

SOUTH CAROLINA

Standard for Interconnecting Small Generation 100 kW or Less with Electric Power Systems (EPS) (Interconnection Standard) (Modified For Cooperatives)

1. Overview:

This Standard contains the requirements, in addition to applicable tariffs and service regulations, for parallel interconnection of non-utility owned single phase small generation systems which are rated at 20 kW or less for residential customers and 100 kW or less for nonresidential customers and are consistent with Section 6 below. "Small" generator procedures for application for and acceptance of an interconnection request for such generators are included in Section 8.

Small Generators meeting the criteria and conditions included and/or referenced herein will normally be approved for interconnection except in extenuating site specific circumstances.

1.1 Scope:

This Standard applies only to "Small" generators installed at existing radial fed Area EPS (Area Electric Power System) distribution customers, with a determination of minimal impact.

1.2 Purpose:

This document was developed to provide a uniform simplified standard for interconnecting certain small generators of 100 kW or less capacity in South Carolina.

1.3 Limitations:

This Standard does not cover momentary parallel systems used for the exclusive purpose of closed transition of loads. The Standard does not cover small generators connecting to area EPS network systems. The Standard does not cover customers served directly from area EPS transmission facilities.

Although outside the scope of this document, generators failing to meet the requirements of this Standard may still be considered for interconnection after more detailed review specific to the proposed application and generator.

1.4 Conflicts:

In case of conflict between any provision of a tariff and of this Standard, the provisions of the tariff shall prevail.

2. References:

IEEE 929 – (Recommended Practice for Utility Interface of Photovoltaic (PV) Systems, latest published edition)

IEEE 1547 – (Standard for Interconnecting Distributed Resources with Electric Power Systems, latest published edition).

IEEE P1547.1 – (Draft: Standard Conformance Test Procedures for Interconnecting Distributed Energy Resources with Electric Power Systems)

IEEE P1547.2 – (Draft: Application Guide for IEEE Standard 1547, Interconnecting Distributed Resources with Electric Power Systems)

IEEE P1547.3 – (Draft: Guide For Monitoring, Information Exchange, and Control of Distributed Resources Interconnected with Electric Power Systems)

UL 1741 – (Inverters, Converts and Controllers for use in Independent Power Systems, latest published edition).

NFPA 70 – (National Electrical Code, latest published edition).

3. Definitions:

3.1 **Area EPS:** Area Electric Power System: The electric facilities of the local utility.

3.2 **Company:** The electric utility owning and operating the Area EPS.

3.3 **Closed Transition of Loads:** A make-before-break load transfer scheme, in which the Generator is operated in parallel with the Area EPS for a brief period of time, to ensure that the load is maintained while in transition from the Company to the Generator or vice versa. This transition scheme includes fast transfer systems, generally less than 100 msec, and soft load systems where the parallel condition is maintained for a number of seconds.

3.4 **Customer:** The electric Customer of record for the location where the generation will be interconnected.

3.5 **Generator:** The distributed “generation system” and equipment to be interconnected to the Area EPS.

3.6 **Isolation Device:** A manual load-break disconnect switch or safety switch with a clear visible indication of switch position between the Area EPS and the Generator. The switch must have pad lock provisions for locking in the open position. The switch must be visible to, and accessible to Company personnel. The switch must be in close proximity, and visible from, the Customer’s point of electrical interconnection with the Company’s Area EPS. The switch must be

labeled "Generator Disconnect Switch". The switch may isolate the Generator system and its associated load from the area EPS or disconnect only the Generator from the Area EPS.

The Company shall have access to the Isolation Device at all times.

- 3.7 **Momentary Parallel Systems:** A Generator utilizing only a Closed Transition mode of operation.
- 3.8 **Point of Common Coupling:** "Point of common coupling" means the point in the interconnection of a customer-generator facility with an electric delivery system and shall have the same meaning as in IEEE Standard 1547.

4. General Requirements:

- 4.1 **Service Regulations and Tariff/Rate Schedule:** This Standard for Interconnecting Small Generation 100 kW or Less with Electric Power Systems is governed by the Company's Service Regulations and Tariff/Rate Schedules.
- 4.2 **Acceptance for Interconnection:** Each application and Generator is evaluated individually and accepted or denied for interconnection with the Company's Area EPS. Any Company evaluation is from the perspective of the impact of the interconnection on the Company and its system. The Customer is solely responsible for ensuring the safe installation and operation of the Generator. Generators shall not be interconnected until the requirements and process described in this Standard have been satisfied.

