

Union Power Cooperative

INTERCONNECTION STANDARD

STANDARD FOR INTERCONNECTING SMALL GENERATION 100 kW OR LESS

1. Definitions:

- 1.1 **Area EPS:** Area Electric Power System: The electric facilities of the local utility.
- 1.2 **Cooperative:** The electric utility owning and operating the Area EPS.
- 1.3 **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 Cooperative 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.
- 1.4 **Member:** The electric Member of record for the location where the generation will be interconnected.
- 1.5 **Generator:** The distributed “generation system” and equipment to be interconnected to the Area EPS.
- 1.6 **Isolation Device:** A manual load-break disconnects 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 Cooperative personnel. The switch must be in close proximity, and visible from, the Member’s point of electrical interconnection with the Cooperative’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 Cooperative shall have access to the Isolation Device at all times.
- 1.7 **Momentary Parallel Systems:** A Generator that utilizes only a Closed Transition mode of operation.
- 1.8 **Point of Common Coupling:** “Point of common coupling” means the point in the interconnection of a Member-generator facility with an electric delivery system and shall have the same meaning as in IEEE Standard 1547.

1.9 Certified Generation System:

- 1.9.1 Generating Facility equipment proposed for use separately or packaged with other equipment in an interconnection system shall be considered certified for interconnected operation if (1) it has been tested in accordance with industry standards for continuous utility interactive operation in compliance with the appropriate codes and standards referenced below by any Nationally Recognized Testing Laboratory (NRTL) recognized by the United States Occupational Safety and Health Administration to test and certify interconnection equipment pursuant to the relevant codes and standards listed in Attachment 3 of the North Carolina Interconnection Procedures, (2) it has been labeled and is publicly listed by such NRTL at the time of the Interconnection Request, and (3) such NRTL makes readily available for verification all test standards and procedures it utilized in performing such equipment certification, and, with consumer approval, the test data itself. The NRTL may make such information available on its website and by encouraging such information to be included in the manufacturer's literature accompanying the equipment.
- 1.9.2 The Interconnection Customer must verify that the intended use of the equipment falls within the use or uses for which the equipment was tested, labeled, and listed by the NRTL.
- 1.9.3 Certified Generation Systems shall not require further type-test review, testing, or additional equipment to meet the requirements of this interconnection standard; however, nothing herein shall preclude the need for an on-site commissioning test by the Parties to the interconnection nor follow-up production testing by the NRTL.
- 1.9.4 If the Certified Generation System includes only interface components (switchgear, inverters, or other interface devices), then an Interconnection Customer must show that the generator or other electric source being utilized with the equipment package is compatible with the equipment package and is consistent with the testing and listing specified for this type of interconnection equipment.
- 1.9.5 An equipment package does not include equipment provided by the Utility.

2. Overview:

This Standard contains the requirements, in addition to applicable tariffs and service regulations, for parallel interconnection of non-utility owned small generation systems which are rated at 100 kW or less and are consistent with Section 6 below. 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.

- 2.1 **Scope:** This Standard applies only to "Small" generators installed at existing radial fed Area EPS (Area Electric Power System) distribution Members, with a determination of minimal impact.
- 2.2 **Purpose:** This document was developed to provide a uniform simplified standard for interconnecting certain small generators of 100 kW or less capacity.

- 2.3 **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 Members served directly from area EPS transmission facilities. The interconnection of generators is subject to applicable Union Power Cooperative approved tariffs and service regulations in addition to compliance with this Standard.

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.

- 2.4 **Conflicts:** In case of conflicts between any provision of a tariff and of this Standard, the provisions of the tariff shall prevail.

3. **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, Converters and Controllers for use in Independent Power Systems, latest published edition)

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

Union Power Cooperative approved tariffs including, but not limited to, rate schedules, riders, service regulations and terms and conditions.

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 Cooperative's Service Regulations and Tariff/Rate Schedules as approved by the Union Power Cooperative Board of Directors.

4.2 **Acceptance for Interconnection:** Each application and Generator is evaluated individually and accepted or denied for interconnection with the Cooperative's Area EPS. Any Cooperative evaluation is from the perspective of the impact of the interconnection on the Cooperative and its system. The Member 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 Cooperative. The existing Member assumes the responsibility of ensuring a new Member is aware the new Member must re-apply and obtain the Cooperative'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 Member 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 **Reserved for Future Use.**

4.4 **Interconnect Cost:** The Member shall bear all the cost of interconnection, including, but not limited to, the cost necessary to meet all technical and protection requirements.

4.4.1 **Interconnecting Facilities:** The Cooperative reserves the right to require additional interconnection facilities to be furnished, installed, owned and maintained by the Cooperative at the Member's expense, if determined necessary by the Cooperative.

4.4.2 **Area EPS Changes or Upgrades:** The costs for any necessary Area EPS changes or upgrades as a result of the interconnection shall be at the Member's expense.

