ANSI and IEEE Standards for Metering

PJM Metering Task Force – Session 1

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Why Review Meter Standards?

- Guaranteed performance of equipment based on certification or compliance with a standard or a standard's testing.
- Best (most useful and accepted) description of PJM metering performance requirements based on actual equipment used.
- Provides some of the foundation to calculate actual expected accuracy of a given metering system.

ANSI C12.1-2008

American National Standard for Electric Meters, Code for Electricity Metering

In General

- Defines performance for “meters and devices used in revenue metering”
- Contains detailed performance requirements, ex. meter performance w/ temperature swings or extreme power factors, etc. Most tests have an allowed "deviation from reference" for each condition, and that deviation is often around +/- 2%.

ANSI C12.1-2008

American National Standard for Electric Meters, Code for Electricity Metering

For Accuracy

- In Section 5.1 “Standards for in-service performance” for “Watthour meters and electronic registers”, 5.1.2.2 says “the performance of all watthour meters is considered to be acceptable when the percent registration is not less than 98% or more than 102% as determined in 5.1.5.

ANSI C12.1-2008

American National Standard for Electric Meters, Code for Electricity Metering

For Accuracy

- 5.1.5 goes on to describe four different methods for calculating the average percentage registration or “average accuracy” which accounts for meter accuracy variation between “Full Load” and “Light Load” conditions.

American National Standard for Electric Meters, Code for Electricity Metering

For Test/Calibration Intervals

- 5.1.4.1 says that “watthour meters should be verified by an annual test program” and goes on to recommend periodic, variable, or statistical test plans the results of which determines appropriate action.
- The Periodic interval plan at 5.1.4.3.1 has an example that schedules “Electro Mechanical Meters without surge-proof magnets – 8 years” and “All other meters – 16 years”.

ANSI C12.1-2008

American National Standard for Electric Meters, Code for Electricity Metering

Conclusion

- Performance standards for meters expressed as testing protocols, accuracy requirements, and maintenance intervals.

American National Standard for Electricity Meters – 0.2 and 0.5 Accuracy Classes

For Accuracy

- Defines performance standards for two classes of more accurate meters; the 0.2 and 0.5 accuracy classes. The performance of these classes are described in detail against load, power factor, voltage variation, etc. But very generally speaking, a 0.2 class electric meter should be accurate to within +/-0.2% of true value and a 0.5 class electric meter should be accurate to within +/-0.5% of true value at full load.

ANSI C12.20-2010

American National Standard for Electricity Meters – 0.2 and 0.5 Accuracy Classes

For Accuracy

- “Where differences exist between the requirements of this Standard and C12.1 and C12.10, the requirements of this Standard shall prevail.”
- “Maximum Deviation in Percent from Reference Performance”

IEEE Standard Requirements for Instrument Transformers

- Defines performance standards for instrument transformers, which includes voltage/potential transformers (PT) and current transformers (CT).
- Three metering accuracy classes are defined for instrument transformers; 0.3, 0.6 and 1.2.
- A 0.3 class current transformer will provide +/-0.3% accuracy measuring 100% of the rated current and +/-0.6% accuracy measuring 10% of the rated current. As such the instrument transformers must be sized correctly – the right class – for the application.

IEEE Standard Requirements for Instrument Transformers

- There is a separate accuracy rating for current transformers for relaying purposes. Relaying transformers are built to give reasonable accuracy at measured current many times the rated current (fault conditions) where a protective relay needs to sense the condition and take action, like open a breaker. At nominal rated current these CTs are +/-3.0% accurate.

ANSI C12.10

American National Standard for Physical Aspects of Watt-hour Meters

- Covers the physical aspect of watt-hour meters, including ratings, wiring, dimensions, markings and general specifications.
- As such it probably has less direct bearing on the accuracy and reliability issues of interest to PJM than the other standards.

Topics of Consideration for MTF

- Which Standards would be useful and effective to reference in PJM Manual 01?
- Are any of the Standards language and device classes useful to adopt in PJM Manual 01?