



ANSI C18.2M, Part 1-2019

*American National Standard for
Portable Nickel Rechargeable Cells and Batteries—
General and Specifications*

Secretariat:

National Electrical Manufacturers Association
1300 N 17th St., Suite 900
Rosslyn, VA 22209

Approved: December 5, 2019

American National Standards Institute, Inc.

NOTICE AND DISCLAIMER
(ANSI Accredited Standards Committee)

The information in this publication was considered technically sound by the consensus of persons engaged in the development and approval of the document at the time it was developed. Consensus does not necessarily mean that there is unanimous agreement among every person participating in the development of this document.

ANSI Standards, of which the document contained herein is one, are developed through a voluntary consensus Standards development process. This process brings together volunteers and/or seeks out the views of persons who have an interest in the topic covered by this publication. As Secretary of the ANSI Accredited Standards Committee, NEMA administers the process in accordance with the procedures of the American National Standards Institute to promote fairness in the development of consensus. As a publisher of this document, NEMA does not write the document and it does not independently test, evaluate or verify the accuracy or completeness of any information or the soundness of any judgments contained in its Standards and guideline publications.

NEMA disclaims liability for any personal injury, property or other damages of any nature whatsoever, whether special, indirect, consequential or compensatory, directly or indirectly resulting from the publication, use of, application, or reliance on this document. NEMA disclaims and makes no guaranty or warranty, express or implied, as to the accuracy or completeness of any information published herein, and disclaims and makes no warranty that the information in this document will fulfill any of your particular purposes or needs. NEMA does not undertake to guarantee the performance of any individual manufacturer's or seller's products or services by virtue of this Standard or guide.

In publishing and making this document available, NEMA is not undertaking to render professional or other services for or on behalf of any person or entity. Nor is NEMA undertaking to perform any duty owed by any person or entity to someone else. Anyone using this document should rely on his or her own independent judgment or, as appropriate, seek the advice of a competent professional in determining the exercise of reasonable care in any given circumstances. Information and other Standards on the topic covered by this publication may be available from other sources, which the user may wish to consult for additional views or information not covered by this publication.

NEMA has no power, nor does it undertake to police or enforce compliance with the contents of this document. NEMA does not certify, test or inspect products, designs or installations for safety or health purposes. Any certification or other statement of compliance with any health or safety-related information in this document shall not be attributable to NEMA and is solely the responsibility of the certifier or maker of the statement.

AMERICAN NATIONAL STANDARD

Approval of an American National Standard requires verification by ANSI that the requirements for due process, consensus, and other criteria for approval have been met by the Standards developer.

Consensus is established when, in the judgment of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made toward their resolution.

The use of American National Standards is completely voluntary; their existence does not in any respect preclude anyone, whether he has approved the Standards or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the Standards.

The American National Standards Institute does not develop Standards and will in no circumstances give an interpretation of any American National Standard. Moreover, no person shall have the right or authority to issue an interpretation of an American National Standard in the name of the American National Standards Institute. Requests for interpretations should be addressed to the secretariat or sponsor whose name appears on the title page of this Standard.

Caution Notice: This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken periodically to reaffirm, revise, or withdraw this Standard. Purchasers of American National Standards may receive current information on all Standards by calling or writing the American National Standards Institute.

Published by

**National Electrical Manufacturers Association
1300 North 17th Street
Rosslyn, VA 22209**

© 2020 National Electrical Manufacturers Association

All rights reserved including translation into other languages, reserved under the Universal Copyright Convention, the Berne Convention for the Protection of Literary and Artistic Works, and the International and Pan American Copyright Conventions.

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.

Printed in the United States of America.

< This Page Intentionally Left Blank. >

CONTENTS

Foreword	iv
1 General	1
2 Specifications	19
Annex A Reliability Guidelines	27
Annex B Storage	29
Annex C Application Charge Performance	30
Annex D Optional Parameters and Their Effects upon Discharge Capacity	31
Annex E Mechanical Stress Tests and Their Effect upon Discharge Capacity	36
Annex F Compliance Checklist	41
Annex G Bibliography	42

Foreword

In 1912, a committee of the American Electrochemical Society recommended Standard methods to be used in testing dry cells. Their recommendations were followed five years later when the National Bureau of Standards prepared specifications that included cell sizes, the arrangement of cells within batteries, service tests, and required performance.

The need for continued revision to the specification led to the authorization by the American Engineering Standards committee of a permanent sectional committee on dry cells, now portable cells. This Committee, C18, representing battery users, manufacturers, and government agencies, has remained active since that time.

This Standard is a revision of ANSI C18.2M, Part 1-2013 *American National Standard for Portable Rechargeable Cells and Batteries—General and Specifications*. This current revision seeks to improve upon previous editions of this Standard by adding consumer product acceptance procedures such as clarification of rated capacity, cycle life, and application charge capacity. Harmonization with the other ANSI C18 Standards was implemented where applicable.

The basic philosophical approach used in developing this Standard was that of setting forth uniform test procedures that permit manufacturers' self-declaration with regard to the performance levels of their products, or, in some cases, establishing minimum acceptable performance levels.

