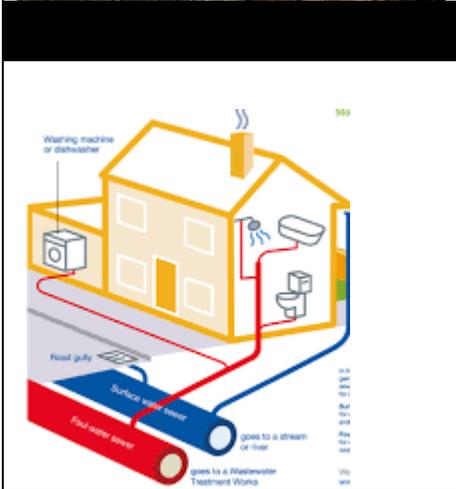
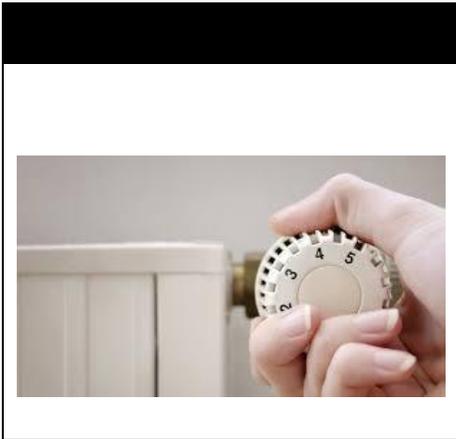




April - 5 - 2021

Power sources and batteries



AGM	Gel Batteries	OPzS
OPzV	Lilon/LiFe	MLG SPTI

- An AGM (absorbed glass mat) battery contains a special glass mat separator that wicks the electrolyte solution between the battery plates. This material's design enables the fiberglass to be saturated with electrolyte – and to store the electrolyte in a “dry” or suspended state rather than in free liquid form
- Gel batteries are called gel because they use silica (or sand) to turn the acid inside the battery into a thick liquid. This liquid does make it spill-proof, like our AGM batteries, but the gel is fragile, and can be easily burned if used in high amperage situations.
- OPzS and OPzV. This types of batteries used to refer to a flooded type of tubular-plated, lead acid, deep cycle batteries. These batteries, generally have a cell voltage of 2 volts and are connected in series to produce higher voltages. ... OPzS batteries are often time referred to as tractionbatteries. OPzS and OPzV are both tubular lead acid batteries. They have a higher lead content and more surface are providing them a

higher energy density and longer lifespan. The difference between OPzS and OPzV is that: OPzS is a flooded cell, meaning the electrolyte (generally sulfuric acid) is in liquid form inside the cell. These type's of cells require occasional top ops with distilled water.

On the other hand OPzV the electrolyte withing the battery is in gel form which allows for recombining the electrolyte back into water and allowing for very little maintenance.

- Lithium-ion battery (a.k.a Li-ion) is rechargeable battery with lithium cobalt dioxide (LiCoO_2) or lithium manganese oxide (LiMn_2O_4) as a cathode
For the more technically minded, lithium ion batteries are secondary cells constructed from layers of lithium sandwiched with an electrolyte and stacked into rectangular packs, although they can also be wrapped into a cylindrical shape. The distinction between lithium, lithium ion and the other varieties of lithium packs is the kind of electrolyte used. Their primary advantages are the energy density and faster charge/discharge times compared to the nickel based batteries historically used.
Lithium-Cobalt-Oxide (LiCoO_2) characteristics:
Highest energy density
Popular for phones, PC's etc.
Risk of thermal runaway in larger systems
- A lithium-iron battery is also a rechargeable type of battery but made with lithium iron phosphate (LiFePO_4) as the cathode material.
While lithium-iron is a newer version in the lithium battery family, its anodes are also made up of carbon in batteries. Phosphate based technology possesses superior thermal and chemical stability which provides better safety characteristics than those of Lithium-ion technology made with other cathode materials. Lithium phosphate cells are incombustible in the event of mishandling during charge or discharge, they are more stable under overcharge or short circuit conditions and they can withstand high temperatures without decomposing. When abuse does occur, the phosphate based cathode material will not burn and is not prone to thermal runaway. Phosphate chemistry also offers a longer cycle life.
- The lithium-iron (LiFePo_4) battery has a slight edge over the Li-ion (LiCoO_2) battery for safety. This is important because a battery should not get overheated or catch fire in case of overcharging.

The lithium-iron battery has superior chemical and thermal stability. A Lithium-iron battery remains cool at room temperature while the Li-ion may suffer thermal runaway and heats up faster under similar charging conditions. LiFePO₄ is a nontoxic material, but LiCoO₂ is hazardous in nature, so is not considered a safe material. Disposal of Li-ion battery is a big concern for the manufacturer and user. .

