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Holland lift fits full traction batteries to most of its lifts.

Major cost or clean low cost power

Holland lift supply a battery hydrometer with every electric lift.

Modern battery powered aerial lifts are increasingly reliable, and easy to maintain. The past few years have seen huge improvements in every aspect of a lifts design. All except the main power source the humble battery and to a lesser extent the on board charger. In many fleets the batteries and charger are now the greatest annual cost and source of reliability issues.

We spoke with a number of battery manufacturers and suppliers and the fact is that while batteries have hardly changed in the past few years, a good regime of battery maintenance and care will not only eliminate most battery related call outs but also dramatically extend the life of a battery pack.

Most of the suppliers we talked with said that in spite of all the advice metered out over the years it is not unusual to find service engineers who are not equipped with any battery test equipment at all and in some cases mechanics responsible for battery powered lifts have no idea how to use the testing equipment anyway.

Holland Lift is unusual in that it includes a hydrometer with every battery powered lift it sells. It also fits the majority of its electric lifts with full traction forklift type battery packs, which while they can last for a very long time are also very expensive to replace if they are abused.

For many years it has been clear that American built deep cycle batteries are far better suited to aerial lift applications than most European equivalents. We include a technical overview of the reasons why American batteries might be better suited to lift applications. It is all, it seems, in the plate design. Yes the article is a little overly "techie" for our pages, but it is worth persevering with it.

Flat plates or Tubular?

While trying not to be overly technical, we look at the pros and cons for each design?

Since the introduction of the lead acid batteries by Gaston Plante, in 1860, battery manufacturers have relentlessly sought better methods of storing greater amounts of electrical energy. Between 1881 and 1892, rapid development occurred in the area of grid design and active material formulation, it is generally accepted that tubular plate technology developed in the same time frame as flat plate. Both plate designs still exist today, with producers of the two types insisting that their technology is superior. As a general rule tubular plate technology is preferred in Europe and its old colonial outposts. While flat plate design is favoured in America and countries historically influenced by America.

Positive Plate Construction

In a lead acid cell, the positive electrode or anode, is comprised of lead dioxide (PbO_2) and is the work horse of the battery. The negative plate is sponge lead (Pb). In both tubular and flat plate batteries, the negative plate is identical in appearance and function. It is the positive plate that differs in design and construction.

Figure 1 shows a typical tubular plate, the current collector consists of a series of spines that extend down from the top bar which is called a comb. The parallel tubes, or gauntlet, which surrounds the spine and holds the "active material", is made of a porous, inert fabric. Once filled, a cap is placed over the opening at the bottom of the tube to prevent the active material escaping.

Fig.1

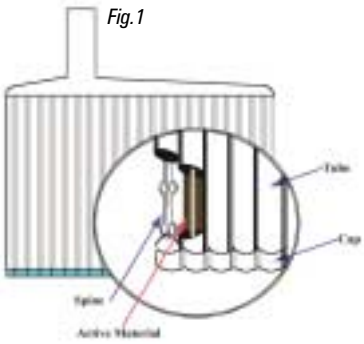
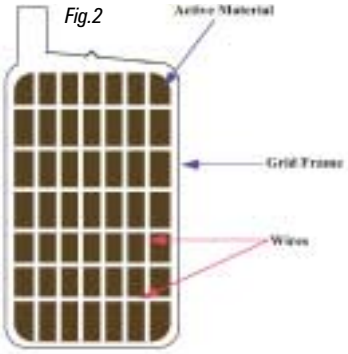


Figure 2 shows a flat plate, which is constructed of a grid, cast from an alloy of lead and antimony. The horizontal and vertical members are called wires and are connected to the frame. The "active material" is pressed into the grid, connecting the grid wires and frame. This extrusion process results in flat surfaces on both sides of the plate.