In April 1996, the then ANSI Accredited Standards Committee C18 on Specifications for Dry Cells and Batteries established a new general format for the publication of its Standards, dividing this Standard into two parts. Part 1 of this American National Standard for Portable Rechargeable Cells and Batteries contains two basic sections. The first section has general requirements and information, such as the scope, applicable definitions, general descriptions of battery dimensions, terminal requirements, marking requirements, general design conditions, test requirements, etc. Section 2 of Part 1 is comprised of specification sheets for various types of cells and batteries. Part 2 of the Standard, a separate document, contains safety requirements.

Suggestions for the improvement of this Standard will be welcome. They should be sent to:

NEMA Technical Operations Department
National Electrical Manufacturers Association
1300 North 17th Street, Suite 900
Rosslyn, VA 22209
Attention: Secretary ANSI ASC C18

This Standard was processed and approved for submittal to ANSI by the American National Standards Committee C18 on Portable Cells and Batteries. Committee approval of this Standard does not necessarily imply that all committee Members voted for its approval. When Committee C18 approved this Standard, it had the following Members:

Steven Wicelinski, Chairperson
Marcus Boolish, Vice Chairperson
Khaled Masri, Secretary

<u>Name of Representative(s):</u>	<u>Organization Represented:</u>	<u>Voting Status</u>
Heather Peterson	Batteries Plus Bulbs	Voting
Jason Fladhammer	Batteries Plus Bulbs	Alt. Voting
David Grandin	Bureau Veritas Consumer Product Services	Voting

Robert	Coughlin	Consumer Product Integrity Consulting, LLC	Voting
Jody	Leber	CSA Group	Voting
Steven	Wicelinski	Duracell, Inc.	Voting
Christopher	Brown	Duracell, Inc.	Alt. Voting
Marcus	Booish	Energizer Brands, LLC	Voting
Carin	Stuart	Energizer Brands, LLC	Alt. Voting
Douglas	Golde	Fisher-Price	Voting
Thomas	O'Hara	Intertek	Voting
Rich	Byczek	Intertek	Alt. Voting
Cary	Costello	Kimberly-Clark Corporation	Voting
Jeff	Becker	Micropower Battery Co.	Voting
Charles	Monahan	Panasonic Corporation of North America	Voting
Rodney	Grimes	SGS	Voting
John	Hadley	Spectrum Brands, Inc.	Voting
Andy	Roszkowski	Spectrum Brands, Inc.	Alt. Voting
Laurie	Florence	UL LLC	Voting
Jeff	Ortega	ZPower, LLC	Voting
Tim	Powers	ZPower, LLC	Alt. Voting

The Members of Subcommittee C18-2 on Portable Rechargeable Batteries who contributed to the development of this Standard are:

John L. Hadley, Chairperson
Carin A. Stuart, Vice Chair
Khaled Masri, Secretary

First Name	Last Name	Organization
Yasuo	Akai	FDK CORPORATION
Akinrori	Awano	Battery Association of Japan
Jeff	Becker	Micropower Battery Co.
Zekarias	Bekele	CSA Group
Marcus	Booish	Energizer Brands, LLC
Christopher	Brown	Duracell, Inc.
Denis	Carpenter	Spectrum Brands, Inc.
Cary	Costello	Kimberly-Clark Corporation
Robert	Coughlin	Consumer Product Integrity Consulting, LLC
Raju	Desai	Apple Inc.
Sharon	Ensminger	Sy Kessler Sales Inc.
Melissa	Fensterstock	Landsdowne Labs
Jeff	Fischer	Spectrum Brands, Inc.
Jason	Fladhammer	Batteries Plus Bulbs
Laurie	Florence	UL LLC
Takahiro	Fujisaki	Maxell, Ltd.
Douglas	Golde	Fisher-Price
David	Grandin	Bureau Veritas Consumer Product Services

Rodney	Grimes	SGS North America Inc.
Ray	Iveson	Duracell, Inc.
Judith	Jeevarajan	Underwriters Laboratories Inc.
Roland	Klinger	RENATA
Jody	Leber	CSA Group
Douglas	Lee	U. S. Consumer Product Safety Commission
Kinoshita	Masaaki	FDK CORPORATION
Khaled	Masri	NEMA
Charles	Monahan	Panasonic Corporation of North America
Thomas	O'Hara	Intertek
Jeff	Ortega	ZPower, LLC
Heather	Peterson	Batteries Plus Bulbs
Tim	Powers	ZPower, LLC
Andy	Roszkowski	Spectrum Brands, Inc.
Hiroataka	Shima	Hitachi Maxell, Ltd.
Carin	Stuart	Energizer Brands, LLC
Yoshiki	Terao	Panasonic
Hirohito	Teraoka	FDK CORPORATION
Steven	Wicelinski	Duracell, Inc.

1 General

Note: Part 1 does not include safety requirements, which can be found in Part 2.

1.1 Scope and Purpose

1.1.1 Scope

This publication applies to portable rechargeable or secondary cells and batteries¹ based on the following electrochemical systems:

- a. Nickel-cadmium
- b. Nickel-metal hydride
- c. Nickel-zinc

Section 1 of this Standard contains general information and all standardized performance and mechanical tests upon which all the specifications in Section 2 are based.

Section 2 specification sheets list those tests and requirements described herein that are required for each battery. Not all tests in Section 1 are necessarily required on every specification sheet.

Part 2 of this Standard describes all safety tests and requirements.

¹ Unless otherwise noted, the word “battery” is used to refer to either cell or battery or both in the remainder of this document.