Considerations for Metering Requirements

PSE&G view point

Areas of Concern

- Designed Accuracy Definition
- Measurement Accuracy
- Design Criteria - Components
- Maintenance Calibration
- Grandfather Clause

How is Accuracy Defined

- Past Language (Manual 01 v25, 9/26/13):

5.4.3 Primary Metering Accuracy

For all new metering installed since December 1, 1997, the following primary transducer accuracy guidelines are followed:

Primary Transducer	Accuracy Guideline
Frequency Transducers	0.001 Hz
Potential Transformers	0.30% of Full Scale
Current Transformers	0.50% of Full Scale
MW/MVAR/Voltage Transducers	0.25% of Full Scale
Remote Terminal Units (A/D)	0.25% of Full Scale

This accuracy guideline results in an overall metering accuracy better than 2% and satisfies the NERC BAL standards. Billing accurate telemeter data values should be supplied whenever possible.

Accuracy Defined vs Used

- Defining Accuracy relative to Full Scale registration has two issues:
  - Error Window May be large of low registration (CT Example)

$$\pm 0.5\% \times 3000\ amps = \pm 15\ amps$$

± 15 amps is ± 1% of a 1500 amp measurement

  - Accuracy Performance of component that matters to the system measurement is at loading below full scale.

Accuracy Defined vs Used

- Industry standards for metering define accuracy as a percentage of the measured value.
- Does use of a % of Full Scale definition increase the risk that measurement data will be miss-understood or miss-used?
- If Accuracy definition is a different basis than used by NERC, acceptable limits may be different than used in NERC documents.

Measurement Accuracy

- If Measurement basis is defined differently,

  (% of Registration rather than % of Full Scale),

  should system accuracy expectation be 2% or something higher than 2%?

Measurement Data of interest

- At what loading are we concerned about accuracy?
  - Clearly at 100% of Thermal ratings of lines / transformers / generators, we are concerned.
  - For system dispatch decisions, are we also concerned about some lower loading? Suggest that loading at 80% of thermal rating is useful.
  - Assumption: Real Time Measurement components will be as accurate at 120% of thermal loading as they are at 80%.
  - Also, No metering equipment may compromise reliability at emergency overload conditions defined by PJM.

Component Accuracy

- Should design guideline be included for at least some measurement components:

Primary Transducer	Accuracy Guideline
Frequency Transducers	0.001 Hz
Voltage Transformers & CVT	0.30% (IEEE C57.13)
Current Transformers	0.60% of measurement (0.3 accuracy class, IEEE C57.13)
MW/MVAR/Voltage Transducers	
Remote Terminal Units (A/D)	
Settlements Wh meter	0.2 accuracy class, ANSI C12.20

Maintenance Calibration Intervals

- There is a wide range of legacy and modern devices deployed for real time metering.
- When analogue transducers remain in service, does historical experience with calibration drift over time mean that calibration Interval should be 8 years or even 6 years for analog devices?

Grandfather Clause

- It is important that a grandfather clause reflect wording from 1997.
- If that wording called for 2% of Full Scale for system measurement. We should not apply a 2% of measured value expectation to legacy equipment.
- *Would full scale be defined by measurement devices or line / transformer thermal rating?*