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IEEE Guide for the Characterization and Evaluation of Lithium-Based Batteries in Stationary Applications

IEEE Power and Energy Society

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Energy Storage & Stationary Battery Committee

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Abstract: Guidance for an objective evaluation of lithium-based energy storage technologies by a potential user for any stationary application is provided in this document. IEEE Std 1679-2010, IEEE Recommended Practice for the Characterization and Evaluation of Emerging Energy Storage Technologies in Stationary Applications is to be used in conjunction with this document. Secondary (rechargeable) electro-chemistries with lithium ions as the active species exchanged between the electrodes during charging and discharging are included in the category of lithium-based batteries for the purposes of this document. Lithium-ion, lithium-ion polymer, lithium-metal polymer, and lithium-sulfur batteries are examples of secondary lithium-based batteries. Primary (non-rechargeable) lithium batteries are beyond the scope of this document. A technology description, information on aging and failure modes, a discussion on safety issues, evaluation techniques, and regulatory issues are provided in this document. Sizing, installation, maintenance, and testing techniques are not covered, except insofar as they may influence the evaluation of a lithium-based battery for its intended application.

Keywords: battery, energy storage, IEEE 1679.1™, li-ion, lithium, lithium-based, lithium-ion, lithium-ion polymer, lithium-metal polymer, lithium-polymer, secondary, standby service, stationary application

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Introduction

This introduction is not part of IEEE Std 1679.1-2017, IEEE Guide for the Characterization and Evaluation of Lithium-Based Batteries in Stationary Applications.

Lithium-based batteries, and lithium-ion batteries in particular, have seen a tremendous growth in interest and application, in particular where battery size and weight are of paramount interest. The use of these batteries are now being evaluated and used in stationary applications. Because of the differences between lithium-based batteries and conventional industrial batteries, such as lead-acid and nickel-cadmium, there is a need for objective information and suitable evaluation techniques. This document provides a technology description, information on aging and failure modes, a discussion on safety issues, evaluation techniques and regulatory issues for the major types of lithium-based batteries for use in stationary applications.

Contents

IEEE Guide for the Characterization and Evaluation of Lithium-Based Batteries in Stationary Applications

1. Overview

1.1 Scope

This document provides guidance for an objective evaluation of lithium-based energy storage technologies by a potential user for any stationary application. This document is to be used in conjunction with IEEE Std 1679™-2010, IEEE Recommended Practice for the Characterization and Evaluation of Emerging Energy Storage Technologies in Stationary Applications.[1]

For the purposes of this document, lithium-based batteries include those secondary (rechargeable) electrochemistries with lithium ions as the active species exchanged between the electrodes during charging and discharging. Examples of secondary lithium-based batteries are lithium-ion, lithium-ion polymer, lithium-metal polymer, and lithium-sulfur batteries. Primary (non-rechargeable) lithium batteries are beyond the scope of this document.

While this document does not cover lithium-based batteries used in mobile applications, the information provided is applicable to electric vehicle or similar batteries that are repurposed for use in stationary applications. This document also applies to batteries that are stationary when in operation but are intended to be relocated, for example, containerized or trailer-mounted systems.

The outline of IEEE Std 1679-2010 is followed in this document, with tutorial information specific to lithium-based batteries provided as appropriate. Examples of tutorial information include technology descriptions, operating parameters, failure modes, safety information, battery architecture, and qualification and application considerations.

This document does not cover sizing, installation, maintenance, and testing techniques, except insofar as they may influence the evaluation of a lithium-based battery for its intended application.

[1]Information on references can be found in Clause 2.