



ANSI C18.1M, Part 2-2024
(Revision of ANSI C18.1M, Part 2-2019)

*American National Standard for
Portable Primary Cells and Batteries with
Aqueous Electrolyte—Safety Standard*

Secretariat:

National Electrical Manufacturers Association

Approved: June 12, 2024

American National Standards Institute

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Foreword (This foreword is not part of American National Standard ANSI C18.1M, Part 2-2024)

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 (currently the National Institute of Standards and Technology) 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. This committee, C18, representing battery users, manufacturers, and government agencies, has remained active since that time. Committee C18 prepared ANSI C18.1M, Part 2, upon which this document is originally based under the sponsorship of the National Electrical Manufacturers Association (NEMA).

ANSI C18.1M, Part 2 was created in parallel with the International Electrotechnical Commission (IEC) project to develop a product safety standard for primary batteries with aqueous electrolyte (IEC Publication 60086-5). This revision provides further harmonization to that IEC standard, including the following changes:

- Removal of the pre-test requirements for Closed Circuit Voltage and Insulation Resistance
- Deletion of the Crush Test (formerly Test I)
- Deletion of the Design Consideration Tests:
 - Thermal Abuse Test (formerly Test J)
 - Mold Stress Test (formerly Test K)
- The exemptions for testing of certain small batteries were clarified by notations under Tables 2 and 3

Suggestions for the improvement of this standard are welcome. They should be sent to the National Electrical Manufacturers Association, 1300 N. 17th Street, Suite 900, Rosslyn, VA 22209, Attention: Secretary ANSI ASC C18.

This standard was processed and approved for submittal to ANSI by the Accredited Standards Committee C18 on Portable Cells and Batteries. Committee approval of the standard does not necessarily imply that all committee members voted for its approval. At the time it approved this standard, the C18 committee had the following members:

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1 Introduction

The concept of safety is closely related to safeguarding the integrity of people and property. This standard defines performance requirements for primary batteries with aqueous electrolyte to ensure their safe operation under normal use and reasonably foreseeable misuse.

Safety is a balance between freedom from risk of harm and other demands to be met by the product. There can be no absolute safety. Even at the highest level of safety, the product can only be relatively safe. In this respect, decision-making is based on risk evaluation and safety judgment.

As safety will pose different problems, it is impossible to provide a set of precise provisions and recommendations that will apply in every case. This may be particularly true for button-type batteries. However, when following a judicious “use when applicable” basis, this technical publication will provide reasonably consistent standards for safety.

2 Scope

This American National Standard specifies tests and requirements for portable primary batteries with aqueous electrolyte and zinc anode (non-lithium) to ensure their safe operation under normal use and reasonably foreseeable misuse. For reference, the chemical systems standardized in ANSI C18.1M, Part 1 are:

- a. Carbon Zinc (Leclanché and Zinc Chloride Types)
- b. Alkaline Manganese Dioxide
- c. Silver Oxide
- d. Zinc Air
- e. Nickel Oxy-Hydroxide

3 Normative References

The following standards contain provisions which, through reference in this text, constitute provisions of this American National Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

ANSI C18.1M, Part 1

American National Standard for Portable Primary Cells and Batteries with Aqueous Electrolyte—General and Specifications

4 Definitions

For the purposes of this American National Standard, the following definitions apply:

battery: One or more cells, including case, terminals, and marking.

battery, button: Small round battery, where the overall height is less than the diameter.

battery or cell, cylindrical: A round cell or battery in which the overall height is equal to or greater than the diameter.

battery, portable: A battery that is easily hand-carried.

battery, prismatic: A battery with non-round geometry.

cell, primary: A source of electrical energy obtained by the direct conversion of chemical energy that is not designed to be charged by any other electrical source.