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ANSI C12 OVERVIEW

AND RELEVANCE TO THE ELECTRIC VEHICLE MARKET

NY State Commission on Electric Vehicle Supply Equipment Infrastructure
Wednesday, June 21, 2023

2:30 PM – 3:00 PM

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ANSI

- American National Standard Institute, Inc.
  - Not a government agency
  - All compliance is voluntary
  - Standards do not have force of Law unless referenced by a state's utility commission as part of their regulatory requirements
  - ANSI generates standards through the use of a sponsoring organization called the "secretariat" who actually publishes the Standard.
    - For C12.1 NEMA (National Electrical Manufacturer's Association) is the secretariat.
    - NEMA has seven sections one of which is for Utility Products and Systems. All meter manufacturers and manufacturers involved in electric metering are members of NEMA or are eligible to be members.
    - Paul Orr has been the NEMA's secretary assigned to C12 for over ten years providing continuity to the process. NEMA Manufacturing members determine which efforts will be funded and which will not be funded.

ANSI (CONT.)

- American National Standard Institute, Inc.
  - NEMA organizes committees to propose and review standards
  - Standards are republished approximately every five (5) years and abandoned if not updated or reaffirmed once every ten (10) years.
  - Standards codify consensus approaches in common practice

ANSI C12

- All ANSI Standards related to Electric Metering are in the ANSI C12 group of Standards
- C12 Main Committee
  - General makeup has expanded slightly over last few years
  - 30 voting members with representation from three groups (no one group can have more than 40%):
    - 12 - Manufacturers: Meter, Socket, Test Equipment, etc.
    - 10 - Users: Utilities
    - 8 - General Interest: PUC, UL, IEEE, Consultants, etc.
  - Meets twice a year in conjunction with EEI/AEIC Meter conference.

ANSI C12 (CONT.)

- ANSI C12.1-2022: Electric Meters – Code for Electricity Metering is the current edition of the American National Standard that specifies acceptable performance criteria for new types of ac watthour meters, demand meters, demand registers, pulse devices, and auxiliary devices.
- C12 Main Committee
  - Has final approval for all activities on any C12 family standard
  - Establishes Subcommittees (SC) and Working Groups (WG) to address various standards and issues
  - Sub committees and Working Groups also meet twice a year in conjunction with EEI Transmission, Distribution and Metering Conference and also hold regular or ad hoc conference calls throughout the year as members put together drafts and other technical material for consideration at the next face to face meeting.

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ANSI C12 (CONT.)

- C12 Subcommittees
  - Various subcommittees have been organized to review specific standards
  - This is where the work is really done
  - Each operates slightly differently
  - Each meets on a schedule of its own choosing
  - Most meet at EEI Biannual Transmission, Distribution and Metering Meetings
  - Communication WG meets more often and longer
  - Various subgroups meet frequently by teleconference

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ANSI C12 (CONT.)

- Since the start of AMI (Advanced Metering Infrastructure) in 2007 the ANSI committee has had to deal with breaking new ground as well as several contentious issues
  - This was atypical prior to 2007 but has become the "new normal" for the past 15 years. The committee has had to use far more virtual meetings for sub committees between the biannual in-person meetings; address all new issues and technology as they are introduced; stay on point during difficult debates; and work in a far more efficient manner. This is another example of how AMI has been changing everything in the electric metering industry.

ANSI C12 SC 1

- C12.1 Code for Electricity Metering - Sub Committee Work
  - Standards Road Map – which includes dc metering in large part due to the proliferation of dc electric vehicle superchargers
  - Demand Type Test working group
  - Putting all safety related requirements into one document (C12.10)
  - Work with outside agencies to make sure they are all providing consistent guidance (e.g. UL 2735 and OIML-Organization of Legal Metrology)
  - Temperature Rise working group
  - In Service Testing Working group
  - DC metering (C12.32)
  - Requirements for Watthour Meter Sockets (C12.7)
  - Protocol Specification for Interfacing to Data Communication Networks (C12.22)
  - Sub Committee on Blondel Compliant Metering

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ANSI C12 SC20

- Sub Committee on Blondel Compliant Metering
  - Working group agreed on
    - the temperature range that the meters will operate in
    - Cleared up some ambiguity in the testing of the meters relative to the reference meters
    - Agreed that the standard would be revised and clearly stated that this is for type testing only
    - Agreed on the voltage range over which the meters will remain accurate

WORKING GROUP TO MERGE C12.1 AND C12.20

- Agreed on a variety of new items that have been brought to the fore through AMI
  - Disturbances test for memory corruption due to rapid power cycling such as during dropout/reclosure events
  - Extended temperature operating ranges
  - True poly phase loading
  - Harmonics testing
  - Auxiliary device influences (requiring accuracy testing with any communication devices active)
  - Extended Voltage range to be accurate over
  - Extended Temperature range to be accurate over

ANSI C12 SC29

- Field Testing of Metering Installations for Accuracy
  - This will be published as a Technical Report
  - After being released and receiving comments some version of this is expected to be worked into Section 5 of ANSI C12.1 in the 2025 to 2026 time frame (next revision after the one just completed).
  - This Technical Report is more stringent than what is presently in the standard so the reception by utilities to this is mixed at this time. Some are welcoming the additional guidance and some are not welcoming the additional guidance. Both responses are based on existing practices.

