

# Appendix C - Minimum Accuracy Standards For New And Upgraded Metering, Recording And Telemetry Installations And For Calibration Of Existing Equipment

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**Appendix C - Minimum Accuracy Standards <sup>(1)</sup>**  
**For New And Upgraded Metering, Recording And Telemetry Installations**  
**And For Calibration Of Existing Equipment**  
**(All figures are accuracy class or in percent of the Fiducial Value<sup>(1)</sup> as appropriate, except as noted.)**

ITEM	ENERGY BILLING AND PEAK LOAD DETERMINATION		ENERGY BILLING		AUTOMATIC GENERATION CONTROL					SECURITY ANALYSIS		
	On-site Meters and Recorders	Computer Retrieved By Coded Messages	Tele-metered and Recorded	Tele-metered and Computer Integrated	Ties		Generation		Ties & Gen	Watts/VARs/Voltage/Hz <sup>(7)</sup>		
					Digital Tele.	Analog Tele.	Digital Tele.	Analog Tele.	SCADA	Digital Tele.	Analog Tele.	SCADA
Current Transformers <sup>(2)</sup>	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.6	0.6	0.6
Voltage Transformers <sup>(2) (5)</sup>	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
WH Meter <sup>(3)</sup>	0.2	0.2	0.2	--	--	--	--	--	--	--	--	--
Transducer <sup>(1)</sup>	--	--	--	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Digital Protective Relay <sup>(1) (5)</sup>	---	--	--	--	--	--	--	--	--	0.5	0.5	0.5
Transmitters <sup>(1)</sup>	--	--	--	0.15	0.05	0.15	0.05	0.15	--	0.05	0.15	--
Receiver <sup>(1)</sup>	--	--	--	0.15	0.05	0.15	0.05	0.15	--	0.05	0.15	--
CPU Interface <sup>(1) (6)</sup>	--	0.2	--	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
DRR Metering systems <sup>(4)</sup>	2.0	2.0	2.0	2.0	--	--	--	--	--	--	--	--
DC metering system of DC coupled asset <sup>(8)</sup>	1.0	1.0	1.0	1.0	--	--	--	--	1.0	--	--	1.0

**Note <sup>(1)</sup>** - The accuracy must be per the equipment manufacturer's published specification.

- These accuracy standards do not include the effect of equipment outages.
- "Fiducial Value" is defined in OP-18 "definitions"

**Note <sup>(2)</sup>** - Instrument transformer data refers to accuracy classes.

**Note <sup>(3)</sup>** - Watt-hour meters shall have a classification for accuracy (CA) 0.2 accuracy class (or better). See IX.D.2 for allowable accuracy for testing. Data Recorders should not affect accuracy though if rounding of values is needed it should not add more than 0.25% error.

**Note <sup>(4)</sup>** - Demand Response Resources overall metering accuracy required if energy billing quality equipment is not used.

**Note <sup>(5)</sup>** - The voltage transformers (VTs) accuracy requirement for security analysis changed from an accuracy class of 1.2 to 0.3 as of the September 17<sup>th</sup> 2010 revision of this Appendix. All VTs placed in service after December 31, 2012 require the higher accuracy. This VT accuracy requirement change occurred with the addition of allowing digital protective relays which have a wider accuracy specification and as such should only be used with the higher accuracy VTs.

**Note <sup>(6)</sup>** - CPU Interface would in most cases be the Analog-to-Digital converter such as where an RTU takes in an analog input channel and converts it to a digital value and the accuracy of this A-to-D component/function is of note. This is similar to a "digital transducer" which is otherwise covered by the "transducer" category.

**Note <sup>(7)</sup>** - For frequency data, regardless of the originating equipment sources, the minimum accuracy requirement is +/- 0.01 Hz.

**Note <sup>(8)</sup>** - Where DC metering is used to allocate AC metering to DC coupled Assets participating in one or more of the Markets separately.

**OP-18 Appendix C Revision History**

**Document History** (This Document History documents action taken on the equivalent NEPOOL Procedure prior to the RTO Operations Date as well revisions made to the ISO New England Procedure subsequent to the RTO Operations Date.)

Rev. No.	Date	Reason
--	draft	For previous revision history, refer to Rev 10 available through Ask ISO;
Rev 11	draft	Biennial review completed by procedure owner; Combined voltage/Hz columns with Watts/VARs column. Added DC metering system of DC coupled asset row and Note 8.