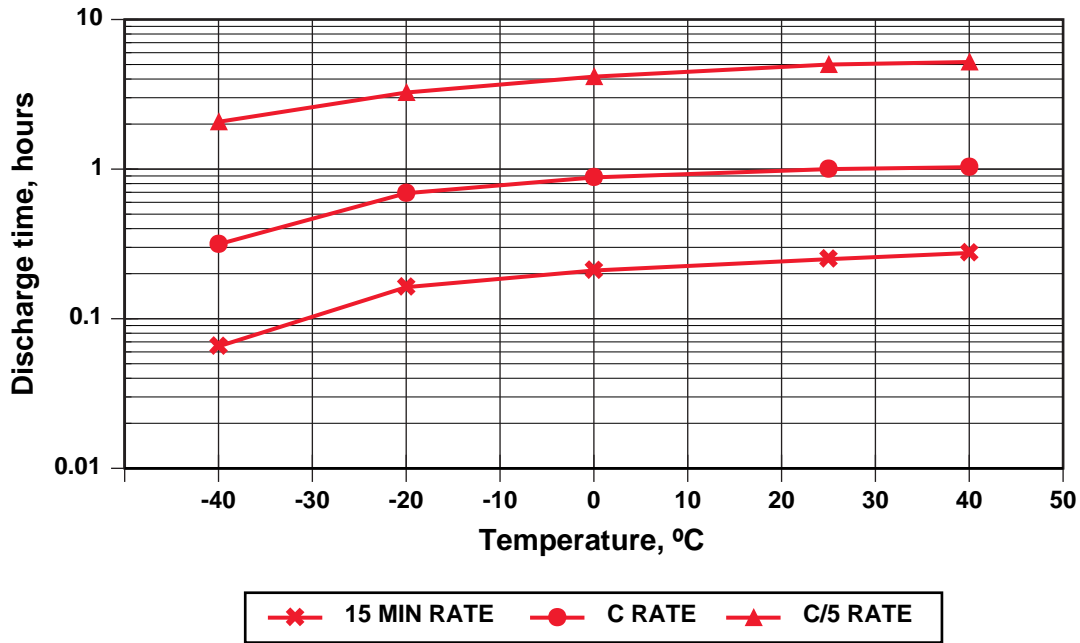
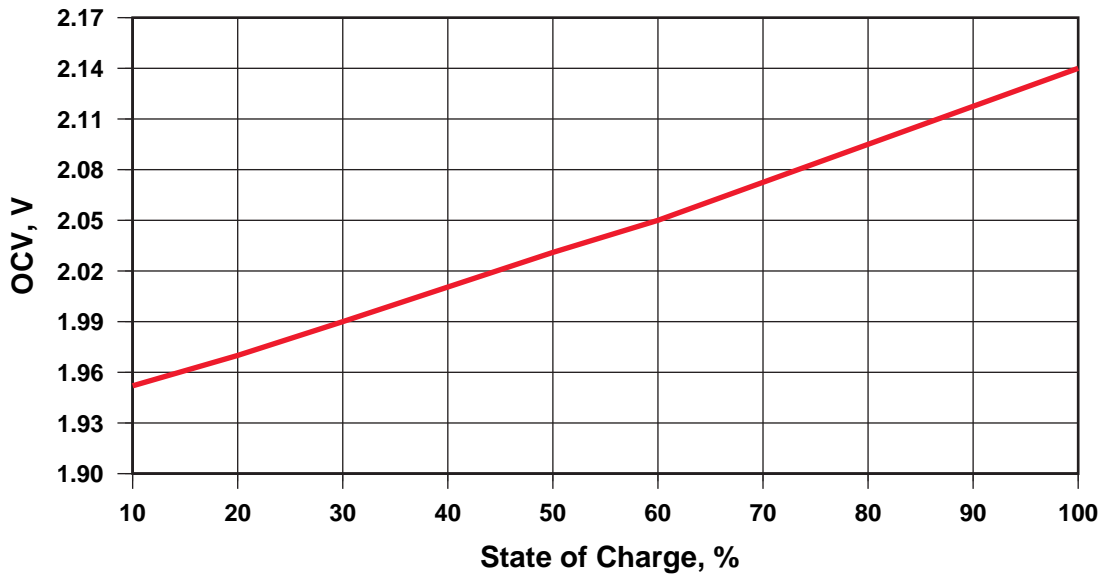


