OSAKA
BATTERIES

Maintenance Free Batteries

We are one step ahead of the market, providing new and advanced products to its customers. The maintenance free concept focuses on the effort to eliminate the evaporation (water loss) inside the battery; therefore no water addition is required for the whole battery life.

Maintenance Free Batteries
Suitable for Automotive

OSAKA

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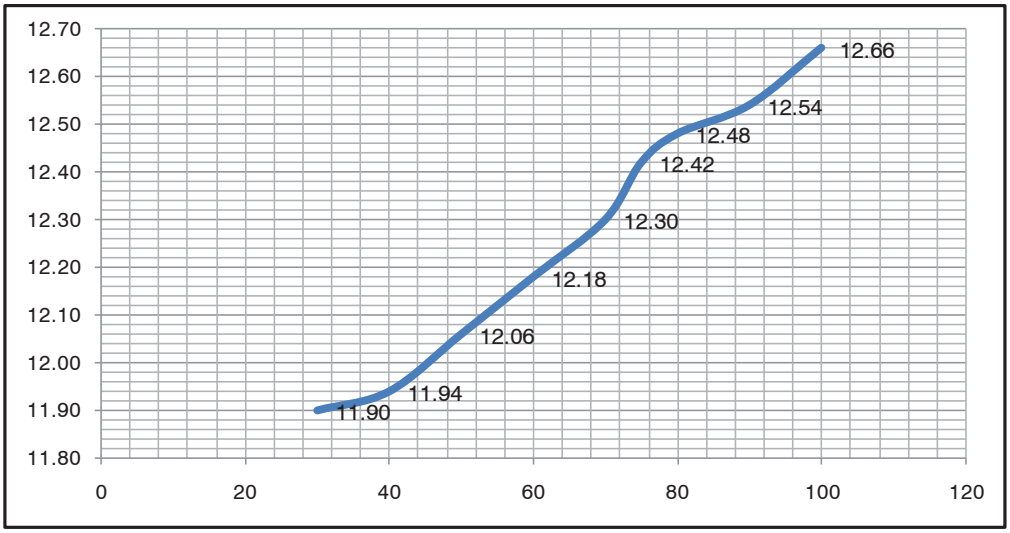
SOC (%) vs. OCV

The charging efficiency varies depending upon the state of charge of the battery, temperatures, and charging rates. An easy method to estimated the State of Charge (SOC) of the battery is by measuring its Open Circuit Voltage (OCV).

This measurement should be made after the battery has been at rest for a minimum of four hours with the battery shut off from its charging source and load. The reference temperature is 25 (77), but the OCV does not change appreciably at other temperatures.

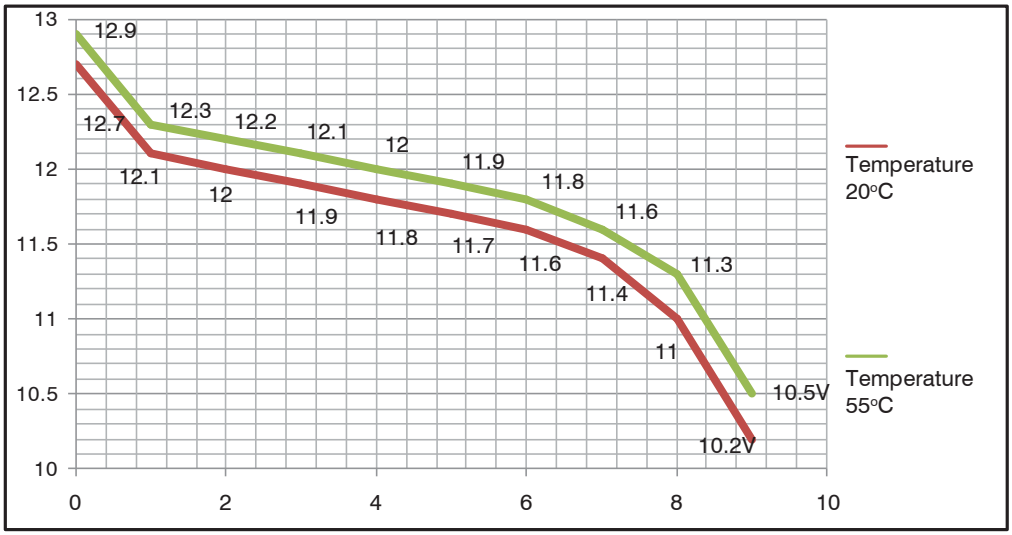
The "Open circuit voltage" varies according to ambient temperature and the remaining capacity of the battery. Generally, open circuit voltage is determined by the specific gravity of the electrolyte. Discharging a battery lowers the specific gravity.