The acceptance for interconnection is for the original applicant only. Subsequent owners or occupants of a site with an interconnected generator must submit a new Application to the Company. The existing customer assumes the responsibility of ensuring a new customer is aware the new customer must re-apply and obtain the Company's written acceptance or the equipment must be removed or disabled to prevent future interconnection and/or operation. The application fee for the re-applying new customer is waived and the technical requirements may be grandfathered for subsequent owners as long as the Generator's maximum output capacity has not been changed and/or the interconnection protection system has not been modified.

- 4.3 **Waiving Requirements:** All requirements of this Standard must be met although the Company may, in its sole discretion, waive all or some of the requirements of this Standard. Waivers must be issued in writing.
- 4.4 **Interconnect Cost:** The Customer will bear all the cost of interconnection on the Customer's side of the point of interconnection as well as necessary changes or upgrades to the Area EPS to meet all technical and protection requirements to address any power quality, reliability or safety issues caused by the Generator operation or connection to the Area EPS.

- 4.5 **Isolating or Disconnecting the Generator:** The Company may isolate the Customer's premises and/or Generator from Company's Area EPS when necessary in order to construct, install, repair, replace, remove, investigate, or inspect any of Company's equipment or part of Company's system; or if Company determines that isolation of the Customer's premises and/or Generator from Company's Area EPS is necessary because of emergencies, forced outages, force majeure or compliance with prudent electrical practices. Whenever feasible, the Company shall give the Customer reasonable notice of the isolation of the Customer's premises and/or Generator from Company's Area EPS. Notwithstanding any other provision of this Standard, if at any time the Company determines that either the Generator may endanger the Company's personnel or other persons or property, or the continued operation of the Customer's Generator may endanger the integrity or safety of the Company's electric system, the Company shall have the right to isolate the Customer's premises and/or Generator from the Company's Area EPS.

The Company may disconnect the Area EPS electric service to any Generator determined to be malfunctioning, or not in compliance with this Standard. The Customer must provide proof of compliance with this Standard before the electrical service will be reconnected.

- 4.6 **Limitation of Liability:** Each party's liability to the other party for any loss, cost, claim, injury, liability, or expense, including reasonable attorney's fees, relating to or arising from any act or omission hereunder, shall be limited to the amount of direct damage actually incurred. In no event shall either party be liable to the other party for any indirect, special, incidental, consequential, or punitive damages of any kind.
- 4.7 **Indemnification:** The parties shall at all times indemnify, defend and save the other party harmless from any and all damages, losses, claims, including claims and actions relating to injury or death of any person or damage to property, demand, suits, recoveries, costs and expenses, court costs, attorney's fees, and all other obligations by or to third parties, arising out of or resulting from the other party's action or inaction of its obligations hereunder on behalf of the indemnifying party, except in cases of gross negligence or intentional wrongdoing by the indemnified party.
- 4.8 **Access to and Operation of the Generator:** The Customer shall limit access to and operation of the Generator to qualified persons and assumes the responsibility of maintaining control of the operation of the Generator.
- 4.9 **Insurance:** The Customer shall obtain and retain, for as long as its Generator is interconnected with the Company's system, liability insurance which protects the Customer from claims for bodily injury and/or property damage. For a non-residential Customer the minimum coverage shall be comprehensive general liability insurance with coverage at least \$300,000 per occurrence and for a residential Customer the minimum coverage shall be at a standard homeowner's

insurance policy with liability coverage in the amount of at least \$100,000 per occurrence. This insurance shall be primary for all purposes. The Customer shall provide certificates evidencing this coverage as required by the Company. The Company reserves the right to refuse to establish, or continue the interconnection of the Customer's Generator with the Company's system, if such insurance is not in effect.

- 4.10 **Generator Alterations:** Changes to the Generator output capacity and/or modification to the protection system required to meet this Standard are prohibited without submitting a new "Application to Interconnect Small Generator" and obtaining a new acceptance from Company.
- 4.11 **Discontinuing Operation:** The Customer shall notify the Company prior to permanently discontinuing operation of the Generator interconnected with the Company.
- 4.12 **Interconnection Application Fee:** The nonrefundable interconnection application fee covers only the application process for interconnection of Generators and shall be one of the following:
 - 4.12.1. For residential service customers: \$100.00
 - 4.12.2. For nonresidential service customers: \$250.00

5. **Generator, Inverter and Protective Equipment Technical Requirements:**

- 5.1 **General:** The Company may elect to visit the site and verify compliance with any requirement of these Standards.

The Generator must be single phase only. Three phase Generators are not covered by this Standard although multiple single phase Generators meeting all requirements of this Standard may be allowed at the sole discretion of the Company.
- 5.2 **Required Standards:** The Customer must certify the following requirements:
 - 5.2.1. The installation of the Generator and all equipment in the system must comply with the latest published edition of IEEE 929 and IEEE 1547 as applicable.
 - 5.2.2. Future IEEE Standards and/or Recommended Practices: IEEE P1547.1, P1547.2 and P1547.3 are still proposed draft documents and still in working groups at the time of writing this Standard. Generators interconnected after these standards are published may be required to comply with these IEEE documents.
 - 5.2.3. The Customer's inverter or interconnection protection system must be tested and listed for compliance with the latest published edition of Underwriters Laboratories, Inc. (UL) 1741.

