

Grand Valley Rural Power Lines, Inc.

## INTERCONNECTION POLICY

Interconnection Procedures

and

Interconnection Guidelines



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# **INTERCONNECTION PROCEDURES**

The following Interconnection Procedures (Procedures) shall apply to all generating and energy storage facilities applying for connection to the Grand Valley Rural Power Lines, Inc. (Grand Valley Power) system. These Procedures comply with the requirements applied to Grand Valley Power by The Colorado Public Utilities Commission and the Power Purchase Agreement between Grand Valley Power and Public Service Company of Colorado.

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.

## **1.0 OVERVIEW**

### **A. Applicability**

1. A request by an Interconnection Customer to interconnect a Distributed Energy Resource (DER) including a renewable distributed generation facility or other resource including energy storage systems that operate in parallel with and are connected to the Grand Valley Power System will follow these Procedures.
2. 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 will respond within 15 business days.
3. 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 will 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.
4. 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 DER facility's 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. Net Metering**

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 Net Metering Generation Rate as described in Grand Valley Power's Electric Service Tariffs, Rules, and Regulations, provided that:

1. The maximum allowable generating capacity of DER facilities for residential consumers is 10 kW.
2. The maximum allowable generating capacity allowed for qualified commercial and industrial consumers is 25 kW or 120% of the previous 12 months consumption history at the service location in question, but in no event shall exceed 100 kW. If there is not sufficient consumption history, Grand Valley Power will estimate the projected consumption using the best information available to it, including information provided by the consumer.

A qualified commercial or industrial consumer shall be located at a service location that meets all of the following criteria:

- a. Is billed under a rate that is not eligible to Farm and Home or Sale for Resale consumers;
  - b. Is located on a parcel that is zoned for non-residential purposes by the local jurisdiction, and;
  - c. There are no permanent living quarters at the service location.
3. DERs with capacity larger than 100 kW will not be net metered by Grand Valley Power. These systems may interconnect to the Grand Valley Power system, and the owner may enter into a power purchase agreement with other parties. Grand Valley Power may or may not be interested in purchasing the generated power, or the generator may sell the power to other parties. Grand Valley Power will charge the owner all applicable Wheeling Rates to transfer the power over the Grand Valley Power system.
  4. The maximum rated capacity of inverter-based generating facilities shall be the direct current (DC) rated output of the generating facilities. DERs with integrated energy storage systems shall be evaluated based on the combined nameplate alternating current (AC) ratings of systems accounting for their export capacity and energy storage operating mode.
  5. The energy that is offset by net metering must be generated at the same service location and served by the same meter as the energy consumed. Virtual Net Metering is not permitted.

## 2.0 GENERAL INTERCONNECTION PROCEDURES

### A. Pre-Application Procedures

1. Prior to submitting its interconnection request, the Interconnection Customer may ask Grand Valley Power interconnection contact employee or office whether the proposed interconnection is subject to these procedures. Grand Valley Power will respond within 15 business days.
2. 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 distributed generation 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.
3. 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 will comply with reasonable requests for such information unless such information is proprietary or confidential and cannot be provided pursuant to a confidentiality agreement.
4. 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.
5. An Interconnection Customer may submit a formal written request for a pre-application report:
  - a) A fee equal to the Level 1 Interconnection Application Fee must accompany the request for the formal report.
  - b) Grand Valley Power will provide the pre-application report to the Interconnection Customer within 20 business days of receipt of the completed request form and payment of the fee.
  - c) The pre-application report shall be non-binding and Grand Valley Power and shall not confer any rights to the Interconnection Customer. The provided information does not guarantee that an interconnection may be completed. Data provided in the pre-application report may become outdated at the time of the submission of the complete interconnection request.
  - d) The pre-application report needs only include existing information. A pre-application report request does not obligate Grand Valley Power to conduct a study or other analysis of the proposed interconnection resource in the event that data is not readily available.

- e) The report will include any data pertaining to Grand Valley Power's requested by the Interconnection Customer relating to the proposed interconnection location unless such information is confidential and cannot be provided pursuant to a confidentiality agreement.

## **B. Capacity of the DER**

1. If the interconnection request is for an increase in capacity for an existing DER, the interconnection request will be evaluated on the basis of the new total capacity of the DER, except as provided in section 2.0 (C).
2. If the interconnection request is for a DER that includes multiple components at a site for which the Interconnection Customer seeks a single point of interconnection, the interconnection request will be evaluated on the basis of the aggregate capacity of the multiple components, except as provided in section 2.0 (C).
3. The interconnection request will be evaluated using the maximum rated capacity of the DER, except as provided below, the interconnection request may be evaluated using less than the maximum rated capacity of the DER if Grand Valley Power determines that the DER is only capable of injecting less power into Grand Valley Power's system.

## **C. Energy Storage Interconnections**

1. Non-exporting energy storage may inadvertently export, so long as the magnitude is less than the energy storage's nameplate rating (kW-gross) and the duration of export of power from the customer's energy storage is less than 30 seconds for any single event. There are no limits to the number of events. Inadvertent export events shall not exceed thermal, service voltage, power quality, or network limits defined by the Colorado Public Utilities Commission.
2. When a storage system is installed in conjunction with a DER facility, both will be reviewed at the same time and be included in one interconnection agreement.
3. Interconnection requests are reviewed based on the combined nameplate ratings of systems accounting for their export capacity and energy storage operating mode. The ongoing operation capacity portion of the interconnection review is based on the actual simultaneous performance AC ratings, taking into account the operational differences of load offset and export. If the contribution of the energy storage to the total contribution is limited by programming of the maximum active power output, use of a power control system, use of a power relay, or some other mutually agreeable, on-site limiting element, only the capacity that is designed to inject electricity to Grand Valley Power's distribution or transmission system (other than inadvertent exports and fault contribution) will be used within certain technical screens and evaluations as specified in these Procedures.
4. Failure of hardware or software system(s) intended to limit energy storage export capacity shall cause the energy storage system to enter a safe operating state. An energy storage system combined with a UL 1741 certified power control system shall be considered capable of entering a safe operating state upon failure of hardware or software system(s). When mutually agreed fail-safe provisions are not provided, at



Grand Valley Power's discretion, the interconnection request may be evaluated using the maximum rated capacity of the energy storage system.

5. When a storage system is installed at the same point of interconnection location as an existing interconnected DER facility, the review level will be based upon the incremental addition of the DER rated capacity and the exporting storage system rated capacity as provided these Procedures.
6. All energy storage systems that are operated in a mode that allows export to Grand Valley Power's system must be charged from Renewable Energy Resources.

#### **D. Interconnection Requests**

1. The Interconnection Customer shall submit its interconnection request to Grand Valley Power, together with the processing fee or deposit specified in the interconnection request. Additional fees or deposits shall not be required, except as otherwise specified in these procedures. A single request to interconnect may be submitted by the Interconnection Customer distributed generation paired with energy storage systems and shall be subject to one interconnection agreement.
2. The interconnection request shall be date-stamped and time-stamped upon receipt. The original date-stamp and timestamp applied to the interconnection request at the time of its original submission shall be the order in which Grand Valley Power reviews applications to determine completeness.
3. The Interconnection Customer shall be notified of receipt by Grand Valley Power within three business days of receiving the interconnection request, which notification may be to an email address provided by the Interconnection Customer.
4. Grand Valley Power will notify the Interconnection Customer within ten business days of the receipt of the interconnection request as to whether the interconnection request is complete or incomplete. If the interconnection request is incomplete, Grand Valley Power will provide, along with the notice that the interconnection request is incomplete, a written list detailing all information that must be provided to complete the interconnection request. The Interconnection Customer will have ten business days after receipt of the notice to submit the listed information or to request an extension of time to provide such information. If the Interconnection Customer does not provide the listed information or a request for an extension of time within the deadline, the interconnection request will be deemed withdrawn. The Interconnection Customer may re-submit the application within one year without paying an additional interconnection application fee.
5. An interconnection request will be deemed complete upon submission of the listed information to Grand Valley Power. The interconnection request shall be date-stamped and timestamped upon being deemed complete. This date shall be accepted as the qualifying date-stamp and timestamp for the purposes of any timetable in subsequent procedures.
6. Any modification to interconnection resource data or equipment configuration or to the interconnection site that is a material modification may be deemed by Grand Valley Power to be a withdrawal of the interconnection request and may require submission of

a new interconnection request. A new interconnection request shall not be required for minor modifications to interconnection resource data or equipment configuration or to the interconnection site. Within ten business days of receipt of a proposed modification, Grand Valley Power, in consultation with an affected system owner, if applicable, will evaluate whether a proposed modification constitutes a material modification.

- a) If the proposed modification is determined to be a material modification, then Grand Valley Power will notify the Interconnection Customer in writing that the customer may: withdraw the proposed modification; or proceed with a new interconnection request for such modification. The Interconnection Customer shall provide its determination in writing to Grand Valley Power within ten business days after Grand Valley Power provides the material modification determination results. If the Interconnection Customer does not provide its determination, the customer's request shall be deemed withdrawn.
  - b) If the proposed modification is determined not to be a material modification, then Grand Valley Power will notify the Interconnection Customer in writing that the modification has been accepted and that the Interconnection Customer shall retain its eligibility for interconnection, including its place in the interconnection queue.
  - c) Any dispute as to Grand Valley Power's determination that a modification constitutes a material modification shall proceed in accordance with the dispute resolution provisions in these procedures.
7. Documentation of site control must be submitted with the interconnection request. Site control may be demonstrated through:
- a) ownership of, a leasehold interest in, or a right to develop a site for the purpose of constructing the interconnection resource.
  - b) an option to purchase or acquire a leasehold site for such purpose, which may include a letter of intent; 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.
  - d) For generating facilities utilizing the Level 1 25 kW AC inverter process, proof of site control may be demonstrated by the Interconnection Customer's signature on the interconnection application.
8. Grand Valley Power will place interconnection requests in a first-come, first-served order per feeder, per substation transformer, and per substation based upon the date an application is complete. The order of each interconnection request will be used to determine the cost responsibility for the upgrades necessary to accommodate the interconnection. At Grand Valley Power's option, interconnection requests may be studied serially or in clusters for the purpose of the system impact study
9. The interconnection request shall include the following information, which should be included on the current version of the Grand Valley Power DER application, found at **[www.gvp.org](http://www.gvp.org)**:

- a) Description of project equipment and specifications;
- b) Project design drawings, including electric one-line drawings, and site plan/layout;
- c) Map showing location;
- d) Evidence of site control;
- e) Certification of the facilities (in Accordance with Attachments 2 and 3, if applicable);
- f) Contact information for the Interconnection Customer.
- g) 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.
- h) 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. The 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.

## **E. Evaluation of Interconnection Requests**

1. A request to interconnect an interconnection resource no larger than 25 kW AC, which may be paired with a non-exporting storage system no larger than 25 kW AC, shall be evaluated under the Level 1 Process.
2. If not eligible for Level 1, a request to interconnect an interconnection resource with a combined nameplate rating larger than 25 kW AC shall be evaluated under the Level 2 Process (Fast Track) in accordance with the eligibility requirements of these Procedures.
3. A request to interconnect an interconnection resource that does not pass the Level 1 or Level 2 Process shall be evaluated under the Level 3 Process.
4. Non-exporting interconnection resources shall be evaluated under the "non-export" interconnection process. The "non-export" interconnection process is also applicable to additions of new non-exporting interconnection resources paired with existing interconnection resources when the existing interconnection resources have already executed an interconnection agreement.

## **F. Interconnection Agreements**

1. Any interconnection resource operating in parallel with Grand Valley Power's system is required to have an interconnection agreement with Grand Valley Power to ensure safety, system reliability, and operational compatibility. References in these procedures to interconnection agreement are to Grand Valley Power's interconnection agreement as provided on the cooperative's website.

2. Interconnection agreements shall survive transfer of ownership of the interconnection resource to a new owner when the new owner agrees in writing to comply with the terms of the agreement and so notifies Grand Valley Power. Alternatively, the new owner may enter into a new interconnection agreement with Grand Valley Power.
3. After receiving an interconnection agreement from Grand Valley Power, the Interconnection Customer shall have 30 business days to sign and return the interconnection agreement. If the Interconnection Customer does not sign the interconnection agreement within 30 business days, the interconnection request shall be deemed withdrawn. Grand Valley Power will provide the Interconnection Customer a fully executed interconnection agreement within two business days after receiving a signed interconnection agreement from the Interconnection Customer. After the parties sign the interconnection agreement, the interconnection of the interconnection resource shall proceed under the provisions of the interconnection agreement.
4. Once the interconnection resource has been authorized by Grand Valley Power to commence operation in parallel with Grand Valley Power's system, the Interconnection Customer shall abide by all rules and procedures pertaining to parallel operation in Grand Valley Power's tariffs and in the interconnection agreement.
5. 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. Such upgrades or facilities shall be specified in the interconnection agreement.
6. All DER facilities must comply with the specifications included in the Grand Valley Power Interconnection Guidelines.

## **G. Reasonable Efforts**

If Grand Valley Power or the Interconnection Customer cannot meet a deadline provided herein, it shall notify the Interconnection Customer or Grand Valley Power if the notifying party is the Interconnection Customer and explain the reason for the failure to meet the deadline, and provide an estimated time by which it will complete the applicable interconnection procedure in the process.

## **H. Disputes**

1. Grand Valley Power and Interconnection Customer shall agree to attempt to resolve all disputes arising out of the interconnection process according to the provisions of this subparagraph.

2. In the event of a dispute, either party shall provide the other party with written notice of dispute. Such notice shall describe in detail the nature of the dispute. If the dispute has not been resolved within five 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 (e.g., mediation, settlement judge, early neutral evaluation, or technical expert) 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.

## **I. Commissioning Tests**

Commissioning tests of the Interconnection Customer's installed interconnection resource shall be performed pursuant to applicable codes and standards, including IEEE 1547.1 "IEEE Standard Conformance Test Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems" (2020). Grand Valley Power must be given at least five business days' written notice, or as otherwise mutually agreed to by the parties, of the tests and may be present to witness the commissioning tests. Grand Valley Power shall be compensated by the Interconnection Customer for its expense in witnessing Level 2 and Level 3 commissioning tests. Grand Valley Power shall provide to the Interconnection Customer an operational approval letter within three business days after notification that the commissioning test has been successfully completed. Such letter may be provided via email.

## **J. 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.

## **K. Comparability**

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.

## **L. Record Retention**

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

## **M. Coordination with Affected Systems**

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 Grand Valley Power in all matters related to the conduct of studies and the determination of modifications to affected systems. A utility which may be an affected system shall cooperate with Grand Valley Power with which interconnection

has been requested in all matters related to the conduct of studies and the determination of modifications to affected systems and shall provide to the Interconnection Customer any analysis and data underlying the affected system utility's determinations.

## N. Insurance

1. An Interconnection Customer, at its own expense, shall secure and maintain in effect during the term of the interconnection agreement, insurance coverage in the following amounts:

<b>Non-Inverter Based Generator Facilities</b>	
<b>DER Nameplate Rating:</b>	<b>Minimum Coverage:</b>
Over 5 MW	\$3,000,000 for each occurrence
2 MW to 5 MW	\$2,000,000 for each occurrence
500 kW to 2 MW	\$1,000,000 for each occurrence
50 kW to 500 kW	\$500,000 for each occurrence
0 to 50 kW	No additional insurance

<b>Inverter Based Generator Facilities</b>	
<b>DER Nameplate Rating:</b>	<b>Minimum Coverage:</b>
Over 5 MW	\$2,000,000 for each occurrence
1 MW to 5 MW	\$1,000,000 for each occurrence
0 to 1 MW	No additional insurance

2. Colorado governmental entities that self-insure against liability in amounts above those required in the table above for interconnection resources up to 2 MW or to the replacement value of the interconnection resource for those interconnection resources above 2 MW, shall not be required to purchase additional insurance or to add Grand Valley Power as an additional insured to any policy, nor shall they be obligated to indemnify Grand Valley Power, though they shall be liable for any negligent or intentional act or omission of the municipality, its employees, contractors, subcontractors, or agents.
3. Certificates of Insurance evidencing the requisite coverage and provision(s) when required shall be furnished to Grand Valley Power prior to the date of interconnection of

the interconnection resource. Grand Valley Power shall be permitted to periodically obtain proof of current insurance coverage from the Interconnection Customer in order to verify proper liability insurance coverage. Customers will not be allowed to commence or continue interconnected operations unless they provide to Grand Valley Power evidence that satisfactory insurance coverage is in effect at all times.

## **O. 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 years or less by qualified personnel, and Certified test reports are to be sent to Grand Valley Power's designated representative.



### **3.0 LEVEL 1 PROCESS (25 kW INVERTER PROCESS)**

This process shall be used for evaluating an interconnection request for a certified inverter-based interconnection resource no larger than 25 kW AC which may be paired with a non-exporting energy storage system no larger than 25 kW AC.

#### **A. General Level 1 Procedures**

1. The Interconnection Customer completes an application and submits it to Grand Valley Power.
2. Grand Valley Power acknowledges to the customer receipt of the application within three business days of receipt.
3. Grand Valley Power evaluates the application for completeness and notifies the customer within ten business days of receipt that the application is or is not complete and, if not, advises what material is missing.
4. Within ten business days, Grand Valley Power will verify whether the interconnection resource can be interconnected safely and reliability using the following screens:
  - a) The proposed interconnection resource's point of interconnection must be on a portion of Grand Valley Power's distribution system that is subject to Grand Valley Power's tariffs. Proposed interconnection resources on highly seasonal circuits shall also be subject to the supplemental review.
  - b) For interconnection of a proposed interconnection resources to a radial distribution circuit, the aggregated generation, including the proposed interconnection resources, on the line section(s) shall not exceed 15 percent of the line section's annual peak load as most recently measured at the substation or calculated for the line section(s). A line section is that portion of a utility's electric system connected to a customer bounded by automatic sectionalizing devices or the end of the distribution line.
  - c) The proposed interconnection resource, in aggregation with other generation on the distribution circuit, shall not contribute more than ten percent to the distribution circuit's maximum fault current at the point on the distribution feeder voltage (primary) level nearest the proposed point of change of ownership.
  - d) The proposed interconnection resource, in aggregate with other interconnection resource on the distribution circuit, shall not cause any distribution protective devices and equipment (including, but not limited to, substation breakers, fuse cutouts, and line reclosers), or Interconnection Customer equipment on the system to exceed 87.5 percent of the short circuit interrupting capability; nor shall the interconnection be proposed for a circuit that already exceeds 87.5 percent of the short circuit interrupting capability.
  - e) If the proposed interconnection resource is to be interconnected on single-phase shared secondary, the aggregate generation capacity on the shared secondary, including the proposed small generating facility, shall not exceed 25 kW.

- f) If the proposed interconnection resource 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 percent of the nameplate rating of the service transformer.
  - g) No construction of facilities by Grand Valley Power on its own system shall be required to accommodate the small generating facility.
  - h) The nameplate capacity of a proposed interconnection resource, in combination with the nameplate capacity of any previously interconnected interconnection resource, shall not exceed the capacity of the customer's existing electrical service unless there is a simultaneous request for an upgrade to the customer's electrical service, regardless of exporting or non-exporting designations for any of the interconnection resources.
5. If the interconnection fails these screens, Grand Valley Power shall generally consider this a failure of the Level 2 Process screens. Grand Valley Power will continue the interconnection review under the Level 2 Process, provided that the Interconnection Customer pays the difference in the Level 2 Process application fee any deposit requirements. Grand Valley Power may also review the application within the ten-business day period to evaluate issues associated with highly seasonal circuits. However, if the proposed interconnection fails the screens, but Grand Valley Power determines that the small generating facility may nevertheless be interconnected consistent with safety, reliability, and power quality standards, Grand Valley Power will provide the Interconnection Customer an executable interconnection agreement within five business days after the determination.
6. Provided all the screening criteria of this process are met unless Grand Valley Power determines and demonstrates that the interconnection resource cannot be interconnected safely and reliably and requires upgrades, Grand Valley Power will approve and execute the application and return it to the Interconnection Customer within ten business days.
7. After installation, the Interconnection Customer returns the certificate of completion to Grand Valley Power. Prior to parallel operation, Grand Valley Power may inspect the interconnection resource for compliance with standards, which may include a witness test, and may schedule appropriate metering replacement, if necessary.

Grand Valley Power will notify the customer that parallel operation of the interconnection resource is authorized within ten business days of the certificate of completion. If the witness test is not satisfactory, Grand Valley Power has the right to disconnect the interconnection resource. The Interconnection Customer has no right to operate in parallel until a witness test has been performed or previously waived on the application. Grand Valley Power is obligated to complete this witness test within ten business days of the receipt of the certificate of completion.

## 4.0 LEVEL 2 PROCESS (FAST TRACK)

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 these Procedures.

### A. Eligibility

1. Eligibility for the Level 2 Process is determined based upon the type and size of the interconnection resource as well as the voltage of the utility line and the location of and the type of utility line at the point of interconnection. An Interconnection Customer may determine whether the interconnection resource is eligible for the Level 2 Process by requesting a pre-application report detailed in 2.0 (A).
2. For certified inverter-based systems, the size limit of the interconnection resource varies according to the voltage of the utility line at the proposed point of interconnection. Certified inverter-based interconnection resource facilities located within 2.5 electrical circuit miles of a substation and on a mainline are eligible for the Level 2 Process under the higher thresholds. On Grand Valley Power's system, a "mainline" is defined as a three-phase circuit with 600-amp construction and overhead conductors of size 336 ACSR or larger, or underground conductors of size 350 MCM or larger.

<b>Level 2 Process Eligibility for Inverter-Based Systems</b>		
<b>Line Voltage</b>	<b>Eligibility Regardless of Location</b>	<b>Eligibility Meeting Location Requirements (Mainline and Substation)</b>
< 5 kV	≤ 500 kW	≤ 500 kW
≥ 5 kV and < 15 kV	≤ 2 MW	≤ 3 MW
≥ 15 kV and < 30 kV	≤ 3 MW	≤ 4 MW
≥ 30 kV and < 69 kV	≤ 4 MW	≤ 5 MW

3.

4. All synchronous and induction facilities must be no larger than 2 MW AC to be eligible for the Level 2 Process, regardless of location.
5. In addition to the size threshold, the interconnection resource must meet the codes, standards, and certification requirements specified in certain of Grand Valley Power's Interconnection Guidelines.

## B. Initial Review

1. The Interconnection Customer must complete the interconnection request and return it to Grand Valley Power under the process described above in 3.0 (A).
2. Within 15 business days after Grand Valley Power notifies the Interconnection Customer it has received a complete interconnection request, Grand Valley Power will perform an initial review using the screens set forth below, notify the Interconnection Customer of the results, and include with the notification copies of the analysis and data underlying Grand Valley Power's determinations under the following criteria:
  - a) The proposed interconnection resource's point of interconnection must be on a portion of Grand Valley Power's distribution system that is subject to Grand Valley Power's tariffs. Proposed interconnection resources on highly seasonal circuits shall also be subject to the supplemental review.
  - b) For interconnection of a proposed interconnection resources to a radial distribution circuit, the aggregated generation, including the proposed interconnection resources, on the line section(s) shall not exceed 15 percent of the line section's annual peak load as most recently measured at the substation or calculated for the line section(s). 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. A fuse is not an automatic sectionalizing device. Energy storage system(s) capacity for purposes of this screen shall be based on section 2.0 (C).
  - c) The proposed interconnection resource, in aggregation with other generation on the distribution circuit, shall not contribute more than ten percent to the distribution circuit's maximum fault current at the point on the distribution feeder voltage (primary) level nearest the proposed point of change of ownership.
  - d) The proposed interconnection resource, in aggregate with other interconnection resource on the distribution circuit, shall not cause any distribution protective devices and equipment (including, but not limited to, substation breakers, fuse cutouts, and line reclosers), or Interconnection Customer equipment on the system to exceed 87.5 percent of the short circuit interrupting capability; nor shall the interconnection be proposed for a circuit that already exceeds 87.5 percent of the short circuit interrupting capability.
  - e) The proposed interconnection resource shall meet the rapid voltage change and flicker requirements of IEEE Standard 1453 (2015) and IEEE Standard 1547-2018, until January 1, 2022, or until such time new DERs applying for interconnection will comply with IEEE 1547-2018 based on the appropriate test.
  - f) The type of interconnection to a primary distribution line shall be determined based on the following table, including a review of the type of electrical service provided to the Interconnection Customer, line configuration, and the transformer connection to limit the potential for creating over-voltages on Grand Valley Power's electric power system due to a loss of ground during the operating time of any anti-islanding function.

g)

Primary Distribution Line Type	Type of Interconnection to Primary Distribution Line	Result/Criteria
Three-phase, three wire	3-phase or single phase, phase-to-phase	Pass screen
Three-phase, four wire	Effectively-grounded 3 phase or Single-phase, line-to-neutral	Pass screen

- h) If the proposed interconnection resource is to be interconnected on single-phase shared secondary, the aggregate generation capacity on the shared secondary, including the proposed small generating facility, shall not exceed 25 kW. Energy storage system(s) capacity for purposes of this screen shall be based on section 2.0 (C).
- i) If the proposed interconnection resource 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 percent of the nameplate rating of the service transformer.
- j) No construction of facilities by Grand Valley Power on its own system shall be required to accommodate the small generating facility.
- k) For interconnection of a proposed interconnection resource to the load side of spot network protectors serving more than a single customer, the proposed interconnection resource must utilize an inverter-based equipment package and, together with the aggregated other inverter-based interconnection resource, shall not exceed the smaller of five percent of a spot network's maximum load or 300 kW. For spot networks serving a single customer, the interconnection resource must use inverter-based equipment package and either meet the requirements above or shall use a protection scheme or operate the generator so as not to exceed on-site load or otherwise prevent nuisance operation of the spot network protectors.
- l) For interconnection of a proposed interconnection resource to the load side of area network protectors, the proposed interconnection resource must utilize an inverter-based equipment package and, together with the aggregated other inverter-based interconnection resource, shall not exceed the smaller of ten percent of an area network's minimum load or 500 kW AC.
- m) The nameplate capacity of a proposed interconnection resource, in combination with the nameplate capacity of any previously interconnected interconnection resource, shall not exceed the capacity of the customer's existing electrical service unless there is a simultaneous request for an upgrade to the customer's electrical service,

regardless of exporting or non-exporting designations for any of the interconnection resources.

### **C. Customer Options Meeting**

1. If the proposed interconnection fails the screens, but Grand Valley Power does not or cannot determine from the initial review whether the interconnection resource may nevertheless be interconnected consistent 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. Grand Valley Power will provide to the Interconnection Customer in writing with detailed information on the reasons(s) for failure.
2. If Grand Valley Power determines the interconnection request cannot be approved without minor modifications at minimal cost; without a supplemental study or other additional studies or actions; or without significant costs to address safety, reliability, or power quality problems, Grand Valley Power will notify the Interconnection Customer within the five business day period after the determination and provide the data and analyses underlying its conclusion. Within ten business days of Grand Valley Power's determination, Grand Valley Power will offer to convene a customer options meeting with Grand Valley Power to review possible Interconnection Customer facility modifications or the screen analysis and related results, to determine what further steps are needed to permit the small 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 will:
  - a) offer to perform facility modifications or minor modifications to Grand Valley Power's electric system (e.g., changing meters, fuses, relay settings) and provide a non-binding good faith estimate of the limited cost to make such modifications to Grand Valley Power's electric system;
  - b) offer to perform a supplemental review pursuant to paragraph section D below 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 study process.

### **D. Supplemental Review**

1. To accept Grand Valley Power's offer to conduct a supplemental review, the Interconnection Customer, within 15 business days of the offer, shall agree in writing to the supplemental review and submit a deposit for the estimated costs. If the written agreement and deposit have not been received by Grand Valley Power within the 15 days, the interconnection request shall continue to be evaluated under the Level 3 Process, unless the request is withdrawn by the Interconnection Customer. The Interconnection Customer shall be responsible for Grand Valley Power's actual costs for conducting the supplemental review. The Interconnection Customer 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.

2. Within 30 business days following receipt of the deposit for a supplemental review, Grand Valley Power will perform a supplemental review of the proposed interconnection resource using the screens set forth below, notify the Interconnection Customer of the results of the screens in writing, and include with the notification copies of the analysis and data underlying Grand Valley Power's determinations.
3. The Interconnection Customer may specify the order in which Grand Valley Power completes the supplemental review screens.
4. Grand Valley Power will notify the Interconnection Customer of the failure of the interconnection resource in any supplement review screen or of Grand Valley Power's inability to perform any screen for the interconnection resource. Within two business days of the receipt of such notice, the Interconnection Customer may grant Grand Valley Power permission:
  - a) to continue evaluating the proposed interconnection under this paragraph;
  - b) to continue evaluating the proposed interconnection under this paragraph subject to Grand Valley Power's determination of minor modifications;
  - c) to terminate the supplemental review and instead to continue evaluating the interconnection resource under the Level 3 Process; or
  - d) to terminate the supplemental review upon withdrawal of the interconnection request by the Interconnection Customer.

## **E. Supplemental Review Screens**

1. Minimum Load Screen:

Minimum load screens will be performed using the following criteria. Minimum load, minimum loading, and minimum load data shall be specific to time(s) that the interconnection resource exports active power to Grand Valley Power.

- a) The interconnection resource capacity on the line section(s) shall be less than 100 percent of the minimum load for all line sections bounded by automatic sectionalizing devices upstream of the proposed interconnection resource. Energy storage system(s) capacity for purposes of this screen shall be based on section 2.0 (C).
- b) This screen shall be determined using twelve months of line section(s) minimum load data (including onsite load but not station service load served by the proposed interconnection resource), calculated minimum load data, or estimated minimum load data using existing data a power flow model. If minimum load data is not available or the minimum load data cannot be calculated or estimated, Grand Valley Power shall include the reason(s) that it is unable to calculate, estimate or determine minimum load in its supplemental review results notification.

- c) The type of interconnection resource shall be taken into account when calculating or estimating circuit or line section(s) minimum load. Grand Valley Power shall use daytime minimum load for solar photovoltaic (PV) interconnection resource with no battery storage (i.e., 10 a.m. to 4 p.m. for fixed panel systems and 8 a.m. to 6 p.m. for PV systems utilizing tracking systems). Grand Valley Power shall use absolute minimum load for all other types of interconnection resource.
- d) Only the net injection into Grand Valley Power's electric system shall be considered as part of the interconnection resource when this screen is applied to interconnection resource serving some station service load.
- e) Grand Valley Power shall not consider as part of the interconnection resource the capacity known to be already reflected in the minimum load data.

2. Voltage and Power Quality Screen:

- a) In aggregate with existing interconnection resource on the circuit and line section(s), the voltage regulation on the circuit and line section(s) shall be maintained in compliance with relevant requirements under all system conditions;
- b) in aggregate with existing interconnection resource on the circuit and line section(s), the voltage fluctuation shall be within acceptable limits as defined by IEEE Standard 1453-2015 and conforming with IEEE Standard 1453-2015, while also taking into account activated inverter functionality, and by the limits defined by IEEE Standard 1547-2018.
- c) in aggregate with existing interconnection resources on the circuit and line section(s), the harmonic levels shall meet IEEE Standard 519 (2014) limits.

3. Safety and Reliability Screen:

- a) The location of the proposed interconnection resource and the aggregate interconnection resource capacity on the line section(s) shall not create impacts to safety or reliability that cannot be adequately addressed without application of the Level 3 Process.
- b) Minimum load, minimum loading, and minimum load data shall be specific to time(s) of interconnection resource export capacity.
- c) Grand Valley Power shall consider whether the line section(s) has significant minimum loading levels dominated by a small number of customers (e.g., several large commercial customers).
- d) Grand Valley Power shall consider whether the loading along the line section(s) is uniform or even given the sources of the screening data.
- e) Grand Valley Power shall consider whether the proposed interconnection resource is located in close proximity to a substation (i.e., less than 2.5 electrical circuit miles)



and whether the line section(s) from the substation to the point of interconnection is a mainline rated for normal and emergency ampacity.

- f) Grand Valley Power shall consider whether the proposed interconnection resource incorporates a time delay function to prevent reconnection of the interconnection resource to Grand Valley Power's system until system voltage and frequency are within normal limits for a prescribed time.
- g) Grand Valley Power shall consider whether operational flexibility is reduced by the proposed interconnection resource, such that transfer of the line distribution circuit/substation may trigger overloads or voltage issues.
- h) Grand Valley Power shall consider whether the proposed interconnection resource employs equipment or systems certified by a recognized standards organization to address technical issues such as, but not limited to, islanding, reverse power flow, and voltage quality.
- i) If the supplemental screening meets Grand Valley Power's determined adequacy with minor modifications, Grand Valley Power shall provide a non-binding good faith estimate of the limited cost to make such modifications to Grand Valley Power's electric system upon notification of review results.

## **F. Interconnection Agreements**

1. If the proposed interconnection passes the screens, the interconnection request shall be approved, and Grand Valley Power will provide the Interconnection Customer an executable interconnection agreement within five business days after the determination.
2. If the proposed interconnection fails the screens, but Grand Valley Power determines that the small generating facility may nevertheless be interconnected consistent with safety, reliability, and power quality standards, Grand Valley Power will provide the Interconnection Customer an executable interconnection agreement within five business days after the determination.
3. If the Interconnection Customer agrees to pay for the modifications to Grand Valley Power's electric system as identified by Grand Valley Power identified in section 4.0(C)(2)(A), Grand Valley Power will provide the Interconnection Customer with an executable interconnection agreement within ten business days of the customer options meeting.
4. If the Interconnection Customer agrees to pay for the modifications to Grand Valley Power's electric system as identified by Grand Valley Power pursuant to subparagraph 4.0(C)(2)(A), Grand Valley Power will provide the Interconnection Customer with an executable interconnection agreement within five business days of Interconnection Customer's agreement to pay.

## 5.0 LEVEL 3 PROCESS

This study process shall be used by an Interconnection Customer proposing to interconnect its interconnection resource with Grand Valley Power's system if the interconnection resource does not meet the size limitations for the Level 2 Process, is not certified; or, is certified but did not pass the Level 1 Process or Level 2 Process.

### A. Scoping Meeting

1. A scoping meeting will be held within ten business days after the interconnection request is deemed complete or as otherwise mutually agreed to by the parties. Grand Valley Power and the Interconnection Customer will bring to the meeting personnel, including system engineers and other resources as may be reasonably required to accomplish the purpose of the meeting.
2. The purpose of the scoping meeting is to discuss the interconnection request. The parties shall further discuss whether Grand Valley Power should perform a feasibility study or proceed directly to a system impact study, or a facilities study, or an interconnection agreement. If the parties agree that a feasibility study should be performed, Grand Valley Power shall provide the Interconnection Customer, as soon as possible, but not later than five 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 estimate of the cost to perform the study.
3. 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. If the Interconnection Customer elects not to perform a feasibility study, Grand Valley Power shall provide the Interconnection Customer, no later than five 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 estimate of the cost to perform the study.
4. Feasibility studies, scoping studies, and facility studies may be combined or waived for simpler projects by mutual agreement of Grand Valley Power and the Interconnection Customer. If all such studies are waived, Grand Valley Power shall provide the Interconnection Customer an executable interconnection agreement within ten business days after the scoping meeting. If the scoping meeting is also omitted by mutual agreement, Grand Valley Power shall provide the Interconnection Customer an executable interconnection agreement within ten business days after the interconnection request is deemed complete and this Level 2 Process is completed.
5. If feasibility studies, system impact studies, and facility studies are combined, or required to be completed for a single application, Grand Valley Power shall perform the combined studies within no more than 90 business days of the date upon which the Interconnection Customer authorizes Grand Valley Power to proceed with the Level 3 Process.
6. Grand Valley Power must offer a developer the opportunity to pay full fees upfront and proceed straight to the system impact study.

## **B. Feasibility Study**

1. Within 30 business days of executing a feasibility study agreement, Grand Valley Power shall perform a feasibility study. The feasibility study shall identify any potential adverse system impacts that would result from the interconnection of the interconnection resource. At its discretion, Grand Valley Power may use the Level 2 supplemental review as described in section 4.0 (D) as the feasibility study.
2. A deposit of the lesser of 50 percent of the good faith estimated feasibility study costs or earnest money of \$1,000 may be required from the Interconnection Customer.
3. The scope of and cost responsibilities for the feasibility study are 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(s).
6. If no system impact study is required and no facilities study is required for the interconnection resource, Grand Valley Power shall provide the Interconnection Customer an executable interconnection agreement within five business days after the completion of the feasibility study.

## **C. System Impact Study**

1. Within 30 business days of executing a system impact study agreement, Grand Valley Power shall perform a system impact study using the screens set forth below. A system impact study shall identify and detail the electric system impacts that would result if the proposed interconnection resource 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 system impacts are identified in the scoping meeting or shown in the feasibility study, a distribution system impact study must be performed. Grand Valley Power 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 adverse impacts on Grand Valley Power's transmission system, within five business days following transmittal of the feasibility study report, Grand Valley Power

shall send the Interconnection Customer a transmission system impact study agreement, including an outline of the transmission-supplied scope of the study and a transmission-supplied 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 system 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, Grand Valley Power 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 of the cost to perform the study, or an executable interconnection 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. A deposit of the good faith estimated costs for each system impact study may be required from the Interconnection Customer.
8. The scope of and cost responsibilities for a system impact study are described in the system impact study agreement.
9. Where transmission systems and distribution systems have separate owners, such as is the case with transmission-dependent utilities whether investor-owned or not – the Interconnection Customer may apply to the nearest utility (transmission owner, regional transmission operator, or independent utility) providing transmission service to the transmission-dependent utility to request project coordination. Affected systems shall participate in the study and provide all information necessary to prepare the study.
10. If no facilities study is required for the interconnection resource, Grand Valley Power shall provide the Interconnection Customer an executable interconnection agreement within five business days after the completion of the system impact study.

## **D. Facilities Study**

1. Within 45 business days of executing an appropriate agreement or contract, Grand Valley Power shall perform a facilities study. 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 five 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 timeframe.
2. In order to remain under consideration for interconnection, or, as appropriate, 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 include a detailed list of necessary system upgrades and an overall cost estimate, with the detailed list to indicate types of equipment, labor, operation and maintenance and other evaluated item costs, within the estimate for completing such upgrades, and identify which itemized cost estimates are uncertain and could be exceeded by 125 percent if actual upgrades are completed.
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.
5. A deposit of the good faith estimated costs for the facilities study may be required from the Interconnection Customer.
6. The scope of and cost responsibilities for the facilities study are described in a facilities study agreement.
7. 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 agreement within five business days.

## ATTACHMENT 1 - DEFINITIONS

1. "Business day" means Monday through Friday, excluding federal holidays.
2. "Distributed energy resource" or "DER" means the Interconnection Customer's source of electric power connected to Grand Valley Power's distribution grid, including retail renewable distributed generation, other small generation facilities for the production of electricity, energy storage systems, or combination of any of these elements, as identified in the interconnection request, but shall not include the interconnection facilities not owned by the Interconnection Customer. DER includes an interconnection system or a supplemental DER device that is necessary for compliance with IEEE 1547-2018, until January 1, 2022, or until such time new DERs applying for interconnection will comply with IEEE 1547 2018.
3. "Distribution system" means Grand Valley Power's facilities and equipment used to transmit electricity to ultimate usage points such as homes and industries directly from interconnection resources or from interchanges with higher voltage transmission networks which transport bulk power over longer distances. The voltage levels at which distribution systems operate differ among areas.
4. "Energy storage system" means any commercially available, customer-sited system or utility-sited system, including batteries and batteries paired with on-site generation, that does not generate energy, that is capable of retaining, storing, and delivering electrical energy by chemical, thermal, mechanical, or other means.
5. "Export capacity" means the amount of alternating current (AC) electrical energy that an interconnection resource is intended to transfer to Grand Valley Power's system across the point of interconnection.
6. "Highly seasonal circuit" means a circuit with a ratio of annual peak load to off-season peak load greater than six.
7. "Inadvertent export" means the potential condition in which a normally non-exporting or limited-exporting DER experiences a momentary export that does not exceed limitations specified in paragraph 2.0 (C).
8. "Interconnection agreement" means a contract between the Interconnection Customer and Grand Valley Power that formally documents terms and conditions related to the operation and maintenance of any DER in accordance with Grand Valley Power's tariffs.
9. "Interconnection customer" or "IC" means any entity, including Grand Valley Power, any affiliates, or subsidiaries of either, that proposes to interconnect its DER with Grand Valley Power's system.
10. "Interconnection facilities" means Grand Valley Power's interconnection facilities and the Interconnection Customer's facilities. Collectively, interconnection facilities include all facilities and equipment between the DER and the point of interconnection, including any modification, additions or upgrades that are necessary to physically and electrically interconnect the DER to Grand Valley Power's system. Interconnection facilities are sole use facilities and shall not include distribution upgrades.

11. "Interconnection request" means the Interconnection Customer's request, in accordance with any applicable Grand Valley Power tariff, to interconnect a new small generating facility, or to increase the capacity of, or make a material modification to the operating characteristics of, an existing DER that is interconnected with Grand Valley Power's system.
12. "Interconnection resource" means the Interconnection Customer's source of electric power connected to Grand Valley Power's distribution grid, including retail renewable distributed generation, other small generation facilities for the production of electricity, energy storage systems, bidirectional storage, electric vehicle chargers with vehicle to grid, vehicle to home, vehicle to building or combination of any of these elements, as identified in the interconnection request, but shall not include the interconnection facilities not owned by the Interconnection Customer. "Interconnection resource" includes an interconnection system or a supplemental DER device that is necessary for compliance with IEEE Standard 1547-2018, until January 1, 2022, or until such time new DERs applying for interconnection will comply with IEEE 1547-2018.
13. "Interconnection tariffs" are required filings from the utilities that set forth fees associated with interconnection. Tariff filings would accommodate utility-specific costs, while allowing for appropriate statewide standardization in the provisions set forth.
14. "Line section" means that portion of Grand Valley Power's electric delivery system that is connected to a customer and bounded by automatic sectionalizing devices or the end of the distribution line.
15. "Mainline" is defined as a three-phase distribution circuit with 600-amp construction and overhead conductors of size 336 ACSR or larger, or underground conductors of size 350 MCM or larger.
16. "Material modification" means a modification that has a material impact on the cost or timing of processing an application with a later queue priority date or a change in the point of interconnection. A material modification does not include, for example: a change of ownership of an interconnection resource; changes to the address of the generating facility, so long as the generating facility remains on the same parcel; a change or replacement of interconnection resource that is a like-kind substitution in size, ratings, impedances, efficiencies, or capabilities of the equipment specified in the original application; or a reduction in the capacity of the interconnection resource of ten percent or less.
17. "Minor modifications" means modifications to Grand Valley Power's distribution system or to the interconnection facilities that do not have a material impact on the cost or on the timing of an interconnection request.
18. "Non-exporting system" means an interconnection resource that is designed so that it does not intentionally transfer electrical energy to Grand Valley Power's distribution or transmission system across the point of common coupling. Such systems may be used to supply part or all of a customer's load continuously or during an outage. A system can be non-exporting by virtue of inverter programming or by some other on-site limiting element.

Non-exporting systems may or may not produce inadvertent exports as defined in paragraph (7) of this section.

19. "Operating mode" means the mode of DER operational characteristics that determines the performance during normal and abnormal conditions. For example, an operating mode such as "export only," "import only," and "no exchange."
20. "Parallel operation" means a DER facility that is connected to Grand Valley Power's system and can supply AC electricity to the Interconnection Customer simultaneously with Grand Valley Power's supply of AC electricity.
21. "Party" or "Parties" means Grand Valley Power, Interconnection Customer, or any combination thereof.
22. "Point of interconnection" means the point where the interconnection facilities connect with Grand Valley Power's system.
23. "Rated capacity" means the rated generated capacity of an inverter based generating facility determined by the DC (direct current) rating of the generating facility.
24. "Study process" means the procedure for evaluating an interconnection request that includes a Level 3 scoping meeting, feasibility study, system impact study, or facilities study.
25. "System upgrades" means the additions, modifications, and upgrades to Grand Valley Power's distribution or Commission-jurisdictional transmission system at or beyond the point of interconnection to facilitate interconnection of interconnection resources and render the service necessary to affect the Interconnection Customer's operation of interconnection resources. System upgrades do not include interconnection facilities.
26. "Transmission system" means an interconnected group of transmission lines and associated equipment for the movement or transfer of electric energy between points of supply and points at which it is transformed for delivery to customers or is delivered to other electric systems.
27. "Utility system" means the facilities owned, controlled, or operated by Grand Valley Power that are used to provide electric service under the tariff.
28. "Upgrades" means the additions and modifications to Grand Valley Power's system at or beyond the point of interconnection that are necessary to interconnect an interconnection resource. Upgrades do not include interconnection facilities.
29. "Witness Test" means the physical demonstration of the Interconnection Customer's facilities' ability to disconnect from Grand Valley Power's system in case of loss of distribution system voltage, failure of the Interconnection Customer's equipment, or other situation described in the Interconnection Guidelines. For inverter-based systems, Grand Valley Power personnel will simulate an outage on the distribution system to confirm that the inverter(s) disconnects and that there is no voltage present at the AC disconnect switch.



## **ATTACHMENT 2 - CERTIFICATION CODES & STANDARDS**

ANSI C84.1-2016 Electric Power Systems and Equipment – Voltage Ratings (60 Hertz)

ANSI/NEMA MG 1--2016, Motors and Generators

IEEE Std C37.90.1-2012, IEEE Standard Surge Withstand Capability (SWC) Tests for Protective Relays and Relay Systems

IEEE Std C37.90.2-2004, IEEE Standard Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers

IEEE Std C37.108-2002, IEEE Guide for the Protection of Network Transformers

IEEE Std C57.12.44-2014, IEEE Standard Requirements for Secondary Network Protectors

IEEE Std C62.41.2-2002/Cor 1-2012, IEEE Recommended Practice on Characterization of Surges in Low Voltage (1000V and Less) AC Power Circuits Corrigendum 1: Deletion of Table A.2 and Associated Text

IEEE Std C62.45-2002, IEEE Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000V and Less) AC Power Circuits

IEEE Std 100-2000, The Authoritative Dictionary of IEEE Standards Terms, Seventh Edition

IEEE Std 519-2014, IEEE Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems

IEEE Std 1453-2015 IEEE Recommended Practice for the Analysis of Fluctuating Installation on Power Systems

IEEE Std 1547-2018, IEEE Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces

IEEE Std 1547.1-2005, IEEE Standard Conformance Test Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems

NFPA 70 (2017), National Electrical Code

UL 1741 Inverters, Converters, and Controllers for Use in Independent Power Systems

UL 1741 SA, until January 1, 2022, or until such time new DERs applying for interconnection will comply with IEEE 1547-2018, IEEE Standards for Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources

## ATTACHMENT 3 - CERTIFICATION OF DER PACKAGES

1. Small generating facility equipment proposed for use separately or packaged with other equipment in an interconnection system shall be considered certified for interconnected operation if it has been tested in accordance with industry standards for continuous utility interactive operation in compliance with the appropriate codes and standards referenced below by any Nationally Recognized Testing Laboratory (NRTL) recognized by the United States Occupational Safety and Health Administration to test and certify interconnection equipment pursuant to the relevant codes and standards listed in Attachment 2; it has been labeled and is publicly listed by such NRTL at the time of the interconnection application; and, such NRTL makes readily available for verification all test standards and procedures it utilized in performing such equipment certification, and, with consumer 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 an 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 customer side of the point of interconnection shall be required to meet the requirements of these interconnection procedures.
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, customer-owned generators, and energy storage systems 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 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 Energy 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 consumers. The maximum size generating facilities allowed for qualified commercial and industrial consumers is 25 kW or 120% of the previous 12 months consumption history at the service location in question, but in no event shall exceed 100 kW. If there is not sufficient consumption history, Grand Valley Power will estimate the projected consumption using the best information available to it, including information provided by the consumer. 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 not be net metered by Grand Valley Power. These systems may interconnect to the Grand Valley Power system and the generator may enter into a power purchase agreement with other parties. Grand Valley Power may or may not be interested in purchasing the generated power or the generator may sell the power to other parties. Grand Valley Power will charge the generator the applicable Wheeling Rates to transfer the power over the Grand Valley Power system.

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, an 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 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.

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

Maximum Harmonic Current Distortion in percent % of I <sub>L</sub>						
I <sub>sc</sub> /I <sub>L</sub>	Individual Harmonic Order (Odd Harmonics*)					TDD
	<11	11 ≤ h <17	17 ≤ h <23	23 ≤ h <35	35 ≤ 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<sub>sc</sub> /I<sub>L</sub>.

Notes

- 1) Current distortions that result in a dc offset, e.g., half-wave converters, are not allowed.
- 2) I<sub>sc</sub>= maximum short-circuit current at PCC.
- 3) I<sub>L</sub>= 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.

Grand Valley Power’s distribution system is designed to maintain adequate Service Entrance voltages to conform to the Voltage Range A of ANSI Standard C84.1 at the “point of electric service delivery/connection”. Interconnection Customers are responsible for designing their facilities to maintain voltages within this Standard. The cost of any required modifications to Grand Valley Power’s facilities to maintain this Standard, including transformers, conductors, overcurrent protection devices, etc. will be the responsibility of the Interconnection Customer. Interconnections that are found to be causing voltage levels outside the Standard at other non-interconnection services on Grand Valley Power’s system will be disconnected until modifications are made to sufficiently mitigate the voltage problems.

## **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 of the Interconnection Procedures.

## **E. Design Review and Documentation**

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

## **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.

## **H. Interconnection Facility Capacity Limitations**

The system design capacity of the DER must meet the capacity limitation requirements of Section 1.0 (B), and the screening criteria as described Interconnection Procedures. Additionally, the capacity of the DER may not exceed the Service Entrance rated capacity or the distribution transformer rating. Any costs of required upgrades to Grand Valley Power's facilities will be the responsibility of the Interconnection Customer.

The maximum allowable capacity of a DER interconnected a single-phase line is 99.9 kW AC. DERs with capacity of 100 kW AC or higher are required to be a three-phase interconnection.

## **I. System Hosting Capacity**

The availability of hosting capacity for new interconnections will be reviewed on a first-come first-serve basis, based on the queue position described in the Interconnection Procedures. Any costs of required upgrades to Grand Valley Power's facilities accommodate a DER will be the responsibility of the applying Interconnection Customer.

## **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 an 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**

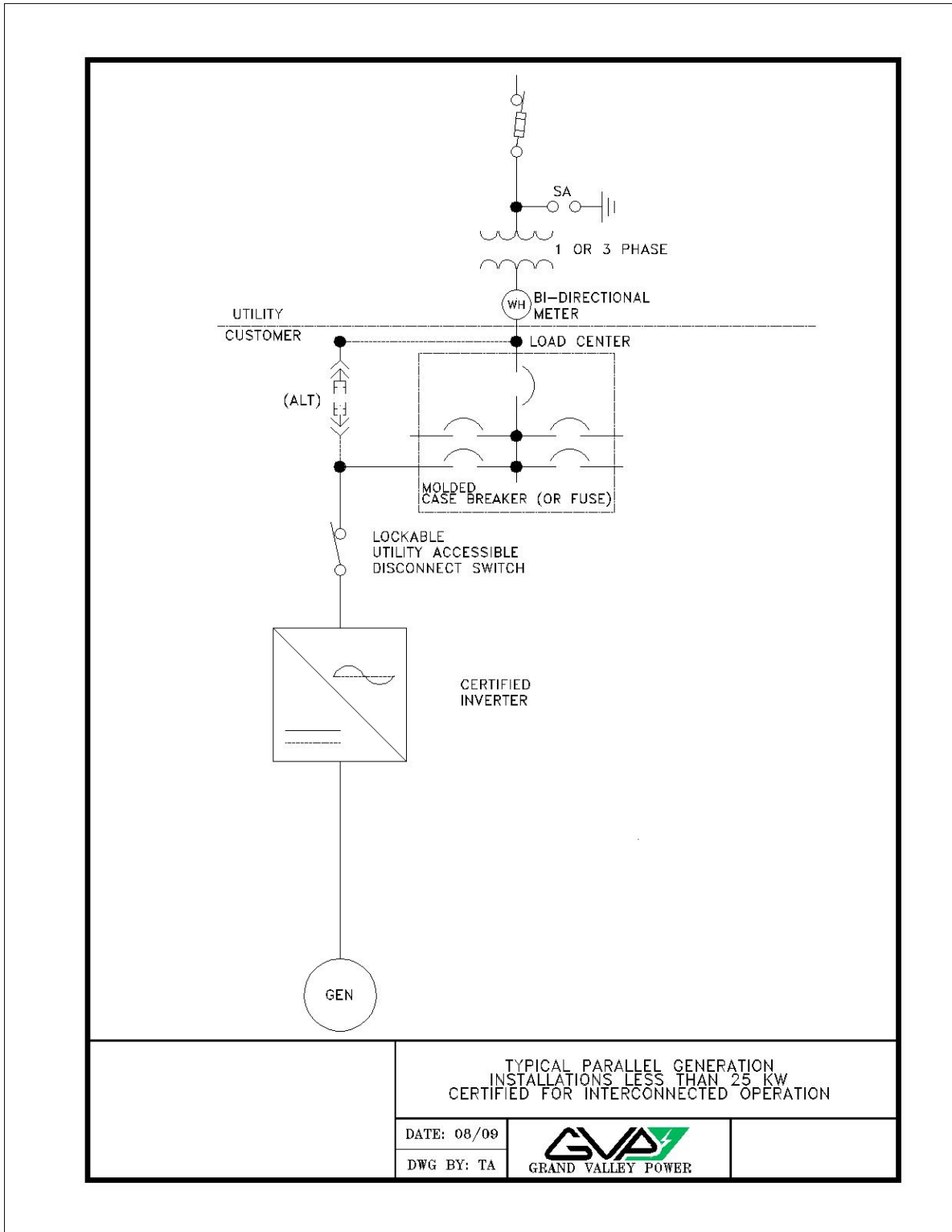
Any change to the Interconnection Customer's facility that affects the output, major components, or critical systems must be approved in writing by Grand Valley Power prior to the changes taking place. If such changes are not approved, Grand Valley Power reserves the right to disconnect the generating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

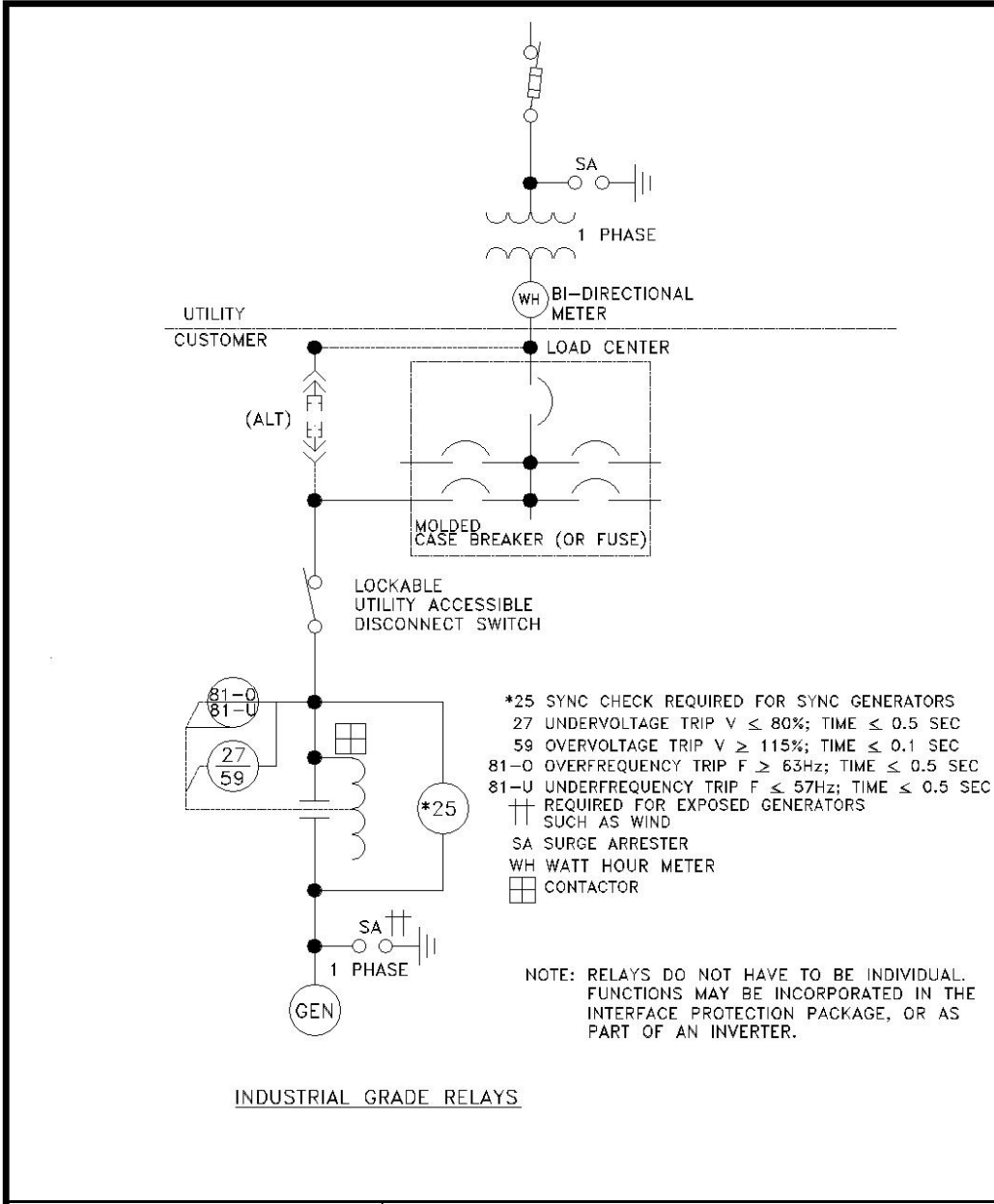
## **9.0 ANNUAL TEST GUIDELINES**

### **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. Non inverter-based installations shall have functional testing of all circuit breakers, relays and transformers must be performed yearly at the Interconnection Customer's expense, and must have a full relay calibration check performed every three years or less by qualified personnel. Certified test reports are to be sent to Grand Valley Power's designated representative.

# APPENDIX A – SYSTEM ONE-LINE DIAGRAMS





TYPICAL PARALLEL GENERATION  
 INSTALLATIONS LESS THAN 10 KW

DATE: 08/09

DWG BY: TA