SOC (%)	100	90	80	75	70	60	50	40	30
OCV	12.66	12.54	12.48	12.42	12.30	12.18	12.06	11.94	11.90



Discharge time vs Temperature

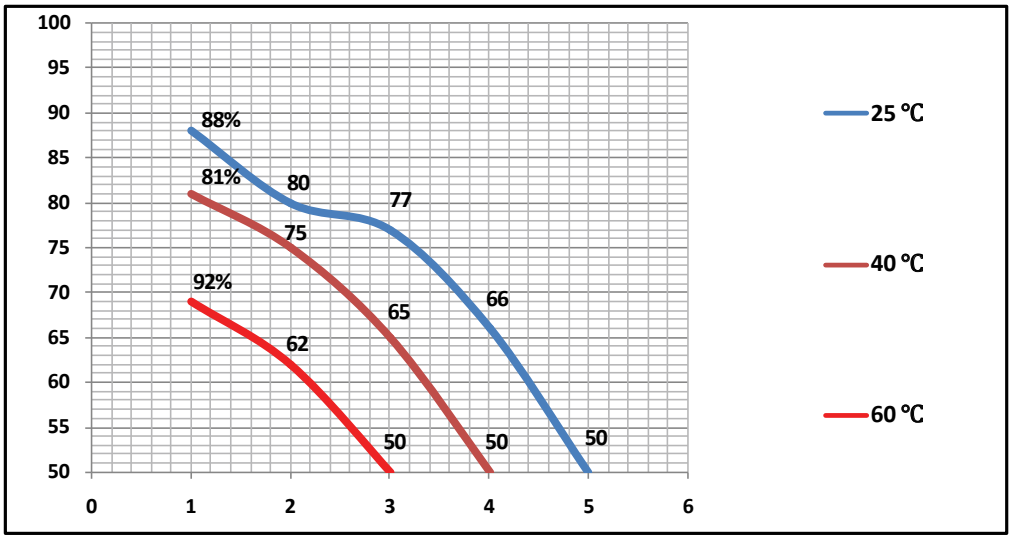
During discharge the voltage will decrease. By convention the rating is based on a 20-hours discharge rate. An important feature of discharge curves; namely, the voltage tends to remain high and almost constant for a relatively long period before declining to an end voltage.

