

ORCAS POWER & LIGHT COOPERATIVE
Interconnection Standards for Installation of Member Generators

“With nameplate rating no greater than 200 kW”

- 1) Member Generator, herein referred to as MG shall comply with all National Electric Code (NEC) requirements, and building codes, and shall obtain Washington State electrical permit(s) for the equipment installation.
- 2) MG shall provide space for metering equipment including a visibly-lockable disconnect- switch and meterbase as per OPALCO’s requirements. The location of this equipment must be pre-approved by OPALCO and meet all code requirements. See figure 1 on page 8 for additional information on meterbase and disconnect switch specification and mounting and wiring requirements.
- 3) MG’s over-current device at the service panel shall be marked to indicate power source and connection to OPALCO’s distribution system.
- 4) MG’s production meter and Utility disconnect shall be labeled with service voltage.
- 5) MG’s power production control system shall comply with all NEC and Institute of Electrical and Electronics Engineers (IEEE) standards for parallel operation with OPALCO including: Power output control system shall automatically disconnect from OPALCO’s power source upon loss of OPALCO voltage and not reconnect until OPALCO’s voltage has been restored for a least five (5) minutes continuously; Power output control system shall automatically initiate a disconnect from OPALCO’s system within ten (10) seconds if the voltage rises above 126 volts, rms phase to ground, or falls below 114 Volts, rms phase to ground, (nominal 120 V rms base) on any single phase.
- 6) MG shall pay all costs associated with the design, installation, operation and maintenance of the generation equipment. Including OPALCO supplied and required equipment and labor cost.
- 7) MG shall deliver the excess energy to OPALCO at the MG’s premises. OPALCO will install and maintain, a single Utility owned revenue meter capable of registering the bi-directional flow of electricity at the MG’s premises. At the MG’s cost, a separate single production meter may be installed to measure production of the renewable generation source. MG is responsible for designing and wiring an MG system that’s production can be metered with a single production meter. All costs associated with the production meter are the responsibility of the MG.
- 8) MG shall not start installation of any generation equipment, including foundations, supports, or roof top connections until a pre-approval application with wiring diagram has been submitted to OPALCO’ Energy Services Department and a site visit has been completed. On ferry served islands, MG shall allow one (1) working week after pre-approval application has been submitted for an OPALCO’s pre-inspection site visit to occur. On non-ferry served islands, MG shall allow two (2) working weeks after pre-

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approval application has been submitted for an OPALCO's pre-inspection site visit to occur. Site visit requires that the MG or MG's representative be present. MG is responsible for scheduling the pre-approval site visit with OPALCO's Energy Service Department.

9) MG shall not commence parallel operation of the generation equipment until a final inspection of the interconnection facilities has been completed by OPALCO. Slugging or by-passing of meterbase socket is not allowed. On ferry served islands, MG's shall allow one (1) working week after final State inspection has been passed and OPALCO's Energy Services Department has been notified of State inspection passage for OPALCO's final inspection to occur. On non-ferry served islands, MG shall allow two (2) working weeks after final State inspection has been passed and OPALCO notified of passage for an OPALCO's final inspection to occur.

10) MG shall allow one (1) working week after final OPALCO inspection has been passed for OPALCO's Metering Department to set a MG owned production meter. On non-ferry served islands, MG shall allow two (2) working weeks after final OPALCO inspection has been passed for OPALCO's Metering Department to set a MG owned production meter. **Final OPALCO inspection does not check if meterbase and disconnect have been wired correctly. If metering department determines that the system is not properly wired, no meter can be set and system cannot be brought on line.**

11) Once generation facility is in operation, MG shall make no changes or modifications in the equipment, wiring or mode of operation without the prior approval of OPALCO.

12) Metering-

- a. OPALCO shall meter production at one location with a single production meter for each generation system installations. Solar, Wind, and Hydro generation facilities are considered separate generation installations. Large Solar installations with multiple inverters are considered one system. It is the responsibility of the MG to provide a system design and wiring connection that can be connected to an OPALCO approved meterbase which can measure system production at one point.
- b. OPALCO will provide an estimated invoice hereinafter called contribution in aide of construction, (CIAC), equal to the estimated cost of the production meter and/or any other OPALCO provided equipment and service. Contribution in aide of construction must be paid in full prior to installation of said MG owned production metering equipment.
- c. A utility owned distribution service meter, capable of measuring energy flow in two directions: the energy delivered by OPALCO to the MG and the energy received by OPALCO from the MG, will be required to be installed at this site.

