

Grand Valley Rural Power Lines, Inc.

## **GENERATION INTERCONNECTION POLICY**

Generation Interconnection Procedure

Generation Interconnection Guidelines



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# **GENERATION INTERCONNECTION PROCEDURE**

The following Generation Interconnect Procedure (Procedure) shall apply to all generating facilities applying for connection to the Grand Valley Rural Power Lines, Inc. (Grand Valley Power) System. This Procedure complies with the requirements applied to Grand Valley Power by: The Colorado Public Utilities Commission, USDA Rural Utilities Service, and the Grand Valley Power Power Purchase Agreement with Public Service Company of Colorado.

Pursuant to applicable Rural Utilities Service regulations, this Policy shall be reconsidered and updated every five years or more frequently as circumstances warrant, but this Policy shall continue to be in effect even if it is not reviewed or updated within five years.

## **I.0 GENERAL OVERVIEW**

### **A. APPLICABILITY**

1. A request by an Interconnection Customer to interconnect a generating facility with the Grand Valley Power System will follow this Procedure:

a) An inverter-based generating facility that utilizes Eligible Energy Resources, is Certified and has a rated capacity up to and including 10 kW shall be evaluated under the Level 1 Process.

b) A generating facility that utilizes Eligible Energy Resources, is Certified and has a rated capacity up to 25 kW shall be evaluated under the Level 2 Process.

c) A generating facility that utilizes Eligible Energy Resources, is not Certified or fails to meet the certification requirements for Level 1 Process or Level 2 Process, shall be evaluated under the Level 3 Process.

d) The maximum sized generating facility allowed at a residential account is 10 kW. Commercial accounts can connect up to 25 kW.

e) Generating facilities that have a rated capacity greater than 25 kW will be referred to Public Service Company of Colorado in order for Grand Valley Power to comply with its wholesale power purchase contract. Grand Valley Power will coordinate the contact procedure between the Interconnection Customer and Public Service Company of Colorado.

3. Prior to submitting its interconnection request, the Interconnection Customer may consult with the Grand Valley Power contact employee to determine whether the proposed interconnection is subject to this Procedure. Grand Valley Power shall respond within 15 business days.

4. As a condition of interconnection with Grand Valley Power's System, each Interconnection Customer shall comply with requirements to ensure infrastructure security, operational security, and reliability with respect to electric system equipment, operations, control hardware and software (cyber-security), as determined by Grand Valley Power and notified to Interconnection Customer or required by applicable law. Grand Valley Power shall take account of requirements

and recommendations of the President's "Critical Infrastructure Protection Board" and best practice recommendations from the electric reliability authority and the Colorado Public Utilities Commission. The Interconnection Customer shall provide all security measures required by Grand Valley Power.

5. Each Interconnection Customer who applies for interconnection with Grand Valley Power's system shall assume the following risks and responsibilities:

- a) The Interconnection Customer must agree to maintain appropriate liability insurance as outlined in this Procedure.
- b) The Interconnection Customer must be responsible for the generating facilities compliance with all national, State, local government requirements and electric utility standards for the safety of the public and personnel responsible for utility electric power system operations, maintenance and repair.
- c) The Interconnection Customer must be responsible for the safe and effective operation and maintenance of the generating facility.
- d) The Interconnection Customer must demonstrate the financial and managerial capability to develop, construct and operate the generation facility.

## **B. PRE-INTERCONNECTION REQUEST**

1. Information on the interconnection request process and Grand Valley Power's System can be obtained through informal requests from the Interconnection Customer presenting a proposed project for a specific site. Information for contacting the Grand Valley Power contact employee is available on the Grand Valley Power website ([www.gvp.org](http://www.gvp.org)). Electric system information for specific project locations, feeders, or small areas shall be provided to the Interconnection Customer upon request and may include relevant system studies, interconnection studies, and other information useful in determining a point of interconnection on the Grand Valley Power System.

2. Grand Valley Power shall not be required to provide information to the Interconnection Customer that would violate confidentiality provisions of prior agreements or critical infrastructure requirements. Grand Valley Power shall comply with reasonable requests for such information unless such information is proprietary or confidential and cannot be provided pursuant to a confidentiality agreement.

3. Grand Valley Power may at its option, or upon request of the Interconnection Customer, conduct a pre-interconnection request conference, at which information provided to the Interconnection Customer and information to be provided by the Interconnection Customer in the interconnection request may be reviewed informally.

## **C. INTERCONNECTION REQUEST CONTENTS**

1. The Interconnection Customer shall submit an interconnection request to Grand Valley Power as required in this Procedure, together with the processing fee or deposit specified in the interconnection request. The interconnection request shall be date and time stamped upon receipt. The original date and time stamp applied to the interconnection request at the time of its

original submission shall be accepted as the qualifying date and time stamp for the purposes of any timetable in this Procedure.

2. The interconnection request shall include the following information:

- Description of project equipment and specifications.
- Project design drawings, including electric one line drawings, and site plan/layout.
- Map showing location.
- Evidence of site control.
- Certification of the facilities (in Accordance with Attachments 2 and 3, if applicable).
- List of required permits and approval.
- Contact information for the Interconnection Customer.
- Other information as Grand Valley Power shall have advised the Interconnection Customer, is required in connection with its interconnection request or that is required under any provision of the Procedures or Guidelines.

If other entities will have responsibility for interfacing with Grand Valley Power with respect to the interconnection request, the Interconnection Customer must provide all necessary contact information in the interconnection request. Interconnection Customer shall provide to Grand Valley Power a copy of all manufacturers' literature for its facilities, including specifications, operating instructions and recommendations for installation and operation.

4. The Interconnection Customer shall be notified of receipt of the interconnection request by Grand Valley Power within 3 business days of such receipt. The notification may be to an e-mail address or fax number provided by the Interconnection Customer.

5. Grand Valley Power shall notify the Interconnection Customer within 10 business days of the receipt of the interconnection request as to whether the interconnection request is deemed by Grand Valley Power to be complete or incomplete.

a) If the interconnection request is incomplete, Grand Valley Power shall provide notice that the request is incomplete and provide a written list detailing all information that must be provided to complete the interconnection request.

b) The Interconnection Customer will have 10 business days after receipt of such notice to submit the listed information or request a time extension to provide such information.

c) If the Interconnection Customer does not provide the listed information or a request for an extension of time by the date specified in b), the interconnection request will be deemed withdrawn.

d) An interconnection request will be deemed complete upon submission of the listed information to Grand Valley Power.

## **D. MODIFICATION OF THE INTERCONNECTION REQUEST**

1. Any modification of the project equipment, project design, or location of the project not otherwise agreed to in writing by Grand Valley Power and the Interconnection Customer shall be deemed a withdrawal of the interconnection request and may require submission of a new interconnection request. Interconnection Customer shall notify Grand Valley Power in a timely

manner of any material modification of the project equipment, project design or location of the project.

## **E. SITE CONTROL DOCUMENTATION**

1. Site control documentation shall be submitted with the interconnection request.
2. Site control may be demonstrated through:
  - a) Ownership of, a leasehold interest in, or a right to develop the site for the purpose of constructing the generating facility; or
  - b) An option to purchase or acquire a leasehold site for such purpose; or
  - c) An exclusivity or other business relationship between the Interconnection Customer and the entity having the right to sell, lease, or grant the Interconnection Customer the right to possess or occupy a site for such purpose.

## **F. QUEUE POSITION**

1. Grand Valley Power shall place each interconnection request in a first come, first served order per feeder and per substation based upon the date and time stamp of the interconnection request.
2. The order of each interconnection request will be used to determine the cost responsibility of the Interconnection Customer for any System upgrades that Grand Valley Power determines are necessary to accommodate the interconnection. The Interconnection Customer(s) whose interconnection causes the need for such upgrades shall be responsible for 100% of such costs, subject to Grand Valley Power requiring later contribution toward such costs by Interconnection Customers that interconnect after completion of the System upgrades and that Grand Valley Power determines benefit from such upgrades. Grand Valley Power shall allocate such costs in a manner it deems to be consistent with industry practice and the Grand Valley Power line extension policy.
3. Interconnection requests may be grouped together for study purposes at the option of Grand Valley Power.

## **G. EXECUTION OF INTERCONNECTION SERVICE AGREEMENT**

1. After receiving an Interconnection Service Agreement from Grand Valley Power, the Interconnection Customer shall have 30 business days to sign and return the Interconnection Service Agreement or request that Grand Valley Power file an unexecuted agreement with the Colorado Public Utilities Commission.
2. If the Interconnection Customer does not sign the Interconnection Service Agreement or ask that it be filed unexecuted within 30 business days, the interconnection request shall be deemed withdrawn.



3. After the Interconnection Service Agreement is signed by Interconnection Customer and Grand Valley Power, the interconnection of the generating facility shall proceed under the provisions of the Interconnection Service Agreement, provided that in case of any conflict between the specific terms of the Interconnection Service Agreement and this Procedure and/or Guidelines, the terms of the Interconnection Service Agreement shall govern.

## **2.0 LEVEL 1 PROCESS (10 kW INVERTER TYPE GENERATION)**

1. This process shall be used for evaluating any interconnection request for interconnection of a Certified inverter-based generating facility no larger than 10 kW that meets the codes, standards and certification requirements of Attachment 2 and Attachment 3 of this Procedure.

2. The Interconnection Customer must complete the interconnection request and submit it to Grand Valley Power based on the process described above in 1.C. Interconnection Request.