5.2.4. The Generator must pass the anti-islanding test in UL 1741.

5.2.5. The Customer's inverter or interconnection protection system must be manufactured after November 7, 2000.

5.2.6. Any protection settings affecting anti-islanding performance must not be adjusted after passing anti-islanding tests.

5.3 **Additional PV (Photovoltaic) Systems requirements:** The Customer must certify that the Generator meets the following requirements:

5.3.1. The installation of the Generator and all equipment in the system comply with the latest published edition of IEEE 929.

5.3.2. The Generator is a non-islanding type as defined in IEEE 929.

5.4 **Electrical Contractors and NEC Code Inspections:** All installed wiring, protection devices, cabinets and connectors, etc. must comply with the latest published edition of the NEC as used by the local jurisdiction and all applicable local codes. An approved electrical inspection by the authority having jurisdiction is required.

5.5 **Isolation Device:** An Isolation device as defined in Section 3.6 is required. The Company in its sole discretion determines if the device is suitable.

6. **Screens and Requirements for determination of minimal impact:**

6.1 **Area EPS Circuit Level Saturation:** The cumulative total of the maximum rated output of all interconnected Generation shall not exceed the following limits, per circuit, for the given Area EPS distribution circuit phase to phase voltage rating:

Circuits 20 kV or greater: 100 kW

Circuits 10 kV but less than 20 kV: 60 kW

Circuits less than 10 kV: 30 kW

6.2 **Limitations of Area EPS Facilities:**

6.2.1. **General:** The Generator shall meet each of the following requirements to qualify for interconnection and each requirement must be maintained after commissioning.

6.2.2. **Area EPS Capacity Limitation:** The maximum rated output of the Generator or total aggregate of multiple Generators shall not exceed the capacity or ratings of the Area EPS facilities as determined by the Company.

- 6.2.3. Secondary, Service and Service Entrance Limitation: The Generator capacity shall be less than the capacity of the Area EPS owned secondary, service and service entrance cable connected to the Point of Common Coupling. The Company will make this determination after reviewing the Area EPS installed facilities.
- 6.2.4. Transformer Loading Limitation: The Generator shall not have the ability to overload the Area EPS transformer or any EPS transformer winding beyond manufacturer or nameplate ratings.
- 6.2.5. Integration with Area EPS Grounding: The grounding scheme of the Generator shall comply with IEEE 1547.
- 6.2.6. Balance Limitation: The generator shall not create a voltage imbalance of more than 3% if the Area EPS transformer, with the secondary connected to the Point of Common Coupling, is a three-phase transformer.
- 6.2.7. Any changes or upgrades to Area EPS to accommodate the Generator will be pursuant to Section 4.4 above.

7. Commissioning, Maintenance and Inspections:

- 7.1 **General:** The Customer or Customer's authorized representative shall perform commissioning, and maintenance as outlined in this section for all Generator equipment. All testing shall be documented and the Company shall be granted the right to audit the documentation. The Company reserves the right to require and witness testing of the Customer's Generator.

The Customer's Generator is subject to inspection by a Company representative at a mutually agreeable time, as the Company deems necessary.

The Company's inspection and/or witnessing the testing of the Customer's equipment shall not be construed as the Company warranting or implying that the Customer's equipment is safe or reliable. The Company shall not be liable to the Customer or others as a result of inspection and witnessing of tests of the Customer's Generator or equipment.

- 7.2 **Commissioning:** The manufacturer's recommended and required commissioning, installation and functional tests shall be completed, with successful results, in accordance with the manufacturer's published recommendations. Commissioning tests in IEEE 1547 shall also be completed with successful results unless these IEEE 1547 tests are duplications of the manufacturer tests. After obtaining the final electrical inspection, the Customer shall invite the Company to the commissioning test and perform the test at a mutually agreed date but not later than 25 days after the invitation.

- 7.3 **Maintenance and Testing:** Maintenance shall be performed in accordance with the manufacturer's published maintenance procedures. Periodic testing shall be completed with successful results in accordance with the manufacturer's published recommendations for periodic testing at, or before, the recommended testing intervals. If the manufacturer does not publish recommendations for periodic testing, suitable testing shall be performed that assures proper protection for the Area EPS, at an interval not to exceed two years. All test results shall be documented and available to the Company for review upon request.
- 7.4 **Failure of Test:** If a Generator fails any test, it shall be disabled and the Isolation Device must be opened until the equipment is repaired.

