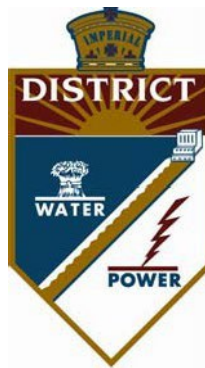


RULES FOR INTERCONNECTION OF DISTRIBUTED GENERATION FACILITIES (Customer-Owned Generation)



*A division of
IMPERIAL IRRIGATION DISTRICT*

Effective March 7, 2023



Rules for Interconnection of Distributed Generation Facilities (Customer-Owned Generation)

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A. APPLICABILITY

These Rules describe the distributive generation interconnection, operating and metering requirements for a Generating Facility (GF) for interconnection to the Distribution System of Imperial Irrigation District (IID). Subject to the requirements of this Rule, IID shall allow the Interconnection of a GF to its Distribution System.

A.1. DEFINITIONS

Capitalized terms used in these Rules, and not defined in other IID Rate Schedules and/or Regulations Governing the Sale and Use of Electric Energy (IID Rates and Regulations), shall have the meaning ascribed to such terms in Section H of these Rules. The definitions set forth in Section H of these Rules shall only apply to these Rules.

A.2. CONSISTENT WITH IEEE 1547

These Rules were revised to be consistent with the requirements of the American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) IEEE Std 1547-2018 *Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces*. IEEE Std 1547-2018 is the revision of IEEE Std 1547-2003 *Standard for Interconnecting Distributed Resources with Electric Power Systems*. In some cases, IEEE 1547 language was adopted directly; in others, IEEE 1547 requirements were interpreted. These Rules have been devised to maintain the spirit of both documents.

Language from IEEE 1547-2018 that was adopted directly (as opposed to paraphrased language or previous language that was determined to be consistent with IEEE 1547-2018) is followed by a citation that lists the Clause from which the language derived. For example, IEEE 1547-2018-4.1.1 is a reference to Clause 4.1.1.

In the event of any conflict between these Rules and any of the standards listed herein, the requirements of this Rule shall take precedence.

B. GENERAL REGULATIONS, RIGHTS AND OBLIGATIONS

B.1. OPERATING AUTHORIZATION

Producer must comply with these Rules, execute an Interconnection Agreement with IID, and receive IID's express written permission before Parallel Operation of its GF with IID's Distribution System. IID shall apply these Rules in a non-discriminatory manner and shall not unreasonably withhold its permission for Parallel Operation of Producer's GF with IID's Distribution System. The Generating Facility Owner's authorization to operate remains in effect until the earliest date that one of the following occurs:

- The Parties agree in writing to terminate the Interconnection Agreement; or
- Ten calendar days after IID provides written notice to Generating Facility Owner of IID's intent to terminate the Interconnection Agreement; or
- Ten calendar days after Generating Facility Owner provides written notice to IID of the Generating Facility Owner's intent to terminate the Interconnection Agreement, which may occur at the Generating Facility Owner's sole discretion; or



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- At 12:01 a.m. on the day following the date that the Customer's electrical service account is closed or terminated; or
- Unless otherwise agreed in writing by the Parties.

B.2. SEPARATE AGREEMENTS REQUIRED FOR OTHER SERVICES

Producer requiring other electric services from IID including, but not limited to, Distribution Service during periods of curtailment or interruption of Producer's GF, shall enter into agreements with IID for such services in accordance with IID Rates and Regulations.

B.3. SERVICES NOT PROVIDED WITH INTERCONNECTION

Interconnection with IID's Distribution System under these Rules does not provide Producer any right to utilize IID's System for the transmission, distribution, or wheeling of electric power, nor does it limit such right. Interconnection with IID's Distribution System under these Interconnection Rules does, at IID's discretion, provide IID the right to use the Interconnection Facility and in some cases the Generator or its auxiliary equipment for grid reliability purposes.

B.4. COMPLIANCE WITH LAWS, REGULATIONS AND RATE SCHEDULES

Producer shall ascertain and comply with IID Rates & Regulations; applicable Federal Energy Regulatory Commission (FERC) regulations; and any local, state or federal law, statute or regulation which applies to the design, siting, construction, installation, operation, or any other aspect of Producer's GF and/or Interconnection Facility. The Facility Owner will comply with IID's engineering specifications.

B.5. DESIGN REVIEWS AND INSPECTIONS

IID shall have the right to review the design of Producer's Generating and/or Interconnection Facility to specify the interface of protective relays; to determine feeder reclosing practice; to identify overcurrent coordination; to identify where to make changes to voltage, regulator, capacitors, and sectionalizing; and to inspect Producer's Generating and/or Interconnection Facility prior to the commencement of Parallel Operation with IID's Distribution System. The Generating Facility Owner is responsible for all local building permits and inspections. IID may require proof that the Generating Facility Owner's protection system is performing to the level required in these Rules and the Interconnection Agreement.

IID may require Producer to make modifications as necessary to comply with the requirements of these Rules. IID's review and authorization for Parallel Operation shall not be construed as confirming or endorsing Producer's design or as warranting the safety, durability or reliability of the Generating and/or Interconnection Facility. IID shall not, by reason of such review or lack of review, be responsible for the strength, adequacy or capacity of such equipment.

B.6. RIGHT TO ACCESS

Producer's GF and/or Interconnection Facility shall be reasonably Accessible to IID personnel as necessary for IID to perform its duties and exercise its rights under IID Rates & Regulations and any Interconnection Agreement between IID and Producer.



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B.7. CONFIDENTIALITY OF INFORMATION

Any information pertaining to a GF and/or Interconnection Facility provided to IID by Producer shall be treated by IID in a confidential manner, unless disclosure is required by applicable law. Notwithstanding the foregoing, IID shall be entitled to disclose Generator information to other regulatory bodies with authority over the construction, operation, or development of the Generating Facility, or as necessary to comply with reporting requirements imposed by applicable regulatory authorities.

B.8. PRUDENT OPERATION AND MAINTENANCE REQUIRED

Producer shall operate and maintain its GF and/or Interconnection Facility in accordance with Prudent Electrical Practices and shall maintain compliance with these Rules.

B.9. CURTAILMENT AND DISCONNECTION

At any time, IID may, without notice, in the event of an Emergency or to correct Unsafe Operating Conditions: limit operation; disconnect, or; require disconnection; as to Producer's GF and/or IID's Distribution System. IID may also limit operation; disconnect, or; require disconnection; as to Producer's GF and/or IID's Distribution System upon the provision of reasonable written notice, if one or more of the following criteria apply:

- a. For routine maintenance, repairs or modifications to IID's Distribution System;
- b. Upon IID's determination that Producer's GF is not in compliance with these Rules, or;
- c. Upon termination of the Interconnection Agreement.

Upon Producer's written request, IID shall provide a written explanation of the reason for any such curtailment or disconnection. IID shall not be obligated to compensate Generating Facility Owner for any loss of use of the Generating Facility or loss of production during any and all periods of curtailment or disconnection.

B.10. TRANSFERABILITY OF INTERCONNECTION REQUEST

An Applicant or Generating Facility Owner may transfer the Interconnection rights contained in an Interconnection Agreement or Application to another person or entity only if such person or entity acquires the proposed Generating Facility identified in the Interconnection Application. The Point of Interconnection and electric design shall not change. The applicant must notify IID prior to any such transfer.

B.11. COMPLIANCE WITH ESTABLISHED TIMELINES

IID shall use endeavor to meet all timelines in meeting all the timelines provided for under this Rule. In the event IID is not able to meet a particular timeline set forth in this Rule, IID shall notify Applicant as soon as practicable and provide an estimated completion date with an explanation of the reasons why additional time is needed.

B.12. MAINTENANCE AND PERMITS

Facility Owner, at Facility Owner's sole expense, shall obtain and possess all permits and authorizations for the Generating Facility in accordance with all applicable laws and



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regulations for the construction, installation, design, operation, and maintenance of the Generating Facility. The Facility Owner shall: (a) maintain the Generating Facility and Interconnection Facilities in a safe and prudent manner and in conformance with all applicable laws and regulations including, but not limited to, the requirements of this Rule; and (b) obtain any government authorizations or permits required for the operation of the Generator or Generating Facility. The Facility Owner shall indemnify IID for any and all losses, damages, claims, penalties or liability IID incurs as a result of the Facility Owner's failure to obtain and/or maintain any government authorizations and/or permits required for construction, installation, design, operation and/or maintenance of the Generating Facility.

B.13. ACCESS TO PREMISE

In the event that Facility Owner owns the real property where the Interconnection Facilities will be located, or (in the event that Facility Owner is leasing or otherwise obtaining rights to locate the Generation Facilities on real property of a third party), Facility Owner shall grant to IID (or obtain for IID) (i) the right to install the Interconnection Facilities and related equipment or materials on said real property along the most practical route, which is of sufficient width to provide legal and safe clearance from all structures now or hereafter erected on said real property; and (ii) the right of ingress and egress from said real property as reasonably necessary for IID to operate, maintain, disconnect, curtail and/or remove the Interconnection Facilities.

Where formal rights-of-way and /or easements are required on or over said real property or the property of some third party for the installation of the Interconnection Facilities, Facility Owner agrees that IID's obligation to install the Interconnection Facilities is expressly conditioned on the granting, without cost to IID, of any and all necessary rights of way and/or easements to IID. The granting of such easement or right-of-way shall be in a form satisfactory to IID.

IID may enter the premises on which the Generating Facility or any ancillary equipment is located without prior notice (a) to inspect at all reasonable hours the Generating Facility's protective devices and read or test any meter for the Generator or Generating Facility; (b) to disconnect, at any time, without notice, the Generator or Generating Facility if, in IID's sole opinion, a hazardous condition exists and that immediate action is necessary to protect persons, or IID's facilities or property of others from damage or interference caused by (1) the Generator or Generating Facility or (2) the Customer and/or Facility Owner's failure to comply with requirements of this Rule. Additionally, IID shall have the right of entry, as necessary, to obtain meter data. Self-reads and reads from adjacent properties are not permitted.

B.14. CONDITIONS OF FACILITY OPERATIONS

The Facility Owner shall deliver electricity from the Generating Facility to IID at IID's Utility Service Meter.

The Facility Owner, and not IID, shall be solely responsible for all legal and financial obligations arising from the construction, installation, design, operation and maintenance



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of the Generator or Generating Facility in accordance with all applicable laws and regulations.

The Facility Owner, at the Facility Owner's sole expense, shall obtain and possess all permits and authorizations in accordance with all applicable laws and regulations for the construction, installation, design, operation and maintenance of the Generator or Generating Facility. The Generator equipment shall be designed, installed, constructed, operated, and maintained in compliance with NEC, IEEE 1547, General Orders 95 & 128, and this Rule.

The Facility Owner shall not connect the Generator or Generating Facility, or any portion of it, to the IID Distribution System, until the Generator or Generating Facility has passed IID inspection. Such approval shall not be unreasonably withheld. IID shall have the right to have representatives present at the initial testing of the Generator or Generating Facility.

The Facility Owner may reconnect its Generator or Generating Facility to the IID Distribution System following normal operational outages and interruptions without notifying IID unless IID has disconnected electric services, or IID notifies the Generating Facility that a reasonable possibility exists that reconnection will pose a safety hazard.

If IID has disconnected Service to the Generator or Generating Facility, or IID has notified the Facility Owner that a reasonable possibility exists that reconnection will pose a safety hazard, the Facility Owner may call IID to request authorization to reconnect the Generator or Generating Facility.

C. APPLICATION AND INTERCONNECTION PROCESS

C.1. APPLICATION PROCESS

Subpart C.1 of this regulation governs the application process:

C.1.a. Applicant Initiates Contact with IID

Upon request, IID shall provide the following information and documents: Interconnection Agreement, Interconnection Application, technical information, if applicable, the Interconnection Study fee information, IID Rates and Regulations and Metering requirements to a potential Applicant. IID shall establish an individual representative as the single point of contact for the Applicant, but may allocate responsibilities among its staff to best coordinate the Interconnection of an Applicant's GF. Applicants may contact IID staff or submit Interconnection Application packages via email to solar@iid.com or by mail at the address specified below:

Attn: Distributive Interconnection Unit
Customer Project Development
Imperial Irrigation District
P.O. Box 937
Imperial, CA 92251



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For all other inquiries, please contact the Distributive Interconnection Unit at (760) 482-3673 or through IID's website at www.iid.com.

C.1.b. Applicant Completes an Application

All Applicants shall complete and file an Application and supply to IID any relevant additional information requested by IID. When applicable per Table C.1, an Application/Engineering Review fee shall be included with the Application.

The following documents are required for all interconnection requests:

- a. Single-line Diagram and Site-plan diagram, which must be approved and stamped by the authority having jurisdiction as well as stamped by a Professional Electrical Engineer (PE).
- b. Regulation 21 application, which must be completed and submitted to IID.
- c. Net Billing Interconnection Agreement – The Net Billing Interconnection Agreement shall include the customer contract account number, existing meter number, site address, system size in kilowatt (kW) with an Alternating Current (AC) CEC rating. The Customer executing the agreement must be the same Customer listed on the contract account number.
- d. Application – The Customer Project Development Service Application shall be completed following the requirements listed under the Customer Project Development Services guidelines.
- e. Application for Interconnection Form (of an Electrical Generating Facility) – This form must be completed with customer, contractor and Generating Facility information.
- f. Bill of Materials - The Bill of Materials must be consistent with all other documents submitted.
- g. Utility AC Disconnect Cut Sheet - The utility AC safety disconnect information (description, manufacture and model) should match the Site-Plan and Bill of Materials, and meet the standards set forth in this Rule 21.
- h. Inverter Manual and Specification - The inverter must be CEC approved and a copy of the correct manual must be submitted with the Application package.

1. Applicant shall submit a separate Interconnection Request for each Point of Interconnection. An Interconnection Request for the expansion of capacity of an existing, operating Generating Facility shall be treated as new an Interconnection Request for a Generating Facility pursuant to this Rule.
2. Normally, within 10 business days of receiving the Application, IID shall acknowledge receipt and state whether the Application has been completed adequately. If the application is incomplete or additional information is needed, IID and Applicant shall cooperate in a timely manner to establish a satisfactory Application.



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3. The Initial Engineering Review fee shall be waived for Applications requesting Interconnection pursuant to IID Schedule DG, Distributive Self-Generation Service, and for a solar powered GF that does not sell power to the grid.
4. An Application is subject to cancellation if it is over one year old (from the date of IID's acknowledgement) and which is not associated with a signed Interconnection Agreement, or any GF that has not been approved for parallel operation within one year of completion of all applicable review and/or studies. However, IID may not cancel an Application if the Applicant provides reasonable evidence that the project is still active and capable of being interconnected pursuant to this Rule 21.

If an interconnection request fails to meet applicable requirements, IID shall state in a written notification the reasons for such failure.

- a. In such event, Applicant shall provide IID the additional required information within thirty (30) business days from the date of IID's first written notification that the Interconnection Request is invalid or incomplete.
- b. Upon request, Applicant may receive one extension of up to thirty (30) business days to resolve deficiencies in the Interconnection Request.

If Applicant does not resolve deficiencies in the Interconnection Request within the time frames set out above, IID may deem the Interconnection Request withdrawn. If an Interconnection Request is deemed withdrawn, Applicant may submit a new Interconnection Request if desired. Applicants contesting IID's determination that an Application is invalid or incomplete may seek relief under the dispute resolution provisions in Section G by so notifying IID within seven (7) business days of notification that the Interconnection Request is incomplete and/or invalid.

5. Applicant may cancel its Interconnection Request at any time by written notice of such cancellation to IID. In addition, after receipt of the Interconnection Request, if Applicant fails to adhere to the requirements and/or timelines set forth in this Regulation, IID shall deem the Interconnection Request to be cancelled and shall provide written notice to Applicant of the cancellation within thirty (30) business days along with an explanation of the reason(s) for such cancellation. Upon receipt of such written notice, Applicant shall have thirty (30) business days in which to cure the deficiency or establishes to IID's reasonable satisfaction that the deemed withdrawal was erroneous.
6. IID, at its discretion, may adjust costs for the review of atypical Applications, such as those submitted for multiple Generators, multiple sites, or otherwise as conditions warrant.



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C.1.c. IID Performs an Interconnection Study and Develops Preliminary Cost Estimates and Interconnection Requirements

1. Initial Engineering Review. Upon receipt of a satisfactorily completed Application and any additional information necessary to evaluate the Interconnection of a GF, IID shall perform an Initial Engineering Review using the process defined in Section I of this Rule. The purpose of the Initial Engineering Review is to determine if the GF qualifies for Simplified Interconnection; or if the GF requires an Interconnection Study.

2. Initial Engineering Review Timeframe. IID shall use best efforts to complete the Initial Engineering Review, absent any extraordinary circumstances, within ten (10) business days after the determination by IID that the Application is complete. If, as a result of the Initial Engineering Review, IID determines the proposed GF can be Interconnected by means of a Simplified Interconnection, IID shall grant the Applicant with permission to move forward with the Interconnection process. A completed Interconnection Agreement with the Applicant's signature will be required prior to finalizing the Interconnection of the Generating Facility.

