ANSI/NEMA SM 31000-1-2021
(Formerly ESM1-1)

Electrical Submeter—General Requirements

Secretariat:

National Electrical Manufacturers Association

Approved May 18, 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.

The National Electrical Manufacturers Association (NEMA) 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, expressed 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.

Contents

Foreword

In the preparation of this Standard, input from users and other interested parties has been sought and evaluated. Inquiries, comments, and proposed or recommended revisions should be submitted to the concerned NEMA product subdivision by contacting the:

NEMA Technical Operations Department
National Electrical Manufacturers Association
1300 North 17th Street, Suite 900
Rosslyn, Virginia 22209

This Standard was originally developed by the NEMA BS-SM ESM1 Working Group and published under the NEMA ESM1-1 2019 designation. In its current form, it was approved by the ANSI ESM1 Consensus Group and certified by ANSI under the ANSI/NEMA ESM1-1 designation. NEMA changed its designation policy in 2021 and subsequently changed the designation of the entire ESM1 Standards series to SM 31000.

Main contributors:

Daniel	**Aljadeff**	**Panoramic Power / Centrica**
Henry	**Alton**	**Metergy Solutions Inc. Triacta Power Solutions Division**
Dave	**Bovankovich**	**Quadlogic Controls Corporation**
Nathaniel	**Crutcher**	**Continental Control Systems, LLC**
Craig	**Denson**	**DENT Instruments, Inc.**
Don	**McComas**	**Eaton**
Tom	**Nelson**	**NIST**
Thomas	**Papallo**	**Siemens Industry, Inc.**
Aaron	**Parker**	**Schneider Electric**

<This page intentionally left blank.>

1 General

1.1 Scope

This part, SM 31000-1, specifies general requirements of the SM 31000 Standard, which covers metrological requirements and associated testing for electrical energy submeters. The Standard applies to direct meters or metering systems comprising meters and associated sensors. These meters provide details of energy use for energy monitoring or revenue submetering.

The Standard does not apply to primary utility-owned meters.

The Standard applies to AC and DC kilowatt-hour meters, demand meters, load survey meters, power quality meters, single- and four-quadrant meters, etc.

The Standard applies to indoor and outdoor applications, portable, permanently installed, and embedded meters.

The Standard applies to AC meters rated at not more than 1000 V that measure active energy, apparent energy, and reactive energy (capacitive, inductive, and/or total), including received, delivered, and/or net, and also those measuring current, voltage, active power, apparent power, reactive power (capacitive, inductive, and/or total), power factor, phase angle, polarity, and frequency when measured in addition to energy.

The Standard also applies to DC meters rated not more than 1500 V that measure energy received, delivered, and/or net and also those that include additional measurement of power, current, and voltage.

The SM 31000 Standard is broken into the following parts:

a. SM 31000-1 General Requirements
b. SM 31000-2 AC Active Energy Accuracy
c. SM 31000-3 Revenue Submetering Requirements
d. SM 31000-4 Additional Measurements Accuracy
e. SM 31000-5 DC Energy Accuracy
f. SM 31000-6 Power Quality Measurements and Accuracy
g. SM 31000-7 Current Sensor Accuracy
h. SM 31000-8 Demand Metering
i. SM 31000-9 Field Testing