8. Procedures

- 8.1 **Interconnection Request:** The Customer submits to the Company an "Application to Interconnect Small Generation" accompanied with the appropriate Interconnection Application Fee to a designated Company contact or department.
- 8.2 **Queue Position:** The Company considers the application based on the date a completed application is received by the Company in reference to priority when evaluating the Area EPS screen limits.
- 8.3 **Impact Screens:** The Company accepts or rejects the application for interconnection after reviewing the application and performing the screens outlined in this Standard. If the application is rejected, the Customer may request the Company to reconsider interconnection outside the scope of this Standard. If the application is accepted the process will continue.

It may be necessary to visit the site to gather information on the Area EPS facilities or the Customer's Generator equipment.

The Company will complete the Impact Screen process within 30 days (absent extenuating circumstances) of receipt of a complete "Application to Interconnect Small Generation." Extenuating circumstances include, but are no limited to, Force Majeure, adverse weather conditions, and system emergencies.

- 8.4 **Agreement for Interconnection:** After all previous items in the process are complete, the Company will provide an agreement to the Customer within 10 days of the completion of the Impact Screens as stated in 8.3. Once the Customer returns the executed Agreement to the Company, the Company will execute the Agreement and return a copy to the Customer. Customer shall not interconnect the generator to Company's Area EPS Facilities unless an Agreement between Customer and Company has been executed by both parties.
- 8.5 **Installation and Inspections:** The Customer installs the Generator and the Customer is responsible for obtaining an approved electrical inspection from the local authority having jurisdiction for the Generator installation. The Customer

shall request the inspector to forward a copy of the approved inspection to the Company contact processing the Generator interconnect request.

- 8.6 **Area EPS Facilities:** At the Customer's expense the Company installs or alters the Area EPS facilities as necessary to accommodate the interconnection.
- 8.7 **Commissioning Test:** The Customer performs the required commissioning test and forwards a confirmation letter to the Company unless the Company witnesses the test and it is successful. The Customer shall invite the Company to the commissioning test and perform the test at a mutually agreed date and time if the Company elects to attend.
- 8.8 **Completion of Application/Expiration Process:** The application shall be valid for no less than one year once the Impact Screen process is completed.

APPLICATION TO INTERCONNECT SMALL GENERATION 100 kW OR LESS (SC)

Customer hereby gives notice of intent to operate an interconnected generating facility pursuant to the "Standard for Interconnecting Small Generation 100 kW or less with Electric Power Systems (Interconnection Standard)". Permission to interconnect is not granted until an Interconnection Agreement has been completed between the Company and the Customer.

Section 1. Contact Information

Customer (Name) : _____ E-Mail Address: _____

US Mail Address: _____ City: _____ State: _____ Zip Code: _____

Daytime Phone Number: _____ Alternate Phone / Cell Number _____

Installer (Name): _____ Date: _____ Phone Number: _____

US Mail Address: _____ City: _____ State: _____ Zip Code: _____

Company: _____ Electrical / Contractor license number(s) _____

Electrical Inspector (Name): _____ County: _____ Phone: _____

Section 2. Generator and Facility Information

Facility Location (if different from above): _____

Electric Utility Name: _____ Account Number: _____

Customer Type: Residential , Commercial , Other _____

Is there an existing interconnected generator at this facility? Yes , No

Total proposed aggregate generation output rating at this site (kW): _____

Generator / Inverter	# 1	# 2	# 3
Energy Source / Type			
Manufacturer Name			
Model Name & # (Specific)			
Nameplate Rating (kW AC)			
Nominal Voltage (Volts AC)			

(Note: If more than 3 Generators / Inverters will be used, complete a separate attachment with the information above)

If a customer owned transformer will be used, specify Mfg, type and ratings: _____
 (Attach Transformer Manufacturer Specifications)

Section 3. Installation Information

Proposed Installation Date: _____ Proposed Interconnection Date: _____

Section 4. Certification

The interconnection protection system is tested and listed for compliance with the latest published edition of Underwriters Laboratories (UL) 1741 including the anti-islanding test. The system (is / will) be installed in compliance with IEEE 929 and or IEEE 1547 as applicable, all manufacturer specifications, the National Electric Code and all local codes. No protection settings affecting anti-islanding have been or will be adjusted or modified.

I hereby certify that, to the best of my knowledge, all of the information provided in this Application is true and correct and the generator will comply with the Interconnection Standard stated above.

Signature of Customer _____ Date: _____

Note: Attach application fee and 1-line (electrical drawing of installation) with application.

Submit Application to: (Utility Representative) _____

 Company (Electric Utility Use only): Note: Only signifies receipt of this form.

This application received by _____ Electric Cooperative, Inc.

Signed (Utility Representative): _____ Date: _____