VRLA Battery Characteristics - Capacity Retention and Storage

Capacity retention

When the charged battery is left standing for an extended period of time, its capacity gradually decreases and enters to a discharged state. The battery consumes the stored electrical energy without releasing it effectively to the circuits. This is called self-discharge. This disappearance of capacity is inevitable and will occur even if the battery is not being used. Self-discharge is caused by internal chemical and electrochemical reactions within the battery. Self-discharge for a lead acid battery is described below.

(1) Chemical
Both (+) active mass (lead dioxide) and (-) active mass (sponge lead), are either decomposed or brought to gradual reaction with sulfuric acid in the electrolyte, which then changes to stable lead sulfate causing self-discharge.

(2) Electrochemical
Impurities brought to the battery either from local cells or oxidation reduces both electrodes, causing self-discharge. The self-discharge quantity of the battery is very small, 1/3 to 1/4 that of ordinary lead-acid batteries. This means that this battery has a superior capacity retention characteristic. Figure 1 shows capacity retention characteristics and storage guidelines.

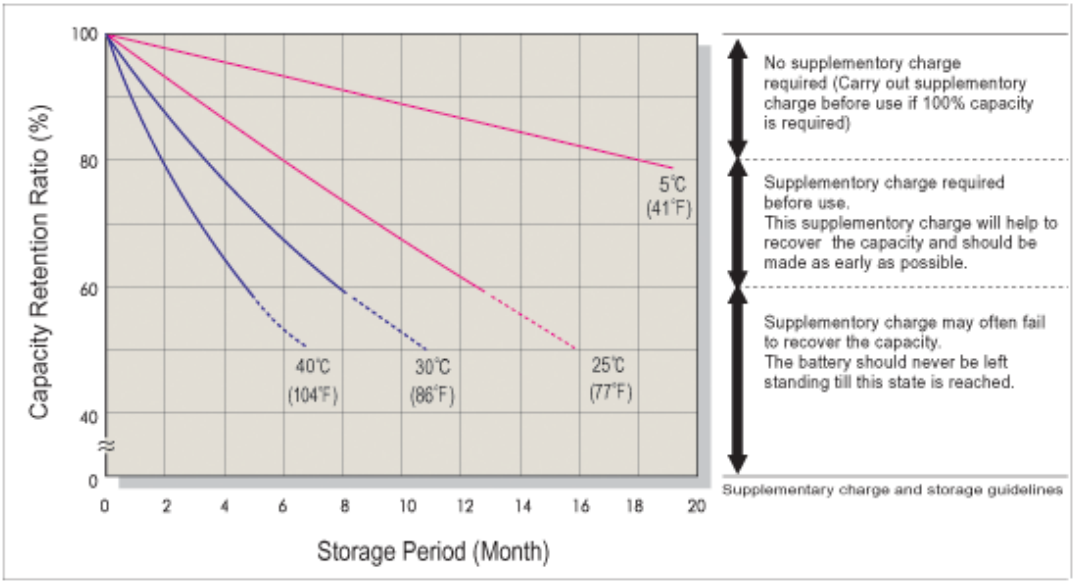

Figure 1: Capacity retention characteristics and the supplementary charge and storage guidelines

Storage

Lead-acid batteries previously were affected by long term storage after charging. CSB Battery, because of its Pb-Ca alloy offers longer extended storage than conventional batteries. Please see Figure 1. During storage, carry out supplementary charging according to the cycle shown in Table 1. For supplementary charging after prolonged storage, either the constant-voltage charge with 2.45V/cell, or the

constant-current charge with 0.05CA, is recommended. But, sometimes, one supplementary charge may not recover to 100% capacity. In such a case, it should be repeated until the capacity is recovered before storage.

Table 1: Storage temperature and recommended supplementary charge interval

Storage temperature	Recommended supplementary charge interval	Supplementary charging methods
Lower than 25℃(77℉)	Each 6 months	Charged by constant voltage 2.275V/cell for 16~24hrs Charged by constant voltage 2.45V/cell for 5~8hrs Charged by constant current 0.05CA for 5~8hrs
25- 30℃(77 - 86℉)	Each 3 months	
Over 30℃(86℉)	Storage to be avoided	

Open circuit voltage and residual capacity

Figure 2 show the relation between open circuit voltage and residual capacity.

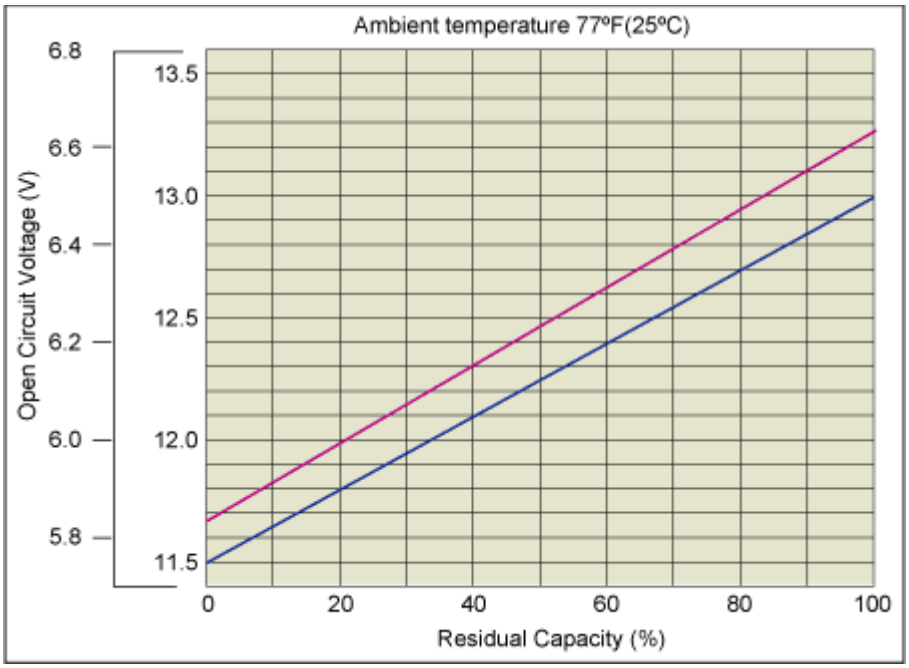

Figure 2: Open circuit voltage characteristics