



**ANSI C137.5-2021**

*American National Standard for Lighting Systems—  
Energy Reporting Requirements for Lighting Devices*

Secretariat:

**National Electrical Manufacturers Association**

Approved: March 4, 2021

**American National Standards Institute, Inc.**

## NOTICE AND DISCLAIMER

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.

American National Standards Institute (ANSI) Standards and guideline publications, 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. While NEMA administers the process and establishes rules to promote fairness in the development of consensus, it 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 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. ANSI states 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 significantly more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered and 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 they have 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 under 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**

© 2021 National Electrical Manufacturers Association

All rights, 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 prior written permission of the publisher.

Printed in the United States of America

**Foreword** (This foreword is not a part of ANSI C137.5-2021)

This is a new Standard and not a revision of a previous Standard.

Suggestions for improvement of this Standard are welcomed. They should be sent to:

Secretary, ASC C137  
National Electrical Manufacturers Association  
1300 North 17<sup>th</sup> Street, Suite 900  
Rosslyn, VA 22209

This Standard was processed and approved for submittal to ANSI by the Accredited Standards Committee on Lighting Systems, C137. Approval of the Standard is not meant to imply that all Committee Members voted to approve it.

**CONTENTS**

- 1 Scope ..... 1**
- 2 References ..... 2**
- 2.1 Informative References..... 2**
- 3 Definitions ..... 2**
- 3.1 Accepted Reference Value (ARV) ..... 2**
- 3.2 Accuracy ..... 2**
- 3.3 Confidence Interval ..... 3**
- 3.4 Energy Reporting Device (ERD)..... 3**
- 3.5 Energy Reporting Device Aggregator (ERDA) ..... 3**
- 3.6 Measurement Uncertainty Limit..... 3**
- 3.7 Precision ..... 3**
- 3.8 Trueness..... 4**
- 3.9 Z-Distribution ..... 4**
- 4 General ..... 4**
- 4.1 Goals ..... 4
- 4.2 Statistical Framework..... 4
- 5 Energy Reporting Device (ERD)..... 5**
- 5.1 Precision ..... 5
- 5.2 Calibration ..... 5
- 5.3 Reporting Reliability (Informative)..... 5
- 5.4 Classification ..... 5
- 5.5 Reported Data..... 7
  - 5.5.1 Energy Consumption..... 7
  - 5.5.2 Reporting Interval ..... 7
  - 5.5.3 Device Identification ..... 7
  - 5.5.4 Timestamping..... 7
- 6 ERD Aggregator (ERDA) ..... 7**
- 6.1 Precision ..... 7
  - 6.1.1 Complex ERDA ..... 7
  - 6.1.2 ERDA With Homogeneous ERD ..... 7
- 6.2 Calibration (Informative)..... 8
- 6.3 Reporting Reliability ..... 8
- 6.4 Reported Data ..... 8

**< This page intentionally left blank. >**

## 1 Scope

This Standard specifies the minimum performance requirements for lighting devices that report energy data. These requirements include the specific energy data types to be reported, the nominal and statistical accuracy performance for all reported data types, and references to other Standards that define the information model for all data types.

Lighting devices addressed by this Standard include AC and DC powered light sources (including both integral replacement lamps and luminaires); LED drivers and other integral or remote power sources; lighting system or device controllers; and associated user interface devices. Energy metering devices, such as sub-meters for buildings, are excluded from the scope of this Standard.

A lighting device that reports its own energy consumption or reports consumption of a connected load, referred to herein as an “Energy Reporting Device,” or ERD, may include a wide variety of functional capabilities such as the following:

- a. End-Use Devices that consume power to provide an end-use function.

Example: the driver circuitry within a luminaire that consumes power as part of a light-emitting system (either as a discrete LED driver or integrated in the light engine circuitry).

Example: a sensor that is connected directly to an external power source.

- b. A power supply that consumes and converts power for connected, but physically separated, devices.

Example: a remote power supply that is connected to one or more luminaires.

Example: a power supply that is connected to one or more low-voltage sensors mounted in a ceiling, wall, or other building location.

Example: a discrete power supply that is contained within a luminaire, separate from the driver, that is connected to one or more low-voltage sensors also housed within the luminaire.

- c. A power consuming and converting device that provides multiple outputs for multiple purposes.

Example: an LED driver that provides separate connections for the light-emitting system and low-voltage sensors.

For purposes of clarity in this document, ERDs are grouped into two types: Class TE (total energy) ERD and Class SE (selected energy) ERD (see clause 5.4). The requirements for each ERD type are specified in clause 5.5.1.