

# The Myth of NICKEL-CADMIUM Battery Memory

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**O**ccasionally, we are asked about nicad memory and its effects on the performance of our emergency lighting products. A little probing usually reveals that their definition of memory is

*"the inability to provide full capacity on discharge if the battery has been subjected to repetitive shallow cycling beforehand."*

Fortunately, no such characteristic exists in any modern, quality nicad that we use or know of. So, where has this memory myth come from? Two places, I think: 1) An actual physical nicad phenomenon known as voltage depression (more on this later), and 2) The willingness of at least one major cell manufacturer to define memory as a nicad trait, but to state that it's nonexistent in their own cells.

Cells exposed to standby overcharge for extended periods may exhibit voltage depression during discharge. This results in the cell voltage dropping about 0.15 Volt lower than normal near the end of discharge. With longer overcharge times, this slight voltage depression may occur earlier in the discharge period. However, this slight drop could only be detected with a meter in a multi-cell battery emergency lighting product. No loss of capacity (runtime) occurs with voltage depression. The condition is reversible and disappears when the cell is fully discharged and recharged (called conditioning).

The reversibility of voltage depression is probably the characteristic that people mistakenly call memory. Whenever a battery is discharged deeper than recent previous discharge(s) and reaches the beginning of previously unused capacity, the voltage may decrease 0.15 Volt. This may mislead someone reading a meter into thinking the cell is near the end of the normal discharge curve, and that the cell "remembers" and delivers the amount of capacity previously used. Instead, this voltage depression is related only to extended overcharging and incomplete discharging, not repetitive shallow cycling.[1]

It's important to remember that voltage depression is not permanent, does not represent a loss of capacity and in a properly designed product causes no performance problems. In equipment with a low-voltage battery disconnect circuit, voltage depression could cause loss of useful capacity and prevent the restoration that comes with conditioning if the equipment has a high cut off voltage setting. Philips Bodine models do not have a specific low-voltage disconnect circuit; instead, the load current naturally disconnects at low battery voltage. This allows full battery capacity to be used, erases voltage depression and keeps the cell material active. Periodic testing required by code not only verifies nicad battery performance but helps to ensure top performance.

[1] Application Manual. Sealed Rechargeable Batteries.  
Gates Energy Products, Gainesville, Florida.