



**Industrial Batteries (UK) Limited**

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

**Technical Note No.1**

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## Choosing the right technology for the Application

Reliable operation in demanding environments calls for specially designed batteries which are more tolerant of the heavy vibration, wide fluctuations of temperature and the general physical and electrical abuses that can destroy conventional batteries.

Typical applications for batteries and the battery performance regimes required are shown below.

Performance Type	Typical Discharge Regime	Typical Size Range	Typical Applications
High rate discharge	Less than 30 mins	10Ah to 1000Ah	Engine Starting Switch Tripping/Closing Electricity Substations UPS Systems Electromagnets
Medium rate discharge	30 mins to 2 hours	10Ah to 1000Ah	UPS Systems Power Supplies Electric Train Duties Gas Turbine Control General mixed loads
Low rate discharge	More than 2 hours	10Ah to 1500Ah	Emergency Lighting Alarms Railway Signalling DC Instrumentation Telecom Systems Renewable Energy

The purpose of having a back-up system is to provide security and, in the event of mains power failure, the battery must work.

If the battery does not work then this is worse than having no system and this gives a false sense of security.

The requirements in any critical system are:

- A reliable system, which will not fail at the critical time.
- A cost effective solution, which linked to the cost of failure of the system.

To achieve this, all costs investment and maintenance costs must be analysed and related to the costs resulting from system failure. In particular, a critical system is any system whose failure could threaten human life, the system's environment or the existence of the organisation which operates the system



The choice of battery depends on many factors related to the application and it is important to choose batteries that satisfy these requirements. There is no single battery type that is appropriate for all applications and the choice of the wrong battery can have potentially disastrous results in the case of failure. Where reliability and life cycle costs are key issues then Ni-Cd batteries offer considerable advantages compared with lead-acid batteries

## General Features of Lead Acid and Nickel Cadmium Batteries

Parameter	Lead Acid	Nickel Cadmium
Calendar Life (years) Under float at 20-25°C with an occasional discharge	Lifetime/performance are related. VRLA lifetime 5-7 years Thin plate UPS lifetime 8-10 years Switchgear lifetime 15 years Thick plate (plante) lifetime 20 years	Lifetime is independent of performance. All Ni-Cd batteries supplied by IBLUK will achieve more than 20 years lifetime under these float conditions.
Cycle Life (equivalent conditions)	VRLA is not designed for cycling Tubular Plate Cycling Cell 700 General Purpose Flat Plate 200	All Ni-Cd cells supplied by IBLUK will achieve at least 1000 cycles, some have a 3000+ capability
Reliability Criteria	Worst case failure is cell open circuit Result is complete loss of battery, known as 'sudden death', resulting in an unpredicted system failure.	Worst case failure is cell short circuit Result is reduced performance. The battery will continue to support the system.
High Performance	A high rate cell can give up to 7 times its Ah capacity in amperes	A high rate NiCd cell can give up to 15 times its Ah capacity in amperes
Physical Size	In terms of Ah, VRLA is the most compact battery. Flooded cells are up to 3 times larger	NiCd cells are generally larger than VRLA cells but equal or smaller than flooded lead acid batteries.
Water Additions	VRLA are designed not to have water added. Flooded cells require additions every 3 - 12 months	NiCd cells require water additions every 1 to 20 years depending on the type and application conditions.
Maintenance Requirements	VRLA maintenance is limited to cleaning and testing. Flooded cells require moderate to high levels.	NiCd maintenance is restricted to cleaning and visual inspection with occasional water additions.
High Temperature Operation (above 20°C)	The lifetime reduces 50% for every 10°C increase in temperature.	The lifetime reduces 20% for every 10°C increase in temperature.
Low Temperature Operation	Performance and capacity falls of significantly at low temperatures., which can also damage the plates	NiCd has less fall off in performance at low temperatures and can work down to -30°C without damage.
Electrical Abuse	Ripple is not tolerated by VRLA batteries. Lead acid batteries cannot recover from over discharge and overcharge causes damage.	Overcharge and over discharge do not damage the battery and it is tolerant to ripple effects.
Mechanical Abuse	Vibration causes shedding and loss of capacity. Transparent SAN cell cases are fragile.	High resistance to vibration and shock. Batteries pass all relevant international tests.
Relative Costs Initial and Life Cycle	Lead acid has a low initial cost but a restricted lifetime. In many applications they can have a poor life cycle cost.	Ni-Cd cells have a higher initial cost than lead acid but superior lifetime and characteristics, giving a lower life cycle cost in many applications.

IBLUK are able to engineer and supply a battery to meet your requirements from the extensive ranges of Alcad and Saft European manufactured nickel-cadmium cells. In addition to a full range of battery stands and accessories, IBLUK also offer assistance on battery sizing, life cycle costing, battery maintenance, battery training and Ni-Cd battery recycling.

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