

CITY OF RIVERSIDE
INTERCONNECTION STANDARDS
For Customer-Owned, Grid Connected
Electric Generating Facilities

A. General

This “Interconnection Standard for Customer-Owned, Grid Connected Electric Generating Facilities” sets forth the requirements and conditions for interconnected non-utility-owned electric generation where such generation may be connected for parallel operation with the electrical system of the City of Riverside Public Utilities (RPU). Generating Facilities will be permitted to interconnect to RPU’s electric distribution system (12 kV and below) only after a determination by RPU that such interconnection will not interfere with the operation of the distribution circuit.

Where there is a difference between the requirements of this document and RPU Electric Rule 22 – Distributed Generation Facilities Interconnection, the more stringent criteria shall apply.

B. Interconnection Requirements

1. Customer shall comply with all the latest applicable National Electric Code (NEC) requirements [NEC Articles 690 and 705], NESC requirements, State of California requirements, building codes, RPU specifications, RPU approved EUSERC configurations, and shall obtain electrical permit(s) for the equipment installation.
2. Any system over 25 kW shall require the service to have a dedicated transformer installed on the customer’s property. If a new or upgraded service is required, the customer shall comply with the electric rules in effect at time of permit issuance.
3. Customer shall provide space for metering equipment and meter base in accordance to RPU requirements. Refer to the diagram on page 5.
4. Customer’s directional over/under-current device at the service panel shall be marked to indicate power source and connection to RPU’s distribution system.
5. The Customer shall assume full responsibility for all maintenance of the generator and protective equipment and keeping of records for such maintenance. These records shall be available to RPU for inspection at all times.
6. Customer’s power production control system shall comply with NEC Articles 690 and 705; and applicable and current Institute of Electrical and Electronics Engineers (IEEE) Standards including Standard number 1547 “Interconnecting Distributed Resources with Electric Power Systems” for parallel operation with RPU; in particular the:
 - a. Power output control system shall automatically disconnect from RPU power source upon loss of RPU voltage and not reconnect until RPU’s voltage has been restored for at least five (5) minutes continuously.
 - b. Power output control system shall automatically initiate a disconnect from RPU source within ten (10) cycles if Customer’s voltage falls below 60 V rms to ground (nominal 120 V rms base) on any phase.
 - c. The customers’ power output control system shall be set to effectively separate from the grid due to utility outages, with control limits set to avoid nuisance trips of the generating facility caused by reasonable service entrance voltage fluctuations. RPU provides voltage that meets industry standard tolerances of 5% within nominal (114 – 126 V on a 120 V base) at the service entrance. The customer’s power output control system shall automatically initiate a disconnect from RPU’s system within two (2) seconds from when the voltage rises above or falls below the set points of the power output control system. The customer shall be responsible for any and all damages caused by their Generating Facilities that are set to operate with voltages outside of the 5% nominal service entrance voltage tolerances..

d. The applicant shall provide RPU with a detailed drawing showing the location of the Generating Facility. RPU shall approve the location of the Generating Facility before the project application is approved.

7. Customer shall provide a written description of how the protection devices will achieve compliance with the requirements of this policy.

8. Customer shall furnish and install a UL-approved safety disconnect switch as noted in the attached schematic diagram which shall be capable of fully disconnecting the Customer's generating facility from RPU's electric system. The disconnect switch shall be located adjacent to RPU's meters and shall be of the visible break type in a metal enclosure which can be secured by a padlock. The disconnect switch shall be accessible to RPU personnel at all times.

9. Meter Location: The RPU Production Meter must be located outdoors and adjacent (minimum of 10 inches and a maximum of 6 feet) to the existing RPU Service Meter. All other location requirements, grounding requirements, and clearance requirements for the RPU Production Meter are identical to those for a RPU Service Meter.

10. RPU will consider variance request for alternate Production Meter locations in the rare situations where locating adjacent to the existing service meter is truly impractical or cost prohibitive. A variance for an alternate Production Meter location must be obtained in writing prior to construction.

11. **Solar Photovoltaic Equipment** shall be in compliance with Underwriters Laboratories (UL) 1741, *Standard for Static Inverters and Charge Controllers for Use in Photovoltaic Systems*; UL 1703, *Standard for Safety: Flat-Plate Photovoltaic Modules and Panels*; and IEEE 1262-1995, *Recommended Practice for Qualification of Photovoltaic (PV) Modules*; and the solar system shall be installed in compliance with IEEE Standard 929- 2000, *Recommended Practice for Utility Interface of Photovoltaic Systems and approved by the CEC for use in California*.

C. Safety

All Safety and operating procedures for joint use equipment shall be in compliance with the Occupational Safety and Health Administration (OSHA) standard 29 CFR 1910.269, the National Electrical Code (NEC), State of California rules, RPU standards, and equipment manufacturer's safety and operating manuals.

D. Schematic Diagram

The Schematic Diagram is required by the Building Division and RPU Engineering during the review and approval process, and for field inspection, testing and meter installation. The diagram is a permanent record copy of the system and is filed at RPU for reference. Discrepancies between the diagram and the actual installation as built shall be cause for rejection at the final testing and net meter installation, which in turn means rescheduling and a significant delay in activating the system. The Schematic Diagram can be anything from a One-Line, to a Schematic, to a complete Wiring Diagram that shows every wire and every connection throughout. Any of these are acceptable as long as the minimum key information is included. The diagram does not need to be overly complex, but accuracy and clarity are critical. The sample diagram on page 4 is for a typical PV System and is very simple, but it contains all the technical information for RPU.

At a minimum, the Schematic Diagram must show how the components of the customer generator system are connected electrically. Additional information, such as equipment part numbers and physical locations, should also be included on the diagram. Some of this additional information may be contained in the application forms as well, but documenting it on the System Diagram provides a single complete reference for the project and speeds the engineering reviews and field work.

Note: These guidelines and the sample diagram are applicable for facilities using a UL-1741 approved synchronous inverter. Facilities not using a UL-1741 inverter have more complex requirements for interconnection and will require much more significant design drawings for review and approval.

The System Diagram should provide the information as described below. Refer to the sample diagram on page 4 for an example.

- **Generator (PV Panels, Fuel Cells, Wind Turbine, Hydro Turbine, etc.)**
Include manufacturer, part number, nameplate maximum capacity (kW), and physical location. For modular systems (e.g. pv panels), also include: number of modules, configuration, nameplate maximum capacity of each module, and total nameplate maximum capacity.
- **Inverter**
Include manufacturer, type or series, part number, serial number, nameplate maximum capacity (kW), output voltage, physical location.
- **Production Meter Socket**
Diagram must show polarity (line/load), and identify the physical location relative to the RPU Service Meter. Production meter socket must meet all RPU approved EUSERC Requirements identical to those for RPU service metering equipment.
- **Disconnect Switch**
Include the physical location relative to the RPU Service Meter.
- **Electrical Service Panel**
Include the panel or main breaker size and the position at which the generation is connected. Show all panels (if there are multiple panels or subpanels) even if not directly connected into the generation system.
- **RPU Service Meter**
Include existing meter serial number, meter form, and class.
- **Other Related Equipment (battery banks, transfer or bypass switches, backup generators, etc.)**
These items are typically associated with more custom and complex systems. Providing accurate information and connection diagrams is especially important as these systems are not as “routine” and because Production Metering can become complex.