DTE TECHNOLOGIES

SMARTENERGYDIVISION

BATTERY TECHNOLOGY OVERVIEW

GENERAL

This battery overview is intended to provide a limited but general understanding of Lithium-ion (Li-ion) versus Lead-Acid technology.

BATTERY TECHNOLOGY

It is common knowledge that there has been significant progress in Battery Technology in recent years.

This development is particularly significant in RSA, where until recently, we have had to adapt short run-time UPS type systems with Lead-Acid battery technology, to cater for the vagaries of RSA load shedding schedules.

The fact is that Lead-Acid batteries are not ideally suited to cope with the regular power outages. Moreover, the repetitive cycle of these events often re-occur before the batteries have had sufficient time to recover and re-charge to full capacity.

Affordable Li-ion technology offers robust back-up support options. This battery technology progress has in turn led to further innovation in Inverter technology and much improved Battery Management capabilities.

A successful battery back-up system is made up of a compatible combination of these elements and will only perform optimally when correctly configured. All viable long-term solutions are totally dependent on appropriately trained and highly skilled resources.

IMPORTANT FEATURE DEFINITIONS

Feature	Definition
Depth of Discharge (DOD)	The level to which you can realistically discharge a battery capacity without causing damage.
Discharge Capacity Derating (C-Derating)	The usable capacity relative to the discharge amperage rate of the battery.
Design Life (Life Cycles)	The number of cycles refers to the number of recharge events possible from DOD to full capacity.
Re-Charge Time (C-Rating)	The length of time it takes to recharge a battery at the manufacturers' specified amp rating.
Warranty Period (Guarantee)	The time period in which a battery may be returned or exchanged.

FEATURE COMPARISONS

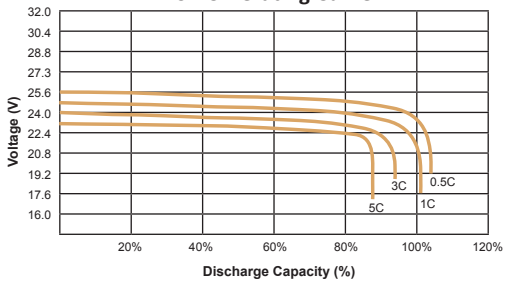
There are several different design types of batteries with varying features, but below are basic guidelines for comparisons.

Feature	Typical Li-Ion	Typical Lead-Acid
Depth of Discharge : DOD	**80% to 90%**	**50% to 60%**
C-Derating - Current Discharge Capacity Curve	100% of capacity at 1C	35% of capacity at 1C
C-Rating – Re-Charge time	**1 to 2 hours**	**10 to 20 hours**
Design Life - Cycles at rated DOD	5000/6000 Cycles =12/15 yrs.	750/1500 Cycles = 3/5 yrs.
Warranty Period - Provided DOD management is compliant	**7 yrs.**	**1 yr.**

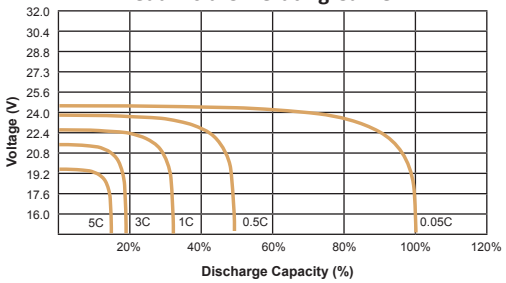
NOTE: Above data is dependant on the Battery Supplier's Specifications

ILLUSTRATIONS

Li-ion C-Derating Curve



Lead-Acid C-Derating Curve



Li-ion Usable Capacity - 80%-90%

Lead-Acid (GEL/AGM/Flooded) Usable Capacity - 50%-60%