3. Interconnection Study. If a GF does not pass the Initial Engineering Review for Simplified Interconnection as proposed, IID shall notify the Applicant and perform an Interconnection Study as described in Section I, Commercial and Virtual Net Billing Applicants shall pay the sum of one thousand Dollars (\$1,000.00) for the Interconnection Study, unless the Application is withdrawn. The Interconnection Study shall be completed, absent any extraordinary circumstances, within twenty (20) business days of receipt of a completed Application and fees.

When the proposed facility requires an Interconnection Study due to the need for significant IID Interconnection Facilities or Distribution System improvements to accommodate the interconnection of an Applicant's Generating Facility, IID and Applicant shall enter into an agreement that provides for IID to perform additional studies, facility design, and engineering. IID shall provide detailed cost estimates to the Applicant of performing the studies and the cost of the improvements required to accommodate the interconnection.

Regardless of the outcome of the evaluation or study process, all Generating Facilities shall be designed to meet the applicable requirements of this Rule for Generating Facility design and operating requirements.

IID may proceed from an Initial Engineering Review to an Interconnection Study without Applicant concurrence. All provisions applicable to Interconnection Requests shall apply, including, but not limited to the requirement to pay all fees, study costs and upgrade costs, and the adherence to all timeline and interconnection provisions contained within Rule 21.



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Upon completion of an Interconnection Study, IID shall provide the Applicant with the specific requirements, estimated costs, and schedule for interconnecting the Generating Facility.

4. Modifications. The Applicant shall submit to IID, in writing, modifications to any information provided in the Interconnection Request. Modification permitted to the interconnection request are: 1) a decrease of up to sixty percent (60%) of electrical output (MW) of the Generating Facility; and 2) modifying the technical parameters associated with the Generating Facility technology or Generating Facility step-up transformer impedance characteristics; and 3) modifying the interconnection configuration.

Prior to making any modification other than those specifically permitted above, the Applicant may first request that IID evaluate, at Applicant's expense, the capital infrastructure upgrades and costs. In response to Applicant's request, IID shall evaluate the proposed modification prior to making it and notify Applicant in writing of its determination. A study may be necessary to determine whether a modification constitutes a scope change. IID shall perform such study and Applicant shall pay for the actual cost of such study.

If the proposed modification is determined to require additional capital infrastructure upgrades and costs, Applicant may either withdraw the proposed modification or proceed with a new Interconnection Request. Applicant shall make such determination within ten (10) business days.

Proposed modifications not requiring capital infrastructure upgrades may still necessitate the re-evaluation of the studies to determine modifications to the Interconnection Facilities and Distribution Upgrades. IID will provide Applicant an estimate of time to complete the re-evaluation and the associated cost. Applicant may either accept the additional time and cost to complete the re-evaluation, withdraw the proposed modification request, or proceed with a new Interconnection Request with such modification. Applicant shall notify IID in writing or electronically of such determination within ten (10) business days.

5. Fees. Applicants are required to pay any applicable Interconnection Request fees and costs associated with Interconnection Studies pursuant to Table C.1. The Interconnection Request fee must be paid as specified by IID. An Applicant is responsible for all fees and/or costs, including Commissioning Testing, required to complete the interconnection process. Applicants that interconnect to IID's Distribution System are responsible for all costs associated with Parallel Operation to support the safe and reliable operation of the IID Electrical System.

The Interconnection and Parallel Operation of a Generating Facility Owner may trigger the need for Interconnection Facilities, added facilities, upgrades, delivery network upgrades, and/or reliability network. Interconnection Facilities installed on Generating Facility Owner's side of the Point of Common Coupling shall be owned,



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operated and maintained by the Facility Owner. Interconnection Facilities installed on IID's side of Point of Common Coupling and Distribution System modifications shall be owned, operated and maintained by IID.



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Table C.1. - Summary of Fees and Exemptions

Generating Facility Type	Initial Engineering Review Fee	Interconnection Study Fee
Distributive Self-Generation (Net Billing)	\$800*	\$600
Net Energy Metering (IID's Net Energy Metering program is closed) Residential: IID's Distributive Self-Generation successor program, Net Billing is available Commercial and Virtual Requests: IID's Distributive Self-Generation, Net Billing	\$0	\$0
	\$0	\$1,000
Non-Standard Process	\$0	\$5,000

Study Path	Eligibility	Studies	Timelines
Standard Process	<u>Residential and Commercial and other Customer Classes 10 kW and above</u>	Initial Engineering Review and Interconnection Study	Initial Engineering Review – 10 Business Days Interconnection Study - 20 Business Days
Non-Standard Process	Non-NEM 2.0 Generation for Export or Energy Storage	Interconnection Study (determined by complexity of the project)	60 Business Days Interconnection Study

C.2. INTERCONNECTION PROCESS

C.2.a. Applicant and IID Enter Into an Interconnection Agreement for Interconnection Facilities or Distribution System Modifications

Where, as a result of the Interconnection Study, IID determines that modifications or additions to its Distribution System are required, or that additional Interconnection Facilities shall be necessary to accommodate an Applicant's GF, IID may also provide



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the Applicant with other Interconnection Facility agreements. These agreements shall set forth the relative responsibilities of IID and the Applicant, completion schedules, and fixed or estimated costs for the required work. Generating Facility Owner shall execute agreements for IID to complete the required work. Such Agreements shall require the Generating Facility Owner to reimburse IID for all actual costs incurred by IID in performing the work and shall further provide for Owner indemnification of IID relating to the Interconnection Facilities.

C.2.b. Where Applicable, IID or Producer Installs Required Interconnection Facilities or Modifies IID's Distribution System

After the execution of the applicable agreements, IID or an IID Contractor shall commence construction/installation of IID's Distribution System modifications to coordinate with the installation of the Interconnection Facility which are identified in the agreements. The parties shall use good faith efforts to meet schedules and estimated costs as appropriate. The GF Owner is responsible for all applicable costs associated with Parallel Operation to support the safe and reliable operation of the IID distribution system.

C.2.c. Producer Arranges for and Completes Commissioning Testing of Generating Facility and Producer's Interconnection Facilities

Prior to Producer operating its GF in parallel with IID's Distribution System, Producer is responsible for testing new GF and associated Interconnection Facility according to Section K to ensure compliance with the safety and reliability provisions of these Rules.

Facility testing shall be conducted at a mutually agreeable time, and depending on who conducts the test, IID's designated representative and Producer shall be given the opportunity to witness the tests.

C.2.d. IID Authorizes Parallel Operation or Momentary Parallel Operation

IID shall authorize GF for Parallel Operation or Momentary Parallel Operation connected to IID's Distribution System. The GF will also receive authorization, in writing, within ten (10) business days of satisfactory compliance with the terms of all applicable agreements. Compliance may require provision to IID of required documentation and the satisfactory completion of required inspections or tests, as described herein, or in the agreements formed between Producer and IID. Producer shall not commence Parallel Operation of its GF with IID's Distribution System unless it has received IID's express written permission to do so.

For a GF qualifying for service under IID's Distributive Self-Generation Service, Rate Schedule DG, IID authorization for Parallel Operation shall be provided no later than thirty (30) business days following IID's receipt of items below:

1. Completed Application including all supporting documents and required payments;
2. Completed signed Interconnection Agreement; and



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3. Evidence of Producer's final inspection clearance from the governmental authority having jurisdiction over the GF.

If the Authorization is not issued within thirty (30) days, IID shall communicate with Owner and advise as to time of anticipated issuance. If the time cannot be met, IID shall notify the Applicant.

1. **Additional Costs for Commercial Interconnection**

Commercial Interconnection Only – Commercial customers that add Distributed Generation (whether behind the utility service meter or interconnected directly to IID's Distribution System) that cause voltage or frequency issues may be required to pay for any additional circuit upgrades as part of their interconnection costs. These costs will be assessed at the time of all interconnection costs during the interconnection study phase.

2. **Costs During Parallel Operation**

All Applicants are required to maintain their Generating Facilities, for the duration of the Interconnection Agreement, in a manner that meets the IID's technical design and operating standards for Parallel Operation, including any updates to those standards. This includes Applicant's responsibility for costs associated with changes to the operating characteristics at the Point of Interconnection necessitated by the IID's upgrades to the Transmission or Distribution System from time to time.

D. GENERATING FACILITY DESIGN AND OPERATING REQUIREMENTS

After February 15, 2018, new applications for interconnection with IID shall comply with the smart inverter requirements as outlined in this Section D of this Rule.

This section has been revised to be consistent with the requirements of the latest approved revision of IEEE 1547. In the event of conflict between these Interconnection Rules and IEEE 1547, these Interconnection Rules shall take precedence. Exceptions are taken to IEEE 1547-2018 Clause 9.3 Distribution Secondary Spot Networks and Clauses 4.11.1 Protection from Electromagnetic Interference (EMI). These clauses are being studied for inclusion in a subsequent version of these Rules. Also, Regulation 21 applies to GF power of 1 MW or less.

Customers that need to replace their existing inverters must replace them with smart inverters.

D.1. GENERAL INTERCONNECTION AND PROTECTIVE FUNCTION REQUIREMENTS

The Protective Functions and requirements of these Rules are designed to protect IID's Distribution System and not the GF. Producer shall be solely responsible for providing adequate protection for its GF and/or Interconnection Facility. Producer's Protective Functions may not impact the operation of other Protective Functions utilized on IID's Distribution System in a manner that would affect IID's capability of providing reliable service to IID Customers.



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Any deviation from the protective functions shown below that are accepted by IID will be paid for by the Generating Facility owner to meet IID's standards.

Generating Facility owners with Energy Storage Systems shall meet the criteria required in Attachment 1 of this Rule.

D.1.a. Protective Functions Required

A GF operating in parallel with IID's Distribution System shall be equipped with Protective Functions to sense abnormal conditions on IID's Distribution System and cause the GF to be automatically disconnected from IID's Distribution System or prevent the GF from being connected to IID's Distribution System inappropriately. These Protective Functions are:

1. Over and under voltage trip functions and over and under frequency trip functions;
2. A means for disconnecting the Generating Facility from IID's Distribution System when a protective function initiates a trip; and
3. A voltage and frequency sensing and time-delay function to prevent the GF from energizing a de-energized Distribution System circuit and preventing the GF from reconnecting with IID's Distribution System, unless IID's Distribution System service voltage and frequency is within the ANSI C84.1- Table 1 Range B Voltage Range of 106 V to 127 V (on a 120 V basis), inclusive, and a frequency range of 59.7 Hz to 60.5 Hz, inclusive, and are stable for at least 60 seconds; and
4. A function to prevent the GF from contributing to the formation of an Unintended Island, and to cease to energize IID's Distribution System within two seconds of the formation of an Unintended Island; and

The GF shall cease to energize IID's Distribution System for faults on IID's Distribution System circuit to which it is connected (IEEE 1547-2018-6.2.1-). The GF shall cease to energize IID's Distribution circuit prior to re-closure by IID's Distribution System equipment (IEEE 1547-2018-6.3).

D.1.b Smart Inverter Protective Functions Required

Smart Inverters operating in parallel with IID's Distribution System shall be equipped with the following Protective Functions to sense abnormal conditions on IID's Distribution System so as to cause the Smart Inverter to be automatically disconnected from IID's Distribution System or to prevent the Smart Inverter from connecting to IID's Distribution System during abnormal conditions:

1. Over and under voltage trip functions and over and under frequency trip functions; and
2. A means for disconnecting the Generating Facility from IID's Distribution System when a protective function initiates a trip; and



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3. Voltage and frequency sensing and time-delay functions to prevent the Smart Inverter from energizing a de-energized Distribution System circuit and to prevent the Smart Inverter from reconnecting with IID's Distribution System unless IID's Distribution System service voltage and frequency is within the parameters contained in the ANSI C84.1 Table 1 Range B voltage Range of 106 volts to 127 volts (on a 120 volt basis), inclusive, and a frequency range of 59.3 Hz to 60.5 Hz, inclusive, and are stable for at least 60 seconds; and
4. A function to prevent the Smart Inverter from contributing to the formation of an Unintended Island and to break connection with the IID's Distribution System within two seconds of the formation of an Unintended Island.

The Smart Inverter shall cease to energize IID's Distribution System for faults on IID's Distribution System circuit to which it is connected (IEEE 1547 2018-6.2.1). The Smart Inverter shall cease to energize IID's Distribution circuit prior to re-closure by IID's Distribution System equipment (IEEE 1547 2018-6.3).

D.1.c. Purpose of Protective Functions

The Protective Functions and requirements of this Rules are designed to protect IID's Distribution System and not the Generating Facility. A Facility Owner shall be solely responsible for providing adequate protection for its Generating Facility and Interconnection Facilities. The Facility Owner's protective equipment shall not impact the operation of other protective devices utilized on the Distribution System in a manner that would affect IID's capability of providing reliable service to its customers.

D.1.d. Momentary Paralleling Generating Facility

Momentary Paralleling to IID's Distribution System shall be for one second (60 cycles) or less. With IID's approval, the transfer switch or scheme used to transfer Producer's loads from IID's Distribution System to Producer's GF may be used in lieu of the Protective Functions required for Parallel Operation.

D.1.e. Suitable Equipment Required

Circuit breakers or other interrupting equipment located at the Point of Common Coupling (PCC) must be Certified or "Listed" (as defined in Article 100, the Definitions Section of the National Electrical Code) as suitable for their intended application. Such equipment must be capable of interrupting the maximum available fault current expected at the PCC. Producer's GF and/or Interconnection Facility shall be designed so that the failure of any single device or component shall not potentially compromise the safety and reliability of IID's Distribution System. The GF paralleling-device shall be capable of withstanding 220% of the Interconnection Facility rated voltage (IEEE 1547-2018 4.11.3). The Interconnection Facility shall have the capability to withstand voltage and current surges in accordance with the environments defined in IEEE Std C62.41.2-2002 or IEEE Std C37.90.1-2002 as applicable and as described in J.3.e (IEEE 1547-4.11.2.).

The Smart Inverter paralleling-device shall be capable of withstanding 220% of the Interconnection Facility rated voltage (IEEE 1547 2018-4.11.3). The Interconnection



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Facility shall have the capability to withstand voltage and current surges in accordance with the environments defined in IEEE Std C62.41.2 or IEEE Std C37.90. as applicable and as described in L.3.e (IEEE 1547 2018-4.11.2).

D.1.f. Visible Disconnect Required

IID requires the Producer to furnish and install a ganged, manually-operated isolating switch (or a comparable device mutually agreed upon by IID and Producer) near the Point of Interconnection within 15 feet or at IID's discretion and within sight of the main panel to isolate the GF from IID's Distribution System. The device does not have to be rated for load break nor does it have to provide over-current protection. The device must:

1. Allow visible verification that separation has been accomplished. (This requirement may be met by opening the enclosure to observe contact separation.)
2. Include markings or signage that clearly indicates open and closed positions.
3. Be capable of being reached quickly and conveniently 24 hours a day by IID personnel for construction, operation, maintenance, inspection, testing or reading, without obstacles or requiring those seeking access to obtain keys, special permission, or security clearances.
4. Be capable of being locked in the open position.
5. Be clearly marked on a single-line diagram with the visible disconnect type and location. The diagram shall be submitted to IID and approved by IID prior to installation. If the device is not adjacent to the PCC, permanent signage must be installed at an IID-approved location providing a clear description of the location of the device.

D.1.g. Single-Phase Generators

For single-phase Generators connected to a shared single-phase secondary system, the maximum Gross Nameplate Rating of the Generating Facilities shall be 20 kVA. Generators applied on a center-tapped neutral 240-volt service must be installed such that no more than 6 kVA of imbalance in capacity exists between the two sides of the 240-volt service. For Dedicated Distribution Transformer services, the maximum Gross Nameplate Rating of a single-phase Generating Facility shall be the transformer nameplate rating. IID's Rates, Rules and Regulations provide IID may charge for power factors.

D.1.h. Drawings, Diagrams and Relays Settings Required

For approved Generating Facilities equal to 500 kW and up to 1,000 kW, prior to Parallel Operation or Momentary Parallel Operation of the GF, IID shall approve Producer's one-line drawings, three-line drawings with the protective function, control diagrams, wiring diagrams and relays settings. Generating Facilities equipped with Protective Functions and a control scheme previously approved by IID for system-wide application or only Certified Equipment may satisfy this requirement.



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D.2. PREVENTION OF INTERFERENCE

Producer shall not operate a GF and/or Interconnection Facility that superimposes a voltage or current upon IID's Distribution System that interferes with IID operations, service to IID Customers, or communication facilities. If such interference occurs, Producer must diligently pursue and take corrective action at its own expense after being given notice and reasonable time to do so by IID. If Producer does not take corrective action in a timely manner, or continues to operate the facilities causing interference without restriction or limit, IID may, without liability, disconnect Producer's facilities from IID's Distribution System, in accordance with Section B.9. of these Rules. To eliminate undesirable interference caused by its operation, each GF shall meet the following criteria:

D.2.a. Voltage Regulation

The GF shall not actively regulate the voltage at the PCC while in parallel with IID's Distribution System. The GF shall not cause the service voltage of other Customers to go outside the requirements of ANSI C84.1-, Range A (IEEE 1547-2018-5).

If approved by IID, the smart inverter may actively regulate the voltage at the PPC while in parallel with IID's Distribution System and shall not cause the service voltage of other Customer(s) to violate the requirements of ANSI C84.1, Range A (IEEE 1547 2018-5.3.1).

D.2.b. Operating Voltage Range

The voltage ranges in Table D.2 define protective trip limits for the Protective Function and are not intended to define or imply a voltage regulation Function. The GF shall cease to energize IID's Distribution System within the prescribed trip time whenever the voltage at the PCC deviates from the allowable voltage operating range. The Protective Function shall detect and respond to voltage on all phases to which the GF is connected.

1. Smart Inverters

Smart Inverters shall be capable of operating within the voltage range normally experienced on IID's Distribution System from plus to minus 5% of the nominal voltage (e.g. 114 volts to 126 volts, on a 120-volt base), at the service panel or PCC. The trip settings at the generator terminals may be selected in a manner that minimizes nuisance tripping in accordance with Table D.1 to compensate for voltage drop between the generator terminals and the PCC. Voltage may be detected at either the PCC or the Point of Interconnection. However, the voltage range at the PCC, with the Generator on-line, shall stay within +/-5% of nominal.

2. Voltage Disturbances

Whenever IID's Distribution System voltage at the PCC varies from and remains outside near nominal voltage for the predetermined parameters set forth in Table 4, the Smart Inverter's Protective Functions shall cause the Smart Inverter(s) to become isolated from IID's Distribution System:



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- a) The Smart Inverter shall stay connected to IID's Distribution System while the grid remains within the "Ride-Through Until" voltage-time range and must stay connected in the corresponding operating mode listed.
- b) For voltage excursions beyond the near nominal (NN) magnitude range and within the range of the HV1 or LV3 regions, the Smart Inverter shall momentarily cease to energize within 0.16 seconds.
- c) In the HV1 region, the Smart Inverter is permitted to reduce power output as a function of voltage pursuant to a mutual agreement between the Facility Owner and IID.
- d) If IID's Distribution System voltage does not exit the ride-through region and recovers to normal system voltage, the Smart Inverter shall restore Continuous Operation within 2 seconds.
- e) If IID's Distribution System voltage does not exit the ride-through region and returns from the LV3 region to the LV2 or LV1 region, the Smart Inverter shall restore available current within 2 seconds.
- f) Different voltage-time settings may be permitted by IID.

Table D.1 - Smart Inverter Voltage Trip Settings

Region	Voltage at PCC (% Nominal Voltage)	Ride-Through Until	Operating Mode	Maximum Trip time
High Voltage 2 (HV2)	$V \geq 120\%$			0.16 sec
High Voltage 1 (HV1)	$110\% < V < 120\%$	12 sec	Momentary Cessation	13 sec
Near Nominal (NN)	$88\% \leq V \leq 110\%$	Indefinite	Continuous Operations	Not Applicable
Low Voltage 1 (LV1)	$70\% \leq V < 88\%$	20 sec	Mandatory Operations	21 sec
Low Voltage 2 (LV2)	$50\% \leq V < 70\%$	10 sec	Mandatory Operations	11 sec
Low Voltage 3 (LV3)	$V < 50\%$	1 sec	Momentary Cessation	1.5 sec

3. Generating Facility 30 kVA or Less

Any GF with a Gross Nameplate Rating of 30 kVA or less shall be capable of operating within the voltage range normally experienced on IID's Distribution System. The operating range shall be selected in a manner that minimizes nuisance tripping between 106 volts and 132 volts on a 120-volt base (88%-110% of nominal voltage). Voltage shall be detected at either the PCC or the Point of Interconnection.

4. Generating Facility Greater than 30 kVA

IID may have specific operating voltage ranges for any GF with a Gross Nameplate Rating greater than 30 kVA and may require adjustable operating voltage settings. In the absence of such requirements, the GF shall operate at



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a range between 88% and 110% of the nominal voltage. Voltage shall be detected at either the PCC or the Point of Interconnection with settings compensated to account for the voltage at the PCC. A GF that is Certified Non-Islanding or that meets one of the options on Screen 9 of the review process (Section I.3.i.) may detect voltage at the Point of Interconnection without compensation.

5. Voltage Disturbances

Whenever IID's Distribution System voltage at the PCC varies from and remains outside the ranges listed in Table D.2, the GF's Protective Functions shall cause the Generator(s) to become isolated from IID's Distribution System.

Table D.2. -Over and Under Voltage Trip Settings

Voltage at Point of Common		Maximum Trip Time [1]	
Assuming 120 V Base	Percent of Nominal Voltage	No. of Cycles (assuming 60 Hz nominal)	Seconds
Less than 60 Volts	Less than 50%	10	0.16
Greater than or equal to 60 Volts but less than 106 Volts	Greater than or equal to 50% but less than 88%	120	2
Greater than or equal to 106 Volts but less than or equal to 132 Volts	Greater than or equal to 88% but less than or equal to 110%	Normal Operation	
Greater than 132 Volts but less than or equal to 144 Volts	Greater than 110% but less than or equal to 120%	60	1
Greater than 144 Volts	Greater than 120%	10	0.16

[1] "Maximum Trip time" refers to the time between the onset of the abnormal condition and the GF ceasing to energize IID's Distribution System. Protective Function sensing equipment and circuits may remain connected to IID's Distribution System to allow sensing of electrical conditions for use by the "reconnect" feature. The purpose of the allowed time delay is to allow a GF to "ride through" short-term disturbances to avoid nuisance tripping. Set points shall not be user adjustable (though they may be field adjustable by qualified personnel). For any GF with a Gross Nameplate Rating greater



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than 30 kVA, set points shall be field adjustable, and different voltage set points and trip times from those in Table D.2 may be negotiated with IID.

D.2.c. Paralleling

The GF shall operate in parallel with IID's Distribution System without causing a voltage fluctuation at the PCC greater than $\pm 5\%$ of the prevailing voltage level of IID's Distribution System at the PCC, and meet the flicker requirements of Section D.2.d. Section J provides technology-specific tests for evaluating the paralleling Function (IEEE 1547-2018-4.10.4).

D.2.d. Flicker

The GF shall not create unacceptable rapid voltage changes or flicker at the point of common coupling (IEEE 1547-2018-7.2.1). To minimize the adverse voltage effects experienced by other Customers (IEEE 1547-2018-7.2.3), flicker at the PCC caused by the GF shall not exceed the limits defined by the "Maximum Borderline of Irritation Curve" identified in IEEE Std 519-1992 (IEEE Recommended Practices and Requirements for Harmonic Control in Electric Power Systems). This requirement is necessary to minimize the adverse voltage affects experienced by other Customers on IID's Distribution System. Generators may be connected and brought up to synchronous speed (as an induction motor) provided flicker limits are not exceeded (see Table D.5).

D.2.e. Integration with IID's Distribution System Grounding

The grounding scheme of the GF interconnection shall not cause over-voltages that exceed the rating of the equipment connected to IID's Distribution System and shall not disrupt the coordination of the ground fault protection on IID's Distribution System (IEEE 1547-4.12) (see Section I.3.h.).

D.2.f. Frequency

IID controls system frequency. The GF shall operate in synchronism with IID's Distribution System. Whenever IID's Distribution System frequency at the PCC varies from and remains outside normal range (nominally 60 Hz) by the predetermined amounts set forth in Table D.3, the GF's Protective Functions shall cease to energize IID's Distribution System within the stated maximum trip time.



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Table D.3. - Frequency Trip Settings

Generating Facility Rating	Frequency Range (Assuming 60 Hz Nominal)	Maximum Trip Time [1] (Assuming 60 Cycles per Second)
Less or equal to 30 kW	Less than 59.3 Hz	10 Cycles
	Greater than 60.5 Hz	10 Cycles
Greater than 30 kW	Less than 57 Hz	10 Cycles
	Less than an adjustable value between 59.8 Hz and 57 Hz but greater than 57 Hz. [2]	Adjustable between 10 and 18,000 Cycles [2, 3]
	Greater than 60.5 Hz	10 Cycles

[1] "Maximum Trip Time" refers to the time between the onset of the abnormal condition and the GF ceasing to energize IID's Distribution System. Protective Function sensing equipment and circuits may remain connected to IID's Distribution System to allow sensing of electrical conditions for use by the "reconnect" feature. The purpose of the allowed time delay is to allow a GF to "ride through" short-term disturbances to avoid nuisance tripping. Set points shall not be user adjustable (though they may be field adjustable by qualified personnel). IID shall be notified prior to any modifications of any trip settings. For a GF with a Gross Nameplate Rating greater than 30 kVA, set points shall be field adjustable and different voltage set points and trip times from those in Table D.3 may be negotiated with IID.

[2] Unless otherwise required by IID, a trip frequency of 59.3 Hz and a Maximum Trip Time of 10 cycles shall be used.

[3] When a 10 cycle Maximum Trip Time is used, a second under frequency trip setting is not required.

D.2.g. Frequency Ride-Through Requirements for Smart Inverters

Smart Inverter based systems shall remain connected to IID's Distribution System while the grid is within the frequency-time range indicated in Table D.4 and shall disconnect from the electric grid during a high or low frequency event that is outside that frequency-time range. The frequency values are shown in Table D.4 - Smart Inverter Frequency Trip Settings. These values provide default interconnection system response to abnormal frequencies. The inverter shall disconnect by the default clearing times. In the high frequency range between 60.2 Hz and 61.5 Hz, or some other mutually agreed range, the Smart Inverter is permitted to reduce real power output until it ceases to export power by 61.5 Hz, or other frequency value mutually agreed between the generating facility operator and IID. Islands and microgrids may need different default frequency settings.



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Table D.4 - Smart Inverter Frequency Trip Settings

System Frequency Default Settings (Hz)	Minimum Range of Adjustment (Hz)	Ride-Through Until	Ride-Through Operational Mode	Maximum Trip Time
$f > 62$	61.8 - 66	No Ride Through	Not Applicable	0.16 sec
$61.2 < f \leq 61.8$	61 - 66	299 sec	Mandatory Operation	300 sec
$58.8 \leq f \leq 61.2$	Not Applicable	Indefinite	Continuous Operation	Not Applicable
$57.0 \leq f < 58.8$	50 - 59	299 sec	Mandatory Operation	300 sec
$f < 57.0$	50 - 57	No Ride Through	Not Applicable	0.16 sec

D.2.h. Harmonics

When the GF is serving balanced linear loads, harmonic current injection into IID's Distribution System at the PCC shall not exceed the limits stated in Table D.5. The harmonic current injections shall be exclusive of any harmonic currents due to harmonic voltage distortion present in IID's Distribution System without the GF connected (IEEE 1547-2018-7.3 -). The harmonic distortion of a GF located at a Customer's site shall be evaluated using the same criteria as for the Host Loads (see Table D.5 and Table D.6).

Table D.5. - Maximum Odd Harmonic, Current Distortion in Percent of Rated Current (I) [1, 2]

Individual harmonic order, h (odd harmonics) [3]	$h < 11$	$11 \leq h < 17$	$17 \leq h < 23$	$23 \leq h < 35$	$35 \leq h \leq 50$	Total rated current distortion (TRD)
Percent (%)	4.0	2.0	1.5	0.6	0.3	5.0

[1] IEEE 1547-2018-7.3

[2] I = the DER unit rated current capacity (transformed to the PCC when a transformer exists between the GF unit and the PCC).

[3]

Table D.6

Maximum Even Harmonic Current Distortion in Percent of Rated Current (I) [1,2]

Individual even harmonic order h	$h = 2$	$h = 4$	$h = 6$	$8 \leq h \leq 50$
Percent (%)	4.0	2.0	1.5	Associated range specified in Table D.5.1

[1] IEEE 1547-2018-7.3

[2] I = the DER unit rated current capacity (transformed to the PCC when a transformer exists between the GF unit and the PCC).



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D.2.i. Direct Current Injection

A GF shall not inject direct current greater than 0.5% of rated output current into IID's Distribution System (see Table D.5).

D.2.j. Power Factor

Each Generator in a GF shall be capable of operating at some point within a power factor range from 0.8 leading to 0.8 lagging. Operation outside this range is acceptable provided the reactive power of the GF is used to meet the reactive power needs of the Host Loads, or that reactive power is otherwise provided under IID Rates and Regulations. Producer shall notify IID if it is using the GF for power factor correction. Unless otherwise agreed upon by Producer and IID, the GF shall automatically regulate power factor, not voltage, while operating in parallel with IID's Distribution System (see Table D.5).

D.2.k. Smart Inverter Power Factor Requirements

Facility Owner shall provide adequate reactive power compensation on site to maintain the Smart Inverter power factor near unity at rated output or an IID specified power factor. The Facility Owner shall be responsible to maintain no VAR exchange at the point of common coupling.

D.3 TECHNOLOGY SPECIFIC REQUIREMENTS

D.3.a. Three-Phase Synchronous Generators

In the case of three-phase Generators, the GF circuit breakers shall be three-phase devices with electronic or electromechanical control. Producer shall be responsible for properly synchronizing its GF with IID's Distribution System by means of either manual or automatic synchronizing equipment. Automatic synchronizing is required for all synchronous Generators that have a Short Circuit Contribution Ratio (SCCR) exceeding 0.05. Loss of synchronism protection is not required except as may be necessary to meet Section D.2.d. (Flicker). Unless otherwise agreed upon by Producer and IID, synchronous Generators shall automatically regulate power factor, not voltage, while operating in parallel with IID's Distribution System. A power system stabilization Function is specifically not required for a GF under 10 MW Net Nameplate Rating.

Power system stabilization functions are specifically not required for Generating Facilities under 10 MW Gross Nameplate Rating. Synchronization means that at the time of connection, the frequency difference shall be less than 0.2 Hz, the voltage difference shall be less than 10%, and the phase angle difference shall be less than 10 degrees.

D.3.b. Induction Generators

Induction Generators (except self-excited Induction Generators) do not require a synchronizing Function. Starting or rapid load fluctuations on induction generators can adversely impact IID's Distribution System's voltage. Corrective step-switched capacitors or other techniques may be necessary and may cause undesirable ferro-resonance. When these counter measures (e.g., additional capacitors) are installed on



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Producer's side of the PCC, IID must review these measures. Additional equipment may be required as determined in an Interconnection Study.

D.3.c. Inverters

Utility-interactive inverters do not require separate synchronizing equipment. Non-utility-interactive or “stand-alone” inverters shall not be used for Parallel Operation with IID’s Distribution System.

The replacement of an existing inverter to an inverter that is of equal or greater ability than the original is allowed.

D.3.d. Single-Phase Generators

For a single-phase Generator connected to a shared single-phase secondary system, the maximum Net Nameplate Rating of the GF shall be 20 kVA. A Generator connected to a center-tapped neutral 240-volt service must be installed such that no more than 6 kVA of imbalanced power is applied to the two “legs” of the 240-volt service. For Dedicated Distribution Transformer service, the maximum Net Nameplate Rating of a single-phase GF shall be the transformer nameplate rating.

D.4 SUPPLEMENTAL GENERATING FACILITY REQUIREMENTS

D.4.a Fault Detection

A GF with an SCCR exceeding 0.1 or 1 KVA that does not cease to energize IID’s Distribution System within two seconds of the formation of an Unintended Island shall be equipped with Protective Functions designed to detect Distribution System faults, both line-to-line and line-to-ground, and shall cease to energize IID’s Distribution System within two seconds of the initiation of a fault.

D.4.b. Transfer Trip

IID may require a Transfer Trip system or an equivalent Protective Function in the case where a GF cannot detect a Distribution System fault (both line-to-line and line-to-ground) or the formation of an Unintended Island where the local loads sufficiently exceed more than 400% of the GF nameplate rating.

D.4.c. Reclose Blocking

Where the aggregate GF capacity exceeds 15% of the peak load on any automatic reclosing device, IID may require additional Protective Functions, including, but not limited to reclose-blocking on some of the automatic reclosing devices.

Unintended Islanding for Generating Facilities that fail the export screen, Facilities must mitigate their potential contribution to an Unintended Island. This can be accomplished by one of the following options: (1) incorporating certified Non-Islanding control functions into the Protective Functions; or (2) verifying that local loads sufficiently exceed the Gross Nameplate Rating of the Generating Facility; or (3) incorporating a transfer trip or an equivalent Protective Function.



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E. INTERCONNECTION FACILITY AND DISTRIBUTION SYSTEM MODIFICATIONS OWNERSHIP AND COSTS

E.1. SCOPE AND OWNERSHIP OF INTERCONNECTION FACILITY AND DISTRIBUTION SYSTEM MODIFICATIONS

E.1.a. Scope

The Parallel Operation of a GF may require an Interconnection Facility or modifications to IID's Distribution System ("Distribution System modifications"). The type, extent and costs of Interconnection Facility and Distribution System modification shall be consistent with these Rules and determined through the Interconnection Study and/or Interconnection Studies described in Section C. Facility Owner understands, accepts and agrees that connection and operation of the Generating Facility shall be subject to the terms and conditions set forth in these Rules, as they may be amended from time to time.

E.1.b. Ownership

An Interconnection Facility, installed on Producer's side of the PCC, may be owned, operated and maintained by Producer or IID. Interconnection Facilities installed on IID's side of the PCC and Distribution System modifications shall be owned, operated and maintained only by IID.

E.2. RESPONSIBILITY OF COSTS OF INTERCONNECTING A GENERATING FACILITY

E.2.a. Study and Review Costs

A Producer shall be responsible for the reasonably incurred costs of the reviews and studies conducted pursuant to Section C.1. of these Rules.

E.2.b. Facility Costs

Producer shall be responsible for all costs associated with Interconnection Facilities owned by Producer. Producer shall also be responsible for any costs reasonably incurred by IID in providing, operating, or maintaining the Interconnection Facilities and Distribution System modifications required solely for the Interconnection of Producer's GF with IID's Distribution System. The Facility Owner's charges and payments for Interconnection Facilities under this Agreement represent the additional cost associated with the Interconnection Facilities and are not to be construed as guarantying any level of service or reliability.

E.2.c. Separation of Costs

Should IID combine the installation of Interconnection Facilities or Distribution System modifications required for the Interconnection of a GF with modifications to IID's Distribution System to serve other Customers or Producers, IID shall not include the costs of such separate or incremental facilities in the amounts billed to Producer.



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E.2.d. Reconciliation of Costs and Payments

If Producer selects a fixed price billing for the Interconnection Facilities or Distribution System modifications, no reconciliation shall be necessary. If Producer selects actual cost billing, a true up shall be required. Within a reasonable time after the Interconnection of Producer's GF, IID shall reconcile its actual costs related to the GF against any advance payments made by Producer. Producer shall receive either a bill for any balance due or a reimbursement for overpayment as determined by IID's reconciliation. Producer shall be entitled to a reasonably detailed and understandable accounting for the payments.

E.3 INSTALLATION OF INTERCONNECTION FACILITIES AND DISTRIBUTION SYSTEM MODIFICATIONS

E.3.a. Interconnection Agreement Required

Any Producer seeking to interconnect to the IID's distribution system must execute an Interconnection Agreement in a form satisfactory to IID. The costs for Interconnection Facilities and Distribution System modifications shall be paid by Producer pursuant to the provisions contained in the Interconnection Agreement. Where the type and extent of the Interconnection Facilities or Distribution System modifications warrant additional detail, Producer and IID shall execute separate agreement(s) to more fully describe and allocate the parties' responsibilities for installing, owning, operating and maintaining the Interconnection Facilities and Distribution System modifications.

E.3.b. Interconnection Facility and Distribution System Modifications

Except as provided for in Sections E.2.b. and E.3.c. of these Rules, an Interconnection Facility connected to IID's side of the PCC and Distribution System modifications shall be provided, installed, owned and maintained by IID at Producer's expense. Producer shall be responsible for any costs incurred by IID in connection with Producer's GF.

E.3.c. Reservation of Unused Facilities

When Producer wishes to reserve any IID-owned Interconnection Facility or Distribution System modification, installed and operated as Special Facilities for Producer at Producer's expense, but idled by a change in the operation of Producer's GF or otherwise, Producer may elect to abandon or reserve such facilities consistent with the terms of its agreement with IID. If Producer elects to reserve idle Interconnection Facilities or Distribution System modifications, IID shall be entitled to continue to charge Producer for the costs related to the ongoing operation and maintenance of the Special Facilities.

E.3.d. Refund of Salvage Value

When Producer elects to abandon the Special Facilities for which it has either advanced the installed costs or constructed and transferred to IID, Producer shall not receive credit for the net salvage value of the Special Facilities.



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F. METERING, MONITORING AND TELEMETRY

F.1. GENERAL REQUIREMENTS

All GFs shall be metered in accordance with this Section and shall meet all applicable standards of IID.

F.2. METERING BY NON-IID PARTIES

The ownership, installation, operation, reading and testing of revenue Metering Equipment for a GF shall be by IID except to the extent that IID authorizes any or all these services be performed by others.

F.3. NET GENERATION METERING

For purposes of monitoring GF operation to determine standby charges and applicable non-by-passable charges as defined in IID Rates and Regulations, and for Distribution System planning and operations, consistent with Section B.4. of these Rules, IID shall have the right to specify the type, and require the installation of Net Generation Metering equipment. IID shall only require Net Generation Metering to the extent that less intrusive and/or more cost-effective options for providing the necessary GF output data are not available. In exercising its discretion to require Net Generation Metering, IID shall consider all relevant factors, including but not limited to:

- a. Data requirements in proportion to need for information;
- b. Producer's election to install equipment that adequately addresses IID's operational requirements;
- c. Accuracy and type of required Metering consistent with purposes of collecting data;
- d. Cost of Metering relative to the need for and accuracy of the data;
- e. The GF's size relative to the cost of the Metering/monitoring; and
- f. Other means of obtaining the data (e.g., GF logs, proxy data).

F.4. POINT OF COMMON COUPLING METERING

For purposes of assessing IID charges for retail service, Producer's PCC metering shall be reviewed by IID, and if required, the metering shall be replaced to ensure that it shall appropriately measure electric power according to IID Rates and Regulations. Where required, the Customer's existing meter may be replaced with a bi-directional meter so that power deliveries to and from Producer's site can be separately recorded. Alternately, Producer may, at its sole option and cost, require IID to install multi-metering equipment to separately record power deliveries to IID's Distribution System and retail purchases from IID. Where necessary, such PCC Metering shall be designed to prevent reverse registration.



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F.5. TELEMETERING

If the nameplate rating of the GF is 1 MW or greater, Telemetering equipment at the Net Generation Metering location is required, at Producer's expense. If the GF is Interconnected to a portion of IID's Distribution System operating at a voltage below 10 kV, Telemetering equipment may be required on a GF Facilities 250 kW or greater. IID shall only require Telemetering where less intrusive and/or more cost-effective options for providing the necessary data in real time are not available.

F.6. LOCATION

In the event that IID-owned Metering is located on Producer's premises, Producer shall provide, at no expense to IID, a suitable location for all such Metering Equipment and Telemetering equipment. Customer switchgear installed to accommodate IID meters shall be EUSERC-complaint. Facility Owner is required to obtain IID's approval of the switchgear design.

F.7. COSTS OF METERING

Producer shall bear all costs of the Metering required by these Rules, including the incremental costs of operating and maintaining the Metering Equipment.

F.8. COMMUNICATION REQUIREMENTS

The communication protocol requirements included in this section shall become mandatory for Generating Facilities utilizing inverter-based technologies for which an Interconnection Request is submitted beginning August 22, 2019. The communications requirements herein shall be between (i) IID and the individual Generating Facility's inverter control or energy management system; or (ii) IID and communication to the Generating Facility through an aggregator not co-located or part of the Generating Facility. IID will require the Generating Facility's main breaker status to be included in the IID's SCADA system.

- a. Generating Facilities utilizing inverter-based technologies must adhere to all of the following communication protocol requirements for communication with IID. This Rule does not specify the communication between the selected communication option and Smart Inverter, but performance will be enforced in accordance with this Rule:
 1. Software shall be updateable via communications remotely;
 2. The transport level protocol shall be TCP/IP;
 3. The default application-level protocol shall be IEEE 2030.5 (i.e., Smart Energy;
 4. Profile 2.0 (SEP 2)) as defined in the California IEEE 2030.5 Implementation Guide, but other application-level protocols may be used by mutual agreement of the parties including IEEE 1815/DNP3 for SCADA real-time monitoring and control and IEC 61850.
- b. Additional communication protocol requirements shall also apply to Generating Facilities utilizing inverter-based technologies. IID requires the following:



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1. Details and guidelines for the implementation of communications with Generating Facilities utilizing inverter-based technologies; and
2. Requirements for which application-level protocols are supported and references to an application-level protocol implementation guide; and
3. Cybersecurity and privacy requirements (these may additionally or alternatively be included in the application-level protocol implementation guide); and
4. Conditions under which communication functions are mandatory.

F.9. SCHEDULING CAPABILITY REQUIREMENTS

Generating Facilities which incorporate Smart Inverters shall incorporate scheduling capabilities with minimum scheduling memory capability of at least 24 events. Each event is composed of modifications to each, selected group of, or all of the following Smart Inverter functions:

- a. Modifications to the voltage and reactive set-points of the Dynamic volt/var function;
- b. Modifications to the reactive power set-points for the fixed power factor function; and
- c. Modifications to the voltage and watt-reduction level set-points for the volt/watt function.

The Generating Facility's scheduling capability requirement herein shall be met by one or more of the following options:

1. Scheduling capability requirements may be stored at the Generating Facility energy management system (GFEMS). The GFEMS shall communicate the necessary commands to the Smart Inverters within 10 minutes from when GFEMS received the scheduling information.
2. Scheduling capability requirements may be stored at the smart inverter control unit (SICU) within the Generating Facility. The SICU shall communicate necessary commands to the Smart Inverters within 10 minutes from when SICU received the scheduling information.
3. Scheduling capability requirements may be stored at an aggregator not co-located within the Generating Facility. The aggregator shall communicate the necessary commands to the Smart Inverter within 15 minutes of the aggregator receiving the scheduling information.

The selected scheduling control system shall store the schedules and shall send operational commands to the Smart Inverters as required by the schedule received from IID. The Smart Inverter shall respond by changing its mode of operation as commanded at the schedule start time with no unreasonable delay. Each scheduled mode of



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operation shall include a start-time and duration. The Smart Inverter should return to its default settings at the end of the duration time or shall enter a new operational mode as directed by the scheduling control system.

F.10. MONITORING AND TELEMETRY REQUIREMENTS

The Smart Inverter shall have the capability to communicate its performance information including: 1) Smart Inverter production or consumption of active power (Watts); and 2) Smart Inverter consumption or production of reactive power (Vars); and 3) Phase voltage measured at the AC terminals of the Smart Inverter (Volts); and 4) Frequency measured at the AC terminals of the Smart Inverter (Hz).

When the Generating Facility includes energy-storage with Smart Inverters, monitoring and telemetry capabilities are required. The Smart Inverter shall be capable of communicating the operational state of charge as a percent of energy storage capacity.

Operational State as In-Service or Not In-Service communication capability requirements. The Smart Inverter shall be capable of communicating when the Smart Inverter is capable of providing electric services as follows:

1. In-Service: An operational state which indicates that the Smart Inverter is connected to the electric system and operating as determined locally by the Generating Facility operator or by a scheduling control system.
2. Not In-Service: An operating state which indicates that the Smart Inverter is not capable of connecting to the electric system and not capable of providing any type of electrical support as required locally or as commanded by a scheduling control system.

Monitoring and performance information should be communicated in aggregate at the Generating Facility. When the Generating Facility includes only Smart Inverters, the production or consumption of active and reactive power shall be communicated as an aggregate of all Smart Inverters within the Generating Facility.

When a Generating Facility includes Smart Inverters and other technologies such as synchronous or induction generation systems, the Generating Facility should communicate the following:

- a. The production or consumption of active and reactive power shall be communicated in aggregate of all Smart Inverters within the Generating Facility.
- b. The production or consumption of active and reactive power shall be communicated in aggregate of all the other technologies within the Generating Facility.



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When the Generating Facility with Smart Inverters includes one or multiple energy storage systems, the available operational energy should be communicated as an aggregate of all the energy storage systems.

F.11. CONTROL THROUGH COMMUNICATION CAPABILITIES

Smart Inverters shall have the capabilities of accepting an operational control or controls through communications in accordance to the following:

1. **Cease to Energize Control Command:** When the Smart Inverter receives a cease-to energize command through communication it must enter into a cease-to-energize state of operation or shall initiate the opening of the DER switch referenced in the inverter terminal in order to galvanically isolate the DER system from the Distribution System.
2. **Return to Service Control Command:** When the Smart Inverter receives a return-to-service control command, the Smart Inverter may return to service operation as required by Generating Facility operator or as required by the scheduling control system.
3. **Limit Active Power Command:** When the Smart Inverter receives a command to limit its production of real power, the Smart Inverter shall reduce its real power production to the specified percent of real power capacity of the Smart Inverter or to a specified real power value.
4. **Set Active Power Mode Function:** The capability for this requirement will become mandatory for Generating Facilities utilizing inverter-based technologies for which an Interconnection Request is submitted twelve (12) months after approval of a nationally recognized standard that includes the function. The utilization of this function is permissible under mutual agreement between IID and the generating facility before the effective date.
5. **Suspension of Active Power Restriction:** When the Smart Inverter receives a command to suspend the command for active power reduction, the Smart Inverter may return to normal operation as required by Generating Facility operator or as required by the scheduling control system.

G. DISPUTE RESOLUTION

G.1. JURISDICTION

IID shall have sole discretion to interpret, add, delete or modify any provision of these Interconnection Rules or an agreement entered into between IID and the Facility Owner to implement these Interconnection Rules and to resolve disputes regarding IID's performance of its obligations under its Rates, Rules, and Regulations, the applicable



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agreements, and requirements related to the interconnection of the Generator or Generating Facilities pursuant to these Interconnection Rules.

G.2. DISPUTE RESOLUTION REQUIREMENT FOR PRODUCER

Should a dispute, claim or controversy arise between Producer and IID relating to or concerning these Rules or any of IID's Rates and/or Regulations, the Implementing Agreements, and/or requirements related to the Interconnection of Producer's facilities pursuant to these Rules (the "Dispute"), then Producer may not initiate any legal claim or action against IID with respect to any such Dispute until Producer has submitted a Dispute Letter, as defined below, to IID and, upon the request of IID, met and conferred with IID, as set forth herein. If Producer fails to comply with the requirements of this Section, Producer will be deemed to have waived said legal claim, controversy or action against IID with respect to any associated Dispute.

G.3. DISPUTE LETTER

In the event of a Dispute, Producer must submit a written document (the "Dispute Letter") to IID containing a recitation of the nature of the Dispute and describing any relief sought by Producer. The Dispute Letter must be submitted to IID within a reasonable time, but in no later than one hundred twenty (120) days after accrual of the associated Dispute. The

Dispute Letter must specify the issue(s) arising under IID's Interconnection Rules, include the relevant facts pertaining to the Dispute, describe the specific nature of the Dispute, the relief sought and any reasons the parties were unable to resolve the dispute during the Dispute Resolution Period, which shall be one hundred twenty (120) days from accrual. Any documents or other information the disputing party believes is relevant to the Dispute shall be included with the Dispute Letter. The Dispute Letter shall be personally delivered or mailed by certified mail, postage prepaid, return receipt requested, to IID at the following address:

Energy Manager
Imperial Irrigation District
333 East Barioni Boulevard
P.O. Box 937
Imperial, CA 92251

The Dispute Letter shall be deemed submitted (for purposes of determining the timing of submission) at such time that the Dispute Letter is received by IID.

G.4. MEET-AND-CONFERENCE EFFORT

Upon receipt of a Dispute Letter, IID will: i) send the disputing party an acknowledgement letter within five (5) business days of the date the Dispute Letter was received (the acknowledgment may be by electronic mail, overnight courier, certified mail, or personal delivery), and ii) analyze the dispute and the documentation provided by the disputing party and any other documentation provided or information the IID deems relevant to the disposition of the Dispute, including but not limited to, documents or information requested from or provided by third parties. Within 60 calendar days of the date that IID receives the Dispute Letter, IID may require an authorized representative of Producer to



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meet and confer with IID in an attempt to resolve the dispute. Producer shall respond to IID's effort to meet and confer and shall negotiate in good faith with IID in an effort to resolve the Dispute.

G.5. PERFORMANCE DURING DISPUTE PROCESS

Pending resolution of any dispute under this section, the parties shall proceed diligently with the performance of their respective obligations under these Interconnection Rules and the applicable agreements, unless the applicable agreements have been terminated.

G.6. DISPUTE RESOLUTION REQUIREMENT IN ALL AGREEMENTS

Following the review of a Dispute and meet-and-confer effort, IID shall: i) deny the requested relief on either procedural or substantive grounds, or ii) grant the relief sought via the Dispute (some elements of the requested relief may be granted, while others denied). IID's decision will be in writing, state the basis of the decision and be provided to the disputing party and other interested parties by electronic mail, overnight courier, certified mail, or personal delivery. The dispute resolution result shall be made a requirement and shall be incorporated into all Implementing Agreements between Producer and IID.

G.7. INDEMNITY AND LIABILITY BY CUSTOMER

The Facility Owner shall indemnify and hold IID, its directors, officers, agents and employees harmless against all loss, damages, expense and liability for injury to, or death of persons, or injury to property caused by the Facility Owner's engineering, design, construction, installation, ownership, maintenance or operations of, or the making of replacements, additions or betterments to, or by failure of, the Generator or Generating Facility in connection with these provisions by reason or omission or negligence, whether active or passive. The Facility Owner shall, on IID's request, defend any suit asserting a claim covered by the indemnity. The Facility Owner shall pay all costs that may be incurred by IID in enforcing this indemnity.

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 in its performance of its obligations in these guidelines 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, consequential, or punitive damages of any kind whatsoever.

Nothing in these provisions shall be construed to create any duty to, any standard of care with reference to, or any liability to, any person not a Party to these provisions. Neither IID, its officers, agents or employees shall be liable for any claims, demands, costs, losses, causes or action, or any other liability of any nature or kind, arising out of the engineering, design, construction, ownership, maintenance or operation of, or making of replacements, additions or betterment to, the Generator of Generating Facility except to the extent actually caused by the sole and gross negligence of IID.



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Neither IID, its officers, agents or employees shall be liable for damages of any kind to the Generator or Generating Facility caused by any electrical disturbance of the IID system or on the system of another, whether or not the electrical disturbance results from the negligence of IID or not.

H. DEFINITIONS

The definitions in this Section are applicable only these Rules, the Application and Interconnection Agreements.

H.1. Accessible: Accessible relates to convenience. A device is Accessible if it can be reached without a ladder or other special equipment. A device may be accessible even in a locked room, if arrangements can be made to ensure that IID will have access to the room. There is no specific requirement that the device be located away from the PCC/revenue meter. The location of the disconnect must be clearly marked on the submitted single-line diagram and permanent signage must be installed at the PCC/meter location providing a clear description of the location of the disconnect.

H.2. Anti-Islanding: A control scheme installed as part of the GF or Interconnection Facilities that senses and prevents the formation of an Unintended Island.

H.3. Applicant: The entity applying for Interconnection pursuant to these Rules by submittal of the appropriate Application.

H.4. Application: An IID-approved standard form submitted by an Applicant to IID for Interconnection of a GF.

H.5. Bill of Materials: List of the components and materials required for the interconnection of a GF.

H.6. Certification Test: A test pursuant to these Rules that verifies conformance of certain equipment with IID approved standards.

H.7. Certification; Certified; Certificate: The documented results of a successful Certification Testing.

H.8. Certified Equipment: Equipment that has passed all required Certification Tests.

H.9. Commissioning Test: A test performed during the commissioning of all or part of a GF to achieve one or more of the following:

- Verify specific aspects of its performance;
- Calibrate instrumentation; or
- Establish instrument or Protective Function setpoints.

H.10. Customer: The person or entity that receives or is entitled to receive Distribution Service through IID's Distribution System.



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H.11. Continuous Operation: The Smart Inverter operates indefinitely without tripping. Any functions that protect the Smart Inverter from damage may operate as needed.

H.12. Curtailment: The instructed reduction of cessation of generation. Generators will be required to respond to IID instructions to reduce generation from the Generating Facility below the forecast amount for the period set forth in such instructions.

H.13. Customer Project Development Service Application: Application required for electric service.

H.14. Customer Project Development Service Guideline: Information provided as a guide to assist Customers with the requirements for electric service.

H.15. Date of Initial Operation: The date on which the Generation Facility becomes fully operational.

H.16. Dedicated Transformer; Dedicated Distribution Transformer: A transformer that provides electricity service to a single Customer. The Customer may have a GF.

H.17. Device: A mechanism or piece of equipment designed to serve a purpose or perform a function. The term may be used interchangeably with the terms “equipment” and “function” without intentional difference in meaning. See also Function and Protective Function.

H.18. Distribution Service: All services required by, or provided to, a Customer pursuant to the approved IID Rates and Regulations other than services directly related to the Interconnection of a GF under these Rules.

H.19. Distribution System: All electrical wires, equipment, and other facilities owned or provided by IID, other than Interconnection Facilities, by which IID provides Distribution Service to its Customers.

H.20. Emergency: An actual or imminent condition or situation, which jeopardizes IID’s Distribution System Integrity.

H.21. Facility Owner: The owner of host of the Generating Facility, who has an Interconnection Agreement with IID.

H.22. Field Testing: Testing performed in the field to determine whether equipment meets IID’s requirements for safe and reliable Interconnection.

H.23. Function: A combination of hardware and software designed to provide specific features or capabilities.

H.24. Generating Facility (GF) or Facility: All Generators, electrical wires, equipment, and other facilities owned or provided by Producer for the purpose of producing electric power.



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H.25. Generator: A device which converts mechanical, chemical or solar energy into electrical energy, including all of its protective and control Functions and structural appurtenances. One or more Generators comprise a GF.

H.26. Gross Nameplate Rating; Gross Nameplate Capacity: The total gross generating capacity of a Generator or GF as designated by the manufacturer(s) of the Generator(s).

H.27. Host Load: The electrical power, less the Generator auxiliary load, consumed by the Customer, to which the GF is connected.

H.28. Implementing Agreements: As used herein, Implementing Agreements means the contract agreements necessary to facilitate interconnection between Producer and IID, including the Application, the System and Facility Impact Interconnection Study Agreement (if required pursuant to an Interconnection Study), and the Generating Facility Interconnection Agreement.

H.29. Inadvertent Export: The unscheduled and uncompensated export of real power from a GF for a duration exceeding two seconds.

H.30. Initial Engineering Review: The review by IID, following receipt of an Application, to determine whether:

- the GF qualifies for Simplified Interconnection; or
- the GF can be made to qualify for Interconnection with an Interconnection Study determining any additional requirements.

H.31. In-Rush Current: The current determined by the In-Rush Current Test.

H.32. Interconnection Agreement: An agreement between IID and Producer providing for the Interconnection of a GF that gives certain rights and obligations to effect or end Interconnection.

H.33. Interconnection; Interconnected: The physical connection of a GF in accordance with the requirements of these Rules so that Parallel Operation with IID's Distribution System can occur (has occurred).

H.34. Interconnection Facility: The electrical wires, switches and related equipment that are required in addition to the facilities required to provide electric Distribution Service to a Customer to allow Interconnection. Interconnection Facilities may be located on either side of the PCC as appropriate to their purpose and design. Interconnection Facilities may be integral to a GF or provided separately.

H.35. Interconnection Study: A study to establish the requirements for the Interconnection of a GF to IID's Distribution System.



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H.36. Inverter: A power electronic device that converts Direct Current (DC) power to Alternating Current (AC) by means of electronic switching. The only static inverters acceptable for interconnection with IID are those inverters that are designed to automatically separate from IID's Distribution System upon loss of voltage from IID and to reclose with IID only after IID's voltage has been restored.

H.37. Interconnection Request: An Applicant's request for Interconnect of a new Generating Facility, or to increase the capacity of, or change the operating characteristics of an existing Generating Facility that is interconnected with IID's Distribution System.

H.38. Island; Islanding: A condition regarding IID's Distribution System in which one or more GF deliver power to Customers using a portion of IID's Distribution System that is electrically isolated from the remainder of IID's Distribution System.

H.39. Line Section: That portion of IID's Distribution System connected to a Customer bounded by automatic sectionalizing devices or the end of the distribution line.

H.40. Load Carrying Capability: The maximum electrical load that may be carried by a section of IID's Distribution System, consistent with reliability and safety.

H.41. Mandatory Operation: The Smart Inverter operates at maximum available current without tripping during the Distribution Provider's Distribution System excursions outside the region of continuous operation. Any functions that protect the Smart Inverter from damage may operate as needed.

H.42. Metering: The measurement of electrical power in kW and/or energy in kWh, and, if necessary, reactive power in kVAR and/or reactive energy in kVARh, at a point, and its display to IID, as required by these Rules.

H.43. Metering Equipment: All equipment, hardware, software including meter cabinets, conduit, etc., that are necessary for Metering.

H.44. Momentary Cessation: The Smart Inverter momentarily reduces current output to the Distribution System to below 10% of the maximum continuous output current rating. The Smart Inverter is allowed to increase current output to the Distribution Provider's Distribution System without any intentional reconnection delay once voltage exits in the Momentary Cessation region and enters a permissive operation region or continuous Operation region.

H.45. Momentary Parallel Operation: The interconnection of a GF to the Distribution System for one second (60 cycles) or less.

H.46. Nationally Recognized Testing Laboratory (NRTL): A laboratory accredited to perform the Certification Testing required under these Rules.



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H.47. Net Energy Metering: Metering for the receipt and delivery of electricity between Producer and IID.

H.48. Net Generation Metering: Metering of the net electrical power output in kW or energy in kWh, from a given GF. This may also be the measurement of the difference between the total electrical energy produced by a Generator and the electrical energy consumed by the auxiliary equipment necessary to operate the Generator. For a Generator with no Host Load and/or CPUC Section 218 Load (Section 218 Load), this is metering that is located at the PCC. For a Generator with Host Load and/or Section 218 Load, this is metering that is located at the Generator, but after the point of auxiliary load(s), and prior to serving Host Load and/or Section 218 Load.

H.49. Net Nameplate Rating: The Gross Nameplate Rating less the consumption of electrical power of a Generator or GF, as designated by the manufacturer(s) of the Generator(s).

H.50. Networked Secondary: An AC distribution system where the secondaries of the distribution transformers are connected to a common bus for supplying electricity directly to consumers. There are two types of secondary networks: Grid Networks (also referred to as area networks or street networks) and Spot Networks or Secondary Network. Refer to IEEE 1547-2011-6 for additional details.

H.51. Network Service: More than one electrical feeder providing Distribution Service at a PCC.

H.52. Non-Export; Non-Exporting: Designed to prevent the transfer of electrical energy from the GF to IID's Distribution System.

H.53. Non-Islanding: Designed to detect and disconnect an Unintended Island with matched load and generation. Reliance solely on under/over voltage and frequency trip is not considered sufficient to qualify as Non-Islanding.

H.54. Parallel Operation: The simultaneous operation of a Generator with power delivered or received by IID while interconnected. For the purpose of these Rules, Parallel Operation includes only a GF which is interconnected with IID's Distribution System for more than 60 cycles (one second).

H.55. Permanently Parallel Operation: The interconnection of GF to the distribution system for more than one second.

H.56. Paralleling Device: An electrical device, typically a circuit breaker, operating under the control of a synchronization Function or by a qualified operator to connect an energized Generator to an energized electric power system or two energized power systems to each other.



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H.57. Periodic Test: A test performed on part or all of a GF and/or Interconnection Facilities at pre-determined times or operational intervals to achieve one or more of the following:

- Verify specific aspects of its performance;
- Calibrate its instrumentation; or
- Verify and re-establish instrument or Protective Function set-points.

H.58. Point of Common Coupling (PCC): The transfer point for electricity between the electrical conductors of IID and the electrical conductors of Producer.

H.59. Point of Common Coupling (PCC) Metering: Metering located at the PCC. This is the same Metering as Net Generation Metering for a GF with no Host Load and/or Section 218 Load.

H.60. Point of Interconnection: The electrical transfer point between a GF and/or IID's Distribution System. This may be coincident with the PCC.

H.61. Power Purchase Agreement (PPA): A contract executed between an independent power producer and IID, wherein the seller exports and delivers to IID energy generated from the Generating Facility, which IID pays for under the terms of the PPA.

H.62. Producer: The entity that executes an Interconnection Agreement with IID. Producer may own or operate the GF, but Producer is responsible for the rights and obligations related to the Interconnection Agreement.

H.63. Production Test: A test performed on a newly produced device to verify certain aspects of its performance.

H.64. Protective Function(s): The equipment, hardware and/or software in a GF (whether discrete or integrated with other functions), the purpose of which is to protect against Unsafe Operating Conditions.

H.65. Prudent Electrical Practices: Those practices, methods, and equipment, as changed from time to time, that are commonly used in prudent electrical engineering and operations to design and operate electric equipment lawfully and with safety, dependability, efficiency and economy.

H.66. Rule and Regulation 21: Refers to requirements for distributed generation interconnection to the Distribution System as established by IID.

H.67. Scheduled Operation Date: The date specified in the Interconnection Agreement when the GF is, by Producer's estimate, expected to begin operation pursuant to these Rules.

H.68. Secondary Network: A network supplied by several primary feeders, suitably interlaced through the area in order to achieve acceptable loading of the transformers



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under emergency conditions and to provide a system of extremely high service reliability. Secondary networks usually operate at 600 volts or lower.

H.69. Section 218 Load: Electrical power that is supplied in compliance with CPUC Section 218. CPUC Section 218 defines an “Electric Corporation” and provides conditions under which a transaction involving a GF would not classify Producer as an Electric Corporation. These conditions relate to “over-the-fence” sale of electricity from a GF without using IID’s Distribution System.

H.70. Short Circuit (Current) Contribution Ratio (SCCR): The ratio of the GF’s short circuit contribution to IID’s Distribution System short circuit contribution provided through IID’s Distribution System for a three-phase fault at the high-voltage side of the distribution transformer connecting the GF to IID’s system.

H.71. Simplified Interconnection: Interconnection conforming to the Initial Engineering Review requirements under these Rules, as determined by Section I.

H.72. Single Line Diagram; Single Line Drawing: A schematic drawing, showing the major electric switchgear, Protective Function devices, wires, Generators, transformers and other devices, providing sufficient detail to communicate to a qualified engineer the essential design and safety of the system being considered.

H.73. Site Plan/Layout: The drawing showing the physical location of the Generating Facility components in relation the IID Distribution System.

H.74. Smart Inverter: A Generating Facility’s inverter that performs functions that, when activated, can autonomously contribute to grid support during excursions from normal operating voltage and frequency system conditions by providing: dynamic reactive/real power support, voltage and frequency ride-through, ramp rate controls, communication systems with ability to accept external commands and other functions.

H.75. Special Facilities: As defined in IID Rates and Regulations.

H.76. Stabilization: The return to normalcy of IID’s Distribution System, following a disturbance. Stabilization is usually measured as a time period during which voltage and frequency are within acceptable ranges.

H.77. Starting Voltage Drop: The percentage voltage drop at a specified point resulting from In-Rush Current. The Starting Voltage Drop can also be expressed in volts on a particular base voltage, (e.g., 6 volts on a 120-volt base, yielding a 5% drop).

H.78. Interconnection Study Review: A process wherein IID further reviews an Application that fails one or more of the Initial Engineering Review Process screens. The Interconnection Study may result in one of the following:

- approval of Interconnection;
- approval of Interconnection with additional requirements; or
- cost and schedule for an Interconnection Study.



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H.79. System and Facility Impact Interconnection Study Agreement: The contract agreement between Producer and IID that is required if a Interconnection Study is necessary and which embodies the Parties' agreement concerning such Interconnection Study.

H.80. System Integrity: The condition under which IID's Distribution System is deemed safe and reliable in accordance with IID Rates and Regulations.

H.81. Telemetry: The electrical or electronic transmittal of Metering data in real-time to IID.

H.82. Transfer Trip: A Protective Function that trips a GF remotely by means of an automated communications link controlled by IID.

H.83. Type Test: A test performed on a sample of a particular model of a device to verify specific aspects of its design, construction and performance.

H.84. Unintended Island: The creation of an Island without the approval of IID. This condition usually follows a loss of a portion of IID's Distribution System.

H.85. Unsafe Operating Conditions: Conditions that, if left uncorrected, could result in harm to personnel, damage to equipment, loss of System Integrity or operation outside pre-established parameters required by the Interconnection Agreement.

H.86. Utility Service Meter: The meter located in a Customer's main electrical panel. This meter is capable of separately recording power flow into, power flow out of, a Customer's facility or premise and provides data for utility billing purposes.

H.87. Utility AC Disconnect Cut Sheet: Manufacturer, model, and description regarding the AC disconnect which is required to separate the GF inverter from the electrical grid. The AC Disconnect is usually mounted to the wall between the inverter and the utility meter.

I. REVIEW PROCESS FOR APPLICATIONS TO INTERCONNECT GENERATING FACILITY

I.1. INTRODUCTION

This review process allows for rapid approval for the Interconnection of any GF that does not require an Interconnection Study. The review process includes a screening to determine if an Interconnection Study is required.

Note: The failure to pass any screen of the review process means only that further review and/or studies are required before the GF can be approved for Interconnection with IID's Distribution System. It does not mean that the GF cannot be Interconnected. Though not explicitly covered in the Initial Engineering Review process, the GF shall be designed to meet all of the applicable requirements in this Rule.



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I.2. PURPOSE

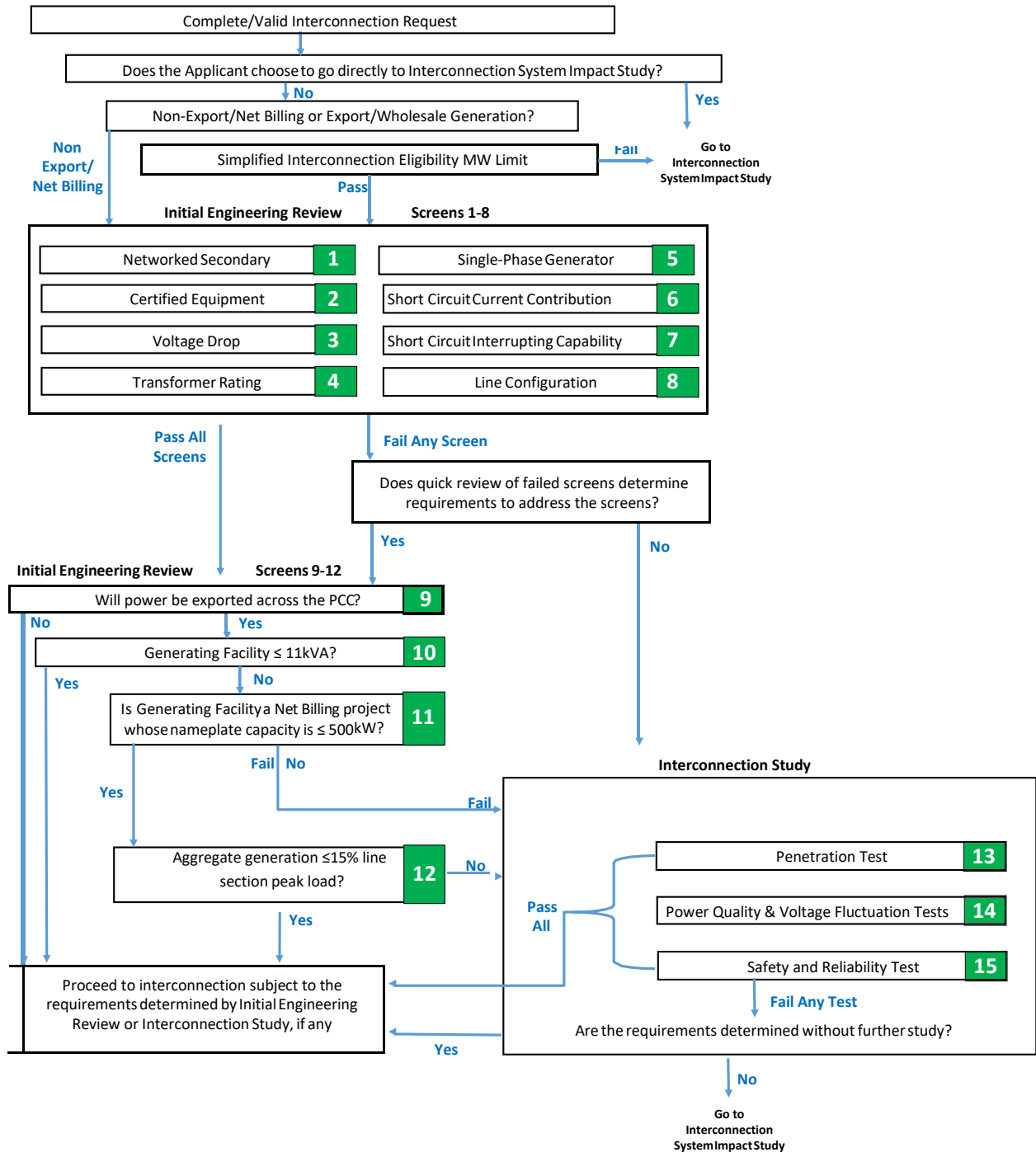
The review determines whether:

- a. A GF qualifies for Simplified Interconnection;
- b. A GF can be made to qualify for Interconnection with an Interconnection Study determining any additional requirements; or
- c. When an Interconnection Study is required, the cost estimate and schedule for performing the Interconnection Study.



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Initial Engineering Review and Interconnection Study Process Flow Chart



I.3. REVIEW PROCESS DETAILS

I.3.a. Screen 1: Is the PCC on a Networked Secondary System?

- If yes, the GF does not qualify for Simplified Interconnection. Perform Interconnection Study.



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- If no, continue to next screen.

Significance: Special considerations must be given to a GF proposed to be installed on networked secondary Distribution Systems because of the design and operational aspects of network protectors. There are no such considerations for radial Distribution Systems.

I.3.b. Screen 2: Is the Interconnection Facility equipment Certified for the application or does the Interconnection Facility equipment have interim IID approval?

- If yes, continue to next screen.
- If no, the GF and/or Interconnection Facility do not qualify for Simplified Interconnection. Perform Interconnection Study.

Interim approval allows IID to treat equipment that has not completed these certification requirements as having met the intent of this screen. Interim approval is granted, at IID's discretion, on a case-by-case basis, and approval for one GF does not guarantee approval for any other GF.

Significance: If the GF and/or Interconnection Facility are Certified or were previously approved by IID, IID does not need to repeat its full review and/or test of the Generating and/or Interconnection Facility's Protective Functions. Site Commissioning Testing may still be required to ensure that the Protective Functions are working properly. Certification indicates that the criteria in this Rule, as appropriate, was tested and verified.

I.3.c. Screen 3: Is the Starting Voltage Drop within acceptable limits?

- If yes, continue to next Screen.
- If no, the GF does not qualify for Simplified Interconnection. Perform Interconnection Study.

Note: This Screen only applies to a GF that starts by motoring the Generator(s). IID has two options in determining whether Starting Voltage Drop is acceptable. The option to be used is at IID's discretion:

Option 1: IID may determine that the GF's starting In-Rush Current is equal to or less than the continuous ampere rating of the Customer's service equipment.

Option 2: IID may determine the impedances of the service distribution transformer (if present) and the secondary conductors to Customer's service equipment and perform a voltage drop calculation. Alternatively, IID may use tables or nomographs to determine the voltage drop. Voltage drops caused by starting a Generator as a motor must be less than 2.5% for primary Interconnections and 5% for secondary Interconnections.

Significance:

- 1) This Screen addresses potential voltage fluctuation problems that may be caused by Generators that start by motoring.



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- 2) When starting, a GF shall have minimal impact on the service voltage to other IID Customers.
- 3) Passing this Screen does not relieve Producer from ensuring that its GF complies with the flicker requirements of these Rules, Section D.2.d.

I.3.d. Screen 4: Is the Transformer or Secondary Conductor rating exceeded?

Do the maximum aggregated Nameplate Ratings for all the Generating Facilities connected to a secondary of the distribution transformer exceed the transformer nameplate rating or secondary conductor rating, modified per established IID practice, absent any Generating Facilities?

- If Yes (fail), continue to Screen 7.
- If No (pass), continue to Screen 7.

Significance: This Screen addresses potential secondary transformer or secondary conductor overloads. When IID's analysis determines a transformer or conductor change is required, IID will furnish Facility Owner with an explanation of why the change is needed.

I.3.e. Screen 5: Does the single-phase Generator cause unacceptable imbalance?

If the proposed Generating Facility is single-phase and is to be interconnected on a center tap neutral of a 240-volt service, does it cause unacceptable imbalance between the two phases of the 240-volt service?

- If Yes (fail), continue to Screen 8.
- If No (pass), continue to Screen 8.

Significance: Generating Facilities connected to a single-phase transformer with 120/240V secondary voltage must be installed such that the aggregated gross output is as balanced as practicable between the two phases of the 240-volt service. When IID's analysis determines a transformer change is required; IID will furnish the customer with an explanation of why the change is needed.

I.3.f. Screen 6: Is the Short Circuit Current Contribution Ratio within acceptable limits?

- If yes, continue to next screen.
- If no, the GF does not qualify for Simplified Interconnection. Perform Interconnection Study.

The Short Circuit Current Contribution Ratio Screen consists of two criteria; both of which must be met when applicable:

- 1) When measured at primary side (high side) of a Dedicated Distribution Transformer serving a GF, the sum of the Short Circuit Contribution Ratios of all GFs connected



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to IID's Distribution System circuit that serves the GF must be less than or equal to 0.1; and

- 2) When measured at the secondary side (low side) of a shared distribution transformer, the short circuit contribution of the proposed GF must be less than or equal to 2.5% of the interrupting rating of Producer's service equipment.

Significance: If the GF passes this Screen, it can be expected that it shall have no significant impact on IID's Distribution System's short circuit duty, fault detection sensitivity, relay coordination or fuse-saving schemes.

I.3.g. Screen 7: Is the Short Circuit interrupting capability exceeded?

Does the proposed Generating Facility, in aggregate with other Generating Facilities on the distribution circuit, cause any distribution protective devices and equipment (including, but not limited to, substation breakers, fuse cutouts, and line reclosers), or Interconnection Request equipment on the system to exceed 87.5 % of the short circuit interrupting capability; or is the Interconnection proposed for a circuit that already exceeds 87.5 % of the short circuit interrupting capability?

- If Yes (fail) continue to Screen 11.
- If No (pass), continue to Screen 11.

Note: This Screen does not apply to Generating Facilities with a Gross Nameplate Rating of 11 kVA or less.

Significance: If the Generating Facility passes this Screen, it can be expected that it will not cause any of IID's equipment to be overstressed.

I.3.h. Screen 8: Is the Line Configuration compatible with the Interconnection type?

- If yes, the GF qualifies for Simplified Interconnection.
- If no, then the GF does not qualify for Simplified Interconnection. Perform Interconnection Study.

Line Configuration Screen: Identify primary distribution line configuration that will serve the GF. Based on the type of Interconnection to be used for the GF, determine from Table I.1 if the GF passes this Screen.

Table I.1 Line Configuration

Primary Distribution Line Configuration	Type of Interconnection to be made to Primary Distribution Line	Result/Criteria
Three-phase, three-wire	Any type	Pass Screen
Three-phase, four-wire	Single-phase, line-to-neutral	Pass Screen



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Three-phase four-wire (For any line that has such a section OR mixed three wire and four wire)	All others	To pass, aggregate GF capacity must be less than or equal to 10% of Line Section peak load.
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Significance: If the primary distribution line serving the GF is of a “three-wire” configuration, or if the GF’s distribution transformer is single-phase and connected in a line-to-neutral configuration, then there is no concern about over voltages to IID, or other Customer’s equipment caused by loss of system neutral grounding during the operating time of the Non-Islanding Protective Function.

I.3.i. Screen 9: Will power be exported across the PCC?

- If yes, the GF does not qualify for Simplified Interconnection. Perform Interconnection Study.
- If no, the GF must incorporate one of the following four options:

Option 1 (“Reverse Power Protection”): To ensure that power is not exported across the PCC, a reverse power Protective Function may be provided. The default setting for this Protective Function, when used, shall be 0.1% (export) of the service transformer’s rating, with a maximum 2.0 second time delay.

Option 2 (“Minimum Power Protection”): To ensure a minimum amount of power is imported across the PCC at all times (and therefore, that power is not exported), an under-power Protective Function may be provided. The default setting for this Protective Function, when used, shall be 5% (import) of the GF’s total Gross Nameplate Rating with a maximum 2.0 second time delay.

Option 3 (“Certified Non-Islanding Protection”): To ensure that the incidental export of power across the PCC is limited to acceptable levels, this option, when used, requires that all of the following conditions be met:

- The total Gross Nameplate Capacity of the GF must be no more than 25% of the nominal ampere rating of Producer’s service equipment;
- The total Gross Nameplate Capacity of the GF must be no more than 50% of Producer’s service transformer capacity rating (this capacity requirement does not apply to Customers taking primary service without an intervening transformer); and
- The GF must be certified as Non-Islanding.

The ampere rating of the Customer’s service equipment to be used in this evaluation shall be that rating for which the Customer’s utility service was originally sized or for which an upgrade has been approved. It is not the intent of this provision to allow increased export simply by increasing the size of the Customer’s service panel, without separate approval for the resize.

Option 4 (“Relative Generating Facility Rating”): This option, when used, requires Net Nameplate Rating of the GF to be so small in comparison to its host facility’s minimum load, that the use of additional Protective Function is not required to ensure that power shall not be exported to IID’s Distribution System.



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This option requires the GF capacity to be no greater than 50% of Producer's verifiable minimum Host Load over the past 12 months.

Significance:

- 1) If it can be ensured that the GF shall not export power, IID's Distribution System does not need to be studied for Load-Carrying Capability or GF power flow effects on IID voltage regulators.
- 2) This Screen permits the use of reverse-power or minimum-power relaying as a Non-Islanding Protective Function (Options 1, 2 and 3).
- 3) This Screen allows, under certain defined conditions, for a GF that incorporates Certified Non-Islanding protection to qualify for Simplified Interconnection without implementing reverse power or minimum power Protective Functions (Option 3). since the impact on IID's Distribution System shall no longer be minimal, therefore, requiring additional study or controls.

I.3.j. Screen 10: Is the Gross Nameplate Rating of the Generating Facility 11 kVA or less?

- If yes, the GF qualifies for Simplified Interconnection. Skip remaining screens.
- If no, continue to next screen.

Significance: The GF shall have a minimal impact on fault current levels and any potential line over voltages from loss of IID's Distribution System neutral grounding.

I.3.k. Screen 11: Is the Generating Facility a Net Billing Generating Facility with nameplate capacity less than or equal to 500kW?

- If Yes (pass), continue to Screen 12.
- If No, (fail), Interconnection Study may be required at IID's sole discretion.

Significance: The purpose of this Screen is solely to facilitate interconnection of Generating Facilities below this size threshold by allowing such facilities to bypass Screen 12. The use of nameplate rating capacity expedites the Initial Engineering Review analysis. In the Interconnection Study, the net export will be analyzed.

I.3.l. Screen 12: Is the aggregate GF capacity on the Line Section less than 15% of Line Section peak load?

- If yes, continue to next screen.
- If no, the GF does not qualify for Simplified Interconnection. Perform Interconnection Study to determine cumulative impact on LineSection.

Significance:

- 1) Low penetration of GF installations shall have a minimal impact on the operation and load restoration efforts of IID's Distribution System.
- 2) The operating requirements for a high penetration of a GF may be different since the impact on IID's Distribution System will no longer be minimal, therefore requiring additional study or controls.



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The purpose of this Screen is solely to identify if the Generating Facility needs additional study and is not intended as justification for limiting the penetration of generation on a Line Section.

Interconnection Study Screens

If any of the Interconnection Study Screens are not passed, a quick review of the failed Screen(s) will determine the requirements to address the failure(s) or that an Interconnection Study is required. In certain instances, IID may be able to identify the necessary solution and determine that an Interconnection Study is unnecessary. Some examples of solutions that may be available to mitigate the impact of a failed screen are:

- Replacing a fixed capacitor bank with a switched capacitor bank;
- Adjustment of line regulation settings; and/or
- Simple reconfiguration of the distribution circuit.

I.3.m. Screen 13: Penetration Test

Where 12 months of Line Section minimum load data is available, can be calculated, can be estimated from existing data, or determined from a power flow model, is the Generating Facility capacity on the Line Section less than 100% of the minimum load for all line sections bounded by automatic sectionalizing devices upstream of the Generating Facility?

- If yes (pass), continue to Screen 14.
- If no (fail), a quick review of the failure may determine the requirements to address the failure; otherwise an Interconnection Study is required.

Note 1: If none of the above options are available, this screen defaults to Screen 12.

Note 2: The type of Generating Facility technology will be considered when calculating, estimating, or determining circuit or Line Section minimum load relevant for the application of this Screen. For solar Generating Facilities with no battery storage, daytime minimum load will be used (i.e., 10 am to 4 pm for fixed panel solar Generating Facilities and 8 am to 6 pm for solar Generating Facilities utilizing tracking systems), while absolute minimum load will be used for all other Generating Facility technologies.

Note 3: When this Screen is being applied to a Generating Facility, the net export in kW, if known, which may flow across the Point of Common Coupling into IID's Distribution System will be considered as part of the generation.

Note 4: IID will not consider as part of the Generating Facility capacity, for purposes of this Screen, the Generating Facility capacity known to be already reflected in the minimum load data.

Significance: Penetration of Generating Facility capacity that does not result in power flow from the circuit back toward the substation will have a minimal impact on equipment loading, operation, and protection of the Distribution System.



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I.3.n. Screen 14: Power Quality and Voltage Tests

In aggregate with existing Generating Facility capacity on the Line Section, distribution circuit, and/or substation.

- i. Can it be determined by the Interconnection Study that the voltage regulation on the Line Section can be maintained in compliance with IID standards (ANSI C84, Range A) and/or conservation voltage regulation voltage requirements under all system conditions?
 - ii. Can it be determined within the Interconnection Study that the voltage fluctuation is within acceptable limits as defined by IEEE 1453 or utility practice similar to IEEE 1453?
 - iii. Can it be determined within the Interconnection Study that the harmonic levels meet IEEE 519 limits at the PCC?
- If yes to all of the above (pass), continue to Screen 15.
 - If no to any of the above (fail), a quick review of the failure may determine the requirements to address the failure; otherwise an Interconnection Study is required.

Significance: Adverse voltages and undesirable interference may be experienced by other Customers on IID's Distribution System caused by operation of the Generating Facility(ies).

I.3.o. Screen 15: Safety and Reliability Tests

Does the location of the proposed Generating Facility or the generation capacity on the Line Section create impacts to safety or reliability that cannot be adequately addressed without an Interconnection Study?

- If yes (fail), review of the failure may determine the requirements to address the failure; otherwise an Interconnection Study is required.
- If no (pass), Interconnection Study is complete.

Significance: In the safety and reliability test, there are several factors that may affect the nature and performance of an Interconnection. These include, but are not limited to:

- i. Generating Facility energy source
- ii. Modes of synchronization
- iii. Unique system topology
- iv. Possible impacts to critical load customers; and/or
- v. Possible safety impacts

The specific combination of these factors will determine if any system study requirements are needed. The following are some examples of the items that may be considered under this screen:



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- i. Does the Line Section have significant minimum loading levels dominated by a small number of customers (i.e. several large commercial customers)?
- ii. Is there an even or uneven distribution of loading along the feeder?
- iii. Is the proposed Generating Facility located in close proximity to the substation (i.e. <2.5 electrical line miles), and is the distribution line from the substation to the customer composed of large conductor/cable (i.e. 600A class cable)?
- iv. Does the Generating Facility incorporate a time delay function to prevent reconnection of the generator to the system until system voltage and frequency are within normal limits for a prescribed time?
- v. Is operational flexibility reduced by the proposed Generating Facility, such that transfer of the Line Section(s) of the Generating Facility to a neighboring distribution circuit/substation may trigger overloads or voltage issues?
- vi. Does the Generating Facility utilize certified anti-islanding functions and equipment?

J. CERTIFICATION AND TESTING CRITERIA

INTRODUCTION

This Section describes the test procedures and requirements for equipment used for the Interconnection of a GF to IID's Distribution System. Included are Type Testing, Production Testing, Commissioning Testing and Periodic Testing. The procedures listed rely heavily on those described in appropriate Underwriters Laboratory (UL), Institute of Electrical and Electronic Engineers (IEEE), and International Electrotechnical Commission (IEC) documents—most notably UL 1741 and IEEE Std 929, as well as the testing described in May 1999 New York State Public Services Commission Standardized Interconnection Requirements. As noted in Section A, these Rules have been revised to be consistent with ANSI/IEEE Std 1547-2018.

The tests described here, together with the technical requirements in Section D of these rules, are intended to provide assurance that the GF's equipment shall not adversely affect IID's Distribution System and that a GF shall cease providing power to IID's Distribution System under abnormal conditions. The tests were developed assuming a low level of GF penetration or number of connections to IID's Distribution System. At high levels of GF penetration, additional requirements and corresponding test procedures may need to be defined.

This Section also provides criteria for "Certifying" Generators or inverters. Once a Generator or inverter has been certified per these Rules, it may be considered suitable for Interconnection with IID's Distribution System. Subject to the exceptions described in this Section, IID shall not repeat the design review or require retesting of such Certified Equipment. It should be noted that the Certification process is intended to facilitate GF Interconnections. Certification is not a prerequisite to Interconnect a GF.



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CERTIFIED AND NON-CERTIFIED INTERCONNECTION EQUIPMENT

Certified Equipment

Equipment tested and approved (e.g., “Listed”) by an accredited NRTL as having met both the Type Testing and Production Testing requirements described in these Rules is considered to be Certified Equipment for purposes of Interconnection with IID’s Distribution System. Certification may apply to either a pre-packaged system or an assembly of components that address the necessary functions. Type Testing may be done in the manufacturer’s factory or test laboratory, or in the field. At the discretion of the testing laboratory, field certification may apply only to the particular installation tested. In such cases, some or all of the tests may need to be repeated at other installations.

When equipment is certified by a NRTL, the NRTL shall provide to the manufacturer, at a minimum, a Certificate with the following information for each device:

Administrative:

- 1) The effective date of Certification or applicable serial number (range or first in series), and/or other proof that Certification is current;
- 2) Equipment model number(s) of the Certified Equipment;
- 3) The software version utilized in the equipment, if applicable;
- 4) Test procedures specified (including date or revision number); and
- 5) Laboratory accreditation (by whom and to what standard).

Technical (as appropriate):

- 1) Device ratings (kW, kVA, Volts, Amps, etc.);
- 2) Maximum available fault current in Amps;
- 3) In-Rush Current in Amps;
- 4) Trip points, if factory set (trip value and timing);
- 5) Trip point and timing ranges for adjustable settings;
- 6) Nominal power factor or range if adjustable;
- 7) If the equipment is Certified for Non-Exporting and the method used (reverse power or under power); and
- 8) If the equipment is Certified Non-Islanding.

It is the responsibility of the equipment manufacturer to ensure that Certification information is made publicly available by the manufacturer, the testing laboratory or by a third party.

Non-Certified Equipment

For non-Certified Equipment, some or all of the tests described in these Rules may be required by IID for each GF and/or Interconnection Facility. The manufacturer or a laboratory acceptable to IID may perform these tests. Test results for non-Certified Equipment must be submitted to IID for the Interconnection Study. Approval by IID for equipment used in a particular GF and/or Interconnection Facility does not guarantee IID’s approval for use in other GF and/or Interconnection Facilities.



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J.3 TYPE TESTING

J.3.a. Type Tests and Criteria for Interconnection Equipment Certification

Type Testing provides a basis for determining that equipment meets the specifications for being designated as Certified Equipment under these Rules. The requirements described in this section cover only issues related to Interconnection and are not intended to address equipment safety or other issues.

Table J.1 defines the test criteria by Generator or inverter technology. While UL 1741(1) was written specifically for inverters, the requirements are readily adaptable to synchronous Generators, induction Generators, as well as single/multi-function controllers and protection relays. Until a universal test standard is developed, IID or NRTL shall adapt the procedures referenced in Table J.1 as appropriate and necessary for a GF and/or Interconnection Facility or associated equipment performance and its control and Protective Functions. The tests shall be performed in the sequence shown in Table J.2.



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Table J.1 - Type Tests and Requirements for Interconnection Equipment Certification

Type Test	Reference (1)	Inverter	Synchronous Generator	Induction Generator
Utility Interaction	UL 1741-39	X	X	X
DC Isolation	UL 1741-40.1	X	---	---
Simulated PV Array (Input) Requirements	UL 1741-41.2	X	---	---
Dielectric Voltage Withstand	UL 1741-44	X	X	X
Power Factor	UL1741 45.2.2	X	X	X
Harmonic Distortion	UL1741 45.4	X	X	X
DC Injection	UL1741 45.5	X	---	---
Utility Voltage and Frequency Variation	UL1741 46.2	X	X	X
Reset Delay	UL1741 46.2.3	X	X	X
Loss of Control Circuit	UL1741 46.4	X	X	X
Short Circuit	UL1741 47.3	X	X	X
Load Transfer	UL1741 47.7	X	X	X
Surge Withstand Capability	J.3.e	X	X	X
Anti-islanding	J.3.b	(2)	(2)	(2)
Non-Export	J.3.c	(3)	(3)	(3)
In-Rush Current	J.3.d	---	---	(4)
Synchronization	J3.f	(5)	X	(5)

Table Notes:

- (1) References are to section numbers in either UL 1741 (Inverters, Converters and Charge Controllers for use in Independent Power Systems) or these Rules. References in UL 1741 to “photovoltaic” or “inverter” may have to be adapted to the other technologies by the testing laboratory to appropriately apply in the tests to other technologies.
- (2) Required only if Non-Islanding designation.
- (3) Required only if Non-Export designation is desired.
- (4) Required for Generators that use IID power to motor to speed.
- (5) Required for all self-excited induction Generators and Inverters that operate as voltage sources when connected to IID's Distribution System.

X = Required

--- = Not Required



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Table J.2 - Type Tests Sequence for Interconnection Equipment Certification

Test No.	Type Test
1	Utility Voltage and Frequency Variation
2	Synchronization
3	Surge Withstand Capability
4	Utility Voltage and Frequency Variation
5	Synchronization
6	Other Required and Optional Tests
Tests 1, 2, and 3 must be done first and in the order shown. Test 4 and on follow in the order convenient to the testing agency.	

J.3.b. Anti-Islanding Test

Devices that pass the Anti-Islanding Test procedure described in UL 1741 Section 46.3 shall be considered Non-Islanding for the purposes of these Interconnection requirements. The test is required only for devices for which a Certified Non-Islanding designation is desired.

J.3.c. Non-Export Test

Equipment that passes the Non-Export test procedure described in Section J.7.a. shall be considered Non-Exporting for the purposes of these Interconnection requirements. This test is required only for equipment for which a Certified Non-Export designation is desired.

J.3.d. In-Rush Current Test

Generation equipment that utilizes IID power to motor up to speed shall be tested using the procedure defined in this Rule to determine the maximum current drawn during this startup process. The resulting In-Rush Current is used to estimate the Starting Voltage Drop.

J.3.e. Surge Withstand Capability Test

The Interconnection equipment shall be tested for the surge withstand requirement in this Rule. in all normal operating modes in accordance with IEEE Std C62.45-2002 for equipment rated less than 1000 V to confirm that the surge withstand capability is met by using the selected test level(s) from IEEE Std C62.41.2-2002. Interconnection equipment rated greater than 1000 V shall be tested in accordance with manufacturer or system integrator designated applicable standards. For Interconnection equipment signal and control circuits, use IEEE Std C37.90.1-2002. These tests shall confirm the equipment did not fail, did not mis-operate, and did not provide misinformation (IEEE 1547-2018-4.11.2).

The location/exposure category for which the equipment has been tested shall be clearly marked on the equipment label or in the equipment documentation. External surge protection may be used to protect the equipment in harsher location/exposure categories.



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J.3.f. Synchronization Test

This test is applied to synchronous Generators, self- excited induction Generators, and inverters capable of operating as voltage source while connected to IID's Distribution System. The test is also applied to the re- synchronization Function (transition from standalone to parallel operation) on equipment that provides such functionality². This test is not necessary for induction Generators or current-source inverters. Instead, the In-rush Current test shall be applied to those Generators.

This test shall demonstrate that at the moment of the paralleling device closure, all three synchronization parameters in Table J.3 are within the stated limits. This test shall also demonstrate that if any of the parameters are outside of the limits stated in the table, the paralleling-device shall not close (IEEE 1547-2018-4.10.4). The test shall start with only one of the three parameters: (1) voltage difference between a GF and/or IID's Distribution System, (2) frequency difference, or (3) phase angle outside of the synchronization specification. Verify that the GF is brought within specification prior to synchronization. Repeat the test five times for each of the three parameters. For manual synchronization with synch check or manual control with auto synchronization, the test must verify that paralleling does not occur until the parameters are brought within specifications.

Table J.3. - Synchronization Parameter Limits [1]

Aggregate Rating of Generator Units (kVA)	Frequency Difference (Δf , Hz)	Voltage Difference (ΔV , %)	Phase Angle Difference ($\Delta \Phi$, °)
0 – 500	0.3	10	20
> 500 – 1,500	0.2	5	15
> 1,500 - 10,000	0.1	3	10

[1] IEEE 1547-2018-4.10.4 (Table 5)

J.3.g. Paralleling Device Withstand Test

The dielectric voltage withstand test specified in this Rule shall be performed on the paralleling device to ensure compliance with those requirements specified in this Rule. (IEEE 1547-2018-4.11.3).

² Test may not need to be performed on both the synchronization and re-synchronization functions if manufacturer can verify to the satisfaction of the testing organization that monitoring and controls hardware and software are common to both functions.



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J.4. PRODUCTION TESTING

As a minimum, each Interconnection system shall be subjected to the Utility Voltage and Frequency Variation Test procedure described in UL1741 under Manufacturing and Production Tests, Section 68 and the Synchronization test specified in this Rule. Interconnection systems with adjustable set points shall be tested at a single set of set points as specified by the manufacturer. This testing may be performed in the factory or as part of Commissioning Testing.

J.5. COMMISSIONING TESTING

Commissioning Testing ensures that the GF has been designed, manufactured, installed, and set properly. A competent installer shall perform a well-defined set of tests at various stages of installation to ensure that the GF is installed and functioning properly and to locate and correct any mistakes as installation progresses rather than having to remobilize and correct the errors at a later time. Commissioning Testing shall provide reassurance that the GF works as intended. Commissioning Testing shall also provide assurance to the utility engineers that the impact upon IID's Distribution System is acceptable, even under upset conditions.

J5a Commissioning Testing, where required, shall be performed on-site to verify protective settings and functionality. Upon initial Parallel Operation of a GF, or any time interface hardware or software is changed that may affect the functions listed below, a Commissioning Testing must be performed. An individual qualified in testing protective equipment (professional engineer, factory-Certified technician, or licensed electrician with experience in testing protective equipment) must perform Commissioning Testing in accordance with the manufacturer's recommended test procedure to verify the settings and requirements per these Rules.

IID may require a written Commissioning Testing procedure be submitted to IID at least ten (10) working days prior to the performance of Commissioning Testing. IID has the right to witness Commissioning Testing. IID may also require written Certification by the installer describing which tests were performed and their results. Protective Functions to be tested during commissioning, particularly with respect to non-Certified Equipment, may consist of the following:

- Over and under-voltage
- Over and under frequency
- Anti-Islanding Function (if applicable)
- Non-Export Function (if applicable)
- Inability to energize dead line
- Time delay on restart after utility source is stable
- Utility system fault detection (if used)
- Synchronizing controls (if applicable)
- Other Interconnection Protective Functions that may be required as part of the Interconnection Agreement



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Commissioning Testing shall include visual inspections of the Interconnection equipment and protective settings to confirm compliance with the Interconnection requirements.

J5b. Other checks and tests that may need to be performed include:

- Verifying final Protective Function settings
- Trip test (Section J.5.f.)
- In-service test (Section J.5.g.)

J5c. Certified Equipment

A GF qualifying for Simplified Interconnection incorporate Certified Equipment that has, at a minimum, passed the Type Tests and Production Tests described in these Rules and is judged to have little or no potential impact on IID's Distribution System. For such a GF, it is necessary to perform only the following tests:

1. Protective Function settings that were changed after Production Testing shall require field verification. Tests shall be performed using injected secondary frequencies, voltages and currents, applied waveforms, at a test connection using a Generator to simulate abnormal utility voltage or frequency, or varying the set points to show that the device trips at the measured (actual) utility voltage or frequency.
2. The Non-Islanding Function shall be checked by operating a load break disconnect switch to verify the Interconnection equipment ceases to energize IID's Distribution System and does not re-energize it for the required time delay after the switch is closed.
3. The Non-Exporting Function shall be checked using secondary injection techniques. This function may also be tested by adjusting the GF output and local loads to verify that the applicable Non-Exporting criteria (i.e., reverse power or under power) are met.

The Interconnection Study or an Interconnection Study may impose additional components or additional testing.

J5d. Non-Certified Equipment

Non-Certified Equipment shall be subjected to the appropriate tests described in Type Testing (Section J.3.) as well as those described in Certified Equipment Commissioning Tests (Section J.5.c.). With IID's approval, these tests may be performed in the factory, in the field as part of commissioning, or a combination of both. IID, at its discretion, may also approve a reduced set of tests for a particular GF or if it determines it has sufficient experience with the equipment.

J5e. Verification of Settings

At the completion of Commissioning Testing, Producer shall confirm all devices are set to IID approved settings. Verification shall be documented in the Commissioning Testing Certification.

J5f. Trip Tests

Interconnection Protective Functions and devices (e.g., reverse power relays) that have not previously been tested as part of the Interconnection Facility with its associated



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interrupting devices (e.g., contactor or circuit breaker) shall be trip tested during commissioning. The trip test shall be adequate to prove that the associated interrupting devices open when the protective devices operate. Interlocking circuits between Protective Function devices or between interrupting devices shall be similarly tested unless they are part of a system that has been tested and approved during manufacturing.

J5g. In-Service Tests

Interconnection Protective Functions and devices that have not previously been tested as part of the Interconnection Facility with its associated instrument transformers or that are wired in the field shall be given an in-service test during commissioning. This test shall verify proper wiring, polarity, current transformer/potential transformer (CT/PT) ratios, and proper operation of the measuring circuits. The in-service test shall be made with the power system energized and carrying a known level of current. A measurement shall be made of the magnitude and phase angle of each alternating current (AC) voltage and current connected to the protective device and the results compared to expected values. For protective devices with built-in Metering Functions that report current and voltage magnitudes and phase angles, or magnitudes of current, voltage, and real and reactive power, the metered values may be used for in-service testing. Otherwise, portable ammeters, voltmeters, and phase-angle meters shall be used.

J.6. PERIODIC TESTING

Periodic Testing of Interconnection-related Protective Functions shall be performed as specified by the manufacturer, or at least every four years. All periodic tests prescribed by the manufacturer shall be performed. Producer shall maintain periodic test reports or a log for inspection by IID. Periodic Testing conforming to IID test intervals for the particular Line Section may be specified by IID under special circumstances, such as high fire hazard areas. Batteries used to activate any Protective Function shall be checked and logged once per month for proper voltage. Once every four years, these batteries must be replaced or a discharge test must be performed.

J.7. TYPE-TESTING PROCEDURES NOT DEFINED IN OTHER STANDARDS

This section describes the additional Type Tests necessary to qualify a device as Certified under these Rules. These Type Tests are not contained in UL 1741 Standard Inverters, Converters and Controllers for Use in Independent Power Systems, or other referenced standards.

J7a. Non-Exporting Test Procedures

The Non-Exporting Test is intended to verify the operation of relays, controllers and inverters designed to limit the export of power and certify the equipment as meeting the requirements of Options 1 and 2 of Screen 2 of the review process. Tests are provided for discrete relay packages and for controllers and inverters with the intended Functions integrated.

1. Discrete Reverse Power Relay Test

This version of the Non-Exporting Test procedure is intended for discrete



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reverse power and under power relay packages provided to meet the requirements of Options 1 and 2 of Screen 2. In the reverse power application, the relay shall provide a trip output with power flowing in the export (toward IID's Distribution System) direction.

Step 1: Power Flow Test at Minimum, Midpoint and Maximum Pickup Level Settings

Determine the corresponding secondary pickup current for the desired export power flow of 0.5 secondary watts (the minimum pickup setting assumes 5 Amps and 120V CT/PT secondary). Apply nominal voltage with minimum current setting at zero (0) degrees phase angle in the trip direction. Increase the current to pickup level. Observe the relay's (LCD or computer display) indication of power values. Note the indicated power level at which the relay trips. The power indication should be within 2% of the expected power. For relays with adjustable settings, repeat this test at the midpoint, and maximum settings. Repeat at phase angles of 90, 180 and 270 degrees and verify that the relay does not operate (measured watts shall be zero or negative).

Step 2: Leading Power Factor Test

Apply rated voltage with a minimum pickup current setting (calculated value for system application) and apply a leading power factor load current in the non-trip direction (current lagging voltage by 135 degrees). Increase the current to relay rated current and verify that the relay does not operate. For relays with adjustable settings, repeat this test at the minimum, midpoint and maximum settings.

Step 3: Minimum Power Factor Test

At nominal voltage and with the minimum pickup (or ranges) determined in Step 1, adjust the current phase angle to 84 or 276 degrees. Increase the current level to pickup (about 10 times higher than at 0 degrees) and verify that the relay operates. Repeat for phase angles of 90, 180 and 270 degrees and verify that the relay does not operate.

Step 4: Negative Sequence Voltage Test

Using the pickup settings determined in Step 1, apply rated relay voltage and current at 180 degrees from tripping direction to simulate normal load conditions (for three-phase relays, use 1_a at 180, 1_b at 60 and 1_c at 300 degrees). Remove phase 1 voltage and observe that the relay does not operate. Repeat for phases 2 and 3.

Step 5: Load Current Test

Using the pickup settings determined in Step 1, apply rated voltage and current at 180 degrees from the tripping direction to simulate normal load conditions (use 1_a at 180, 1_b at 300 and 1_c at 60 degrees). Observe that the relay does



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not operate.

Step 6: Unbalanced Fault Test

Using the pickup settings determined in Step 1, apply rated voltage and two times rated current to simulate an unbalanced fault in the non-trip direction (use V_a at 0 degrees, V_b and V_c at 180 degrees, 1_a at 180 degrees, 1_b at 0 degrees, and 1_c at 180 degrees). Observe that the relay, especially single phase, does operate properly.

Step 7: Time Delay Settings Test

Apply Step 1 settings and set time delay to minimum setting. Adjust the current source to the appropriate level to determine operating time, and compare against calculated values. Verify that the timer stops when the relay trips.

Repeat at midpoint and maximum delay settings.

Step 8: Dielectric Test

Perform the test described in IEC 414 using 2 kV RMS for one minute.

Step 9: Surge Withstand Test

Perform the surge withstand test described in IEEE Std C37.90.1.1989 or the surge withstand capability test described in this Section.

2. Discrete Under-Power Relay Test

This version of the Non-Exporting test procedure is intended for discrete under-power relay packages and meets the requirements of Option 2 of Screen 2. A trip output shall be provided when import power (toward Producer's Load) drops below the specified level.

Note: For an under-power relay, pickup is defined as the highest power level at which the relay indicates that the power is less than the set level.

Step 1: Power Flow Test at Minimum, Midpoint and Maximum Pickup Level Settings

Determine the corresponding secondary pickup current for the desired power flow pickup level of 5% of peak load minimum pickup setting). Apply rated voltage and current 0 (zero) degrees phase angle in the direction of normal load current.

Decrease the current to pick up level. Observe the relay's (LCD or computer display) indication of power values. Note the indicated power level at which the relay trips. The power indication shall be within 2% of the expected power. For relays with adjustable settings, repeat the test at the midpoint and maximum



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settings. Repeat at phase angles of 90, 180 and 270 degrees and verify that the relay operates (measured watts shall be zero or negative).

Step 2: Leading Power Factor Test

Using the pickup current setting determined in Step 1, apply rated voltage and rated leading power factor load current in the normal load direction (current leading voltage by 45 degrees). Decrease the current to 145 percent of the pickup level determined in Step 1 and verify that the relay does not operate. For relays with adjustable settings, repeat this test at the minimum, midpoint and maximum settings.

Step 3: Minimum Power Factor Test

At nominal voltage and with the minimum pickup (or ranges) determined in Step 1, adjust the current phase angle to 84 or 276 degrees. Decrease the current level to pick up (about 10 percent of the value at 0 degrees) and verify that the relay operates. Repeat at phase angles of 90, 180 and 270 degrees and verify that the relay operates for any current less than rated current.

Step 4: Negative Sequence Voltage Test

Using the pickup settings determined in Step 1, apply rated relay voltage and 25 percent of rated current in the normal load direction, to simulate light load conditions. Remove Phase 1 voltage and observe that the relay does not operate. Repeat for Phases 2 and 3.

Step 5: Unbalanced Fault Test

Using the pickup settings determined in Step 1, apply rated voltage and two times rated current, to simulate an unbalanced fault in the normal load direction (use Va at 0 degrees, Vb and Vc at 180 degrees, 1a at 0 degrees, 1b at 180 degrees, and 1c at 0 degrees). Observe that the relay, especially single-phase types, operates properly.

Step 6: Time Delay Settings Test

Apply Step 1 settings and set time delay to minimum setting. Adjust the current source to the appropriate level to determine operating time and compare against calculated values. Verify that the timer stops when the relay trips. Repeat at midpoint and maximum delay settings.

Step 7: Dielectric Test

Perform the test described in IEC 414 using 2 kV root mean square (RMS) for one minute.

Step 8: Surge Withstand

Perform the surge withstand test described in IEEE Std C37.90.1.1989 or the surge withstand test described in Section J.3.e.

3. Tests for Inverters and Controllers with Integrated Functions

Inverters and controllers designed to provide reverse or under-power Functions shall be tested to certify the intended operation of this function. Two methods are acceptable:

Method 1: If the inverter or controller utilizes external current/voltage measurement to determine the reverse or under-power condition, then the inverter or controller shall be functionally tested by application of appropriate secondary currents and potentials as described in the Discrete Reverse Power Relay Test Section of these Rules.

Method 2: If external secondary current or voltage signals are not used, then unit-specific tests must be conducted to verify that power cannot be exported across the PCC for a period exceeding two seconds. These may be factory tests, if the measurement and control points are integral to the unit or they may be performed in the field.

J7b. In-rush Current Tests Procedures

This test shall determine the maximum In-rush Current drawn by the Generator.

1. Locked-Rotor Method

Use the test procedure defined in NEMA MG-1 (manufacturer's data is acceptable if available).

2. Start-Up Method

Install and setup the GF equipment as specified by the manufacturer. Using a calibrated oscilloscope or data acquisition equipment with appropriate speed and accuracy, measure the current draw at the Point of Interconnection as the GF starts up and parallels with IID's Distribution System. Startup shall follow the normal, manufacturer-specified procedure. Sufficient time and current resolution and accuracy shall be used to capture the maximum current draw within five percent. In-rush Current is defined as the maximum current draw from IID during the startup process using a 10-cycle moving average. During the test, the utility source, real or simulated, must be capable of maintaining voltage within +/- 5% of rated at the connection to the unit under test. Repeat this test five times. Report the highest 10-cycle current as the In-rush Current. A graphical representation of the time-current characteristic along with the certified In-rush Current must be included in the test report and made available to IID.

ATTACHMENT 1

ENERGY STORAGE SYSTEMS FOR DISTRIBUTED GENERATION FACILITIES

1. Energy Storage Systems

This Section is intended to present the Imperial Irrigation District's (IID's) requirements for the establishment of connecting Distributed Generation (DG) to IID's electric grid with the option to also install Energy Storage System (ESS) devices (e.g., batteries).

All references to inverter-based DG and/or ESS system sizes will be based upon total nameplate AC rating of the inverter(s).

The requirements presented here are necessary for IID to supply uniform, satisfactory, and safe electrical connections between the Customer's DG and/or ESS, and IID's electrical system. It is necessary that all written material (this text, as well as all of the notes on the drawings) be carefully read.

The National Electric Code (NEC) and the County/City Electrical Inspector for your area may have requirements for your generation system that are beyond what IID requires. Please check with your local Inspector to make sure your plans meet their requirements.

SAFETY FIRST!! All materials used, and all work performed, on a Customer's premise (with the exception of the meter), shall conform with requirements of the local inspection authority, the National Electric Code, and all applicable safety orders, rules, and regulations of the State of California. Customer service switchboard equipment shall meet IID requirements and be UL approved. No DG and/or ESS can be connected unless approved by the County/City Electrical Inspector for your area (also referred to as the Authority Having Jurisdiction or AHJ). In order to provide a safe interconnection between the DG and/or ESS and IID's electrical system, an IID representative must inspect and approve the DG and/or ESS installation.

2. Definitions

- 2.1 **Critical Load Sub-Panel:** an electrical panel where customer essential loads are connected and which is served by an on-site Energy Storage System.
- 2.2 **Demarc/MPOE:** Demarcation point is sometimes abbreviated as demarc or DMARC, or MPOE (stands for Minimum Point Of Entry), and is used to describe the interface between customer premise and the telephone company wiring.
- 2.3 **DG (Distributed Generation):** Any type of Customer owned electric generator, static inverter, or generating facility that has the capability of being operated in parallel with IID's distribution system.
- 2.4 **Energy Storage System:** a system that uses either chemical means (e.g., batteries) or mechanical means (e.g., flywheels) to store energy for later use. The system will include all necessary equipment necessary to convert the storage means into usable energy (e.g., wires, inverters, chargers, gearboxes, motor/gen set, etc.).

- 2.5 **Interactive Static Inverter:** A power electronic device that converts Direct Current (DC) power to Alternating Current (AC) by means of electronic switching. The only static inverters acceptable for the interconnection of Customer owned equipment with IID are those inverters that are designed to automatically separate from IID's distribution system upon loss of voltage from IID and to reclose with IID only after IID's voltage has been restored.
- 2.6 **Medium Voltage:** voltages between 600 Volts and 34,500 Volts.
- 2.7 **Smart Contactor:** a device that will automatically disconnect an Energy Storage system from the host electric utility upon detection of the loss of voltage from the utility.
- 2.8 **Station Service:** Station service loads include all energy consumption necessary for the generation of electricity that can be supplied by the facility itself while it is generating electricity, and any loads not separately metered from any station service load. These include, but are not limited to, pumps, condensers, pollution controls, monitoring and control equipment, and any energy demand used in the operations of a facility that occur *only* in response to the operations or changes in operation of the facility itself. **This does not include any energy used at the facility that is needed when the facility itself is not generating, e.g., maintenance, vehicle transportation, cleaning, or other similar energy uses, unless these energy uses are not separately metered from a station service load.** Electricity used for station service, or parasitic load, is not eligible for California's Renewables Portfolio Standard.
- 2.9 **Utility Service Meter:** The Meter located in a Customer's main electrical panel. This meter is capable of separately recording power flow into, and power flow out of, a Customer's facility or premise.
- 2.10 **Visible Disconnect Device:** An electrical switching device that can separate the Generating Facility from IID's Distribution System and is designed to allow visible verification that separation has been accomplished. This requirement can be met by opening the enclosure to observe the contact separation. It will be used by IID and the Customer to establish an open point when working on either the Utility Service Meter or the DG and/or ESS system. With the door open, the air gap shall be visible at the trailing edge of the movable disconnect blades when the switch is in the open position. It will completely isolate the Customer's generating facility from IID's distribution grid. A Combiner / Sub-Panel may be substituted for a Visible Disconnect.

3. References – Latest Editions, Errata, Corrections, Bulletins, and Amendments

All Customer equipment shall conform to nationally recognized standards and recommended practices. These include, but are not limited to the following:

- 3.1 California Electrical Code (CEC);
- 3.2 IEEE Std 519 – Recommended Practice and Requirements for Harmonic Control in Electrical Power Systems;
- 3.3 IEEE Std 929 – Recommended Practice for Utility Interface of Photovoltaic (PV) Systems;
- 3.4 IEEE Std 1547-2018 – Standard for Interconnecting and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces;
- 3.5 IEEE Std 1547.1 – Standard for Conformance Test Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems;
- 3.6 NEMA C84.1 - Electric Power Systems and Equipment-Voltage Ratings (60 Hertz) {formerly ANSI C84.1};
- 3.7 NFPA 70 – 2017 National Electrical Code (NEC), especially Articles 690, 705, 706, 708, and 710;
- 3.8 OSHA 1910.145(F)(7);
- 3.9 UL 98 – UL Standard for Safety Enclosed and Dead-Front Switches; and
- 3.10 UL 1741 – UL Standard for Safety Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources

4. Design Review and Approval

- 4.1 Prior to *APPROVAL* of the Customer’s Distributed Generation and/or Energy Storage System (ESS), the Customer shall submit all documents required under Section C of this Rule.
- 4.2** IID shall not be responsible for the costs incurred by the Customer for the relocation or replacement of any equipment installed by the Customer prior to IID’s approval.
- 4.3 All metering equipment shall meet requirements set forth in IID's Rules and Regulations. Changes or modifications to the approved design shall not be made without prior approval. If changes or modifications are desired, the Customer shall submit the revised plans including the changes or modifications for IID approval.

4.4 For installations that include ESS with DG, or have just standalone ESS, the metering requirements will depend upon the connection(s) to the critical loads.

5. IID Requirements

- 5.1 DG and ESS: A Smart Contactor needs to be installed between the main panel and the Critical Load Panel. This contactor will open and isolate the DG and ESS from the utility system, should the utility experience an outage. This will allow the DG and ESS to continue to power the Critical Loads.
- 5.2 All applicable NEC requirements mentioned in previous options still apply, in addition to the NEC requirements that apply to ESS.
- 5.3 Labeling is needed on the exterior of all panels and on the breaker in the main panel to the effect that DG and ESS are connected to them.
- 5.4 The ESS may be located greater than five feet (5') from the Critical Load Panel, the conductors may pass through a wall panel, or the ESS may be out of sight from the Critical Load Panel.
- 5.5 A disconnecting means and overcurrent protection shall be provided at the energy storage device end of the circuit. Fused disconnecting means or circuit breakers shall be permitted.
- 5.6 Where fused disconnecting means are used, the line terminals of the disconnecting means shall be connected toward the energy storage device terminals.
- 5.7 Overcurrent devices or disconnecting means shall not be installed in energy storage device enclosures where explosive atmospheres can exist.
- 5.8 A second disconnection means is to be located at the connected equipment and shall be installed where the disconnecting means required is not within sight of the connected equipment.
- 5.9 Where the energy storage device disconnecting means is not within sight of the PV system AC and DC disconnecting means, placards or directories shall be installed at the locations of all disconnecting means indicating the location of all disconnecting means.
- 5.10 Photovoltaic power systems may use utility-interactive inverters to control battery state-of-charge by diverting excess power into the utility system.
- 5.11 These systems shall not be required to comply with NEC 690.72(B)(2). The charge regulation circuits used shall comply with the requirements of NEC 400.5.
- 5.12 These systems shall have a second independent means of controlling the battery charging process for use when the utility is not present or when the primary charge controller fails or is disabled.
- 5.13 If the Critical Load Panel and ESS located *inside* a garage (out of sight of the main service panel), a second disconnect switch needs to be located between the Energy Storage System and the Critical Load Panel. This second disconnect switch needs to be **OUTSIDE** next to the Main Service Panel. The disconnects need to be labeled.

- 5.14 The Disconnect for the ESS needs to be within fifteen feet (15'), or at IID's discretion and within sight of the main panel.
- 5.15 One-line drawings for ESS need to have labels of where the equipment is installed (e.g., inside garage).
- 5.16 Disconnects will need to be labeled "1 of 2" and "2 of 2" (and so forth if more than two). It is preferred that these labels be engraved so that they would still be readable if painted over.
- 5.17 A Smart Contactor may be installed to isolate the ESS and Critical Loads from the utility system should the utility lose power.

6. AC Disconnects Utility Requirement

The Disconnect Device(s) will isolate all ungrounded (hot) conductors of the generating facility and/or ESS from IID's distribution system. The switch/breaker shall be a gang-operated, and load-break rated. A Combiner / Sub- Panel can substitute for the Visible Disconnect Device.

7. Labeling

Labels shall conform to the current California Electric Code, NEC, and Authority Having Jurisdiction.