Reliability Analysis of Primary Battery

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Abstract

In industrial situation, electronic and electromechanical systems have been using different types of batteries in rapidly increasing numbers. These systems commonly require high reliability for long periods of time. Consequently, it is important to evaluate the reliability and quality over such time. There is little in the literature dealing with the reliability analysis of batteries in electronic and electromechanical applications.

The purpose of this paper is to present a newly developed reliability analysis technique and demonstrate this concept with collected data from a small experiment that collects drycell batteries' voltage drop as function of time(usage/cycle) and associated operating conditions when two D-type alkaline batteries in series are used to power a flashlight. Here, the failure criterion is set to different levels of performance characteristics of equipment or device. (For example, 2.2 volts, 2.0 volts and so forth. Depending on user requirement, at 2.2volts level, flashlight does not function as intended; in turn, resulted in failure.)

The proposed reliability analysis technique utilizes the performances that are measurable directly from equipment or device; it can be only applied to the situation where the performance degraded over the time and other load conditions.

This paper suggests a methodology that overcomes the gap between the acturial concepts and models of reliability and the performance based reliability models.