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Minimum Operational Performance Standards (MOPS) for Non-Rechargeable Lithium Batteries

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FOREWORD

This document was prepared by RTCA Special Committee 235 (SC-235), and was approved by the RTCA Program Management Committee on September 21, 2017.

RTCA, Incorporated is a not-for-profit corporation formed to advance the art and science of aviation and aviation electronic systems for the benefit of the public. The organization functions as a Federal Advisory Committee and develops consensus-based recommendations on contemporary aviation issues. RTCA's objectives include but are not limited to:

- coalescing aviation system user and provider technical requirements in a manner that helps government and industry meet their mutual objectives and responsibilities;
- analyzing and recommending solutions to the system technical issues that aviation faces as it continues to pursue increased safety, system capacity and efficiency;
- developing consensus on the application of pertinent technology to fulfill user and provider requirements, including development of minimum operational performance standards for electronic systems and equipment that support aviation; and
- assisting in developing the appropriate technical material upon which positions for the International Civil Aviation Organization and the International Telecommunications Union and other appropriate international organizations can be based.

The organization's recommendations are often used as the basis for government and private sector decisions as well as the foundation for many Federal Aviation Administration Technical Standard Orders.

Since RTCA is not an official agency of the United States Government, its recommendations may not be regarded as statements of official government policy unless so enunciated by the U.S. government organization or agency having statutory jurisdiction over any matters to which the recommendations relate.

EXECUTIVE SUMMARY

This document was prepared by RTCA Special Committee 235.

The Committee membership includes representatives from cell and battery manufacturers, equipment manufacturers, aircraft manufacturers, regulatory and other government agencies, and related industry associations.

The SC-235 Committee reviewed and considered existing regulatory requirements and multiple standards and resources associated with non-rechargeable lithium batteries in developing this updated standard. These standards and resources include the AAIB Aircraft Accident Report 2/2015, Special Conditions related to non-rechargeable lithium batteries, DO-227, DO-347, DO-160 Rev G, UL 1642, UN Section 38.3, IEC 60952, and ISO-7137 [see References].

This standard provides design, testing, and installation guidance for non-rechargeable lithium batteries and battery systems which are permanently installed on aircraft or used in aviation.

The intent of this document is to assist equipment designers and manufacturers in the selection of non-rechargeable cells and battery systems whose safety and performance have been demonstrated as appropriate to the aviation environment.

Section 1 (Purpose and Scope) discusses the scope of this document, and provides guidance, best practices, and a list of some basic terms of reference.

Section 2 (Equipment Performance Requirements and Test Procedures) contains requirements and associated procedures for non-rechargeable lithium cells, batteries, and End Items powered by lithium batteries including general, performance, safety, and environmental requirements and tests.

Section 3 (Aircraft Installation Considerations) provides information that may impact the design or aircraft installation of the battery system or end item. It also provides cautions and advice for the installer. This section is intended to provide installation guidance and considerations that may help applicants to meet the airworthiness regulation requirements for the installation of non-rechargeable lithium batteries on aircraft.

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1 PURPOSE AND SCOPE

1.1 Purpose

The purpose of this document is to establish a Minimum Operational Performance Standard (MOPS) for non-rechargeable lithium cells and batteries installed as or in End Items on aircraft. This MOPS contains a set of requirements, tests, and evaluation criteria to establish and assure the safe operation of End Items which are powered by non-rechargeable lithium batteries containing lithium metal or lithium alloys. This MOPS applies to batteries used as the main power source or that are used for back-up or stand-by power. Guidance is also provided on design, safety, handling, and storage of these items.

Lithium batteries with a number of chemistries, sizes, and construction details are widely used today, and due to a variety of factors can present hazards if improperly designed, manufactured, tested, handled, used, or stored.

Compliance with the requirements contained within this document is recommended as a means of assuring that the cell or battery will perform its intended function(s) safely under conditions encountered in routine aviation operations. To ensure safe operation on the aircraft, it is imperative that users of this standard thoroughly understand the aircraft performance requirements (which establish the operating environments for End Items) and the capabilities and limitations of the batteries and battery systems which power those End Items. It is the equipment installers' responsibility to ensure that the batteries and battery systems meet the certification and installation requirements of the aircraft. Any regulatory application of this document is the sole responsibility of the certifying civil aviation authority.

1.2 Scope

This standard applies to non-rechargeable lithium cells, batteries, and battery systems that are permanently installed on aircraft.

For the purposes of this standard, a non-rechargeable lithium battery and battery system is considered permanently installed equipment when it is included as part of the type design of the aircraft (or a supplemental/amended type design). This standard also applies to non-rechargeable lithium batteries and battery systems contained within Portable Electronic Devices (PEDs) that are part of the type design.

Non-rechargeable lithium batteries within PEDs that are not part of the type design are outside the scope of this document; these PEDs fall under the purview of Federal Aviation Administration (FAA) Flight Standards division and are regulated by operational rules under Title 14 of the Code of Federal Regulations (CFR). PEDs that are not part of the type design, especially those located on the flight deck, can pose similar hazards as permanently installed equipment.

This standard does not apply to secondary (rechargeable) lithium batteries or to passenger-carried items regardless of their battery type.

1.3 Inclusions In This Document

The performance and safety of non-rechargeable lithium cells, batteries, and battery systems are covered by this MOPS as stand-alone items or when installed in an End Item.