ANSI C12 SC29 (CONT.)

- Field Testing of Metering Installations for Accuracy
  - The Technical Report will provide some guidance on acceptable testing under all three types of field testing and what to look for if the installation fails accuracy testing. The three modes of testing defined are;
    - Voltage and current supplied by test equipment
    - Site voltage, equipment provided current
    - Site voltage and current (customer load)
  - This will not be an ANSI Standard at this time but only a Technical Report that Utilities may use at their own discretion. Would not carry the force of law if a Utility commission pointed to ANSI C12 as their default Code for Electricity in their State

VA and VAR Metering Standard

- Establish a legal definition for VA and VAR
- VA being addressed first in order to “Fast Track” the result.
  - Definitions agreed upon
  - Initial draft completed
- Discussion about L+G’s proposal of using “source VA” vs Vector VA and Arithmetic VA and the actual load the customer has
- There is future potential to promote VA and active energy (watts) as the primary metering quantities, but even if this were to gain traction this would be in the relatively distant future. However once ANSI can agree on the definition to use for VA this will become a metering option with some revenue implications, even if this is simply used to point out metering issues at particular customer locations.

ANSI C12.46

- Sub-Committee to Develop a Replacement for C12.1 and C12.20
  - Adopts the structure of OIML IR-46
  - Addresses Active, Reactive, and Apparent Energy as well as all meter accuracy classes
  - Same group working on the merger of C12.1 and C12.20 is working on this
  - Reviewing ANSI's proposed draft with OIML

ANSI C12.46 (CONT.)

- Sub-Committee to Develop a Replacement for C12.1 and C12.20 (cont.)
  - At times the R46 tests are being used as they are close to the ANSI tests. There are ANSI C12.1 and C12.20 tests that are not in R46 so they are being added. This will make the new C12.46 and the new C12.1 (merged C12.1 and C12.20) compatible clearing the way for C12.46 to eventually become the new C12.1 and make the United States compliant with our OIML Standards commitments.
  - The Roadmap working group will develop a time line for C12.46 to supersede C12.1

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ANSI C12.DC SC 32

- Sub-Committee to Develop an ANSI Standard for DC Metering
  - Recently published the first standard and in the process of updating this initial standard
  - This is becoming more an more of an issue as DC Superchargers. Their numbers are growing dramatically, they draw significant amounts of power in a short period of time and there is a very insistent demand by the Bureau of Weights and Measures for equipment to certify and test the dispensing accuracy
  - There is also the potential to use nothing but DC in residential homes in the not so distant future, requiring a DC meter on these types of homes

ANSI Sub-Metering Working Group

- Sub-Metering is also becoming more prevalent and with the official acceptance of sub-metering the need to provide guidance on this area has become necessary
- Working on guaranteeing the system level accuracy given the preponderance of different equipment.
- Regulators want to know how you test these meters and installations
  - One difficulty is that the transformers may be located many floors away from the meter.
  - Another is that the meter may be installed within the power lines and not readily accessible.
- There are few actual metrology issues

IEEE P1704 – Utility Industry End Device Communications Module

- ANSI also maintains a presence and contributes to Standards that are related to but not covered entirely within the ANSI C12.1 purview.
- This standard will provide a method for providing space for communication modules and USB as the connection method to the Comm module from the meter (vs. RJ11). Micro B USB 2.0 adapter.

OIML R46

ORGANISATION INTERNATIONALE DE MÉTROLOGIE LÉGALE

- The International Organization of Legal Metrology was formed in 1955. By Treaty 86% of the world's population is covered and 96% of the world's economy.
- The Group works with the International Bureau of Weights and Measures and the International Organization for Standardization (ISO) to ensure compatibility between each organizations work.
- Once again this organization has no legal authority to impose solutions on the members but the recommendations are typically used by the member states as part of their own domestic law.

OIML R46 (CONT.)

ORGANISATION INTERNATIONALE DE MÉTROLOGIE LÉGALE

- Latest meeting was held last week in the Netherlands
- ANSI voted to have a representative from NIST lead the delegation and TESCO's CTO emeritus Bill Hardy to go as the technical liaison as he is heading or an active participant in each of the relevant working groups for ANSI
- They are nearly complete going through the entire document and resolving differences.
- There is also a new standard D31 to cover how software verification is done on a wide array of items including electric meters. R46 will need to reference how we comply with D31 going forward.
- One of the most active sub groups is addressing the measurement of electricity being dispensed by Electric Vehicles.

QUESTIONS AND DISCUSSION

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This presentation can also be found under Meter Conferences and Schools on the TESCO website: tescometering.com