Industrial Batteries (UK) Limited

Main distributor of Alcad Ni-Cd Batteries in the UK and suppliers of Battery Support Services

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Application Note No.2

Renewable Energy Systems

There is great interest in renewable energy as it is energy derived from resources that are regenerative and for all practical purposes are not depleted. This seems to be an ideal solution to our energy problems. However, these energy sources are fundamentally different from fossil fuels and must be managed in a different way.

In general, renewable energy sources are intermittent or vary in intensity throughout the day. This is certainly true of wind, solar and tidal, with the generated power depending on the availability of natural forces and not on the demand requirements. Thus if large scale use is to be made of renewables then either, auxiliary generation has to be provided to compensate for lack of wind or sun, or some form of electrical energy storage is necessary. In addition, renewable energy power generation sites are often located away from transmission facilities. This can be overcome by off-grid systems. These can be from relatively small systems, typically photovoltaic, where a battery has long been the usual energy storage system, to large scale 'island' systems, where substantial energy storage is required.

The electricity generated by renewable systems can be quite variable in its quality. This leads to a need to introduce a power quality network to ensure that the electricity meets the standard required by the users.

Large scale renewable energy systems, such as wind farms, are almost always **grid connected**. However, although batteries are not generally used for bulk energy storage they nevertheless have a role in:

- power quality
- spinning reserve in hybrids (kWhs)
- vane control
- pylon drives
- conventional utility support systems (UPS etc)

In choosing a battery it must be remembered that electrical utility equipment has a design life in excess of 20 years, that renewable energy systems have design lives of 20+ years (photovoltaic arrays), 30+ years (wind generators) and that a very high standard of security of supply is required. It is therefore important to match the lifetime and reliability the battery to the other components of the system to optimise the cost and integrity of the system.

The typical requirements for **stand alone renewable energy installations** are ruggedness, environmental flexibility, unattended operation, ease of installation, and reliability.
Traditionally the most usual system had photovoltaic panels. However, with the increasing availability of small wind turbines, systems can now be photovoltaic, wind turbine or hybrids utilising both. In addition a back up generator may also be part of the system.
Regardless of the configuration, an ‘off-grid’ stand alone system has to have some form of energy storage, and this is usually provided by a battery.
With an increasing number of systems being installed in critical applications such as telecommunications and navigational aids, emphasis is placed on designing for safety and reliability as the requirements for system integrity and availability are paramount. Obviously, for optimum reliability the battery chosen for the system must match the characteristics of the other components in the system.

The demands made on batteries in renewable energy applications differ widely from those used for a conventional standby applications with the most important battery requirements being:

- ability to withstand cycling, daily and seasonal
- ability to withstand high and low environmental temperatures
- reliability and availability during the 20 years service life of the system
- ability to operate reliably, unattended and with minimal maintenance
- resistance to withstand failure of electronic control systems.
- easily installed with limited handling equipment and unskilled labour
- ruggedness for transportation to remote sites.

It is important to note that even in large scale grid connected systems most of these attributes still apply.

Nickel-Cadmium offers matching characteristics

The principal features of the Ni-Cd battery can be summarised as follows:

- ✓ High cycle life: excellent deep and shallow cycle behaviour with the Alcad Solar range providing up to 8 000 cycles at 15 % DOD during its 20 years life
- ✓ Long life and reliability: nickel-cadmium batteries have lifetimes in excess of 20 years and the internal steel structure means that it cannot fail in open circuit and cause a complete loss of supply.
- ✓ Excellent performance and life over a wide temperature range: the affect of high temperatures on nickel cadmium battery life is far less than on lead acid battery life and low temperature performance is significantly superior.
- ✓ Abuse Resistance: nickel-cadmium has the ability to work over a very wide temperature range and is not damaged by overcharge and over discharge. The steel internal structure makes it resistant to mechanical abuse.
- ✓ Simple Maintenance: The bolted connection system simplifies assembly and the only maintenance required in service is a visual check, connector check and topping up with approved water every few years.
- ✓ Low Life Cycle Cost: when the cost of replacements and unexpected failure is factored in, nickel-cadmium is the most cost-effective option for renewable energy systems.

Our Battery Ranges

IBLUK supply premium quality industrial nickel-cadmium batteries from the leading manufacturers Alcad and Saft. From our extensive range of Alcad batteries we offer:

- The Solar range which is designed for renewable energy storage applications and has a high cycle life and low maintenance built in. It is available in a capacity range of 45 to 1110 Ah.
- The XHP range which uses sintered positive and plastic bonded negative plates. They are high performance low maintenance products with excellent low temperature capability, a small footprint and available in a capacity range from 11 to 320 Ah

IBLUK Support

Industrial Batteries (UK) Limited has been serving the industrial battery market in the United Kingdom since 1997 and specialises in nickel-cadmium industrial battery supply and support.

We will size the optimum battery for your application from our extensive ranges, provide battery layouts, supply battery stands where required and help you to choose the most cost effective solution.

We also provide battery training, maintenance equipment, accessories and support services. Please do not hesitate to contact us.

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