**CAPACITY AS A FUNCTION OF TEMPERATURE FOR CYCLON SINGLE CELLS & MONOBLOCS
(USE GRAPH UP TO 40°C FOR MONOBLOCS)**

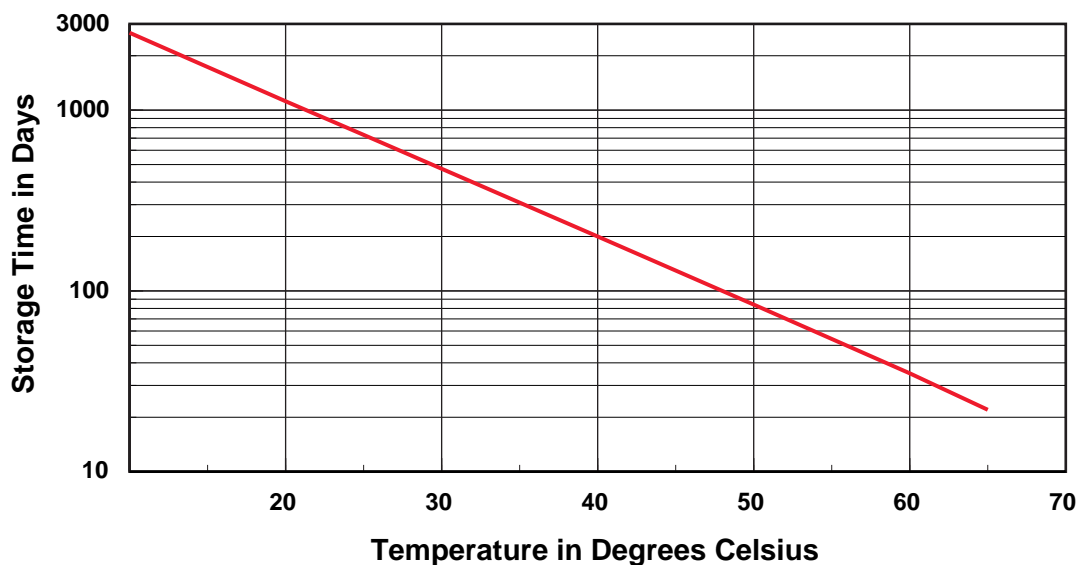


STATE OF CHARGE FOR CYCLON SINGLE CELLS & MONOBLOCS

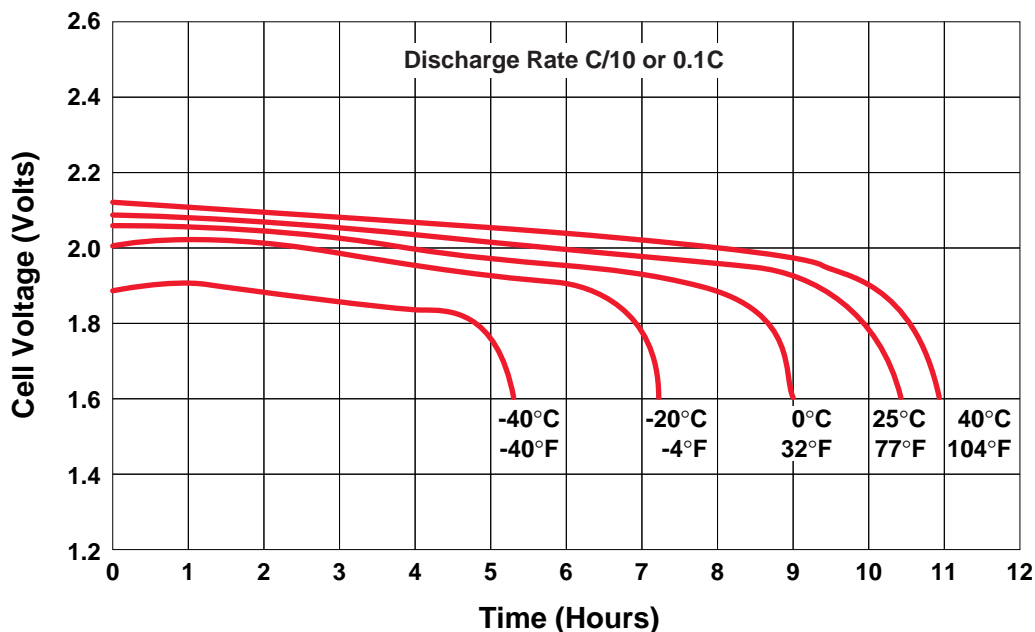




**STORAGE TIME AS A FUNCTION OF TEMPERATURE FOR CYCLON SINGLE CELLS & MONOBLOCS
(FULLY CHARGED CELL)**



VOLTAGE REGULATION FOR CYCLON SINGLE CELLS & MONOBLOCS



CHARGING RECOMMENDATIONS:

Broadly speaking, a battery may be recharged using either a constant voltage (CV) charger or a constant current (CC) charger, or a modification of either or both of these.

The exact regime chosen generally depends upon the time and economic constraints imposed by the system. Constant current charging is widely used in cyclic applications where a recharge must be accomplished in a relatively short time period. Constant voltage charging, where a single voltage level is applied across the battery terminals, is the most suitable method to recharge CYCLON products. Depending on the CV charger's current limit, it is possible to recharge these batteries from a 100% discharged condition to better than 95% state of charge in less than one hour, using only the cyclic charge voltage.

Constant voltage charging

Constant voltage (CV) charging should be within the following ranges:

Fast Chargers:	Per cell: 2.45 to 2.50 volts @ 25°C
	12 volts: 14.70 to 15.0 volts @ 25°C
Float Chargers:	Per cell: 2.27 to 2.35 volts @ 25°C
	12 volts: 13.62 to 14.10 volts @ 25°C

To avoid thermal runaway in warmer temperatures, and to improve charge acceptance in colder temperatures, the charger voltage should be compensated by approximately 3 millivolts per cell per degree Centigrade variance from 25°C. This is a negative coefficient, with the voltage being lowered as the temperature increases, and vice versa.

There is no need to limit the inrush current to the battery during the initial phase of constant voltage charging. The internal resistance of Hawker CYCLON Single Cells and Monoblocs allows for large inrush current without damage.

Since not all of the charge returned is accepted to replenish the electro-chemical potential, a good rule of thumb to use is that the charge returned should be 105% to 110% of the capacity delivered on the previous discharge.

Most current waveforms are not pure DC nor are they pure sine waves. Therefore, *consult the Hawker Application Support Department for assistance* when evaluating the charger current waveforms for your specific application.