

COMMISSIONING TEST CHECKLIST & CERTIFICATION

BASIC REQUIREMENTS

Commissioning Testing, where required, will be performed on-site to verify protective settings and functionality, prior to Parallel Operation of a Generating Facility, or any time interface hardware or software is changed that may affect the functions listed below.

A Commissioning Test must be performed by an individual that is qualified in testing protective equipment (professional engineer, factory-Certified technician, or licensed electrician with experience in testing protective equipment). The Commissioning Testing should be performed in accordance with the manufacturer's recommended test procedure to prove the settings and requirements of this Rule.

Commissioning test shall be completed and certified prior to PPI being performed by PG&E.

PG&E has the right to witness Commissioning Tests as described below, or to require written Certification by the installer describing which tests were performed and their results. Protective Functions to be tested during commissioning, particularly with respect to non-Certified Equipment, may consist of the following:

Function Tests:

- Over and Under Voltage
- Over and Under Frequency
- Anti-Islanding Function (if applicable)
- Non-Export Function (if applicable)
- Inability to energize Dead Line
- Time delay on restart after Utility source is stable
- Utility system fault detection (if used)
- Synchronizing Controls (if applicable)
- Other Protective Functions that may be required as part of the Interconnection Agreement.

Additional Testing (if applicable):

- Verify final Protective Function Settings
- Trip Test
- In-service Test

Certified Equipment:

Generating Facilities qualifying for Simplified Interconnection incorporate Certified Equipment that have, at a minimum, passed the Type Tests and Production Tests described in this Rule and are judged to have little or no potential impact on PG&E's Distribution System. For such Generating Facilities, it is necessary to perform only the following tests:

- 1.** Protective Function settings that have been changed after factory testing will require field verification. Tests shall be performed using injected secondary frequencies, voltages and currents, applied waveforms, a test connection using a Generator to simulate abnormal utility voltage or frequency, or varying the set points to show that the device trips at the measured (actual) utility voltage or frequency.

- **2.** The Non-Islanding function will be checked by operating a load break disconnect switch to verify the Interconnection equipment ceases to energize PG&E's Distribution System and does not re-energize it for the required time delay after the switch is closed.
- **3.** The Non-Exporting function shall be checked using secondary injection techniques. This function may also be tested by adjusting the Generating Facility output and local loads to verify that the applicable Non-Exporting criteria (i.e., reverse power or under power) are met.

The Supplemental Review or an Interconnection Study may impose additional components or additional testing.

Non-Certified Equipment:

Non-Certified Equipment shall be subjected to the appropriate tests described in Type Testing (Section J.3.) as well as those described in Certified Equipment Commissioning Tests (Section J.5.c.). With PG&E's approval, some of these tests may be performed in the factory, in the field as part of commissioning, or a combination of both. PG&E, at its discretion, may also approve a reduced set of tests for a particular application or, for example, if it determines it has sufficient experience with the equipment.

Verification of Settings:

If the testing is part of the commissioning process, then, at the completion of such testing, the Producer shall confirm all devices are set to PG&E-approved settings. This step shall be documented in the Commissioning Test Certification and during the onsite PPI.

Trip Tests:

Interconnection Protective Functions and devices (e.g., reverse power relays) that have not previously been tested as part of the Interconnection Facilities with their associated interrupting devices (e.g., contactor or circuit breaker) shall be trip tested during commissioning and during the onsite PPI. The trip test shall be adequate to prove that the associated interrupting devices open when the protective devices operate. Interlocking circuits between Protective Function devices or between interrupting devices shall be similarly tested unless they are part of a system that has been tested and approved during manufacture.

In-Service Tests:

Interconnection Protective Functions and devices that have not previously been tested as part of the Interconnection Facilities with their associated instrument transformers or that are wired in the field shall be given an in-service test during commissioning. This test will verify proper wiring, polarity, CT/PT ratios, and proper operation of the measuring circuits. The in-service test shall be made with the power system energized and carrying a known level of current. A measurement shall be made of the magnitude and phase angle of each Alternating Current (AC) voltage and current connected to the protective device and the results compared to expected values. For protective devices with built-in Metering functions that report current and voltage magnitudes and phase angles, or magnitudes of current, voltage, and real and reactive power, the metered values may be used for in-service testing. Otherwise, portable ammeters, voltmeters, and phase-angle meters shall be used.

Please review Electric Rule 21 for Section J at:

http://www.pge.com/docs/pdfs/suppliers_purchasing/new_generator/ER21.pdf

Commissioning Certification Table

Project Name: _____

Project Location: _____

<i>Test</i>	<i>Successful</i>	<i>Unsuccessful</i>	<i>Notes</i>
Over Voltage			
Under Voltage			
Over Frequency			
Under Frequency			
Anti-Islanding Function (if applicable)			
Non-Export Function (if applicable)			
Inability to energize Dead Line			
Time delay on restart after Utility source is stable.			
Utility system fault detection (if used)			
Synchronizing Controls (if applicable)			
Other Protective Functions			
Additional Testing			
Verify final Protective Function Settings			
Trip Test			
In-service Test			

Customers Signature: _____

Date: _____

Testing Agent: _____

Date: _____