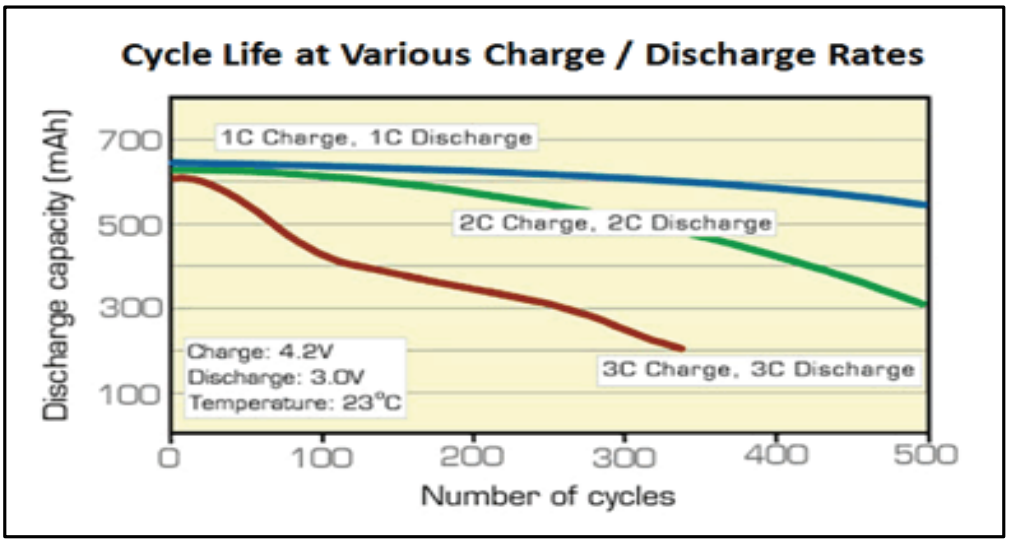


Shelf Life & Storage

Shelf Life & Storage Low internal resistance and special alloys in the electrodes assure a low self discharge rate and, consequently, a long shelf life. If kept at 25°C (77°F), about 60-70% of the nominal capacity remains after one year of storage. Due to the self-discharge characteristics of this type of battery, it is imperative that they be charged within 6 months of storage, otherwise permanent loss of capacity might occur as a result of sulfation. The rate of self discharge varies with the ambient temperature. At room temperature (25°C (77°F)) it is about 3% per month.

At low temperatures it is nearly negligible; at higher ambient temperatures self discharge increases. To obtain maximum battery life and performance, batteries should be recharged as soon as possible after each use and not stored in a discharged state. If possible batteries should be stored at 25°C (77°F) or lower, and recharged every six months when not in use.





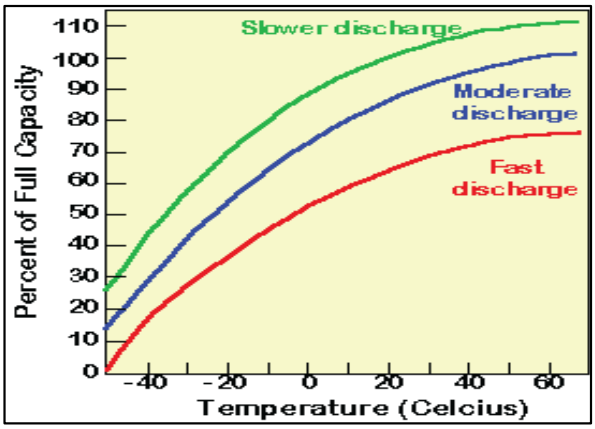
Battery Capacity

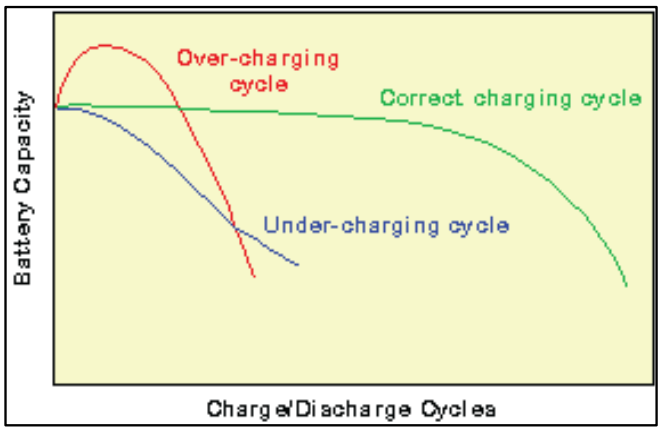
Battery capacity falls by about 1% per degree below about 25°C. However, high temperatures are not ideal for batteries either as these accelerate aging, self-discharge and electrolyte usage. The graph below shows the impact of battery temperature and discharge rate on the capacity of the battery.

Capacity, expressed in ampere-hours (AH), is the product of the current discharged and the length of discharge time. The rated capacity (C) of a battery is measured by its performance over 20 hours of constant current discharge at a temperature of 25°C (77°F) to a cut off voltage of 1.75 volts/cell.

Temperature Actual capacity is a function of ambient temperature and rate of discharge. At 25°C (77°F) rated capacity is 100%. The capacity increases slowly above this temperature and decreases as the temperature falls.

At any ambient temperature, the higher the rate of discharge, the lower the available capacity.





