simple in its design; it works through a chemical reaction between a vat of acid and lead. These "ingredients" include one of the heaviest of metals, sulfuric acid and other highly poisonous chemical additives. The warning label is extensive, and you should use personal protective equipment if working with them. During charging, hydrogen and oxygen accumulate, and an explosion can result if ignited. As scary as that sounds, if handled correctly and maintained properly, it is a relatively inexpensive technology that has been our only source of power to start our vehicles for a very long time.

On the other hand, lithium-iron batteries come in many varieties, but all have one thing in common — the catchword "lithium-iron." Lithium battery research started as far back as 1912, but it wasn't until the 1980s that it was commercially available. Lithium-iron phosphate (LiFePO4) batteries are considered to be the safest composition and are being used in the powersports industry today.

How lithium-iron phosphate batteries function is very different than the traditional lead acids. They can come in different "packages" such as cylindrical cells or prismatic cells (square or rectangular) and they have a powder composition that is pressed together in layers between aluminum and copper foil with a thin plastic separator between the layers and a small amount of electrolyte to transfer the charge. These cells (3.3 volts per cell) are then stacked together in a series to create a 12-volt battery with enough cranking amps to turn over an engine. Now this is where the high-tech part of these batteries comes into play. It is not enough to simply put a series of lithium cells together in a plastic case. The cells are individual and will charge and discharge at different rates, which is why you need a circuit to balance the cells' charge level. This can come from inside the battery itself or can be pro-

vided within a balancing charger.

A battery is only as good as the least charged cell, which will affect performance and longevity if they are not balanced. Lithium cells are also susceptible to damage from overcharging (voltage about 16V) or over discharging (voltage below 8V), so electronic circuits are also required to prevent these two situations. If severely overcharged, a lithium battery can catch on fire. It's rare to actually catch a lithium on fire, but it is possible, so electronic circuits, called a battery management system (BMS), is essential.

Lithium batteries are less forgiving than lead acid in these scenarios, which makes a battery management system very important. But the benefits are amazing! The key advantages of lithium batteries over lead acid batteries are:

- Nontoxic, nonpoisonous and nonhazardous materials.
- 70 to 80 percent less weight. A 3-pound battery can replace a 28-pound lead acid battery.
- Up to 4,000 charge/discharge cycles (eight-year lifespan), more than four times the life of a lead-acid battery.
- Longer storage life due to an extremely low self-discharge rate of 2 percent per month. A lead acid discharge rate is 30 percent per month. This means it takes lithium a year to lose as much charge as a lead acid does in 17 days.
- Environmentally friendly — non-contaminating, lead-free and no hazardous materials.
- Wide operating temperature range (-30 to +60 degrees Celsius) — lithium batteries feature dry cell technology and will not freeze or boil over.
- They can be fully charged in less than a half hour.
- Maintenance-free.
- No special mounting direction.

Besides, who ever thought that having a vat of acid under a bike's seat was a good idea? ☞

Vs.
LITHIUM-IRON
LEAD-ACID

Lithium Battery

EarthX, Inc.

This battery features custom-designed cells for maximum cranking amps, designed to last eight years. The battery's cell balancing circuitry ensures the cell's charge levels are balanced, offering protection from overcharge and overdischarge.

For More Info:
www.earthxmotorsports.com



Super Sport Series Application & Specification Guide

Power-Sonic

The new 2013-14 Power-Sonic Super Sport Series Application & Specification Guide not only includes updated fitment information, but also features helpful cross-reference information as well as a new Top 25 List of Batteries being sold to the aftermarket segment. The guide is available in print and online at the company's website.

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