ANSI C12.1-2022

American National Standard for Electric Meters—Code for Electricity Metering

Secretariat:

National Electrical Manufacturers Association

Approved: June 9, 2022

American National Standards Institute, Inc.

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Published by

National Electrical Manufacturers Association
1300 North 17th Street, Suite 900
Rosslyn, Virginia 22209

Printed in the United States of America

Foreword (This foreword is not part of American National Standard C12.1-2022)

This American National Standard establishes acceptable performance criteria for electricity meters. Accuracy class designations, current class designations, voltage and frequency ratings, test current values, service connection arrangements, pertinent dimensions, form designations, and environmental tests are covered.

This version of C12.1 has been modified in several areas in an effort to respond to a changing industry and to improve the clarity of some of the tests. In the North American market, electromechanical meters are no longer manufactured and tests related to them have been deprecated. Additional work in the field of electromagnetic compatibility and auxiliary communications device influence has also been included in this version. The content of another standard in this series, ANSI C12.20, has been merged into C12.1 so that there is now a singular document that covers the entire Code for Electricity Metering. Blondel and non-Blondel meters are both covered by this new version of C12.1. C12.20 will be withdrawn with the publication of this version of C12.1.

Most other specifications have been retained from the previous edition. The following is a brief summary of the main changes:

- Polyphase loading has been mandated for all type testing of polyphase meters
- Voltage tests for meters with wide input voltage ranges have been simplified
- Test No. 4: Effect of variation of power factor has been greatly simplified
- Test No. 7: Equality of current circuits has been simplified
- Test No. 10: Effect of register friction has been deprecated
- Test No. 12: Effect of tilt has been deprecated
- Introduction of the Critical Change Value concept for certain External Influence tests
- Test No. 17: Effect of high-voltage line surges has been modernized
- Test No. 18: Effect of external magnetic field has been modernized
- Test No. 26: Effect of radio frequency interference has been modernized
- Test No. 28: Effect of electrostatic discharge (ESD) has been modernized
- Tests 39 through 44: Harmonic Influence have been carried over from C12.20
- Appendices A and B have been modernized
- A section on non-Blondel metering has been added to Appendix A

The Code for Electricity Metering is a body of work that originated over 110 years ago with the first edition released in 1910. Since then, a great many people have dedicated themselves to updating and modernizing this work. This latest edition is dedicated to all the past and present committee members who have demonstrated a passion for Electricity Metering standards development, and upon whose shoulders this latest version stands.

The Secretariat of the Accredited Standards Committee on Electricity Metering, C12, is held by the National Electrical Manufacturers Association (NEMA) and the National Institute of Standards and Technology (NIST). At the time this standard was processed and approved, the C12 Committee had the following members:

Tom Nelson, Chair

Paul Orr, Secretary

Organization Represented:	*Name of Representative:*
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Brooks Utility Products	Robert Kiessling
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The Durham Company	Mark Shoemaker
UL Solutions	Scott Hunter
Watthour Engineering Company, Inc.	Lea Wren
Xcel Energy	Dan Nordell

The following members of the C12.1 Committee were actively involved in the revision of this standard:

Curt Crittenden, Chair
Frank Boudreau, Vice Chair

Kerry Barnette	**Duke Energy**
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Don Tucker	**Ercot**
John Voisine	**Landis+Gyr**
Lea Wren	**Watthour Engineering Company, Inc.**

In addition, the Editorial Committee for the current revision of C12.1 includes the following:

Andrew Dudding	Frank Boudreau
Greg Dickson	Scott Holdsclaw
Brian Cole	Piotr Przydatek
Ron Zook	Shannon Edwards
Zach Hughes	June Sabbah
Joe Canine	Avygdor Moise
David Ellis	Dan Nordell
Bill Hardy	

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Scope and References

1.1 Scope

This standard establishes acceptable performance criteria for new types of AC watthour meters, demand meters, demand registers, pulse devices, and auxiliary devices. It also describes acceptable in-service performance levels for meters and devices used in revenue metering. It also includes information on related subjects, such as recommended measurement standards, installation requirements, test methods, and test schedules. This Code for Electricity Metering is designed as a reference for those concerned with the art of electricity metering, such as utilities, manufacturers, and regulatory bodies.

Where differences exist between the requirements of this standard and the most current version of ANSI C12.10, the requirements of this standard shall prevail.

1.2 References

The following publications shall be used in conjunction with this standard. When they are superseded by an approved revision, the latest approved revision shall apply:

ANSI C12.7-2014 *Requirements for Watthour Meter Sockets*

ANSI C12.10-2011 *Physical Aspects of Watthour Meters—Safety Standard*

ANSI C12.18-2006 (R2016) *Protocol Specification for ANSI Type 2 Optical Port*

ANSI/ASQ Z1.4-2003 (R2018) *Sampling Procedures and Tables for Inspection by Attributes*

ANSI/ASQ Z1.9-2003 (R2018) *Sampling Procedures and Tables for Inspection by Variables for Percent Nonconforming*

ANSI/IEEE C63.4-2014 *Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz*

ASTM B117-2019 *Standard Practice for Operating Salt Spray (Fog) Apparatus*

ASTM G155-2013 *Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials*

Code of Federal Regulations (Telecommunication) CFR 47, Part 15—*Radio Frequency Devices, Subparts A—General and B—Unintentional Radiators*

Chapter 19 “The Customers’ Premises, Service and Installations,” *Handbook for Electricity Metering, 11th Edition, Washington, D.C.: Edison Electric Institute, 2014*

IEC 61000-4-3:2020 *Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-6:2013 *Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields*

IEEE 1-2000 *IEEE Recommended Practice - General Principles for Temperature Limits in the Rating of Electrical Equipment and for the Evaluation of Electrical Insulation*

IEEE C37.90.1-2012 *IEEE Standard Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus*