Victorville Municipal Utility Services (VMUS)

Generation Interconnection Standards and Guidelines

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These standards and guidelines have been prepared by the Victorville Municipal Utility Services (VMUS or Utility). They are available to interested parties for information, planning design, and construction of interconnection facilities for customer generators. Copies of this document and information pertaining to other requirements for electrical system interconnection to the Utility's distribution system may be obtained by downloading directly from Website address www.VictorvilleCa.Gov or by contacting Victorville Municipal Utility Services at 760-243-6340.

This document, in conjunction with applicable city, county, state and federal rules and regulations combine to form the standard to which all new interconnecting facilities for customer generation, shall conform.

The effective date of these standards and guidelines and revision dates are indicated on the title page of each document. All requirements of the guidelines are subject to change without notice; therefore, those who are contemplating any venture with the Utility, which will be regulated by these standards and guidelines, should make sure that they have the most current and latest revision.

The purpose of this document is to standardize equipment and facilities relating to interconnection facilities for customer-owned distributed generation systems within the Utility's service territory. Distributed generation is generally defined as generating sources whose combined gross output is less than 1 megawatt (MW) that is connected to the Utility system at a single point of interconnection. This document is designed to provide typical standards and guidelines for interconnection facilities for most distributed generation systems including solar, battery storage, fuel cells, and other renewable power sources; however, design requirements are subject to adjustment as necessary.

Standards, rules and regulations of other agencies with jurisdiction in areas covered by this document are not altered in any way by these standards and guidelines. Any and all questions regarding applicability of various rules and regulations shall always be resolved in favor of the more stringent requirements.

Modifications and/or deviations to/from the requirements of the standards and guidelines contained in this document must be authorized, in writing, by the VMUS Director of Utilities. No work, which includes modifications to this document, should proceed without this written approval.

Generation Interconnection Standards and Guidelines

1.0 Introduction

These standards and guidelines state the minimum requirements for safe and effective operation of customer-owned generation on the VMUS electric system. Customers shall be guided by this document when planning installations of distributed generation that is capable of extended parallel operation with the Utility system.

1.1 Policy on Customer Generation

As specified in the Utility Electric Rates, Rules and Regulations, Rule No. 21, it is the policy of the Utility to permit any customer to operate generating equipment in parallel with the electric system within the limitations below whenever this can be done without adverse effects on the general public, or to Utility equipment or personnel. Certain protective devices (relays, circuit breakers, etc.), specified by the Utility must be installed at any location where a customer desires to operate generation in parallel with the Utility. The purpose of these devices is to promptly disconnect the customer's generating equipment from the Utility system whenever faults, abnormal, or unsafe operation occur. Other modifications to electrical system configuration or protective relays may be required to accommodate parallel generation.

For each of VMUS' distribution systems, the total generating capacity of Eligible Customer Generators for the NEM 1.0 program cannot exceed 5% of the Utility's contracted peak capacity for the system that the customer's service is connected to. This option is available on a first come, first served basis. Once this total capacity is reached, other generators will be allowed to connect to that system under the NEM 2.0 program, however, design requirements are subject to adjustment as necessary.

The maximum generation capacity that will be approved to be connected to each meter is up to 50% of the meter average peak daily load, and cannot exceed the minimum peak demand from the prior 12 month period for the system that the customers service is connected to This load will be determined by analyzing one year of historic data, while ignoring any extraordinary events (outages, partial lights, etc.), unless there have been recent major changes to the daily demand schedule. In that case, the most recent information will be evaluated. New customers with no historical data will be evaluated on a case-by-case basis.

The Utility will not assume any responsibility for protection of the customer's generator(s), or of any other portion of the customer's electrical equipment. The customer is fully responsible for protecting their equipment in such a manner that faults or other disturbances on the Utility system do not cause damage to the customer's equipment, or adversely affect the customer in any way.

1.2 Generation Sources

The customer may elect to use any of a variety of energy sources. The end conversion of the connection to the Utility system must be into 60 Hz alternating current.

The customer may elect to run the generator in parallel with the utility or as a separate system with the capability of non-parallel load transfer between the two independent sources. The requirements of these two methods of operation are outlined in Sections 1.3 and 1.4.

1.3 Separate Systems

A separate system is defined as one in which there is no possibility of connecting the customer's generating equipment in parallel with the Utility's system. For this design to be practical, the customer must be capable of transferring load between the two systems in an open transition or non-parallel mode. This can be accomplished by either an electrically or mechanically interlocked switching arrangement that precludes operation of both switches in the closed position. Separate systems are typically designed as standby or backup emergency generation that serves dedicated loads at the customer facility in the event of an outage, i.e., when there is no electric service from the Utility.

If the customer has a separate system, the Utility will require verification that the transfer scheme meets the non-parallel requirements. This will be accomplished by approval of drawings by the City in writing and, if the City so elects, by field inspection of the transfer scheme. The City will not be responsible for approving the customer's generation equipment and assumes no responsibility for its design or operation.

Most Uninterruptible Power Supply (UPS) systems do not specifically meet the separate system criteria. However, if they are not capable of backfeed, they will be classified as a separate system. If they can backfeed, they must meet the requirements of parallel operation.

1.4 Parallel Operation

A parallel system is defined as one in which the customer's generation can be connected to a bus common with the Utility's system. A transfer of power between the two systems is a direct and often desired result. A consequence of such parallel operation is that the parallel generator becomes an electrical part of the Utility system that must be considered in the electrical protection of the Utility's facilities.

Utility lines are subject to a variety of natural and man-made hazards. The electric problems that can result from these hazards require that the damaged equipment be de-energized as soon as possible because of the hazards they pose to the public and to the operation and stability of the Utility system.

In systems without parallel generation, the Utility controls the only source of power supply to a given line and therefore has the responsibility to install equipment, which is adequate, under expected circumstances, to detect faulted equipment and de-energize it. A parallel generator connected to a Utility line represents another source of power to energize the line and must also have adequate protective devices installed to sense trouble on the Utility system.

For installations with larger generators, specific devices may be required for the detection of short circuits and grounds on the Utility system as well as voltage and frequency relays to detect isolated operation. The general and specific requirements for parallel generation installations of various sizes are discussed in the following sections.

2.0 General Design Requirements

2.1 Design Requirements

2.1.1 The customer's installation must meet all applicable national, state and local construction and safety codes.

a. Major equipment that is not included on the California Energy Commission's eligible equipment lists shall be evaluated for compliance with these interconnection guidelines.

b. It shall comply with the latest requirements of the following standards:

- ANSI/IEEE 1547 Standards for Interconnecting Distributed Resources with Electric Power Systems
- IEEE 1547.1 Standards for Conformance Tests Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems
- UL 1741 and UL 1741-SA Standards for Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources
- NFPA 70 National Electrical Code (NEC) Standards for the Safe Installation of Electrical Wiring and Equipment
- National Electrical Safety Code (NESC@) Safety Standards for Underground Electric Utility and Communications Utility Installations
    - o Section 9 Grounding Methods for Electric Supply and Communications Facilities
    - o Section 11 Protective Arrangements in Electric Supply Stations

2.1.2 Protective devices (relays, fuses, circuit breakers, ground banks, etc.) for the protection of the Utility' system and synchronizing equipment must be installed as required by the City and Utility. A customer shall be solely responsible for providing adequate protection of its generating facility. Customer's protective functions shall not impact the operation of other protective functions on the Utility's system in a manner that would affect the Utility's capability of providing reliable service to its customers. For all generation systems including inverter-based resources, the responsible engineer/consultant shall make sure that work meets all the required safety and government rules and regulations and the correctness of protection. The City and Utility will review and approve the protection and SCADA interface requirements only.

2.1.3 Visible, Accessible, Lockable disconnect required. Customer shall furnish and install ganged, manually operated isolation switch near the point of interconnection to isolate the generator from the Utility's system. The following requirements shall be met:

- The disconnecting device shall allow visible verification that separation of the generator from the Utility's system has been accomplished. This requirement may be met by opening the enclosure to observe contact separation.
- The disconnecting device shall include markings or signage that clearly indicates open and closed positions.
- During electrical emergencies or at times in which the total output from generation is greater than the collective load of the system the customer is connected to it may be required to disconnect the generator from the Utility's system. Therefore, the disconnecting device shall be capable of being accessed quickly and conveniently 24 hours a day, 7 days a week by the Utility personnel without obstacles or requiring those seeking access to obtain keys, special permission, or security clearances, unless other arrangements for access are mutually agreed upon by both parties.
- The disconnection device shall be capable of load breaking and rated for the generation source.
- The disconnecting device shall be capable of being locked using standard Utility padlocks in the open position.
- The disconnecting device shall be clearly marked on the submitted one-line diagram and its type and location approved by the Utility prior to installation.
- The disconnecting device shall be installed in such a location and in such a manner that Utility personnel will have access under all conditions and at all times.

2.1.4 Metering requirements are subject to the Utility's approval. Metering equipment must meet the Utility's specifications for service equipment and meters.

- For Distributed Generation sites, metering shall be located at the main interconnection switchgear with manufacturer installed and typical industry rated revenue grade current and voltage transformers. The metering socket shall be wired through test switches. The meter will be provided by the Utility.
- The Utility may require separate metering for distributed generation systems. The cost of the metering shall be at the expense of the customer. In some cases, the customer may be required to establish a new service account for the generating system. Contact Customer Service to establish a new service account.

2.1.5 The customer shall provide two (2) sets of preliminary design drawings for initial review by the City, and four (4) sets of final design drawings once all approvals are met. The City may request a title block on the drawings to allow for approval signatures as necessary. Drawings may be submitted in digital format; Design packages shall include:

<u>Mandatory for all distributed generation systems</u>:

- Interconnection Application Form

- Interconnection Agreement or Net Energy Metering Agreement
- Single-line diagram
- Site layout diagram, with generating source(s) and safety devices clearly identified
- Manufacturer cutsheets of generator and system major equipment.
- Description of safety features (mechanical and electrical)
- All electrical elementary/wiring diagrams

Other information as required by the City:

Description of the distributed generation system, electrical parameters, mechanical parameters, operating principles and procedures

- All relay settings and coordination calculations, fuse sizes, breaker settings, and any associated data
- Transformer and cable data
- The design limitation of the excitation system for synchronous generators
- The design of the ground grid system
- The design and application of any solidly grounded transformer
- Certified test reports on all required relays showing relay settings and trip tests to the appropriate circuit breaker. The customer must specify that the City will approve only those portions of the drawings which apply to protection of the Utility system. The City may comment on other areas which appear to be incorrect or deficient but will not assume responsibility for the correctness of protection pertaining to the customer's system.

2.2 General Operating Requirements

2.2.1 The interconnection of the customer's generating equipment with the Utility system shall not cause any reduction in the quality of service being provided to other customers, with no abnormal voltages, frequencies, or interruptions being permitted. If high or low voltage complaints or flicker complaints result from operation of the customer's generation, such generating equipment shall be disconnected until the problem is resolved.

2.2.2 The customer may not commence parallel operation of generator(s) until the Utility has reviewed the design submittal and given final written approval. The Utility reserves the right to inspect the customer's facility and witness testing of any equipment or devices associated with the interconnection.

2.2.3 Customer shall comply with all the terms of the applicable Interconnection Agreement or the Net Metering Agreement.

2.2.4 The customer will not be permitted to energize a de-energized utility circuit.

2.2.5 Operation of the customer's generator shall not adversely affect the voltage regulation of the Utility's system. Adequate voltage control shall be provided, by the customer, to minimize voltage regulation on the system caused by changing generator-loading conditions.

2.2.6 The customer shall maintain their equipment in good order. The Utility reserves the right to inspect the customer's facilities whenever it appears that the customer is operating in a manner hazardous to the Utility system's integrity.

2.2.7 The customer shall discontinue parallel operation when requested by the Utility:

a. To facilitate maintenance, test, or repair of utility facilities.

b. During system emergencies.

c. When the customer's generating equipment is interfering with other customers on the system.

d. When an inspection of the customer's generating equipment reveals a condition hazardous to the Utility system or a lack of scheduled maintenance or maintenance records for equipment necessary to protect the Utility system.

2.2.8 When required, and typically for larger generators (>1,000 kW), the customer shall maintain an operating log at each generating facility indicating changes in operating status (available or unavailable), maintenance outages, trip indications or other unusual conditions found upon inspection. For generators that are "blockloaded" to a specific kWh level, changes in this setting shall also be logged. Additional charges may be applied for inspections and monitoring.

2.3 Design Information — The Utility System

2.3.1 The Utility's primary distribution voltage is 12.47 kilovolts (kV). The system is fed from a wye connected transformer with the neutral solidly grounded. Only the three (3) phase conductors are provided for the distribution system. The customer should contact the Utility for information on the specific circuit serving the customer's facility.

2.3.2 Customers with generators should be aware that certain conditions in the Utility system might result in circuit reclosing, or situations which may cause negative sequence currents to flow in a generator. It is the sole responsibility of the customer to protect his equipment from reclosing or excessive negative sequence currents.

2.4 Induction Generators

2.4.1 Induction generators are not approved for parallel operation on the City distribution system at this time.

2.5 Synchronous Generators

2.5.1 For synchronous generators, sufficient generator reactive power capability shall be provided to withstand normal voltage changes on the Utility system. The generator voltage-var schedule, voltage regulator, and transformer ratio settings will be jointly determined by the Utility and the customer to ensure proper coordination of voltages and regulator action. Customers are encouraged to generate their own var requirements to minimize power factor adjustment charges and enhance generator stability.

2.5.2 Synchronous generator installations require interconnection to the distribution system through a generator transformer. The transformer shall have delta configured windings connected to the City's distribution system to trap zero sequence current. The generator shall not contribute to ground fault current on the distribution system. The generating facility shall be responsible for detection and protection against a ground fault on the generating facility side of the generator transformer.

2.6 Inverter Systems

2.6.1 Inverters shall be Utility-Interactive type which do not require separate synchronizing equipment.

2.6.2 Inverters shall have Anti-Islanding protection which will automatically disconnect the inverter when grid voltage is not detected per IEEE 1547.

2.6.3 The total harmonic distortion of the inverter(s) output shall be less than 5%, as required per IEEE 1547. If an inverter is found to be adversely affecting the power quality of other customers or the Utility, the customer shall be required to install filtering to bring the harmonic output of his inverter to acceptable levels.

3.0 Specific Requirements

The City has established two different classes for customer-owned parallel generation, each with distinctive protection, metering and operating requirements. These classes are:

1. Less than 1,000 kW

2. Greater than or equal to 1,000 kW, with customer-owned protection

Where multiple generators are connected to the Utility's system through a single service point, the class will be determined by the sum of the ratings of the generators.

These classes have been established for convenience and are based on circuits with normal load density. The final decision as to the requirements for each installation will be made depending on customer load, the magnitude of other load connected to that circuit/system, available short circuit contribution, etc.

3.1 Total Generation Less Than 1,000 kW

3.1.1 The following requirements for small generators are based on an assumed low density of parallel generation customers on the serving circuit. Other conditions may be imposed should the density exceed a tolerable limit. Refer to Figure A and/or C.

3.1.2 Customer generator controls to be equipped with a line voltage relay or contactor that will prevent the generator from being connected to a de-energized or single-phased (if normally three-phase) source. This relay is to disconnect the generator from a de-energized utility line and prevent its reconnection until the Utility reenergizes the line.

3.1.3 Specific site or technology conditions may have additional requirements.

3.1.4 Customer is to be served through a dedicated transformer that serves no other customers. The purpose of the dedicated transformer is to ensure that the generator cannot become isolated with a small amount of other customer load. It also serves to confine any voltage fluctuations or harmonics produced by the generator to the customer's own system.

3.2 Total Generation Greater Than 1,000 kW, With Customer-Owned Protection

3.2.1 All installations in this class require City review of the protective functions to be provided. Refer to Figure B for a typical installation. Note that certain requirements regarding liability and indemnity may apply to installations using customer-owned protection, which shall be defined in an Interconnection Agreement.

3.2.2 The customer shall provide adequate protective devices to:

a. Detect and clear the generator(s) from short circuits or grounds on the Utility facilities serving the customer.

b. Detect the voltage and frequency changes, which can occur if the Utility facilities serving the customer are disconnected from the system and clear the customer generation from the isolated system.

c. Prevent re-paralleling the customer generation, after an incident of trouble, unless the Utility service voltage is of normal magnitude and phase sequence.

3.2.3 Typical protection devices which may be required to satisfy the above requirements are:

a. Phase overcurrent trip devices.

In some cases, these will have to be voltage-restrained or voltage-controlled overcurrent relays in order to provide coordination with the Utility's relays.

b. Residual overcurrent or overvoltage relays to trip for ground faults on the Utility's system.

c. Under/overvoltage relays.

Undervoltage relays should be adjustable from 75-90% of nominal voltage and have time delay to prevent unnecessary tripping on external faults. Overvoltage relays should be adjustable from 110-120% of nominal voltage and may be instantaneous. Setting change with temperature variation should not exceed ± 2 volts over the expected temperature range.

d. Under/over frequency relays.

The underfrequency relay should be adjustable from 55-59 Hz and the over frequency relay from 61-65 Hz. Setting change with temperature variation over the expected range, or voltage variation over ± 10%, should not exceed ± 1 Hz.

e. Phase sequence/undervoltage relay.

To permit paralleling when the Utility's voltage and phase sequence are normal.

f. Synchronizing relay

To permit parallel operation, and to synchronize with the Utility's system.

3.2.4 In specific installations, particularly with large generators (over 1,000 kW), the Utility may require specific additional protective functions such as loss of excitation, loss of synchronism and overexcitation protection, if these conditions would have an impact on the Utility system.

3.2.5 Depending on the size of the generation and the size of the distribution system to which it is connected, the Utility may require the customer to utilize "utility quality" protective relays, which are subject to the Utility's approval. Such relays have more stringent tolerances and more flexible, widely published characteristics than "industrial quality" relays. This requirement can be invoked only if generation is of such size that close coordination with the Utility relays is required. In general, installations aggregating less than 1,000 kVA will not be subject to this requirement.

3.2.6 In some cases, protective devices supplied with the generating equipment will meet some or all of these requirements, provided that it is capable to trip the generator whenever the Utility source is lost. If the customer desires to automatically separate from the Utility and commence isolated operation upon loss of the Utility source, additional devices will be necessary to affect the separation.

3.2.7 All protective devices supplied to satisfy these requirements shall be equipped with operation indicators (targets) or shall be connected to an annunciator or event recorder so that it will be possible to determine, after the fact, which devices caused a particular trip.

3.2.8 All protective devices supplied to satisfy these requirements shall be tested by qualified personnel at intervals at least as frequent as those used by the Utility for the relays protecting the line(s) serving the customer. This interval is currently four years for voltages of 12.47kV and below. Special tests may also be requested by the Utility to investigate apparent mis-operations or to have a record of the performance for anticipated litigation.

3.2.9 Each routine or special test shall include both a calibration check and the actual trip of the circuit breaker from the device being tested. For each test a report shall be prepared and sent to the Utility listing the tests made and the "as found" and "as left" calibration values.

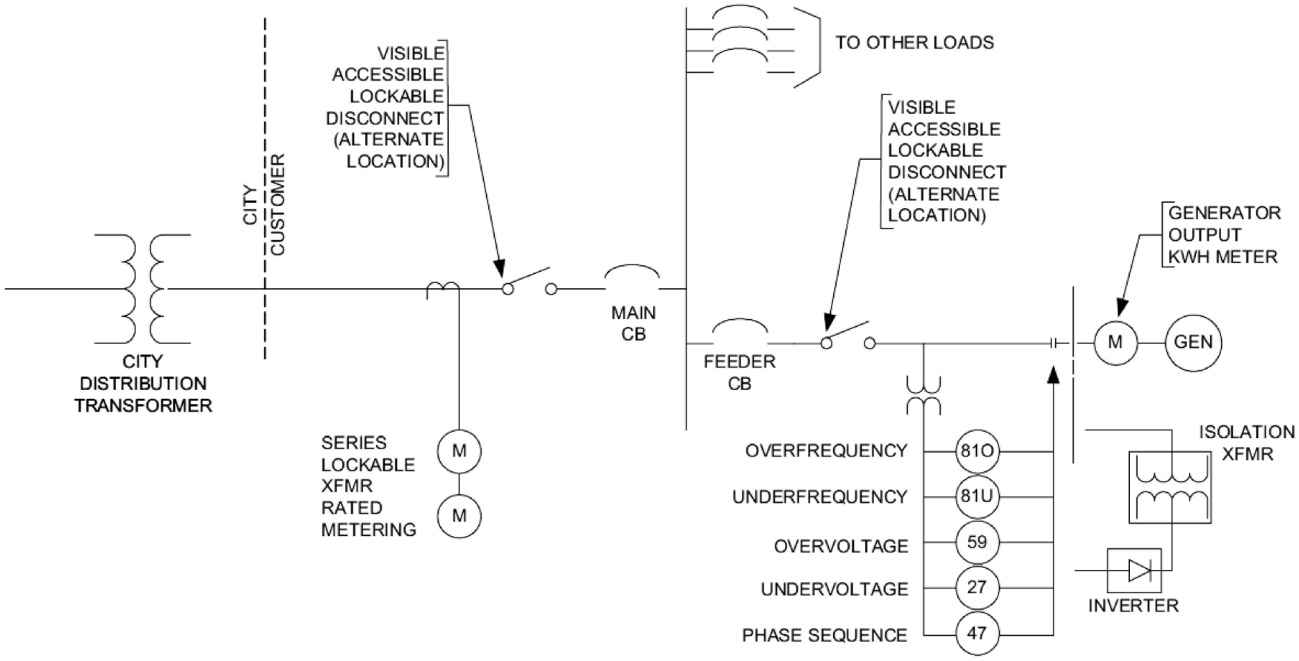
3.2.10 Telemetering equipment at the Generator Metering location may be required at the customer's expense. The Utility shall only require Telemetering to the extent that less intrusive and more cost-effective options for providing the necessary data in real time are not available.

FIGURE A

CUSTOMER GENERATION INSTALLATION

(CONCEPTUAL ILLUSTRATION, NOT FOR DESIGN)

LESS THAN 1,000 KW



NOTES:

1. ALL MAJOR EQUIPMENT MUST BE INCLUDED ON THE CEC'S ELIGIBLE EQUIPMENT LISTS.

2. AN ISOLATION TRANSFORMER SHALL BE REQUIRED TO INTERFACE THE ENERGY SOURCE TO THE SERIES METERING EQUIPMENT FOR THREE-PHASE SYSTEMS, AND MAY BE REQUIRED FOR SINGLE-PHASE SYSTEMS AS DETERMINED BY THE UTILITY.

3. THE CUSTOMER SHALL PROVIDE, INSTALL, AND MAINTAIN THE INDICATED ENERGY SOURCE DISCONNECT EQUIPMENT.

4. THE CUSTOMER SHALL BE RESPONSIBLE FOR THE PROTECTION OF THEIR EQUIPMENT AGAINST FAULTS OR OTHER SYSTEM DISTURBANCES.

5. THE VISIBLE, ACCESSIBLE, LOCKABLE DISCONNECTION DEVICE SHALL BE INSTALLED IN SUCH A LOCATION AND IN SUCH A MANNER THAT UTILITY PERSONNEL WILL HAVE ACCESS UNDER ALL CONDITIONS AND AT ALL TIMES. THE DEVICE SHALL BE CAPABLE OF BEING LOCKED IN THE OPEN POSITION USING STANDARD UTILITY LOCKS.

6. CUSTOMER MAY BE REQUIRED TO PROVIDE VOLTAGE AND FREQUENCY PROTECTION FOR GRID TIE CONNECTION IN INVERTER CIRCUITRY (REFER TO SECTION 2.6 - INVERTER SYSTEMS IN THIS GUIDELINE).

7 NET METER AND PRODUCTION METER SHOULD BE LOCATED IN SAME AREA AND SHALL BE LOCATED NO MORE THAN 5 FEET APART UNLESS APPROVED BY UTILITY.

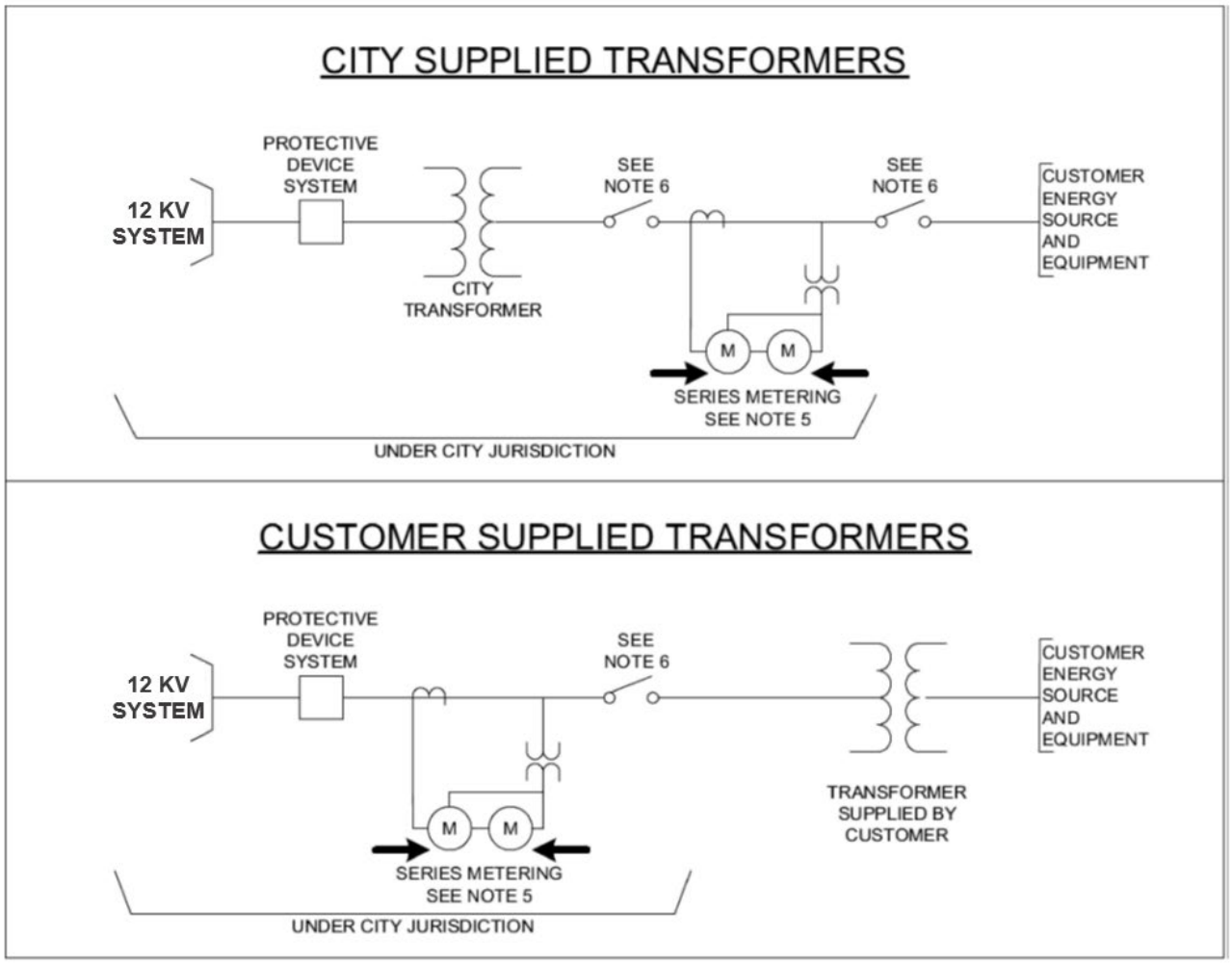
8 NO CONNECTIONS ARE ALLOWED ON THE LINE SIDE OF THE NET METER AND/OR BETWEEN THE NET METER AND THE MAIN BREAKER.

FIGURE B

CUSTOMER GENERATION INSTALLATION

(CONCEPTUAL ILLUSTRATION, NOT FOR DESIGN)

1,000 KW AND OVER



NOTES:

1. ALL MAJOR EQUIPMENT MUST BE INCLUDED ON THE CEC'S ELIGIBLE EQUIPMENT LISTS.

2. AN ISOLATION TRANSFORMER SHALL BE REQUIRED TO INTERFACE THE ENERGY SOURCE TO THE SERIES METERING EQUIPMENT FOR THREE-PHASE SYSTEMS, AND MAY BE REQUIRED FOR SINGLE-PHASE SYSTEMS AS DETERMINED BY THE UTILITY.

3. THE CUSTOMER SHALL BE RESPONSIBLE FOR THE PROTECTION OF HIS EQUIPMENT AGAINST FAULTS OR OTHER SYSTEM DISTURBANCES.

4. ALL ENERGY SOURCE PROTECTION SCHEMES SHALL BE DESIGNED TO BE COMPATIBLE WITH THE UTILITY EQUIPMENT PROTECTION SCHEMES.

5. METERING REQUIREMENTS ARE SUBJECT TO THE UTILITY'S APPROVAL.

6 THE CITY SHALL REQUIRE THAT THE CUSTOMER PROVIDE SUITABLE FACILITIES ON CUSTOMER PROPERTY FOR THE UTILITY TO INSTALL CABLE TERMINATIONS, DISCONNECTS, CIRCUIT BREAKERS AND TRANSFORMERS.

7 THE VISIBLE, ACCESSIBLE, LOCKABLE DISCONNECTION DEVICE SHALL BE INSTALLED IN SUCH A LOCATION AND IN SUCH A MANNER THAT UTILITY PERSONNEL WILL HAVE ACCESS UNDER ALL CONDITIONS AND AT ALL TIMES. THE DEVICE SHALL BE CAPABLE OF BEING LOCKED IN THE OPEN POSITION USING STANDARD UTILITY LOCKS.

8. NET METER AND PRODUCTION METER SHOULD BE LOCATED IN SAME AREA AND SHALL BE LOCATED NO MORE THAN 5 FEET APART UNLESS APPROVED BY UTILITY.

9. NO CONNECTIONS ARE ALLOWED ON THE LINE SIDE OF THE NET METER AND/OR BETWEEN THE NET METER AND THE MAIN BREAKER.

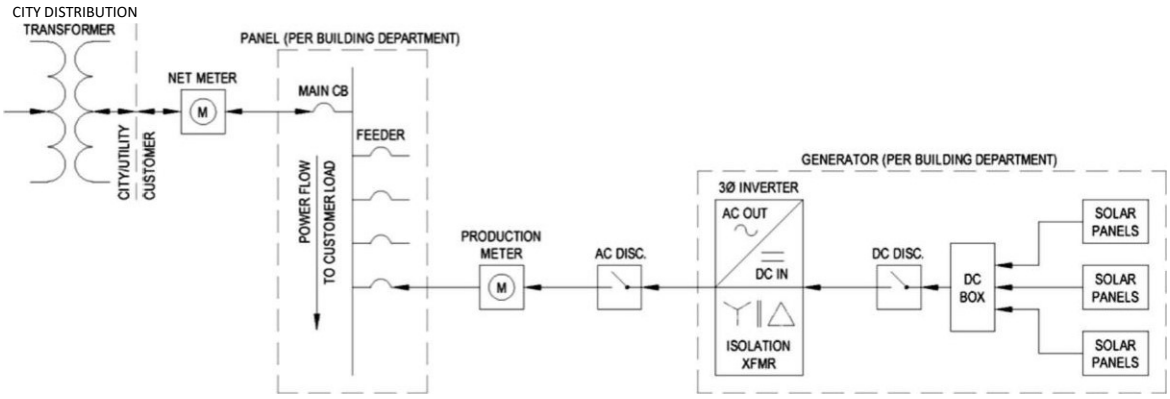
FIGURE C

CUSTOMER GENERATION INSTALLATION

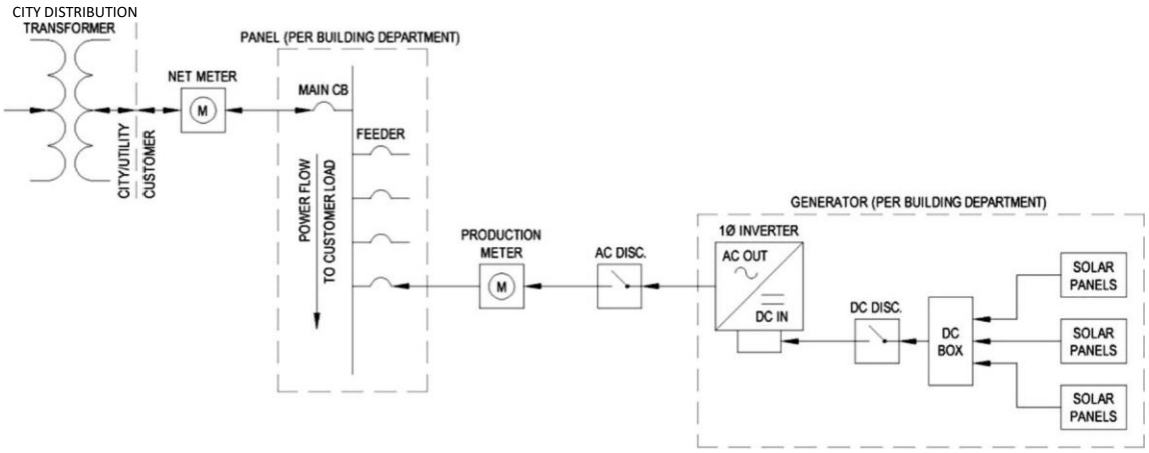
(CONCEPTUAL ILLUSTRATION, NOT FOR DESIGN

PHOTOVOLTAIC SOLAR ELECTRIC SYSTEM

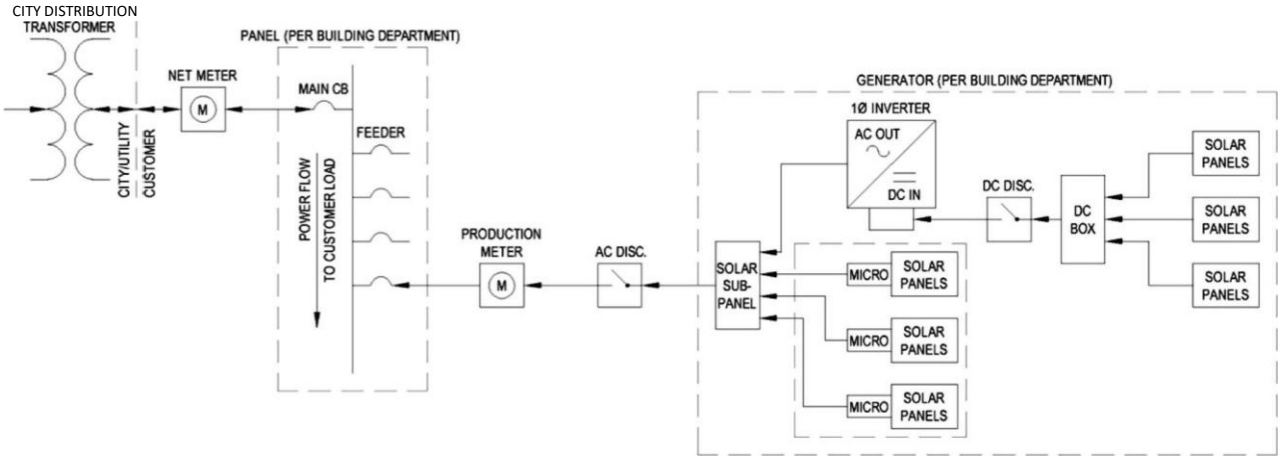
TYPICAL 3Ø COMMERCIAL PHOTOVOLTAIC SYSTEM



TYPICAL 1Ø COMMERCIAL PHOTOVOLTAIC SYSTEM



TYPICAL 1Ø /COMMERCIAL PHOTOVOLTAIC SYSTEM (OPTION TO ADD MICRO-INVERTERS)



NOTES:

1. ALL MAJOR PHOTOVOLTAIC SOLAR ELECTRIC SYSTEM COMPONENTS, INCLUDING PV MODULES AND INVERTERS MUST BE INCLUDED ON THE CEC'S ELIGIBLE EQUIPMENT LISTS.

2. THE CUSTOMER SHALL PROVIDE, INSTALL, AND MAINTAIN THE INDICATED ENERGY SOURCE DISCONNECT EQUIPMENT.

3. THE CUSTOMER SHALL BE RESPONSIBLE FOR THE PROTECTION OF HIS EQUIPMENT AGAINST FAULTS OR OTHER SYSTEM DISTURBANCES.

4. THE VISIBLE, ACCESSIBLE, LOCKABLE AC DISCONNECT DEVICE SHALL BE INSTALLED IN SUCH A LOCATION AND IN SUCH A MANNER THAT UTILITY PERSONNEL WILL HAVE ACCESS UNDER ALL CONDITIONS AND AT ALL TIMES. THE DEVICE SHALL BE CAPABLE OF BEING LOCKED IN THE OPEN POSITION USING STANDARD UTILITYY LOCKS.

5. CUSTOMER MAY BE REQUIRED TO PROVIDE VOLTAGE AND FREQUENCY PROTECTION FOR GRID TIE CONNECTION IN INVERTER CIRCUITRY (REFER TO SECTION 2.6 - INVERTER SYSTEMS IN THIS GUIDELINE).

6. POWER PRODUCTION METERING REQUIREMENTS ARE SUBJECT TO THE UTILITY'S APPROVAL. CUSTOMER SHALL FURNISH AND INSTALL METERING PANEL FOR THE POWER PRODUCTION METER. CHECK WITH THE UTILITY FOR TYPE OF METER PANEL/SOCKET.

7. NET METER AND PRODUCTION METER SHOULD BE LOCATED IN SAME AREA AND SHALL BE LOCATED NO MORE THAN 5 FEET APART UNLESS APPROVED BY UTILITY.

8. NO CONNECTIONS ARE ALLOWED ON THE LINE SIDE OF THE NET METER AND/OR BETWEEN THE NET METER AND THE MAIN BREAKER.