3. Within 15 business days after notification by Grand Valley Power that the interconnection request is complete, Grand Valley Power will conduct an initial review, which shall include the following screening criteria:

a) The proposed generating facility point of interconnection must be on a portion of the Grand Valley Power system that is subject to its tariffs.

b) For interconnection of a proposed generating facility to a radial distribution circuit, the aggregated generation, including the proposed generating facility, shall not exceed 15% of the line section annual peak load as most recently measured at the substation or calculated for the line section. A line section is that portion of Grand Valley Power's electric system connected to a customer bounded by automatic sectionalizing devices or the end of the distribution line.

c) If the proposed generating facility is to be interconnected on single-phase shared secondary, the aggregate generation capacity on the shared secondary, including the proposed generating facility, shall not exceed 20 kW.

d) If the proposed generating facility is single-phase and is to be interconnected on a center tap neutral of a 240 volt service, its addition shall not create an imbalance between the two sides of the 240 volt service of more than 20% of the nameplate rating of the service transformer.

e) No construction or modification of Grand Valley Power's system shall be required to accommodate the generating facility.

4. If, Grand Valley Power finds that the interconnection request satisfies the Level 1 Process requirements described above and that the generating facility can be interconnected safely and reliably to its System and the Interconnection Customer is otherwise in compliance with the applicable requirements of the Procedure, Grand Valley Power shall approve and execute the interconnection request and return it to the customer with an executable Interconnection Service Agreement to the Interconnection Customer within 5 business days.

5. After installation and final approval granted by the electrical inspector of record, the customer will return the Certificate of Completion to Grand Valley Power. Prior to parallel operation, Grand Valley Power may inspect the generating facility for compliance with standards, which may include a witness test, and may schedule appropriate metering replacement, if necessary.

6. Grand Valley Power will notify the customer if the interconnection of the generating facility is authorized within 5 business days. If the witness test or other inspection results are not satisfactory, Grand Valley Power has the right to disconnect the generating facility. The customer has no right to operate in parallel until a witness test has been performed or previously waived on the application. Grand Valley Power will complete this witness test within 10 business days of the receipt of the certificate of completion.

### **3.0 LEVEL 2 PROCESS (FAST TRACK)**

1. This process shall be used for evaluation of any interconnection request for interconnection of a Certified packaged generating facility up to 25 kW if the proposed generating facility meets the codes, standards, and certification requirements of Attachment 2 and Attachment 3 of this Procedure.

2. The Interconnection Customer must complete the interconnection request and return it to Grand Valley Power under the process described above in 1.C. Interconnection Request.

3. Within 15 business days after notification by Grand Valley Power that the interconnection request is complete, Grand Valley Power will conduct an initial review, which shall include the following screening criteria:

a) The proposed generating facility point of interconnection must be on a portion of the Grand Valley Power system that is subject to its tariffs.

b) For interconnection of a proposed generating facility to a radial distribution circuit, the aggregated generation, including the proposed generating facility, shall not exceed 15% of the line section's annual peak load as most recently measured at the substation or calculated for the line section. A line section is that portion of Grand Valley Power's electric system connected to a customer bounded by automatic sectionalizing devices or the end of the distribution line

c) The proposed generating facility, in aggregate with other generation on the distribution circuit, shall not contribute more than 10% to the distribution circuit's maximum fault current at the point nearest the proposed point of interconnection.

d) The proposed generating facility, in aggregate with other generation on the distribution circuit, shall not cause any distribution protective devices and equipment (including, but not limited to, substation breakers, fused cutouts, and line reclosers), or the Interconnection Customer equipment on the system to exceed 87.5% of its short circuit interrupting duty; nor shall the interconnection be proposed for a circuit that already exceeds 87.5% of the short circuit interrupting duty of such equipment.

e) If the proposed generating facility is to be interconnected on single-phase shared secondary, the aggregate generation capacity on the shared secondary, including the proposed generating facility, shall not exceed 20 kW.

f) If the proposed generating facility is single-phase and is to be interconnected on a center tap neutral of a 240 volt service, its addition shall not create an imbalance between the two sides of the 240 volt service of more than 20% of the nameplate rating of the service transformer.

g) No construction of facilities by Grand Valley Power on its system shall be required to accommodate the generating facility.

4. If Grand Valley Power determines that the proposed interconnection passes the screens, the interconnection request shall be approved and Grand Valley Power will provide to the Interconnection Customer an executable Interconnection Service Agreement within 5 business days after the determination.

5. If Grand Valley Power determines that the proposed interconnection fails the screens, but Grand Valley Power determines that the generating facility may nevertheless be interconnected consistent with safety, reliability, and power quality standards, Grand Valley Power shall provide to the Interconnection Customer an executable Interconnection Service Agreement within 5 business days after the determination.

6. If the proposed interconnection fails the screens, but Grand Valley Power does not or cannot determine from the initial review that the small generating facility may nevertheless be interconnected consistently with safety, reliability and power quality standards unless the Interconnection Customer is willing to consider minor modifications or further study, Grand Valley Power will provide the Interconnection Customer with the opportunity to attend a customer options meeting.

7. If the proposed interconnection fails the screens, and Grand Valley Power determines the interconnection request cannot be approved without minor modifications at minimal cost; or a supplemental study or other additional studies or actions; or at significant cost to address safety, reliability, or other power quality problems, within the 5 business day period after the determination, Grand Valley Power shall notify the Interconnection Customer and provide copies of the data and analyses underlying its conclusion. Within 10 business days of the determination, Grand Valley Power shall offer to convene a customer options meeting to review possible interconnection facility modifications or the screen analysis and related results, to determine what further steps are needed to permit the generating facility to be connected safely and reliably. At the time of notification of Grand Valley Power's determination, or at the customer options meeting, Grand Valley Power shall:

a) Offer to perform facility modifications or minor modifications to the Grand Valley Power system that are required (e.g., changing meters, fuses, relay settings), and provide a non-binding good faith estimate of the limited cost to make such modifications to its system; or

b) Offer to perform a supplemental review if Grand Valley Power concludes that the supplemental review might determine that the generating facility could continue to qualify for interconnection pursuant to the Level 2 Process, and provide a non-binding good faith estimate of the costs and time of such review; or

c) Obtain the Interconnection Customer's agreement to continue evaluating the interconnection request under the Level 3 Process.

8. If the Interconnection Customer agrees to a supplemental review in writing within 15 business days of the offer, the Interconnection Customer shall submit a deposit for the estimated costs. The Interconnection Customer shall be responsible for Grand Valley Power's actual costs of conducting the supplemental review and must pay any review costs that exceed the deposit within 20 business days of receipt of the invoice or resolution of any dispute. If the deposit exceeds the invoiced costs, Grand Valley Power will return such excess within 20 business days of the invoice without interest.

9. Within 10 business days following receipt of the deposit for a supplemental review, Grand Valley Power will determine if the generating facility can be interconnected safely and reliably.

10. If no modifications are required, Grand Valley Power shall forward an executable Interconnection Service Agreement to the Interconnection Customer within 5 business days.

11. If modifications to the Interconnection Customer's facilities are required to allow the generating facility to be interconnected consistent with safety, reliability, and power quality standards under this Procedure, Grand Valley Power shall forward an executable Interconnection Service Agreement to the Interconnection Customer within 5 business days after confirmation that the Interconnection Customer has agreed to make the necessary changes at the Interconnection Customer's expense.

12. If minor modifications to Grand Valley Power's system are required to allow the generating facility to be interconnected consistent with safety, reliability, and power quality standards under this Procedure, Grand Valley Power shall forward an executable Interconnection Service Agreement to the Interconnection Customer within 10 business days that requires the Interconnection Customer shall pay the costs of such system modifications prior to interconnection.

13. If Grand Valley Power determines that the generating facility cannot be interconnected safely and reliably in accordance with the Level 2 Process, it shall offer to process the interconnection request under the Level 3 Process upon obtaining Interconnection Customer's agreement.

## **4.0 LEVEL 3 PROCESS**

### **A. APPLICABILITY**

1. This process shall be used by the Interconnection Customer proposing to interconnect its generating facility with the Grand Valley Power system if the generating facility meets any of the following conditions:

a) Is not Certified under Attachment 2 and 3; or

b) Is Certified but did not pass the Level 1 Process or the Level 2 Process screens.

## **B. SCOPING MEETING**

1. A scoping meeting will be held within 10 business days after the interconnection request is deemed complete or as mutually agreed to by the parties.
2. The Parties will bring all system engineers or other personnel and other resources as may be reasonably required to accomplish the purpose of the meeting.
  - a) The purpose of the scoping meeting is to discuss the interconnection request Feasibility Study, Facilities Impact Study and the Interconnection Service Agreement.
  - b) If the Parties agree that a Feasibility Study should be performed, Grand Valley Power shall provide the Interconnection Customer within 5 business days after the scoping meeting, a Feasibility Study Agreement including an outline of the scope of the study and a non-binding good faith cost estimate for the study.
  - c) The scoping meeting may be omitted by mutual agreement. In order to remain in consideration for interconnection, an Interconnection Customer who has requested a Feasibility Study must return the executed Feasibility Study Agreement within 15 business days.
  - d) If the Parties agree not to perform a Feasibility Study, Grand Valley Power shall provide the Interconnection Customer within 5 business days after the scoping meeting, a System Impact Study Agreement including an outline of the scope of the study and a non-binding good faith cost estimate for the study.
  - e) The Feasibility Study and Facility Impact Study may be combined for simpler projects by mutual agreement of the Parties.

## **C. FEASIBILITY STUDY**

1. The Feasibility Study shall identify any potential adverse system impacts that would result from the interconnection of the generating facility.
2. A deposit of the lesser of 50 % of the good faith estimated feasibility study costs or earnest money of \$1000.00 may be required from the Interconnection Customer.
3. The scope, responsibilities and cost estimate for the Feasibility Study are to be described in the Feasibility Study Agreement.
4. If the Feasibility Study shows no potential for adverse system impacts, Grand Valley Power shall send the Interconnection Customer a facilities study agreement, including an outline of the scope of the study and a non-binding good faith estimate of the cost to perform the study.
5. If the feasibility study shows the potential for adverse system impacts, the review process shall proceed to the appropriate system impact study.

## **D. SYSTEM IMPACT STUDY**

1. A System Impact Study shall identify and detail the electric system impacts that would result if the proposed generating facility were interconnected without project modifications or electric system modifications, focusing on the adverse system impacts identified in the Feasibility Study, or to study potential impacts, including but not limited to those identified in the scoping meeting. A System Impact Study shall evaluate the impact of the proposed interconnection on the reliability of the electric system.
2. If no transmission System Impact Study is required, but potential electric power distribution system adverse impacts are identified in the scoping meeting or shown in the Feasibility Study, a distribution System Impact Study must be performed. The utility shall send the Interconnection Customer a distribution System Impact Study agreement within 15 business days of transmittal of the Feasibility Study report, including an outline of the scope of the study and a non-binding good faith estimate of the cost to perform the study, or following the scoping meeting if no feasibility study is to be performed.
3. In instances where the Feasibility Study or the distribution System Impact Study shows potential for transmission system adverse system impacts, within 5 business days following transmittal of the Feasibility Study report, the utility shall send the Interconnection Customer a transmission System Impact Study agreement, including an outline of the scope of the study and a non-binding good faith estimate of the cost to perform the study, if such a study is required.
4. If a transmission System Impact Study is not required, but electric power distribution system adverse impacts are shown by the Feasibility Study to be possible and no distribution System Impact Study has been conducted, Grand Valley Power shall send the Interconnection Customer a distribution System Impact Study agreement.
5. If the Feasibility Study shows no potential for transmission system or distribution system adverse system impacts, the utility shall send the Interconnection Customer either a Facilities Study agreement, including an outline of the scope of the study and a non-binding good faith estimate to perform the study, or an executable Interconnection Service Agreement, as applicable.
6. In order to remain under consideration for interconnection, the Interconnection Customer must return executed System Impact Study agreements, if applicable, within 30 business days.
7. The scope and cost responsibilities for a System Impact Study shall be described in the System Impact Study agreement. A deposit of the good faith estimated costs for each System Impact Study may be required from the Interconnection Customer.
8. Where transmission systems and distribution systems have separate owners, the Interconnection Customer may apply to the transmission owner to request project coordination.

## **E. FACILITIES STUDY**

1. Once the required System Impact Study(s) is completed, a System Impact Study report shall be prepared and transmitted to the Interconnection Customer along with a Facilities Study agreement within 5 business days, including an outline of the scope of the study and a non-

binding good faith estimate of the cost to perform the Facilities Study. In the case where one or both impact studies are determined to be unnecessary, a notice of the fact shall be transmitted to the Interconnection Customer within the same time frame.

2. In order to remain under consideration for interconnection in Grand Valley Power's interconnection queue, the Interconnection Customer must return the executed Facilities Study agreement or a request for an extension of time within 30 business days.
3. The Facilities Study shall specify and estimate the cost of the equipment, engineering, procurement, and construction work needed to implement the conclusions of the System Impact Study(s).
4. Design for any required interconnection facilities and/or upgrades shall be performed under the Facilities Study agreement. Grand Valley Power may contract with consultants to perform activities required under the Facilities Study Agreement. The Interconnection Customer and Grand Valley Power may agree to allow the Interconnection Customer to separately arrange for the design of some of the interconnection facilities. In such cases, facilities design will be reviewed and/or modified prior to acceptance by Grand Valley Power, under the provisions of the facilities study agreement. If the parties agree to separately arrange for design and construction, and provided security and confidentiality requirements can be met, Grand Valley Power shall make sufficient information available to the Interconnection Customer in accordance with confidentiality and critical infrastructure requirements to permit the Interconnection Customer to obtain an independent design and cost estimate for any necessary facilities.
5. The scope and cost responsibilities for a Facilities Study shall be described in the System Impact Study agreement. A deposit of the good faith estimated costs for the Facilities Study may be required from the Interconnection Customer.
6. Upon completion of the Facilities Study, and with the agreement of the Interconnection Customer to pay for interconnection facilities and upgrades identified in the Facilities Study, Grand Valley Power shall provide the Interconnection Customer an executable Interconnection Service Agreement within 5 business days.

## **5.0 PROVISIONS THAT APPLY TO ALL INTERCONNECTION REQUESTS**

Grand Valley Power will make reasonable efforts to meet all time frames provided in these Procedures unless it is agreed upon with the Interconnection Customer for a different schedule. If Grand Valley Power cannot meet a deadline it shall notify the Interconnection Customer and explain the reason for failure to meet the deadline, and provide an estimated time by which it will complete the applicable interconnection process. Grand Valley Power may contract with consultants to perform any activities associated with the review and design of interconnection requests and interconnection facilities.

All generation facilities must comply with the specifications included in the Grand Valley Power Interconnection Guidelines.

## **A. DISPUTES**

1. The parties agree to attempt to resolve all disputes arising out of the interconnection provisions of this article.
2. In the event of a dispute, either party shall provide the other party with a written notice of dispute. Such notice shall describe in detail the nature of the dispute. If the dispute has not been resolved within 5 business days after receipt of the notice, either party may contact a mutually agreed upon third party dispute resolution service for assistance in resolving the dispute.
3. The dispute resolution service will assist the parties in either resolving their dispute or in selecting an appropriate dispute resolution venue to assist the parties in resolving their dispute.
4. Each party agrees to conduct all negotiations in good faith and will be responsible for one-half of any costs paid to neutral third parties
5. If neither party elects to seek assistance from the dispute resolution service, or if the attempted dispute resolution fails, then either party may exercise whatever rights and remedies it may have in equity or law consistent with the terms of the agreements between the parties or it may seek resolution at the Colorado Public Utilities Commission.
6. All metering for Interconnection Customer generation projects that utilize Eligible Energy Resources will be net metering installations. Grand Valley Power will furnish and install the net meter at Grand Valley Power expense. If other Grand Valley Power metering is required for operation of the generating facility, the metering will be provided by Grand Valley Power at the Interconnection Customer's expense.

## **B. COMMISSIONING TESTING**

1. Testing of the Interconnection Customer's installed equipment shall be performed pursuant to applicable codes and standards, including IEEE 1547.1 2005 "IEEE Standard Conformance Test Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems".
2. Grand Valley Power must be given at least 5 business days written notice of the tests and may be present to witness the commissioning tests.
3. Grand Valley Power Energy shall be compensated by the Interconnection Customer for its expense in witnessing Level 2 Process and Level 3 Process commissioning tests.

## **C. CONFIDENTIALITY**

1. Confidential information shall mean any confidential and/or proprietary information provided by one party to the other party that is clearly marked or otherwise designated "Confidential". All design, operating specifications and metering data provided by the Interconnection Customer shall be deemed confidential information regardless of whether it is clearly marked or otherwise designated as such.
2. Confidential information does not include information previously in the public domain, required to be publicly submitted or divulged by governmental authorities (after notice to the



other party and after exhausting any opportunity to oppose such publication or release), or necessary to be divulged in an action to enforce an agreement between the parties. Each party receiving confidential information shall hold such information in confidence and shall not disclose it to any third party nor to the public without the prior written authorization from the party providing that information, except to fulfill obligations under agreements between the parties, or to fulfill legal or regulatory requirements.

a. Each party shall employ at least the same standard of care to protect confidential information obtained from the other party as it employs to protect its own confidential information.

b. Each party is entitled to equitable relief, by injunction or otherwise, to enforce its rights under this provision to prevent the release of confidential information without bond or proof of damages, and may seek other remedies available at law or in equity for breach of this provision.

3. Notwithstanding anything in this article to the contrary, if the Colorado Public Utilities Commission, during the course of an investigation or otherwise, requests information from one of the parties that is otherwise required to be maintained in confidence, the party shall provide the requested information to the Colorado Public Utilities Commission, within the time provided for in the request for information. In providing the information to the Colorado Public Utilities Commission, the party may request that the information be treated as confidential and non-public by the Colorado Public Utilities Commission and that the information be withheld from public disclosure. Parties are prohibited from notifying the other party prior to the release of confidential information to the Colorado Public Utilities Commission. The party shall notify the other party when it is notified by the Colorado Public Utilities Commission that a request to release confidential information has been received by the Colorado Public Utilities Commission, at which time either of the parties may respond before such information would be made public.

4. Grand Valley Power shall receive, process, and analyze all interconnection requests in a timely manner as set forth in this Procedure. Grand Valley Power shall use the same reasonable efforts in processing and analyzing interconnection requests from all Interconnection Customers, whether the generating facility is owned or operated by Grand Valley Power, its subsidiaries or affiliates, or others.

5. Grand Valley Power shall maintain records for 3 years, subject to audit, of all interconnection request received under this Procedure, the times required to complete interconnection request approvals and disapprovals, and justification for the actions taken on each interconnection request.

6. Grand Valley Power will coordinate the conduct of any studies required to determine the impact of the interconnection request on affected systems with affected system operators and, if possible, include those results in its applicable interconnection study within the time frame specified in these Procedures. Grand Valley Power will include such affected system operators in all meetings held with the Interconnection Customer as required by these Procedures. The Interconnection Customer will cooperate with the utility in all matters related to the conduct of studies and the determination of modifications to affected systems.

7. The interconnection request shall be evaluated using the maximum rated capacity of the generating facility. If the interconnection request is for an increase in capacity for an existing generating facility, the interconnection request shall be evaluated on the basis of the new total capacity of the generating facility. If the interconnection request is for a generating facility that

includes multiple energy production devices at a site for which the Interconnection Customer seeks a single Point of Interconnection, the interconnection request shall be evaluated on the basis of the aggregate capacity of the multiple devices.

## **D . INSURANCE**

1. For systems of 10 kW or less, the Interconnection Customer, at its own expense, shall secure and maintain in effect during the term of the agreement liability insurance with a combined single limit for bodily injury and property damage of not less than \$300,000 for each occurrence.
2. For systems above 10 kW but not more than 25 kW, the Interconnection Customer, at its own expense, shall secure and maintain in effect during the term of the agreement liability insurance with a combined single limit for bodily injury and property damage of not less than \$2,000,000 for each occurrence.
3. Insurance coverage for systems greater than 25 kW shall be determined on a case-by-case basis by Grand Valley Power and shall reflect the size of the installation and the potential for system damage.
4. Except for those solar systems installed on a residential premise which have a design capacity of 10 kW or less, Grand Valley Power shall be named as an additional insured party by endorsement to the insurance policy and the policy shall provide that written notice be given to Grand Valley Power at least thirty 30 days prior to any cancellation or reduction of any coverage. Such liability insurance shall provide, by endorsement to the policy, that Grand Valley Power shall not by reason of its inclusion as an additional insured incur liability to the insurance carrier for the payment of premium of such insurance. For all solar systems, the liability insurance shall not exclude coverage for any incident related to the subject generating facility or its operation.
5. Certificates of Insurance evidencing the requisite coverage and provision(s) shall be furnished to Grand Valley Power prior to the date of interconnection of the generating facility.
6. Grand Valley Power shall be permitted to periodically obtain proof of current insurance coverage from the generating Interconnection Customer in order to verify proper liability insurance coverage.
7. Interconnection Customer will not be allowed to commence or continue interconnected operations unless evidence is provided that satisfactory insurance coverage is in effect at all times.

## **E. MAINTENANCE**

Interconnection Customers shall maintain their equipment in good working order. Grand Valley Power reserves the right to inspect Interconnection Customer's facilities upon reasonable notice or without notice other than by a phone call or phone message whenever it appears that an Interconnection Customer is operating in a manner hazardous to the Grand Valley Power system integrity and/or customer safety. Functional testing of all circuit breakers, relays and transformers must be performed yearly at the Interconnection Customer's expense. Installations must have a full relay calibration check performed every three year or less by

qualified personnel and Certified test reports are to be sent to Grand Valley Power's designated representative.

## **6.0 NET METERING**

A. Grand Valley Power shall allow the Interconnection Customer's retail electricity consumption to be offset by the electricity generated from "Eligible Energy Resources" (ERR) in accordance with the Renewable Energy Net Metering Service as described in Grand Valley Power' Electric Service Tariffs, Rules and Regulations, provided that:

- a) The rated capacity of the generator does not exceed 10 kW for residential accounts and 25 kW for commercial accounts; and
- b) The rated capacity of the generator does not exceed the Interconnection Customer's service entrance capacity.

# ATTACHMENT 1

## DEFINITIONS

1. Business Day – Monday through Friday, excluding Federal Holidays.
2. Certified or Certification – With reference to a generating facility, meeting the codes and standards set forth in Attachment 2 and Attachment 3 to this Procedure, to the satisfaction of Grand Valley Power.
3. Eligible Renewable Energy Resource – Energy generated from an “Eligible Renewable Energy Resource” or “ERR” Including a solar, wind, geothermal, or biomass generation facility, or a hydroelectric facility with a nameplate rating of 10MW or less, that meets the standards for an eligible renewable energy resource as set forth by the Colorado Public Utilities Commission pursuant to §40-2-124, C.R.S.
4. Facilities Study - A study performed by Grand Valley Power and paid for by Interconnection Customer to determine the requirements for modifications of Grand Valley Power System based on findings of a System Impact Study, including the estimated cost of the work required to make such modifications.
5. Feasibility Study – A study performed by Grand Valley Power and paid for by Interconnection Customer to determine potential effects of the generating facility interconnect on the Grand Valley Power System.
6. Generating Facility (generating facility) – The Interconnection Customer's device for the production of electricity identified in the interconnection request. Such interconnection request shall not include the Interconnection Facilities not owned by the Interconnection Customer.
7. Interconnection Customer – Any entity, that proposes to interconnect or that has a Generating Facility that is interconnected with the Grand Valley Power System.
8. Interconnection Customer Options Meeting – A meeting held with Grand Valley Power and Interconnection Customer to discuss available options if the interconnection request cannot be approved.
9. Interconnection Facilities – include Grand Valley Power's Interconnection Facilities and the Interconnection Customer's Interconnection Facilities. Collectively, Interconnection Facilities include all facilities and equipment between the Generating Facility and the Point of Interconnection, including any modification, additions, or upgrades that are necessary to physically and electrically interconnect the Generating Facility to Grand Valley Power's system.
10. Interconnection request – The Interconnection Customer's request to interconnect a new Generating Facility, or to increase the capacity of, or make a material modification to the operating characteristics of, an existing Generating Facility that is interconnected with the Grand Valley Power System.
11. Interconnection Service Agreement – An Agreement between Grand Valley Power and the Interconnection Customer to allow the interconnection of a Generating Facility to the Grand Valley Power System.
12. Line Section – A portion of the Grand Valley Power system connected to the Interconnection Customer at the Point of Interconnection, bounded by automatic sectionalizing devices or the end of the distribution line.
13. Party or Parties – Grand Valley Power, Interconnection Customer or any combination of the above.
14. Point of Interconnection – The point where the Interconnection Customer's Interconnection Facilities connect with the Grand Valley Power System. The location of the Point of Interconnection will be determined by Grand Valley Power in accordance with standard industry practice or as individual circumstances may dictate.

15. Rated Capacity – The rated capacity of an inverter based generating facility shall be the DC (direct current) rating of the generating facility.

16. Renewable Energy Credits (RECs) – “Renewable Energy Credit” or “REC” has the meaning set forth in to §40-2-124, C.R.S., as may be amended from time to time or as further defined or supplemented by Law, and any regulations adopted pursuant to this section, and for purposes of these rules shall be deemed to include any and all rights to credits, benefits, emissions reductions, offsets, and allowances, howsoever entitled, attributable to generation from renewable energy sources and/or displacement of conventional energy generation.

17. System – The facilities owned, controlled, or operated by Grand Valley Power that are used to provide electric service under its tariff.

18. System Impact Study – A study performed by Grand Valley Power and paid for by Interconnection Customer to identify and detail impacts of the generating facility on the Grand Valley Power system.

19. Upgrades – The required additions and modifications to the Grand Valley Power System at or beyond the Point of Interconnection. Upgrades do not include Interconnection Facilities.

## ATTACHMENT 2

### CERTIFICATION CODES & STANDARDS

1. IEEE1547 Standard for Interconnecting Distributed Resources with Electric Power Systems (including use of IEEE 1547.1 testing protocols to establish conformity)
2. UL 1741 Inverters, Converters, and Controllers for Use in Independent Power Systems
3. IEEE Std 929-2000 IEEE Recommended Practice for Utility Interface of Photovoltaic (PV) Systems NFPA 70 (2005), National Electrical Code
4. IEEE Std C37.90.1-1989 (R1994), IEEE Standard Surge Withstand Capability (SWC) Tests for Protective Relays and Relay Systems
5. IEEE Std C37.90.2 (1995), IEEE Standard Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers
6. IEEE Std C37.108-1989 (R2002), IEEE Guide for the Protection of Network Transformers
7. IEEE Std C57.12.44-2000, IEEE Standard Requirements for Secondary Network Protectors
8. IEEE Std C62.41.2-2002, IEEE Recommended Practice on Characterization of Surges in Low Voltage (1000V and Less) AC Power Circuits
9. IEEE Std C62.45-1992 (R2002), IEEE Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000V and Less) AC Power Circuits
10. ANSI C84.1-1995 Electric Power Systems and Equipment – Voltage Ratings (60 Hertz)
11. IEEE Std 100-2000, IEEE Standard Dictionary of Electrical and Electronic Terms
12. NEMA MG 1-1998, Motors and Small Resources, Revision 3
13. IEEE Std 519-1992, IEEE Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems
14. NEMA MG 1-2003 (Rev 2004), Motors and Generators, Revision 1

## **ATTACHMENT 3**

### **CERTIFICATION OF GENERATOR EQUIPMENT PACKAGES**

1. Generating Facility equipment proposed for use separately or packaged with other equipment in an interconnection system shall, subject to the other criteria in this Attachment 3, be considered Certified for interconnected operation only if (1) it has been tested in accordance with industry standards for continuous utility interactive operation in compliance with the appropriate codes and standards listed in Attachment 2 by any Nationally Recognized Testing Laboratory (NRTL) recognized by the United States Occupational Safety and Health Administration to test and certify interconnection equipment , (2) it has been labeled and is publicly listed by such NRTL at the time of the interconnection request, and (3) such NRTL makes readily available for verification all test standards and Procedures it utilized in performing such equipment certification, and, with Interconnection Customer approval, the test data itself. The NRTL may make such information available on its website and by encouraging such information to be included in the manufacturer's literature accompanying the equipment.
2. The Interconnection Customer must verify that the intended use of the equipment falls within the use or uses for which the equipment was tested, labeled, and listed by the NRTL.
3. Certified equipment shall not require further type-test review, testing, or additional equipment to meet the requirements of this interconnection Procedure; however, nothing herein shall preclude the need for an on-site commissioning test by the Parties to the interconnection nor follow-up production testing by the NRTL.
4. If the Certified equipment package includes only interface components (switchgear, inverters, or other interface devices), then a Interconnection Customer must show that the generator or other electric source being utilized with the equipment package is compatible with the equipment package and is consistent with the testing and listing specified for this type of interconnection equipment.
5. Provided the generator or electric source, when combined with the equipment package, is within the range of capabilities for which it was tested by the NRTL, and does not violate the interface components' labeling and listing performed by the NRTL, no further design review, testing or additional equipment on the Interconnection Customer side of the point of common coupling shall be required to meet the requirements of this interconnection Procedure.
6. An equipment package does not include equipment provided by Grand Valley Power.

# **GENERATION INTERCONNECTION GUIDELINES**

## **1.0 INTRODUCTION**

### **A. GENERAL**

Interconnection Customer's generating facilities, generators, distributed resources, small power interconnection customers and customer-owned generators are herein designated as "Interconnection Customer." Grand Valley Rural Power Lines, Inc. is herein designated as "Grand Valley Power". The term "generating facility" in these guidelines refers to any device, system or distributed resource which produces electricity and is suitable for interconnection to the Grand Valley Power distribution system.

These Guidelines provide for the minimum provisions for safe and effective Parallel Systems Operation (PSO) with the Grand Valley Power distribution facilities. These minimum provisions are general and may not cover all the details required. They do not address all of the engineering requirements or complexities involved in designing a generating facility or generating facility protection scheme. The Interconnection Customer is responsible for the overall safe and effective design and operation of their generating facility.

### **B. POLICY ON DISTRIBUTED RESOURCES**

Grand Valley Power will authorize PSO with Grand Valley Power facilities for Interconnection Customer generation projects that utilize Eligible Energy Resources and whose generating capacity is 10 kW or less for residential and 25 kW or less for commercial services. Eligible Energy Resources are defined as recycled energy, solar, wind, geothermal, biomass and new hydroelectricity as further defined in CRS 40-2-124. Such installations shall be installed with no adverse effects to the general public, Grand Valley Power facilities or personnel, and other consumer's equipment or personnel. Interconnection Customer generation projects that are outside these guidelines will be referred to Public Service Company of Colorado; Grand Valley Power will notify Public Service Company of Colorado of the generation project.

Protective devices (relays, circuit breakers, etc.), shall be installed at locations where a Interconnection Customer desires PSO. The purpose of the protective devices is to rapidly disconnect the Interconnection Customer's equipment from the Grand Valley Power system when faults or abnormal operations occur. These devices are mutually beneficial to Grand Valley Power and the Interconnection Customer; however, it is the responsibility of the Interconnection Customer to install the equipment necessary to protect its equipment.

Modifications to the Grand Valley Power facilities may be required in order to accommodate PSO. These modifications will be done at the Interconnection Customer's expense. Interconnection Customer should discuss project plans with Grand Valley Power before purchasing or installing equipment. There are portions of the Grand Valley Power system that



are not suited to PSO without extensive system upgrades. All generating facilities must meet the standards set in IEEE 1547.

Grand Valley Power has NO responsibility, either direct or implied, for the protection of the Interconnection Customer's equipment. It is fully the responsibility of the Interconnection Customer to protect its installation in such a manner that faults or other disturbances on the Grand Valley Power system shall not cause damage to the Interconnection Customer's installation.

### **C. GENERATION SOURCES**

An Interconnection Customer may use any of the Eligible Energy Resources to generate electric power. The Interconnection Customer's facility must produce 60 Hz sinusoidal alternating current at the Grand Valley Power standard voltage, and meet all other operating requirements (harmonics, power quality, etc.) specified herein.

### **D. PARALLEL OPERATION**

A PSO facility is connected to and operates in parallel with the Grand Valley Power system. It is a direct and often desired effect for Interconnection Customers. Power can be transferred between the Interconnection Customers generation and the Grand Valley Power system.

Grand Valley Power facilities are subjected to an assortment of environmental (lightning, wind, and ice) and man-made hazards. Short-circuits, grounded conductors, and open conductors are the electric problems which are the outcome of these hazards. These fault conditions require that the equipment involved be de-energized as quickly as possible because of the hazards they pose to the public and to the operation of the system. Interconnection Customer's facilities shall have adequate protective devices to sense problems on the Grand Valley Power System and promptly disconnect from all sources. PSO can also cause a condition known as "accidental isolating" or "islanding." This condition is created when a portion of the Grand Valley Power load is isolated from the Grand Valley Power system but is still connected to an Interconnection Customer's facilities. Such load could continue to operate but at abnormal voltage and/or frequency. Correctly installed protective relaying, installed by the Interconnection Customer, will avoid accidental isolating or islanding so that the relaying can detect the island and cease to energize the Grand Valley Power system.

Protective devices are intended to disconnect the generating facility when trouble occurs. The requirements are minimal for small facilities and increase with the complexity of the Interconnection Customer's generating system. General and specific requirements for PSO of various sizes are discussed in following sections.

## **E. LIABILITY**

This section is a guide for Grand Valley Power and the Interconnection Customer for responsibilities and liabilities. Any obligation detailed in the actual contract between the parties that conflict with this guide takes precedence over this guide. The terms “approve”, “approved”, and “approval” used within this guide means acceptance. Acceptance by Grand Valley Power is not an endorsement of Interconnection Customer’s design, specifications or facility. Acceptance by Grand Valley Power does not relieve the Interconnection Customer of any responsibility for the safety or reliability of the Interconnection Customer’s equipment. Each Party shall be responsible for and shall defend, indemnify and hold the other Party harmless from and against any and all claims or causes of action for personal injury, death, property damage or loss, or violation of governmental laws, regulations or orders, including costs and expenses, court costs and attorney fees, which injury, death, damage, loss or violation occurs on or is caused by operations of equipment or facilities on the party’s respective side of the point of connection. Notwithstanding the above, each Party shall be solely responsible for and shall defend, indemnify and hold harmless the other Party from and against any and all claims or causes of action for personal injury, death, property damage or loss, or violation of governmental laws, regulations or orders, including costs and expenses, court costs and attorney fees, wherever occurring, which injury, death, damage, loss or violation is due solely to the acts or omissions of such Party, including the use of defective equipment or faulty installation or maintenance of equipment by such party. However, nothing contained in this section shall be construed as relieving or releasing either Party from liability for personal injury, death, property damage or loss, or violation of governmental laws, regulations or orders, wherever occurring, resulting from its own negligence or the negligence of any of its officers, servants, agents or employees or the intentional wrongdoing by the indemnified party. In the event of concurrent negligence, liability shall be apportioned between the Parties according to each Party’s respective fault. Neither Party shall be liable to the other or any other third party, in contract or in tort or otherwise, for loss of use of equipment and related expenses, expense involving cost of capital, claims of customers of either party as applicable, loss of profits or revenues, cost of purchase of replacement power, or any indirect, incidental or consequential loss or damage whatsoever.

Interconnection Customer shall provide Grand Valley Power with documentation demonstrating that the Interconnection Customer has obtained the liability insurance required by this Policy. If use of the Interconnection Customer’s facility should cause unusual fluctuation or disturbance on, or inductive interference with the Grand Valley Power facility or other Grand Valley Power customer(s), then Grand Valley Power shall have the right to require the Interconnection Customer to install, at the Interconnection Customer’s expense, suitable apparatus to correct such fluctuation, disturbance or interference.

## **2.0 GRAND VALLEY POWER SYSTEM INFORMATION**

### **A. VOLTAGE**

Primary distribution voltages for Grand Valley Power are 12.47 kv and 24.94 kv, effectively grounded, 4 wire facilities. Secondary and service voltages will vary depending on the location. Three phase power lines and facilities do not exist at all locations in the Grand Valley Power service territory. Interconnection Customer shall contact Grand Valley Power for specific circuit information where the Interconnection Customer's facility is proposed.

### **B. CIRCUIT RESTORATION**

Because most faults on overhead lines are of a temporary nature, it is the general practice of Grand Valley Power to reclose its protection equipment (reclosers and circuit breakers) on the distribution facilities between 1.5 and 10.0 seconds after automatically tripping open. Relaying shall be installed by the Interconnection Customer to disconnect the generating facility(s) from Grand Valley Power faulted or isolated facilities before the reclosing operation. During a reclosing operation there is some risk that the Interconnection Customer's relaying is inadequate or too slow to separate the systems before the reclosing operation. The Interconnection Customer may desire added protection to mitigate such risk. Grand Valley Power may be capable of providing "Hot Line Reclose Blocking" (HLRB) or Synch-Check Supervision at the reclosing point. The Interconnection Customer is obligated to ascertain the necessity for this added protection. If possible and required, Grand Valley Power shall install, maintain and/or rearrange its equipment for HLRB, or other protection features. All design, materials, construction costs and ongoing maintenance costs associated with the added protection will be done at the expense of the Interconnection Customer. The Interconnection Customer is responsible for ensuring proper disconnection of systems. Out-of-sync reclosing is hazardous and potentially destructive to Interconnection Customer's equipment.

### **C. EFFECTIVE GROUNDING**

Grand Valley Power maintains effective grounding on the distribution system and requires that all Interconnection Customers design their systems so that they contribute to maintaining an effectively grounded system. A PSO facility design (through selection of transformer(s), generator(s), grounding, etc.) shall contribute to maintaining an effectively grounded system. Effective grounding limits the voltage rise, typically to 125-135%, on unfaulted phases during single-line to ground fault conditions. To achieve this, a Interconnection Customer's facility equivalent impedance (Thevenin equivalent impedance) shall meet the following criteria (reference IEEE Std 142-1982):

1. The positive sequence reactance must be greater than the zero sequence resistance ( $X_1 > R_0$ ); and
2. The zero sequence reactance must be greater than or equal to two and one-

half( $2\frac{1}{2}$ ) times the positive sequence reactance and less than or equal to three (3) times the positive sequence reactance ( $2.5X_1 \leq X_0 \leq 3.0X_1$ ).

When calculating the effective grounding networks, the networks should include the impedance for the following: The step-up transformer, generator subtransient reactance, neutral grounding on the step-up transformer and/or generator, cable runs greater than 50 feet in length and the grounding bank.

There are many different system configurations that will meet the effective grounding requirements. Common guidelines and restrictions include, but are not limited to, the following:

1. Step-up transformer with grounded-wye high side and low side with a grounding bank or the neutral grounded with a reactor.
2. Step-up transformer with a delta generator and a grounded-wye system must have a reactor in its grounded-wye neutral connection.
3. Line voltage producing generators, not using a step-up transformer, shall be adequately grounded (with grounding reactor in generator neutral) or use a grounding bank.

Substantial current flow into Interconnection Customer generating facility or grounding equipment can be caused by voltage imbalance on the Grand Valley Power system. Interconnection Customer's equipment shall withstand allowable imbalances and operate during such conditions.

Interconnection Customer shall consult Grand Valley Power for normal source impedance and current and voltage imbalance data for a given location before purchasing equipment to insure all devices are properly rated. Both steady state and short time duty shall be considered. Normal source is the ordinary arrangement of the Grand Valley Power facility, while a temporary source, due to maintenance, construction or emergency activities, will alter the source impedance of a Interconnection Customer facility. Future changes to the Grand Valley Power system can impact the Interconnection Customer's system. Any changes to the Interconnection Customers system that are required to meet Grand Valley Power system changes are the responsibility of the Interconnection Customer.

Solidly grounded generators can be harmonic sources or sinks and should be avoided. Generators that cannot tolerate severe phase current imbalance should have a grounding bank.

#### **D. GRAND VALLEY POWER GROUND RELAYS**

When an Interconnection Customer's facility is operating in parallel with a Grand Valley Power facility, the ground relays associated with the Grand Valley Power substation will become desensitized during a single-line to ground fault. To maintain protection of Grand Valley Power facilities, the Interconnection Customer shall not limit the Grand Valley Power contribution to a single-line to ground fault to less than 90% of the value without the Interconnection Customer's ground source on line.

Before a Interconnection Customer selects a site and purchases equipment, Grand Valley Power recommends that the Interconnection Customer's plans be reviewed by Grand Valley Power' Engineering Department. Grand Valley Power may limit a Interconnection Customer from adding generation to certain feeders due to system requirements and/or protection issues.

### **3.0 SYSTEM INTEGRITY**

#### **A. GENERAL**

Interconnection of Interconnection Customer's facilities with Grand Valley Power facilities shall not cause a reduction in the quality of service to other Grand Valley Power consumers. Interconnection Customer's facilities shall not cause abnormal voltages, frequencies, interruptions or in any way reduce the quality of service that Grand Valley Power provides to its customers. Interconnection Customer shall immediately disconnect from the Grand Valley Power facilities if notified that Grand Valley Power receives a high or low voltage, transient voltage, voltage distortion or harmonics complaint. The Interconnection Customer will be allowed to reconnect to the Grand Valley Power facility after the Interconnection Customer has resolved the problem. It is the responsibility of the Interconnection Customer to maintain the generating facility in good working order so that the voltage, Total Harmonic Distortion (THD), power factor, and VAR requirements are continually met.

#### **B. HARMONICS**

Harmonics on the power system from all sources shall be minimized. The total harmonic distortion (THD) from the facility shall be measured at the facility's metering point or point of common coupling (PCC). The Interconnection Customer must meet or exceed the harmonic current or voltage levels in the current addition of IEEE Std. 519. The following Tables are reprinted from IEEE Std. 519-1992.

**CURRENT DISTORTION LIMITS FOR GENERAL DISTRIBUTION SYSTEMS  
(120V through 25kV)**

Maximum Harmonic Current Distortion in percent % of $I_L$						
$I_{SC}/I_L$	Individual Harmonic Order (Odd Harmonics*)					TDD
	<11	$11 \leq h < 17$	$17 \leq h < 23$	$23 \leq h < 35$	$35 \leq h$	
<20**	4.0	2.0	1.5	0.6	0.3	5.0
20<50	7.0	3.5	2.5	1.0	0.5	8.0
50<100	10.0	4.5	4.0	1.5	0.7	12.0
100<1,000	12.0	5.5	2.0	2.0	1.0	15.0
>1,000	15.0	7.0	6.0	2.5	1.4	20.0

\*Even harmonics are limited to 25% of the odd harmonic limits above.

\*\*All power generation equipment is limited to these values of current distortion, regardless of actual  $I_{SC}/I_L$ .

**Notes**

- 1) Current distortions that result in a dc offset, e.g., half-wave converters, are not allowed.
- 2)  $I_{SC}$ = maximum short-circuit current at PCC.
- 3)  $I_L$ = maximum demand load current (fundamental frequency component) at PCC.

**VOLTAGE (V) DISTORTION LIMITS**

Buss V. @ PCC	Individual V. Distortion(%)	Total V. Distortion THD (%)
25kV and below	3.0	5.0

Any interference with customers or communications caused by Interconnection Customer's harmonics in excess of federal, state and local codes shall be resolved at the expense of the Interconnection Customer.

**C. VOLTAGE AT DISTRIBUTION LEVEL**

Operation of Interconnection Customer's generating facility shall not adversely affect the voltage stability of the Grand Valley Power system. Adequate voltage control shall be provided by the Interconnection Customer to minimize voltage deviation on the Grand Valley Power system caused by changing generating facility source or loading conditions. Automatic power factor or VAR controllers shall be provided for installations using synchronous generators. Generating facilities installations greater than 5 kW shall maintain Power Factors between 95% leading and 95% lagging, inclusive, over an operating range of 25% to 100% of rating during all hours of operation. Operation with a leading power factor (VARs to generating facility) is a function of generating facility design and manufacturers rating and difficult for the Interconnection Customer to control. However, if an Interconnection Customer's facility is operating with a

power factor less than 95% leading, the Interconnection Customer shall be responsible for installing reactive power compensation to improve the overall power factor to greater than 95% leading. Power factor requirements shall be met at the point of delivery during all hours of operation and overall operating conditions.

Adequate generating facility reactive power shall be installed to withstand the normal voltage changes on the Grand Valley Power system. To insure proper coordination of voltages and regulator operations the generating facility voltage VAR schedule, voltage regulator and transformer ratings (with taps if applicable) will be jointly determined by Interconnection Customer and Grand Valley Power. Induction generator starts which adversely impact the Grand Valley Power system voltage shall limit voltage changes and bring the unit to synchronous speed before connecting to the Grand Valley Power system using step-switched capacitors or other techniques.

Interconnection Customer created voltage flicker (magnitude and frequency) shall not exceed the values given by Grand Valley Power flicker curve chart. Voltage flicker percentage is referenced to generating facility pre-synchronize or motor pre-start conditions. Grand Valley Power consumers may have voltage sensitive loads; therefore, if Grand Valley Power receives complaints related to Interconnection Customer's operation, the Interconnection Customer shall be responsible for reducing voltage variations even if the current operation is within the guidelines. Voltage flicker is normally measured at the interface between the Interconnection Customer and Grand Valley Power. If voltage flicker problems occur, Grand Valley Power may also take measurements at the nearest consumers.

The Interconnection Customer is responsible for all associated damage caused to the equipment of other Grand Valley Power consumers due to voltage flicker issues. It is suggested that the Interconnection Customer review the "Computer Business Equipment Manufacturer's Association" (CBEMA) curve detailed in IEEE/ANSI Standard 446-1987, for typical equipment sensitivity to very short voltage disturbances.

## **4.0 GENERAL DESIGN REQUIREMENTS**

### **A. CODES**

The Interconnection Customer's installation must meet the State of Colorado's Public Utility Commission rules for "Small Power Producers and Cogenerators" and "Small Generator Interconnection Procedures". The installation must also meet all applicable national, state and local government construction and safety codes. Grand Valley Power will not allow operation of the installation unless the installation has been inspected and approved by the jurisdictional electrical inspector. All generating facilities must meet the standards set forth in IEEE 1547.

The Interconnection Customer must provide access to all generating facilities for Grand Valley Power personnel during normal business hours and all emergency situations.

## **B. PROTECTIVE DEVICES**

Protective device (relays, circuit breakers, etc.) for the protection of Grand Valley Power's system must be installed as required by Grand Valley Power. See the attached one-line diagrams for guidelines.

A manual disconnecting device, which shall include a lockable disconnect and a visible open, must be provided. The device must be readily accessible to and operable by Grand Valley Power personnel at all times. The location of the disconnecting device shall be near the meter location and be readily accessible to Grand Valley Power personnel at all times and shall be labeled "Utility Disconnect Switch" or "AC Disconnect Switch".

## **C. EFFECTIVE GROUNDING**

Generating facility facilities must maintain effective grounding (see Section 2.0)

## **D. DESIGN SPECIFICATIONS**

Interconnection Customer is required to submit detailed design specifications and engineering information as specified for Level 1, Level 2 or Level 3 in the Interconnection Policy

## **E. DESIGN REVIEW AND DOCUMENTATION**

Design review will follow the process as specified for Level 1, Level 2 or Level 3 in the Interconnection Policy.

## **F. INDUCTION GENERATORS**

For installations with a total generating capacity of 5 kW or less, Grand Valley Power will supply the VAR requirements from general system sources without a charge to the Interconnection Customer. Installations over 5 kW capacity will require capacitors to be installed to maintain a power factor of 0.95 lagging to 0.95 leading over a range of 25% to 100% of output rating. Such capacitors will be at the expense of the Interconnection Customer.

Under certain conditions a self-excited induction generator can produce abnormally high voltages which can cause damage to the equipment of other Interconnection Customers and other non interconnection customers. Overvoltage relays can limit the duration of such high voltages but cannot control their magnitude. Because of these problems, the reactive power supply for large induction generators must be studied on an individual basis.



In general, self-excitation problems are most likely in rural areas where the Grand Valley Power system capacity and load density are low.

It is particularly important to contact Grand Valley Power to determine if an induction generator can be connected to an existing distribution line. Where self-excitation problems appear likely, special service arrangements will be required. In many cases, the additional expense for such special service methods will outweigh the cost savings associated with induction generators. Especially during self-excitation, it is important for a facility to meet the effective grounding requirements to restrict the range of voltage imbalance.

## **G. INVERTER SYSTEMS**

Inverter systems can be harmonic sources. Section 3.0.B specifies the harmonics requirements. If an Interconnection Customer's equipment is found to be interfering with the Grand Valley Power system, other Interconnection Customers, or public communications, the interfering Interconnection Customer will be required to install filtering or other corrective measures to bring the harmonic output of his inverter to within the values specified in Section 4. The inverter must provide power at a 0.95 lagging to 0.95 leading power factor.

Line commutated inverter systems are the preferred design for interconnection to the Grand Valley Power system. These systems, by design, will disconnect when the Grand Valley Power voltage source is removed. Self commutated inverter systems will self excite and could back-feed into the Grand Valley Power system and must meet the same requirements as induction generators. The energizing of a de-energized circuit is discussed in Section 2 and is not allowed.

## **5.0 PROTECTIVE RELAYING REQUIREMENTS**

The minimum relaying requirements are shown on the one line diagrams in Appendix A. The relaying requirements will vary based on generating facility type and size. IEEE 1547.2 also contains typical generating facility one line diagrams.

## **6.0 METERING REQUIREMENTS**

All metering for Interconnection Customer generation projects that utilize Eligible Energy Resources will be net metering installations. Grand Valley Power will furnish and install the net meter at Grand Valley Power's expense.

If other Grand Valley Power metering is required for operation of the generating facility, the metering will be provided by Grand Valley Power at the interconnection customer's expense.

The Interconnection Customer shall install a permanent label on their meter housing with the wording "Generation System Connected", "Photovoltaic System Connected" or "Warning, Two Sources of Incoming Power".

## **7.0 DEMONSTRATION OF PROTECTIVE DEVICES**

One month (minimum) prior to a Interconnection Customer demonstrating the operation of the generation equipment, a written testing procedure outlining the testing of relay(s), breaker(s), generator(s), and voltage and VAR requirements shall be provided to Grand Valley Power. Grand Valley Power will witness sufficient testing to determine the safe operation of the Interconnection Customer's facility. These tests will include, but may not be limited to, trip checks, calibration checks and in-service checks. The Interconnection Customer is responsible for providing qualified personnel and equipment to perform all testing. The Interconnection Customer is financially responsible for all Grand Valley Power labor costs associated with Grand Valley Power witnessing. When witness testing is complete the unit can be released for PSO.

## **8.0 GENERAL OPERATING REQUIREMENTS**

### **A. DE-ENERGIZED CIRCUITS**

Interconnection Customers shall not energize a de-energized Grand Valley Power circuit(s). Interconnection Customers will be liable for any accident, injury, or damage resulting from an intentional or unintentional energizing of Grand Valley Power circuits. Interconnection Customers will be disconnected immediately for energizing a de-energized circuit, and will not be reconnected until all issues that resulted in the action are resolved to the satisfaction of Grand Valley Power.

### **B. DISCONNECTING FROM GRAND VALLEY POWER FACILITIES**

Interconnection Customers will disconnect from Grand Valley Power facilities when requested for routine maintenance, etc. of Grand Valley Power equipment, if the Interconnection Customer's generating equipment is interfering with customers on the system, or if notified by Grand Valley Power that system conditions require the removal. Grand Valley Power shall disconnect Interconnection Customer manually or automatically, without notice, for system emergencies. When an Interconnection Customer is disconnecting from Grand Valley Power

facilities for its own purposes, Interconnection Customers will notify Grand Valley Power prior to disconnecting.

### **C. REVISION, REPLACEMENT, OR DESIGN CHANGE**

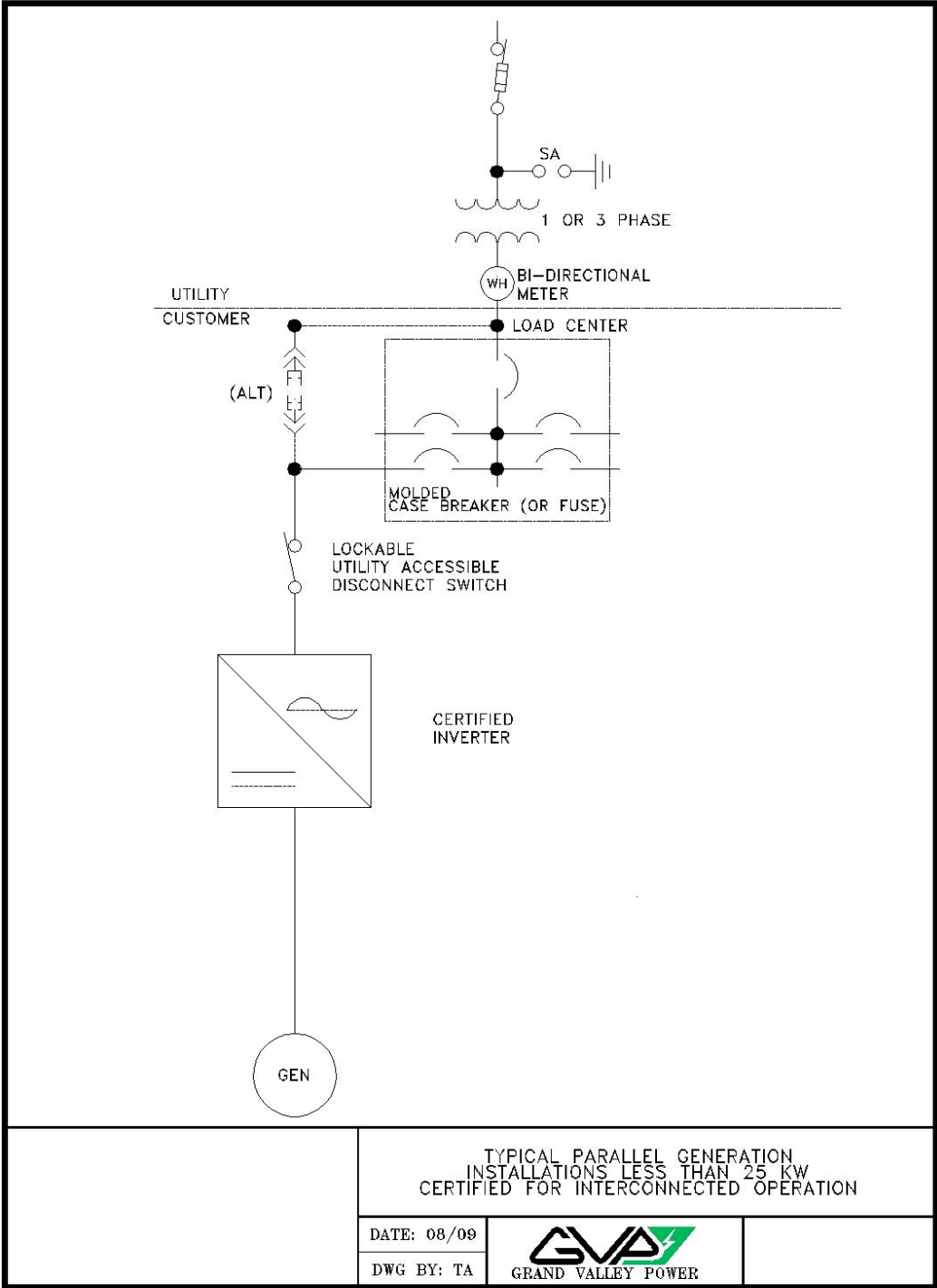
Any change to the Interconnection Customer's facility that affects the output, major components, or critical systems must be approved in writing by Grand Valley Power prior to the changes taking place. If such changes are not approved, Grand Valley Power reserves the right to disconnect the generating system from Grand Valley Power's distribution system.

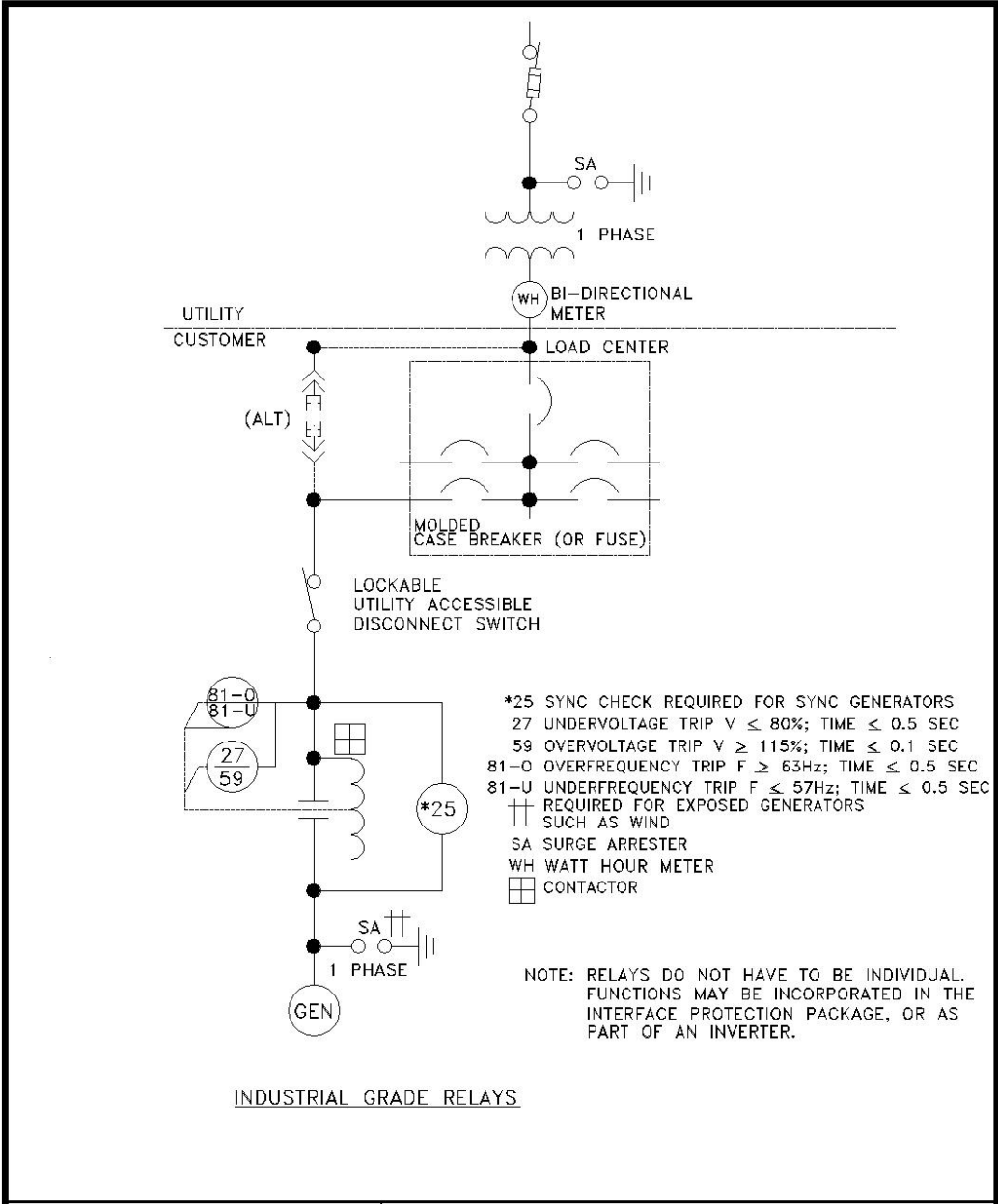
## **9.0 ANNUAL TEST GUIDELINES**

### **A. MAINTENANCE**

Interconnection Customers shall maintain their equipment in good working order. Grand Valley Power reserves the right to inspect Interconnection Customer's facilities whenever it appears that an Interconnection Customer is operating in a manner hazardous to the Grand Valley Power system integrity and/or customer safety. Functional testing of all circuit breakers, relays and transformers must be performed yearly at the Interconnection Customer's expense. Installations must have a full relay calibration check performed every three years or less by qualified personnel and certified test reports are to be sent to Grand Valley Power's designated representative.

## **APPENDIX A**



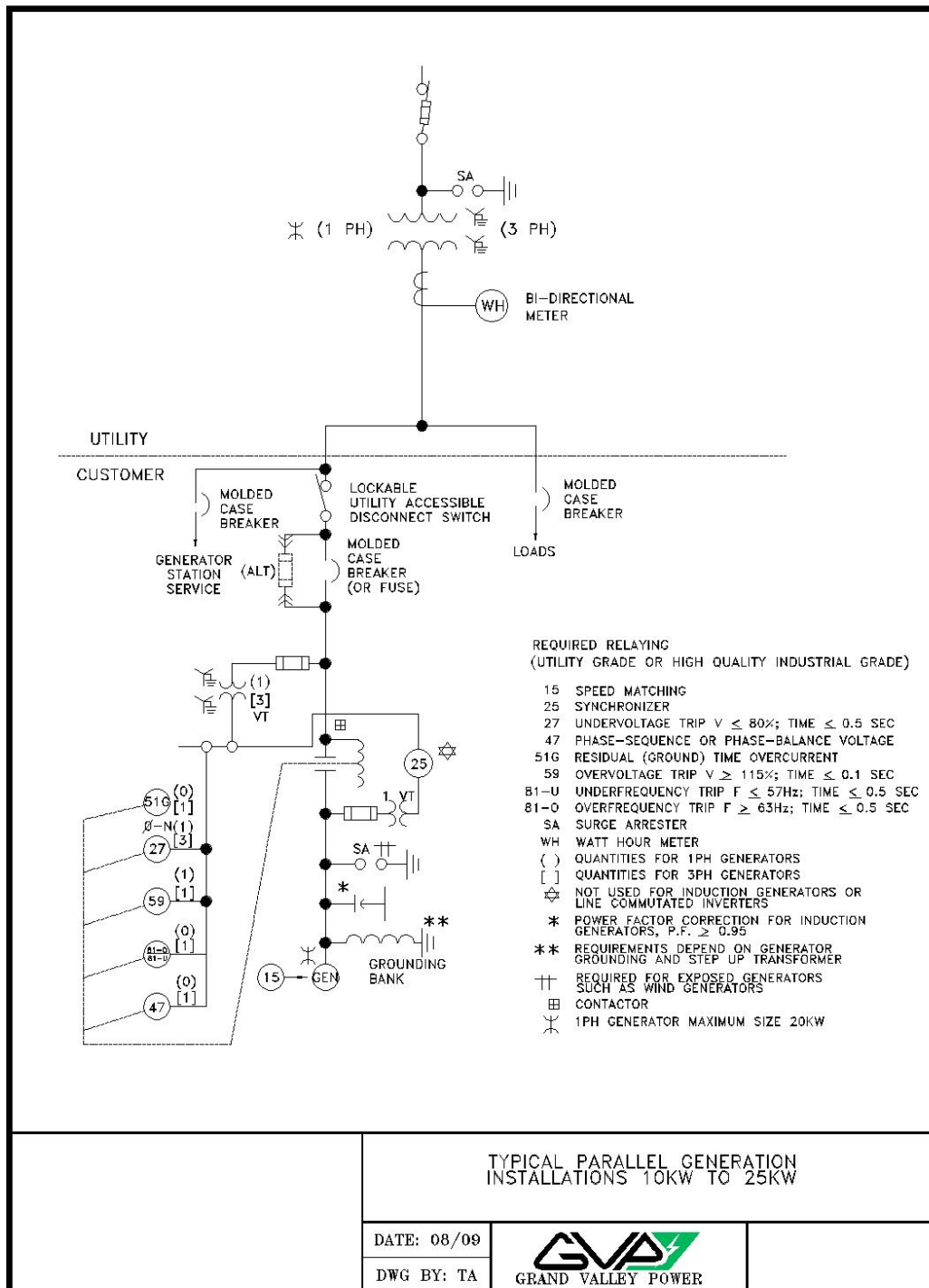


TYPICAL PARALLEL GENERATION INSTALLATIONS LESS THAN 10 KW

DATE: 08/09

DWG BY: TA





**REQUIRED RELAYING**  
(UTILITY GRADE OR HIGH QUALITY INDUSTRIAL GRADE)

- 15 SPEED MATCHING
- 25 SYNCHRONIZER
- 27 UNDERVOLTAGE TRIP  $V \leq 80\%$ ; TIME  $\leq 0.5$  SEC
- 47 PHASE-SEQUENCE OR PHASE-BALANCE VOLTAGE
- 51G RESIDUAL (GROUND) TIME OVERCURRENT
- 59 OVERVOLTAGE TRIP  $V \geq 115\%$ ; TIME  $\leq 0.1$  SEC
- 81-U UNDERFREQUENCY TRIP  $F \leq 57\text{Hz}$ ; TIME  $\leq 0.5$  SEC
- 81-O OVERFREQUENCY TRIP  $F \geq 63\text{Hz}$ ; TIME  $\leq 0.5$  SEC
- SA SURGE ARRESTER
- WH WATT HOUR METER
- ( ) QUANTITIES FOR 1PH GENERATORS
- [ ] QUANTITIES FOR 3PH GENERATORS
- ☆ NOT USED FOR INDUCTION GENERATORS OR LINE COMMUTATED INVERTERS
- \* POWER FACTOR CORRECTION FOR INDUCTION GENERATORS, P.F.  $\geq 0.95$
- \*\* REQUIREMENTS DEPEND ON GENERATOR GROUNDING AND STEP UP TRANSFORMER
- †† REQUIRED FOR EXPOSED GENERATORS SUCH AS WIND GENERATORS
- ⊞ CONTACTOR
- ⋈ 1PH GENERATOR MAXIMUM SIZE 20KW