4.4.3 **Area EPS Engineering Costs:** Engineering studies necessary to evaluate the impact of the interconnection, as well as the cost of performing engineering estimates for required EPS upgrades shall be borne by the Member; at the Cooperative's sole discretion, payment for all or a portion of the estimated engineering costs may be required in advance of the Cooperative performing the analysis.

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

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

4.6 **Liability:** The Member is liable and shall bear the cost of resolving any power quality, reliability, or safety issues or problems caused by the Generator operation or connection to the Area EPS. The Member 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.

- 4.7 **Insurance:** The Member shall obtain and retain, for as long as its Generator is interconnected with the Cooperative's system, liability insurance which protects the Member from claims for bodily injury and/or property damage. The minimum coverage shall be comprehensive general liability insurance with coverage at least \$300,000 per occurrence. This insurance shall be primary for all purposes. The Member shall provide certificates evidencing this coverage as required by the Cooperative or at a minimum a certificate of insurance shall be forwarded to the Cooperative in January of each year. The Cooperative reserves the right to refuse to establish, or continue the interconnection of the Member's Generator with the Cooperative's system, if such insurance is not in effect.
- 4.8 **General 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 Cooperative.
- 4.9 **Discontinuing Operation:** The Member shall notify the Cooperative prior to permanently discontinuing operation of the Generator interconnected with the Cooperative.
- 4.10 **Interconnection Application Fee:** The nonrefundable interconnection application fee covers only the application process for interconnection of Generators and shall be: **\$250.00**
This is in addition to any other applicable fees and charges outlined within these documents.

5. Generator, Inverter and Protective Equipment Technical Requirements:

- 5.1 **General:** The Cooperative may elect to visit the site and verify compliance with any requirement of these Standards.
- 5.2 **Required Standards:** The Member and a registered professional engineer, obtained by the member, and licensed to practice in the State of North Carolina 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 will be required to comply with these IEEE documents.
- 5.2.3 The Member'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 Member'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 Member 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 1.6 is required. The Cooperative 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 Cooperative.

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 Cooperative 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 Member is responsible to perform installation, commissioning, and maintenance as outlined in this section and in the manufacturer's guidelines for all Generator equipment. The Member is responsible for and ensuring that all testing is documented and the Cooperative shall be granted the right to audit the documentation. The Cooperative reserves the right to require and witness testing of the Member's Generator.

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

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

The Cooperative shall require, at the Member's expense, a certification by a Professional Engineer registered in the State of North Carolina that the installation complies with IEEE 1547. Certified Generator Systems, as described in Section 1.9 above, with capacity of 10kW or less, or inverter based system less than 5kW which utilize inverters that are UL Certified for compliance with UL 1741 shall not require this Certification, given the installation complies with IEEE 1547.

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 Member shall invite the Cooperative 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 Cooperative for review upon request. The Cooperative may require further testing at its expense.

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 Member submits to the Cooperative an “*Application to Interconnect*” accompanied with the appropriate Interconnection Application Fee to a designated Cooperative contact or department.
- 8.2 **Queue Position:** The Cooperative considers the application based on the date a completed application is received by the Cooperative in reference to priority when evaluating the Area EPS screen limits.
- 8.3 **Impact Screens:** The Cooperative 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 Member may request the Cooperative 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 Member’s Generator equipment. Costs to perform the Impact Screen are the responsibility of the Member, as stated in section 4.4 of this document.

The Cooperative will complete the Impact Screen process within 120 days (absent extenuating circumstances) of receipt of a complete “Application to Interconnect Small Generation.” Extenuating circumstances include, but are not 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 Cooperative will provide an agreement to the Member within 60 days of the completion of the Impact Screens as stated in 8.3. Once the Member returns the executed Agreement to the Cooperative, the Cooperative will execute the Agreement and return a copy to the Member. Member shall not interconnect the generator to Cooperative’s Area EPS Facilities unless an Agreement between Member and Cooperative has been executed by both parties.
- 8.5 **Installation and Inspections:** The Member installs the Generator and the Member is responsible for obtaining an approved electrical inspection from the local authority having jurisdiction for the Generator installation. The Member shall request the inspector to forward a copy of the approved inspection to the Cooperative contact processing the Generator interconnect request.
- 8.6 **Area EPS Facilities:** At the Member’s expense the Cooperative installs or alters the Area EPS facilities as necessary to accommodate the interconnection.
- 8.7 **Commissioning Test:** The Member performs the required commissioning test and forwards a confirmation letter to the Cooperative. The member shall invite the Cooperative to the commissioning test and perform the test at a mutually agreed date and time if the Cooperative elects to attend.
- 8.8 **Certification of Compliance:** The Member shall provide a certification by a Professional Engineer registered in the State of North Carolina that the installation complies with IEEE 1547. Certified Generator Systems, as described in Section 1.9 above, with capacity of 10kW or less, or inverter based system less than 5kW which utilize inverters that are UL Certified for compliance with UL 1741 shall not require this Certification, given the installation complies with IEEE 1547.

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.