ANSI C12.19-2008

American National Standard

For Utility Industry End Device Data Tables

Secretariat:

National Electrical Manufacturers Association

IEEE Number: 1377-2009
Measurement Canada Number: MC1219-2009

Approved February 24, 2009

American National Standards Institute, Inc.

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Published by

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

Printed in the United States of America

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Foreword (This Foreword is not part of American National Standard C12.19-2008.)

The ANSI C12.19 standard provides a common data structure for use in transferring data to and from utility End Devices, typically meters. It has been approved after considerable cooperative effort among utilities, meter manufacturers, automated meter reading service companies, ANSI, Measurement Canada (for Industry Canada), NEMA, IEEE, Utilimetrics, and other interested parties.

The standard data structure is defined as sets of tables. The tables are grouped together into sections called decades. Each decade pertains to a particular feature-set and related function such as Time-of-use, Load Profile, etc. Table data is transferred from or to the End Device by reading from or writing to a particular table or portion of a table.

The second release of the standard represents a philosophical departure from the first release. This release of the standard is intended to accommodate the concept of an advanced metering infrastructure such as that identified by the Office of Electricity Delivery and Energy Reliability of the U.S. Department of Energy; the Smart Metering Initiative of the Ontario Ministry of Energy (Canada) and the stated requirements of Measurement Canada for the approval of a metering device for use in Canada.

This standard covers a broader range of functionality relative to its previous version; however, it does not follow that implementations of this standard need to be large or complex. Implementers are encouraged to choose an appropriate subset that is suitable for their needs. Therefore, it is very unlikely for any one End Device to embed all tables or even the majority of the tables described herein. Thereby, implementers are encouraged to deploy their desired functionalities using complete and consistent suites of standard tables from standard decades to the largest extent practical.

Readers that are acquainted with ANSI C12.19-1997 will discover that the new version contains many changes. The changes may be categorized as follows:

1. Additions of new features or new functionality through the introduction of new tables, decades, or syntax.
2. Extensions or improvements to pre-existing functionality in support of contemporary and anticipated industry needs.
3. Corrections of errors and provision of clarifications that address known deficiencies and documentation of the accepted or anticipated industry practice.
4. Introduction of XML-based table description language (TDL/EDL) and documentation of services supporting the needs expressed by initiatives such as Smart Metering, Advanced Metering Infrastructure and alike.
5. Removal of features that were found undesirable.
6. Provision of guidelines for implementers of this standard and developers of future versions of the standard on backward compatibility and planned phase-out of obsolete features.

Some of the many new features introduced in this revision of the standard include:

- Addition of new data types in support of high-precision sub-second time stamps, such as HTIME_DATE and HTIME.
- Creation of new syntax for the aggregation of transmitted characters into strings, STRING.
- Creation of new syntax for the aggregation of transmitted octets into opaque blobs, BINARY.
- Addition of new Decade 9, Telephone tables. This decade imports and supersedes the tables and syntax defined in ANSI C12.21.
- Creation of new Decade 11, Load Control and Pricing Tables. This decade provides for demand-side management capabilities, including load control, demand response, prepayment and direct customer billing functions.
- Creation of Decade 14, Extended User-defined Tables. This decade provides capability for transmitting and receiving a contiguous stream of element and sub-element data. The data are referenced methodically to the legitimate and formal C12.19 data element.

- Creation of Decade 15, Quality-of-service Tables. This decade provides control, capture and logging of high-precision Quality-of-service performance indicators, such as power quality, and the inclusion of detailed waveforms, power spectra and related information.
- Creation of Decade 16, One-way Devices Tables. This decade provides control and management tables in support of one-way (talk-only) End Devices.

Some extensions or improvements to pre-existing functionality include:

- Table 0, General Configuration Table, retains its original form and it is backward compatible with ANSI C12.19-1997. However, a few notable control elements were modified:

  i. Extended CHAR_FORMAT to support UTF-8.
  ii. Replaced MANUFACTURER element with DEVICE_CLASS element to facilitate a more dynamic End Device data model recognition.
  iii. Extended TM_FORMAT in support of high-precision, sub-second, time stamps.

- Changed all data source selections in all tables (e.g., Table 22) from UINT8 to SOURCE_SELECT_RCD. This form is backward and forward compatible with ANSI C12.19-1997 when MODEL_SELECT is 0.
- Table 3, End Device Mode Status Table, incorporates the changes proposed in ANSI C12.21.
- Table 7, Procedure Initiate Table, and Table 8, Procedure Response Table, were updated and extended to provide procedures in support of new functionality that is needed by:
  i. Decade 7, History and Event Log Tables;
  ii. Decade 9, Telephone Control Tables;
  iii. Decade 11, Load Control and Pricing Tables;
  iv. Decade 12, Network Control Tables and
  v. Decade 15 Quality-of-service Tables.

- Table 12, Unit of Measure Entry table, was expanded with new UOMs.
- Table 17, Transformer Loss Compensation, was added to Decade 1.
- Extended the event log tables to provide a new capability to manage and detect program changes through the life of the End Device.
- Extended the event log tables to provide a new capability to manage, authenticate and verify the integrity of data read from an End Device service point by any receiving client application that may reside across any communication system.
- Extended the table type that can be transmitted to include up to 2040 extended-user-defined tables via TABLE_IDA_BFLD. Also introduced a new Decade 14, Extended User-defined Tables, to manage the collation of table elements, down to the bit level, into extended-user-defined tables.

Major corrections of errors and provision of clarifications include:

- Section 7.0, Compliance, was updated to reduce variations in the implementation of the standard.
- Section 8.0, Table Transportation Issues, was updated to include the “Errata to ANSI Standard C12.19-1997, Utility Industry Data Tables” published in 2001. It also updated to harmonize this standard with ANSI C12.18, ANSI C12.21 and ANSI C12.22.
- Table 7, Procedure Initiate Table, and Table 8, Procedure Response Table, indices calculations were completely rewritten in order to eliminate a fatal error in the production of unique indices for procedure parameters when using index/count access methods.

Removal of features that were found undesirable include:

- Section 5.0, Syntax, no longer supports two-dimensional arrays. Appropriate corrections were applied wherever this syntax was used. This does not impact the offset/count data access methods.

The reader is encouraged to review the descriptive text as it brings significant clarifications and examples of use where appropriate.

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

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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. At the time this standard was processed and approved, the C12 Committee had the following members:

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Utility Industry End Device Data Tables

1 Scope

This Standard defines a Table structure for utility application data to be passed between an End Device and any other device. It neither defines device design criteria nor specifies the language or protocol used to transport that data.

2 References

2.1 Normative

ANSI C12.10-2004 American National Standard for Physical Aspects of Watthour Meters—Safety Standard, (or latest version).

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IEEE Std C57.123-2002 IEEE Guide for Transformer Loss Measurement.

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