Battery Life Time

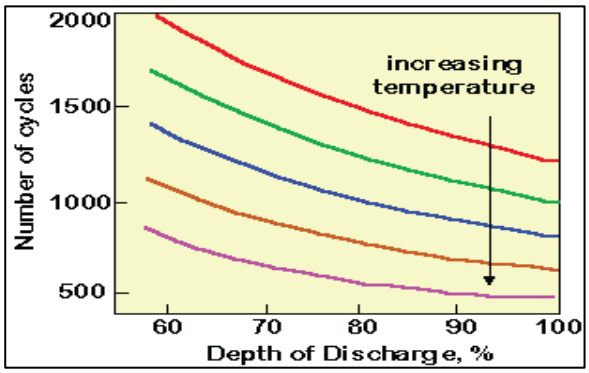
Over time, battery capacity degrades due to sulfation of the battery and shedding of active material. The degradation of battery capacity depends most strongly on the interrelationship between the following parameters:

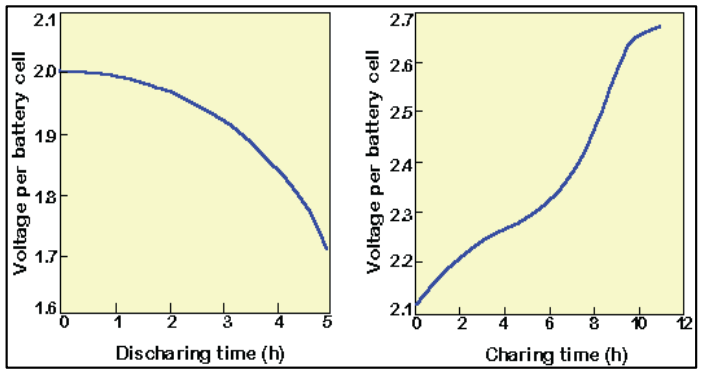
* The charging/discharging regime which the battery has experienced
* The DOD of the battery over its life
* Its exposure to prolonged periods of low discharge
* The average temperature of the battery over its life time

Overcharging or undercharging the battery results in either the shedding of active material or the sulfation of the battery, thus greatly reducing battery life.

Depth of Discharge

The final impact on battery charging relates to the temperature of the battery. Although the capacity of a lead acid battery is reduced at low temperature operation, high temperature operation increases the aging rate of the battery.





Fully Discharged and Charged States

In between the fully discharged and charged states, a lead acid battery will experience a gradual reduction in the voltage. Voltage level is commonly used to indicate a battery's state of charge. The dependence of the battery on the battery state of charge is shown in the figure below. If the battery is left at low states of charge for extended periods of time, large lead sulfate crystals can grow, which permanently reduces battery capacity. These larger crystals are unlike the typical porous structure of the lead electrode, and are difficult to convert back into lead.

Battery Type	Plates per Cell	Capacity 20 Hr	Battery Container Size	Dimension (mm)				Battery Weight (Kg)
				L	W	H	TH	
MF 35Gen	5	20	NS40	198	126	198	218	7.50
MF 50	9	38		198	126	198	218	10.14
MF 60	11	40		198	126	198	218	11.40
MF 70	11	48	N40	236	128	200	220	12.42
MF 75	9	50	N50	254	170	198	218	15.40
MF 55D23L	11	55		230	170	198	218	15.80
MF 80	11	75		254	170	198	218	17.40
MF 95	13	78		304	171	200	220	
MF-90D31R/L	12	75	N70	304	171	200	220	18.93
MF 100	13	80		304	171	200	220	19.55
MF 110	15	90		304	171	200	220	21.70
MF-6X15-(SLI)	15	100	6x15	365	170	202	222	24.53
MF-N100-(SLI)	17	100	N100	398	168	208	228	27.40
MF-N120-(SLI)	21	120	N120	504	182	208	228	37.92
MF-N150-(SLI)	25	150	N150	504	218	210	230	42.58
MF DIN 55	11	55	DIN MF55	245	177	190	190	16.60
MF DIN 66	13	66	DIN MF66	276	177	190	190	19.50
MF DIN 88	17	88	DIN MF88	355	177	190	190	24.50

PLUS Optimised Starting Power

Enhanced Safety and Envelope Separators

Ca Advanced Calcium Plus Technology

State of Charge Indicator

Sealed Maintenance Free

*All data and specifications are subject to change without any prior notice.

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