



LUMA ENERGY SERVCO, LLC¹

CERTIFICATION RECERTIFICATION

Test Certification for Distributed Energy Resources (RED, for its Spanish acronym) to Interconnect with the Electrical Distribution System of the Puerto Rico Electric Power Authority

Name of the Client (Account Holder): _____ Project Number: _____

Project Address: _____

System Description (See References – Item A): _____

| RED System Operation Mode | Check | |
|---|----------|----|
| Interconnected (<i>Grid-Tied</i>) | | |
| Hybrid (<input type="checkbox"/> Export <input type="checkbox"/> self consumption) | | |
| Battery bank operating continuously | | |
| Backup battery bank only | | |
| Totally disconnected from the network (<i>Stand by</i>) or through <i>Automatic Transfer Switch (ATS)</i> | | |
| GD Installation Verification | Complies | |
| | Yes | No |
| Check wiring and grounding, including control system wiring. (See References – item B) | | |
| Ensure that all the signs required by the applicable regulations (Regulation to Interconnect Generators with the Electrical Distribution System of the Electric Power Authority and Participate in the Net Metering Program, (NEC), technical communications and other applicable codes) are properly placed. | | |
| Correct installation of protection equipment (current transformers - CT and voltage transformers - VT), as applicable. | | |
| Correct installation of <i>Rapid Shutdown System (RSS)</i> , boot device and tags, as applicable | | |
| Provision to install LUMA padlock on manual switch, if applicable. | | |
| Check compliance with safety rules (especially clearances) established for energy storage systems. | | |
| GD tests: | | |
| Adequate operation of relays, and protection devices, as applicable. <input type="checkbox"/> Does not apply | | |
| Proper functioning of <i>Rapid Shutdown System (RSS)</i> , as applicable. | | |
| Proper operation of all equipment together. | | |
| Adequate GD disconnection operation. (See References-item E) | | |
| Adequate manual switch operation, if applicable. (See References – item F) | | |
| Adequate operation of the disconnection function in case of loss of electrical service of LUMA (anti-islands) (See References -section G) | | |
| Verification of inverter or control system settings (if any original settings were modified in the field) | | |
| Settings on the equipment screen and programming in compliance with: <input type="checkbox"/> Tables of the Regulation <input type="checkbox"/> Alternate Tables (See References, items C and D) | | |
| Confirm the position of jumpers or other physical adjustments, when applicable. <input type="checkbox"/> Does not apply | | |
| Methods used (check all that apply) | | |
| Apply ripples to the system under test | | |
| Use a power system simulator | | |
| Vary voltage and current settings until disconnected, as applicable. <input type="checkbox"/> Does not apply | | |
| Injection of signals to the voltage and current measurement circuits. | | |

1. LUMA Energy ServCo, LLC (“LUMA”) as agent of the Puerto Rico Electric Power Authority (“Authority”) and in accordance with the terms of the Agreement for the Operation and Maintenance of the Electric Power Transmission and Distribution System of Puerto Rico.

| | | |
|--|--|--|
| Other methods recommended by the manufacturer: _____ | | |
| Comments: _____ _____ | | |

References:

- A. Indicate the number of generators installed and the type of technology (photovoltaic, wind, etc.) in addition to the models of the equipment installed. (Example: Photovoltaic system with ___ inverters, brand ___, model ___, serial number ___ and ___ solar panels, brand ___, model ___.
- B. Check that the installation is in accordance with the design on the plan or illustrative diagram of electrical construction endorsed by LUMA.
- C. The inverters or GD protection equipment will have the following settings for voltage and frequency protection.

| Programming Required in the GD | |
|--------------------------------------|------------------------|
| Voltage Range (% of Nominal Voltage) | Disconnection time (s) |
| $V < 45$ | 0.16 |
| $45 \leq V < 60$ | 1 |
| $60 \leq V < 88$ | 2 |
| $110 < V < 120$ | 1 |
| $V \geq 120$ | 0.16 |

| Programming Required in the GD | | |
|--------------------------------|----------------------|------------------------|
| Function | Frequency (Hz) | Disconnection time (s) |
| Low frequency 1 | $F < 57.5$ | 10 |
| Low frequency 2 | $57.5 \leq f < 59.2$ | 300 |
| Over frequency 1 | $60.5 < f \leq 61.5$ | 300 |
| Over frequency 2 | $f > 61.5$ | 10 |

*Note: LUMA may require other disconnection times or frequency or voltage ranges, as established in the IEEE 1547a-2014 standard, so it reserves the right to request that the settings for voltage and frequency protection be modified. If so, the inverter or the protection equipment must be programmed with the settings requested by LUMA and included in the following alternate tables:

| Voltage Range (%V Nominal) | Disconnection time (s) |
|----------------------------|------------------------|
| | |
| | |
| | |
| | |
| | |

| Frequency (Hz) | Disconnection time (s) |
|----------------|------------------------|
| | |
| | |
| | |
| | |

- D. Confirm that the inverter is programmed to maintain continuous unity power factor at the interconnection point.
- E. If the inverter has the function of shutting down and disconnecting from the system manually, verify that it operates properly.
- F. If a manual switch is required, it must be capable of interrupting the maximum current to which it will be exposed. It must also be visible and accessible to LUMA staff, and allow the installation of a LUMA padlock to secure the open position. This manual switch can be used to perform the GD disconnection test in the event of a loss of LUMA electrical service (anti-islands).
- G. To carry out a GD disconnection test in the event of a loss of PREPA electrical service, the following steps must be followed according to the type of system:
 - For Single Phase Systems:
 1. During the normal operation of the equipment, disconnect all phases simultaneously, using an appropriate disconnect that is not part of the equipment under test.
 2. Verify that the equipment does not energize its output terminals connected to the PREPA system.
 3. Reconnect the equipment and verify that it does not energize its output terminals after 5 minutes have elapsed.
 - For three-phase systems:
 1. Disconnect a single phase and verify that the equipment does not energize its output terminals.

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2. Reconnect the phase and repeat this procedure for the other phases.

I, _____, certify that I am a licensed and collegiate electrical engineer, who performed the tests detailed in this document and they comply with the requirements established in the Regulation to Interconnect Generators with the *Electricity Distribution System of the Electric Power Authority and participate in the Net Metering Programs* and applicable standards and codes. In the case of existing or modified GD systems, I also certify that maintenance was carried out on all the equipment that makes up the system as indicated by the manufacturer.

Name: _____
Engineer License Number: _____
Engineer License Expiration Date: _____
Company: _____
Telephone: _____
Date: _____

Professional Seal

Signed _____