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- d. The MG shall provide space and meter socket equipment as specified by OPALCO at a location approved by OPALCO for the purpose of measuring energy production. Approval for production meter location is required before any generation equipment can be installed including foundations, supports, and roof top attachments. This meter socket must be visible to OPALCO crews at all times and shall be mounted between 54 inches and 78 inches above level grade, and be labeled as a 240 volt meterbase or 120 volt meterbase . Production meterbase shall be a **Milbank U7490-0** and not be used as a junction box. Top terminals of the meterbase socket shall be connected to the inverter. The only wires allowed in the meterbase are those attached to an approved connection terminals inside meterbase. Slugging of meterbase socket by owner or installer is not allowed.

13) Utility Visibly-Lockable Disconnect Switch – A visibly accessible disconnect switch that can be visibly-locked in the open position is to be provided and installed by the MG. The location of this switch must be pre-approved by OPALCO before any generation equipment including: foundations; supports; and roof top attachments can be installed. This disconnect must be visible to OPALCO crews at all times and shall be mounted between 54 inches and 78 inches above level grade and be a **Square D Cat. No DU221RD or DU222RB** type disconnect. Disconnect shall not be used as a junction or splice box. The only wires allowed in the Utility disconnect are those attached to approved connection terminals inside this disconnect. The disconnect switch shall be used:

- a. If it is necessary for the protection of the line crew personnel when working on de-energized circuits during a system emergency.
- b. If inspection of the MG's reveals a hazardous condition or a lack of proper maintenance.
- c. If the MG interferes with other Members, or utilities, or with the operation of OPALCO's distribution system.

14) Any future modification or expansion of the MG will require an engineering review and approval by OPALCO before any modification can begin.

15) Protective Relaying –

- a. All generating units over 25 kW must be equipped with short circuit interruption devices consisting of thermal-magnetic over-current devices on each phase as well as under voltage release and solenoid tripping accessories.
- b. Over and under voltage and frequency protection shall be provided to effectively isolate the facility from OPALCO's system should the power output not be within OPALCO's normal operation tolerances. The normal tolerances for under- and over- voltage are 114 to 126 volts. Frequency must be within +/- 0.05% of 60 Hz.

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16) Power Factor – The power output of the generation facility must approach a unity power factor when operated in parallel with OPALCO’s system. Equipment shall be installed to correct any deficiencies in power factor by the owner of the generation facility at the MG’s expense. Under no condition will the power factor of the generation facility be permitted to drop below 0.94.

17) Power Quality – Generation equipment shall comply with the power quality requirements and harmonic limitations in IEEE 519 Recommended Practices and requirements of Harmonic Control in Electric Power Systems.

18) Safety – All safety and operation 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), Washington Administrative Code (WAC) rules, the Washington Industrial Safety and Health Administration (WISHA) standard, OPALCO standards, and equipment manufactures safety and operation manuals.

19) Maintenance and Permits – MG shall:

- a. Maintain the electric generation system and interconnection facilities in a safe and prudent manner and in conformance with all applicable laws and regulations including, but not limited to, OPALCO’s Interconnection Standards and MG Service Policy 14.
- b. Obtain any governmental authorizations and permits required for the construction and operation of the electric generating system and interconnection facilities, including electrical permit.
- c. Consult with and obtain pre-approval from OPALCO’s Energy Services Department for all generating facilities to be operated in parallel with OPALCO before any construction activities starts.
- d. Reimburse OPALCO for any and all losses, damages, claims, penalties, or liability it incurs as a result of MG’s failure to obtain or maintain any governmental authorizations and permits required for construction and operation of MG’s generation system or failure to maintain MG’s facility.

20) Access to Premises – OPALCO may enter MG’s premises or property under the following conditions:

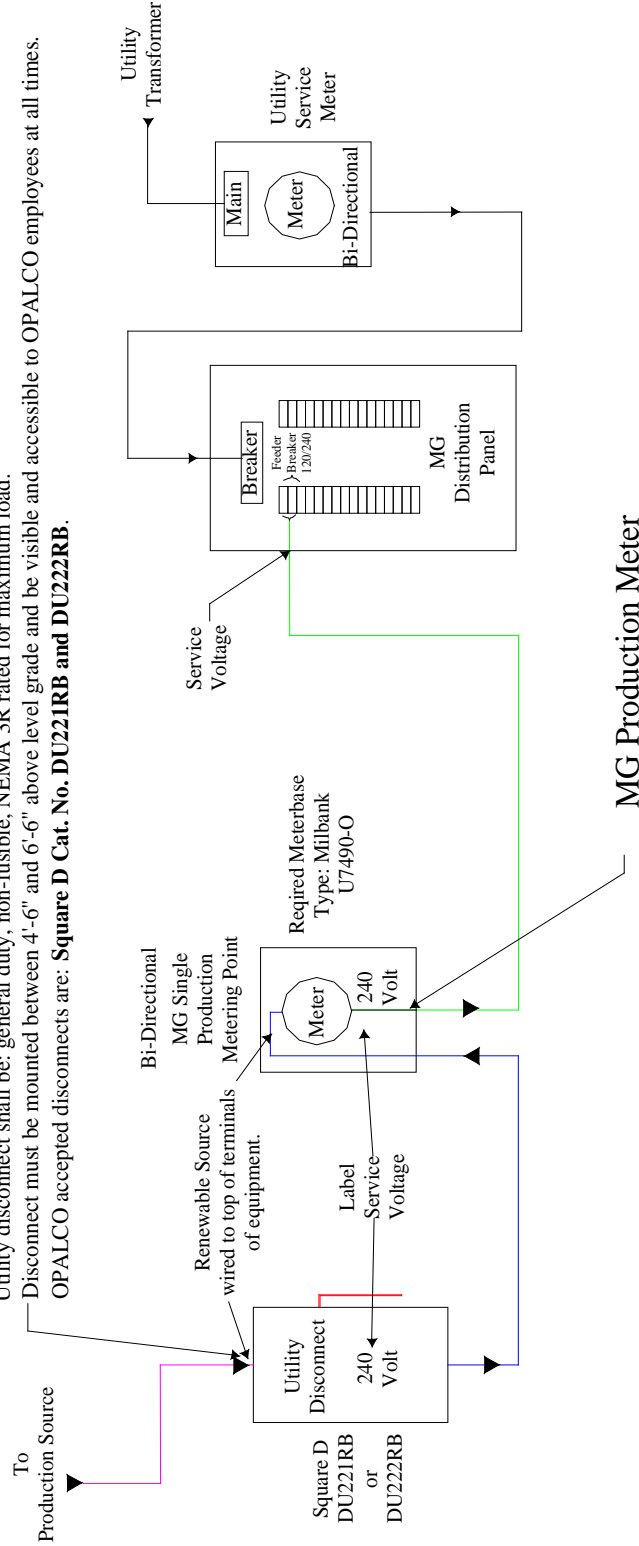
- a. To inspect, at all reasonable hours, MG’s protective devices and to read and maintain meter(s).
- b. To disconnect the generation systems interconnection with OPALCO’s, without notice if in OPALCO’s judgment a hazardous condition exists and such immediate action is necessary to protect persons, OPALCO’s facilities, or property of others from damage or interference caused by MG’s generation system.

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All Member generation facilities (MG) must comply with all State and Federal laws as well as OPALCO Member Service Policy 14 and OPALCO Interconnect Standards. All required MG utility disconnect and meterbase locations shall be pre-approved through OPALCO's Energy Services Department and not be used as junction or splice boxes. It shall **always** be the responsibility of the installer to contact OPALCO in advance of any installation and arrange a pre-installation site meeting. OPALCO shall meter production of Solar or Wind or Hydro generation system from one metering point with a single OPALCO approved meter.. MG is required to provide wiring for production metering to an OPALCO approved single location. Only wires connected to U.L. listed factory terminals shall be allowed in Utility disconnect and production meterbase.

MG Utility Disconnect

Utility disconnect must have a handle that can be visibly locked in the open position.
 Utility disconnect shall be: general duty, non-fusible, NEMA 3R rated for maximum load.
 Disconnect must be mounted between 4'-6" and 6'-6" above level grade and be visible and accessible to OPALCO employees at all times.
 OPALCO accepted disconnects are: **Square D Cat. No. DU221RB and DU222RB.**



Production meterbase must be mounted between 4'-6" and 6'-6" above level grade and be visible and accessible to OPALCO.
 Production meterbase shall not be used as a junction or splice box and shall be **Milbank type U7490-0**. Any exception must be pre-approved with OPALCO's Metering Department.
 Production meterbase service voltage shall be labeled on meterbase front cover.
 Production meterbase's top terminals shall be wired to the production source.
 Production meters are not allowed to be inside or under any structures.
 Production meters shall always be installed between Utility disconnect and MG distribution panel.

Figure 1- One-Line Example of Meterbase and Utility Disconnect