# *ABS Alaskan, Inc.*

**2130 Van Horn Road, Fairbanks, Alaska 99701 • (907) 451-7145**
**166 E Potter Drive #2, Anchorage, AK 99518-1363 • (907) 562-4949**
**Alaska Toll-Free (800) 478-7145 - U.S. Toll-Free (800) 235-0689**
**FAX: (907) 451-1949 Web: http://www.absAK.com/**

# GELL CELL BATTERIES

Over the past ten years a new form of the lead acid battery has emerged. Commonly called the "gell cell" battery, "dry" battery, "sealed" battery, or "non- spillable" battery, this form of the lead acid battery is becomingly increasingly popular for a variety of applications. The one common characteristic of all the batteries manufactured under this category is their "non-spillable" classification. Hence, "non-spillable" is the description that will be used here to identify this form of lead acid batteries.

The traditional lead acid battery has been around for a long time and continues to play an extremely important role in our lives. However, this battery has several less than desirable characteristics. It contains freestanding fluid, called "battery acid" or electrolyte, that is quite corrosive and, if leaked or spilled from the battery, can damage clothing, metals, and our eyes. The battery is susceptible to "gassing", or venting of pressure and moisture, that produces hydrogen and sulfur dioxide gases, creating an explosion risk under certain conditions and corroding electrical circuits and connections. In addition, the lead acid battery has a "self-discharge" characteristic that makes it a poor candidate for unmaintained storage.

The "non-spillable" lead acid battery was developed in response to these needs. Whether it takes the form of the original "gelled" electrolyte technology or the newer (and now more common) Absorptive Glass Mat (AGM) technology, the non-spillable battery addresses many of the shortcomings of the traditional lead acid battery.

Traditional "flooded cell" lead acid batteries have a hazardous materials classification number &Mac246; UN2794 &Mac246; which identifies the risks associated with the batteries and the proper remedial actions. True non-spillable batteries have passed certain drop and vibration testing requirements and are assigned their own hazardous materials classification number &Mac246; UN2800.

There are a couple of misconceptions regarding non-spillable batteries:

1. No lead acid battery is truly "sealed". To do so would create an explosion risk. If a battery creates excessive pressure, that pressure requires a release mechanism. Hence, all batteries contain some means of venting, should the internal pressures get too high. Non-spillable batteries address this with a pressure-regulated valve that will open and release excessive pressure within the battery. Be aware, though, that there are "sealed" batteries containing free- standing electrolyte in the battery which are not "non-spillable". The best known of these is the Delco brand.

2. Non-spillable batteries are not "dry" in the sense that they are devoid of fluid. Like any lead acid battery, non-spillable batteries require electrolyte interacting with the plates inside the battery to produce electricity. The difference with non-spillable batteries is that there is no free-standing fluid inside the battery to leak out in the event the battery is tipped over or broken. This is accomplished in one of two ways. The original method was to thicken, or "gell", the electrolyte. In this thickened state, the electrolyte could not flow. The more recent, and now more common, technology is the AGM technology referred to earlier. With this technology, a concentrated electrolyte is held in suspension in a finely woven fiberglass Absorptive Glass Mat material between the plates inside the battery. The only fluid in the battery is that which is "absorbed" by the AGM material and held in suspension there. For a variety of reasons, the AGM technology is currently the most common technology used in non- spillable batteries.

One of the initial challenges with non-spillable batteries was to reduce the heat buildup inside the battery that evaporates the electrolyte and creates pressure: the "gassing" of the battery. Gassing vents moisture as well as pressure, and, since there is minimal fluid in the non-spillable battery, any gassing will seriously weaken the battery. To reduce gassing, the internal resistance inside the battery needed to be reduced. This was accomplished by changing the hardening materials used to improve the structural strength of the lead in the battery. This change also produced the benefits of lower internal "self-discharge" and improved battery storage capabilities, less external corrosion to contend with, quicker battery recharge times, and better battery cold temperature cranking performance.

A major limitation to the initial non-spillable batteries was that the change in lead hardening materials limited the ability of the battery to discharge and recharge repeatedly &Mac246; commonly referred to as its "cycling" or "deep cycling" capabilities. Adjustments to the trace metals mixture have improved the cycling characteristics of the non-spillable batteries considerably. We are not convinced that the cycling capabilities of non-spillable batteries in repeated deep discharges (in excess of 50%) equal that of the better brands of traditional "flooded-cell" deep cycling lead acid batteries. Also an issue is the higher cost of the non-spillable batteries. However, in less strenuous cycling applications where the additional benefits of the non-spillable battery are important considerations, the non-spillable battery is a very viable, and often preferential, choice for remote and home power applications.