The primary objective of both plate constructions is the uniform distribution of the density of the "active material" throughout the plate. If the density is too high, performance will be reduced and

Fig.2



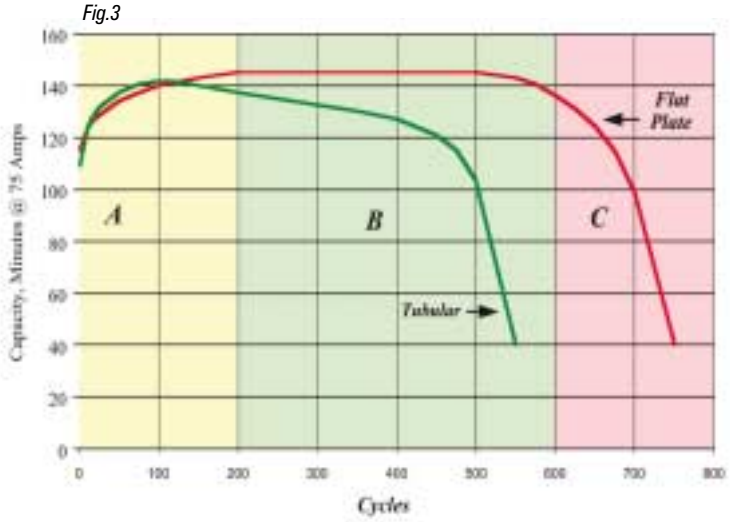
manufacturing costs increase, while low density results in premature capacity loss and short battery life.

When a lead acid battery is given its initial charge, the active material in the positive plate is converted to lead dioxide (PbO2). Lead dioxide exists in two forms, Alpha and Beta. The ratio of Alpha and Beta PbO2 in the charged plate is due in large part to the paste formulation and plate curing processes.

Battery life

Figure 3 shows the typical deterioration of a battery used in applications such as aerial lifts, where a battery is discharged and then recharged on a regular basis, unlike say a starter battery which has a short discharge and then an immediate recharge. The chart shows the increase in battery capacity which is typical in its early life and is characteristic of a high concentration of Alpha-PbO2. The tubular plate battery shows a rapid increase in capacity within a few cycles, and is typical of an active material formulation high in Beta-PbO2 content. It should also be noted that after achieving its maximum performance, a gradual decline in capacity begins, continuing through section B of the graph. The flat plate battery, while slower to reach maximum capacity, maintains its full performance throughout this period, not experiencing age-related capacity loss until well into section C, by which time the tubular plate battery has reached the end of its useful life.

Fig.3



Failure characteristics

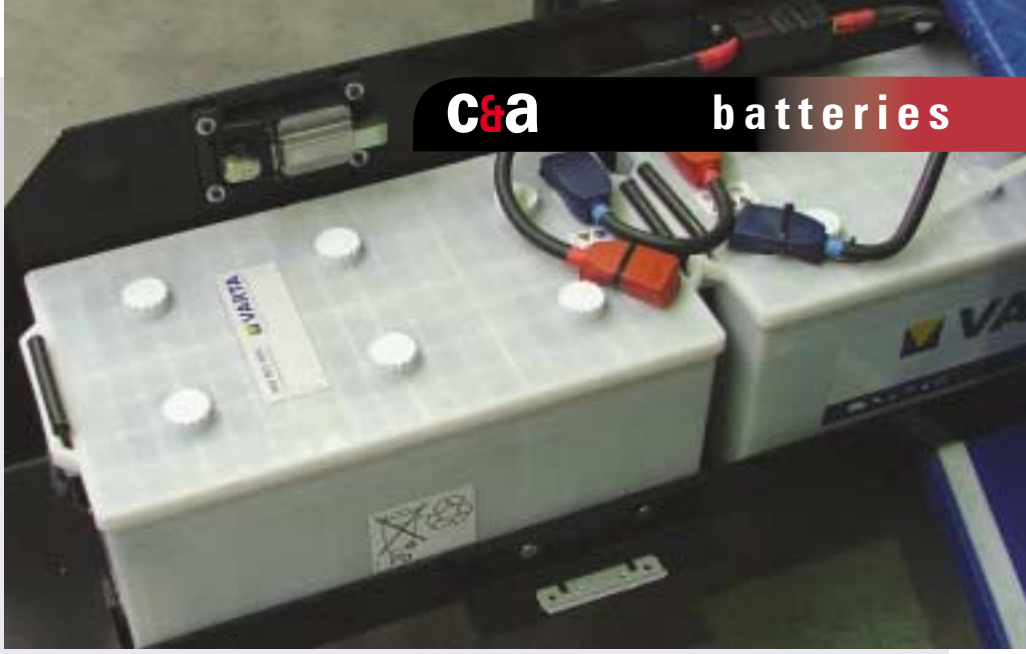
The typical end-of-life failure of a flat plate battery is a steady deterioration of the structural integrity of the active material due to consumption of Alpha-PbO2, and grid failure resulting from corrosion caused by charging. A tubular battery tends to fail from a shedding of its active material, with the physical stress placed on the tube from discharging and charging, eventually rupturing the tubes so that the active material is lost from the positive plate. This is why tubular plate batteries often have up to twice the space for sediment, compared to a flat plate battery.

Conclusions

Proponents of both designs have debated the virtual benefits of their favoured technology for decades. In essence tubular plate batteries offer a higher watt-hour per kilogram ratio, while Flat plate designs are generally more robust with heavier grids and more active material. They also tend to consume much less water and are better at sustaining their voltage under high rate discharges, such as the raising of a fully loaded platform. And thus better suited to aerial lifts. So next time you are offered a battery you are not familiar with, ask is it flat or tubular?

So how do you lower your battery costs?

David Chambers of Trojan Batteries provides this simple check list.



An unusual European battery back from Varta..flat plate or Tubular?

1. Safety

- Always wear protective clothing, safety glasses, and gloves while performing battery maintenance
- Never add acid to battery
- Keep battery clean and dry
- Keep sparks, flames and cigarettes away from battery
- Keep vent caps tight except when checking electrolyte or adding water
- Charge only in well ventilated areas
- Skin contact with electrolyte should be avoided

A typical battery set up.

2. Charging

- Follow charger manufacturer instructions
- Charge after each use
- Ensure electrolyte level is above the plates
- Tighten vent caps before charging
- Do not interrupt charge cycle
- Never charge a frozen battery
- Avoid charging at temperatures above 120°F (49°C)

3. Watering (flooded batteries only)

- Add water only after fully charging the battery
- The proper electrolyte level is 1/8" below the bottom of the fill well
- Never allow the electrolyte level to fall below the plates
- Use distilled water or water with low mineral content

4. Cleaning

- Tighten all vent caps before cleaning
- Clean the battery and cable lugs with a solution of baking soda and water
- Do not allow anything to get inside the battery
- Rinse with water and dry
- Thinly coat all cable connections with petroleum jelly or anti-corrosion spray

5. Torque

- Tighten all wiring connections to the battery specifications
- Over-tightening can result in post breakage
- Under-tightening can result in post meltdown or fire
- Make sure there is good contact with the terminals

6. Equalizing

- Do not equalize Gel or AGM batteries
- Equalize when low or wide ranging specific gravity (+/-.015) is detected after a full charge
- Connect battery to charger, set to equalize mode, and start the charge cycle
- Take voltage readings every hour
- Equalization is complete when voltage no longer rises
- If charger does not have an equalization setting speak to your suppliers technical support department.

A better mousetrap?

The new EFA charger

In spite of dramatic developments in the design and reliability of battery powered lifts, on board battery chargers continue to be sensitive to the treatment dished out by many users. French company EFA has launched a new compact, high frequency battery charger which it claims offers a number of benefits over existing compact models.

Among the benefits claimed for the new charger are:

• A universal input voltage that will allow the same unit to be used anywhere in the world while also being very tolerant of steep voltage drops caused by very long extension leads. It is also not bothered by voltage fluctuations of minus 15 to plus 10 percent during charge .

• An IP66 waterproof rating to ensure protection against pressure washers.

• A fully microprocessor controlled charging process, with curves for Lead Acid, Gel or VLRA type batteries.

• Built in protection against polarity inversion and short circuits.

• Will start charging almost totally empty batteries, without jump assistance.

The 24Volt 25Amp model is suitable for most small scissor lifts, with dimensions of only 28cm long x 18,5cm wide and nine centimeters high, it weighs only 4.5 Kg.