CSBattery ENERGY CO.,LIMITED

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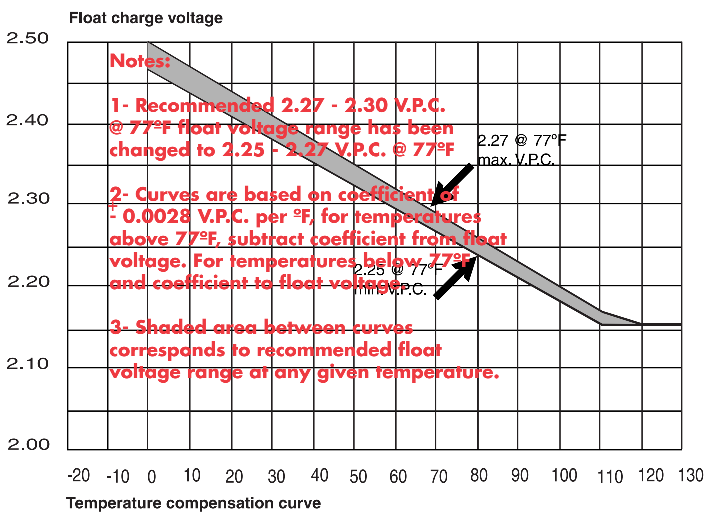
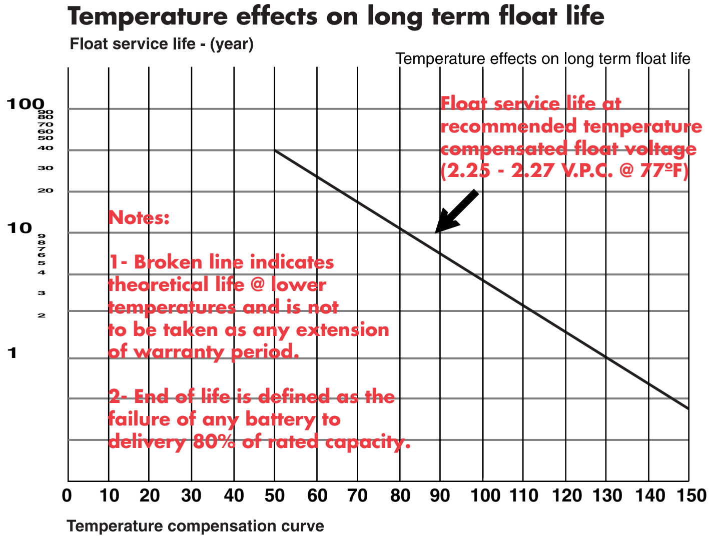
BATTERY TEMPERATURE

Heat is the worst enemy of any battery. Its effects must be seriously taken into account and steps must taken minimize these effects. The application parameters to do so are covered below.

Float charge voltage - Temperature compensation curve



Temperature effects on long term float life



Battery system location:

Battery system location is the first part of the application details needed to properly size and use any battery. It is recommended that a battery system's average temperature be maintained between 68º (77ºF). A cell to cell variation of 5ºF (maximum) is also highly desirable. When a system location calls for temperatures outside these parameters, applications engineering may use one of the following methods. Design the system with the added temperature environment controls (ex: change o system location, forced air circulation and/or cooling pro-visions, etc.) or use the temperature compensation float voltage coefficient of + 0.0028 V.P.C. or -0.0028 V.P.C. per ºF. For temperatures above 77ºF subtract coefficient from float voltage. For temperatures below 77ºF, add coefficient to float voltage.

A battery system's discharge capacity:

A battery system's discharge capacity is directly related to the battery's temperature. PRC Series batteries are rated 100% at 77ºF. The percentage of capacity available at a specific rate of discharge can be taken directly from the "Percent Capacity VS. Temperature" curve.
To use, one must first select the rate
of discharge closest to the actual rate the application calls for, then travel along the curve to the expected operating temperature on the horizontal axis. Now, find the point on the vertical axis which corresponds to the temperature and rate curve selected. Multiply this percent capacity by the ampere or wattage rate on the published discharge curves to arrive at the temperature corrected discharge rate.

The designed float service life:

The designed float service life of the PRC Series batteries is 10 years at 77ºF using a 2.25 - 2.27 V.P.C temperature compensated float charge voltage. The float service life is directly related to the application's operating temperature. For temperatures above 77ºF standard, grid growth (corrosion) is accelerated and battery life is shortened. The actual amount in which the life will be affected is given on the "Temperature effects on long term float life" curve . This curve was derived

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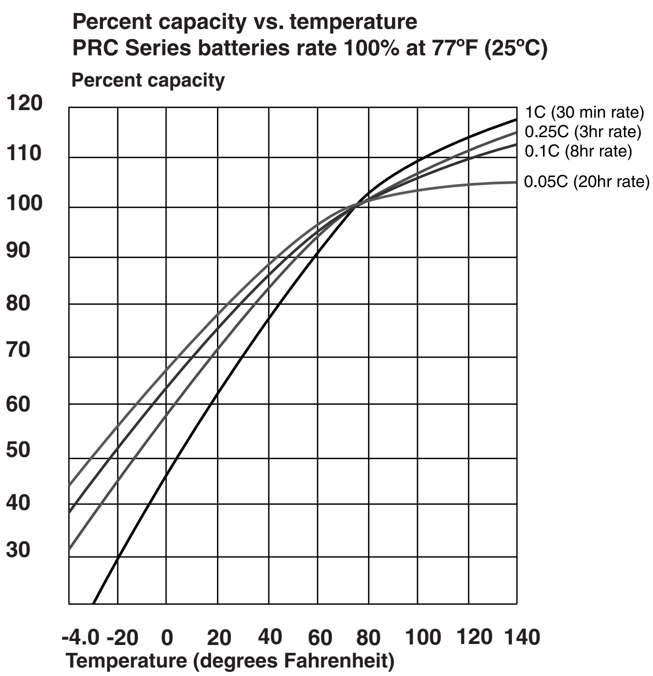

Float charge voltage :

The selection and maintenance of a specific float charge voltage is essential to achieving the designed service life and rated capacity of the battery. If the float charge voltage is too high, more float charge current will flow through the battery causing accelerated grid growth (corrosion), hence shortening the battery service life. If the float charge voltage is too low, the battery will not be maintained in a full charge state.This will cause the accumulation of the lead sulfate, resulting in degradation of capacity, followed by a reduction in service life. Battery temperatures play an important role in the selection of the float charge voltage used in any stationary application. The PRC Series batteries are designed for 10 years full float charge operation @ 77ºF and 2.25 - 2.27 V.P.C. When the application's environments is such that the battery's temperature varies from the 77ºF standard, changes occur in the float charge voltage requirements. These changes are due to variations in the battery self-discharge rate, internal resistance, current acceptance and electrolyte viscosity.

It is therefore recommended that the float charge voltage be temperature compensated to accommodate the variations. Enclosed is a copy of the "Battery Temperature vs. Float Charge Voltage" curve developed for this purpose.

This curve can be used in one of two ways. If the average temperature profile of the application is a known constant or is well controlled, the float charge voltage can be set on the charger according to the compensation curve. If the application calls for unknown battery temperatures or variations (ex: day / night, winter / summer, ect.), the charger design can be modified to automatically compensate for these variations.

This modification is relatively simple to accomplish as the compensation factor is linear in nature over a wide range of temperatures. Please refer to the curve for further details.