



Appendix I – Transient Overvoltage Qualify Instructions

Instructions

1. Perform load rejection testing per Attachment A, for each inverter model to be considered by the Hawaiian Electric Companies for transient overvoltage compliance.
 - a. Inverter model numbers provided should match the model numbers in its entirety as it would appear on the interconnection application and the equipment itself in order to avoid delays in project approvals.
2. Tests may be performed at a Nationally Recognized Testing Laboratory or at a manufacturer's testing facility. The following lists an example set of test and measurement equipment – similar or better equipment shall be utilized for testing:
 - a. Grid Simulator: Pacific Power 3060-MS/3235 62.5kVA AC power supply with isolation transformer and UPC32 programmable controller.
 - b. DC Input Source (central/string inverters): AV-900 300A/900V/250kW dual channel DC power supply.
 - c. Resistive Load Banks: Simplex Neptune 100kW/173kVar RL load bank and Simplex Titan 436kVA at ± 0.37 power factor RLC load bank.
 - d. Yokogawa DL850E Scopecorder, 7020210/701250 modules for power measurements, 701267 modules for signal measurements
 - e. Yokogawa 700924 differential voltage probes (1:100 setting)
 - f. Yokogawa 701930/701931 current probes (10mV/A, 150/500A maximum)
 - g. AEMC MR 561 current probe (10mV/A, 150A maximum)
 - h. Fluke 87 RMS multimeter
3. Provide submittal documents per "Document Submittals" below.

Document Submittals

- Equipment List (Attachment B, Excel or csv format)
 - o The equipment list will be used to verify that acceptable test and measurement equipment is being utilized.
- Raw Data Files for All Test Runs (Attachment C, Excel or csv format)
 - o Raw data files will include data captured from each test run and penetration scenario conducted. Data files should at minimum include: voltage, current, and time measurements.
 - o Raw Data files should be labeled in the following format:
 - Model#_EUTpwoutput-Loadoutput_DCvoltage_TestRun#.csv (xlsx)
 - InverterXYZ-AB-240_100-10_Max_01.csv
 - This file represents test #1 at 100% power output with 10% load at Max DC voltage input.
- Summary of Results Table (Attachment D, Excel or csv format)
 - o The summary table will encompass the results of all test runs conducted per the two methods of measuring transient overvoltage per the load rejection test procedure in Attachment A.



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- Typical and/or Abnormal Waveforms (Attachment E, Excel or csv format)
 - Manufacturers will provide worst case overvoltage, typical waveform(s), and any atypical waveform(s) observed during testing. The waveforms provide context to the data summarized in Attachment D.

Mail all electronic format submittal documents on CD media to:

Hawaiian Electric Company, Inc.
Attn: Advanced Inverters
P.O. Box 2750
Honolulu, HI 96840
Attn: Grid Technologies (CP14-NR)

OR

Please submit questions and provide online access instructions for downloadable data to:

DER-Qualify@hawaiianelectric.com

Submittal documents shall be downloadable by the Hawaiian Electric Companies.