

***OG&E***  
**DISTRIBUTED ENERGY RESOURCES  
INTERCONNECTION STANDARDS**

---

**Requirements for the Interconnection of Distributed Generation or Energy Storage Systems to  
Oklahoma Gas and Electric Company's (OG&E) Distribution System**

## TABLE OF CONTENTS

---

1.0 Introduction	1
2.0 Definitions	1
3.0 OG&E Distributed Energy Resource Interconnection Process Flow Chart	3
4.0 Details of the Interconnection Process	
4.1 Inverter Based Units No Greater Than 10kW	4
4.2 Expedited Review of Installations Less Than 1 Megawatt (1000kW)	4
4.3 Full Study Process	5
5.0 Technical Requirements	6
TABLE 1 – Requirements for Automatic Approval of 10kW or Less Inverter Based Systems	7
TABLE 2 – Requirements for Small Systems – 300kW or Less	7
TABLE 3 – Requirements for Medium Systems Greater Than 300kW and Up to 1000kW (1MW)	8
TABLE 4 – Requirements for Large Systems above 1000kW (1MW)	9
6.0 Energization and Disconnect	10
7.0 Customer Responsibilities	10
Appendix 1 – Applicable Industry Standards	11
Appendix 2 – Effect of Large DERs on Feeder Protection & Power Quality	12
Appendix 3 – Labeling Requirements	14
Appendix 4 – Metering Standards	15
Appendix B-4: Typical Technical and Protection Requirements for Dedicated Feeders	18
Appendix B-5: Typical Technical and Protection Requirements for Dedicated Substations	19

## 1.0 Introduction

This document supersedes (OG&E Generation Interconnection Guidelines Rev 9/21/1999). This document states the minimum requirements for safe and effective operation of Producer-owned electric generation or energy storage systems that are interconnected with the OG&E Distribution System. Producers and OG&E personnel may be guided by this document when planning such installations. It is emphasized that these requirements are general and may not cover all details in specific cases. The Producer should discuss project plans with OG&E before purchasing or installing equipment.

OG&E will limit its review and comments to the technical requirements for interconnection of the Producer's distributed energy resource (DER) with OG&E's distribution system. The Producer is fully responsible for protecting its equipment so that disturbances on the OG&E system do not cause damage to the Producer's equipment. OG&E review of the Producer's equipment is not an endorsement of the Producer's design and OG&E shall not be responsible for the safety or adequacy of such equipment.

Producers planning an electrically isolated installation will not be subject to these guidelines. A generator or energy storage system that can never be operated parallel with the OG&E distribution system or is to be temporarily connected in parallel during a load transfer for a period of less than 100 milliseconds (1/10th of a second) is considered to be an electrically isolated system and is not required to meet the requirements of this guide. However, make-before-break transfer schemes must be approved by OG&E and must meet the requirements of Underwriters Laboratories Standard UL 1008.

This guide is not applicable to producers that plan to sell wholesale energy to the bulk electrical transmission system. All requests for interconnection to OG&E transmission facilities should be made through the Southwest Power Pool (SPP) at [www.spp.org](http://www.spp.org).

## 2.0 Definitions

**"Distributed Energy Resources"** means all sources of electric power, including generators and energy storage facilities, which are operated in parallel with the Utility distribution system. This includes rotating electrical generators, wind turbines, microturbines, Photovoltaic (PV) systems, batteries and fuel cells.

**"IEEE 1547 compliant"** means equipment that has been tested by a nationally recognized testing laboratory and verified to conform to the Institute of Electrical and Electronics Engineers (IEEE) Standard 1547.

**"Induction Machine"** means a rotating AC electrical generator similar in design to an induction motor. It is often referred to as an asynchronous machine. An induction machine acts as a motor when rotating slower than the electric system frequency but generates electricity when a prime mover such as an engine rotates the shaft faster than the system frequency.

**“Inverter”** means a device or system that changes direct current (DC) power into alternating current (AC) power that is compatible with the utility supply line. An inverter is typically composed of electronic components and is not an AC electrical generator.

**“Islanding”** is a condition where the utility source has been disconnected, but the Producer’s equipment continues to serve either its own facility load or the loads of other utility customers connected to the source feeder. Islanding of a Producer’s generation creates a safety hazard for OG&E employees.

**“Line Section”** means an OG&E feeder line or a part of a line that is connected to the Producer’s equipment and bounded by automatic sectionalizing devices.

**“Make-before-break transfer”** means load transfer equipment that makes a parallel connection to the utility before breaking the connection to the Distributed Resource or vice versa. During such transfers, the utility and the Distributed Resource are temporarily paralleled.

**“OG&E”** or **“Utility”** means Oklahoma Gas and Electric Company.

**“Parallel Operation”** means the direct connection of the Producer’s power generation or energy storage equipment to the OG&E distribution system for periods longer than 100 millisecond (1/10th of a second).

**“Parallel Operating Agreement”** is an agreement to allow connection to the OG&E system.

**“Producer”** means the owner of a non-utility electric power generation or energy storage facility.

**“Producer’s close blocked for dead line”** means the Producer’s interconnecting circuit breaker cannot be closed if the utility feeder line is not energized.

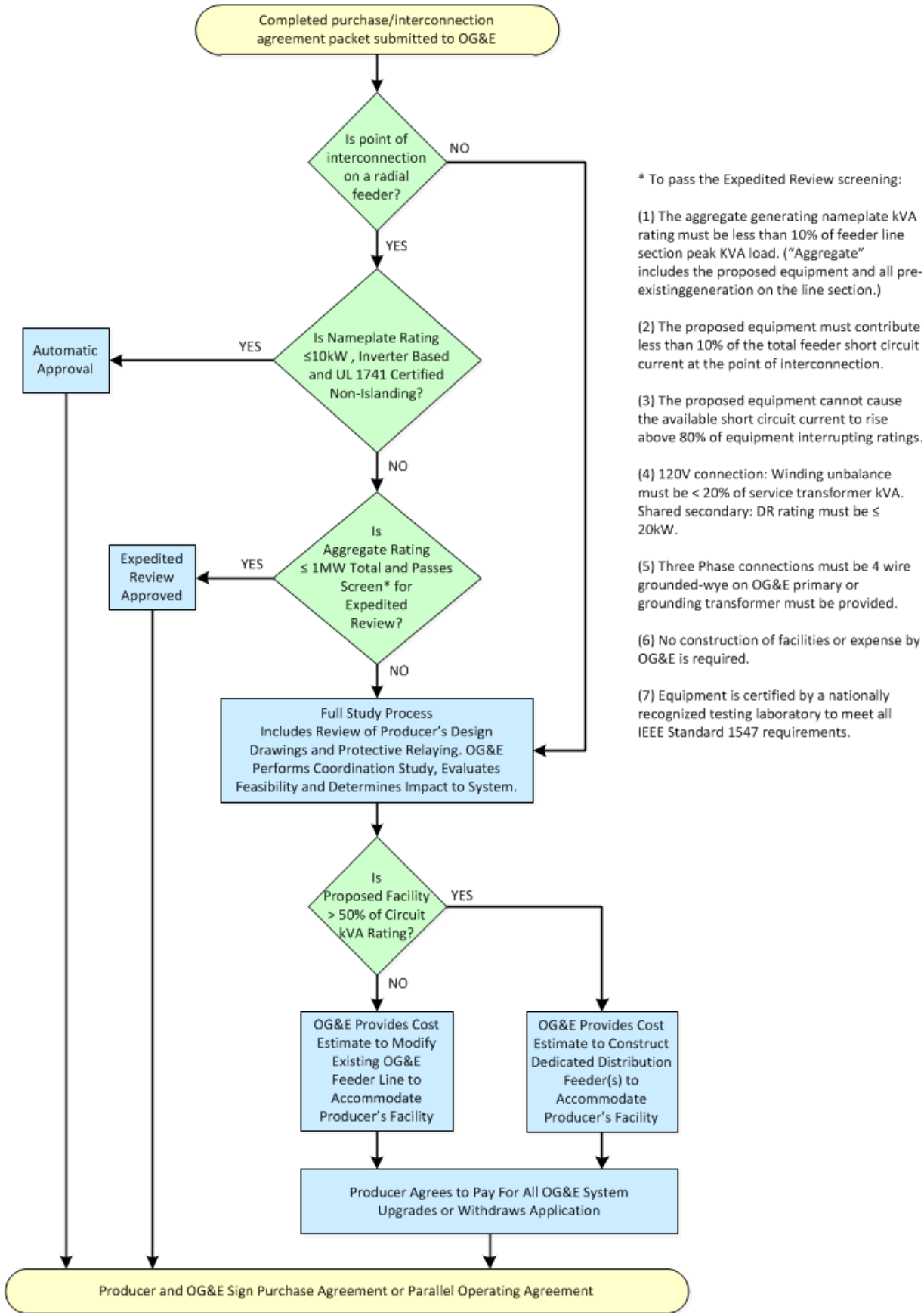
**“Synchronous Machine”** means a rotating AC electrical generator that operates in synchronism with the AC power system frequency. Synchronous generators can be severely damaged if connected out of synchronism with a utility AC distribution system.

**“Transfer Trip”** means equipment that sends a trip signal from one location to another via a communications system such as phone line, radio or fiber optics. Transfer trip is normally applied whenever large synchronous machine are connected to a utility feeder that utilizes high-speed breaker reclosing following line disturbances.

**“UL certified non-islanding inverter”** means equipment that conforms to UL -1741 standards or has been tested by another nationally recognized testing laboratory and verified to conform to applicable sections of UL-1741 for utility interactive (grid connected) inverters.

**“Utility Grade Protective Relaying”** means relays which meet the requirements of IEEE standards C37.90, C37.90.1, and C37.90.2.

### 3.0 OG&E Distributed Energy Resource Interconnection Process



## 4.0 Details of the Interconnection Process

The objective of the OG&E Interconnection Process is to meet all applicable federal, state and local regulations while conforming to all industry standards and accepted industry practices. OG&E policy adheres to the latest revision of the Institute of Electrical and Electronics Engineers (IEEE) Standard 1547, Standard for Interconnecting Distributive Resources with Electric Power Systems and IEEE Standard 1547.2, the accompanying application guide and the Oklahoma Administrative Code, Title 165. Oklahoma Corporation Commission Rules Chapter 35: Electric Utility Rates and Chapter 40: Standard Terms of Purchases from Purchasers of 300 KW or Less.

All applications will be screened and evaluated based on the rated nameplate kW of the Producer's proposed equipment, not the kW the Producer plans to generate or sell. Upon receipt of a completed application form and required information, OG&E shall perform an initial screening of the application using the following criteria.

### 4.1 Inverter Based Units No Greater Than 10kW (OAC 165:40-5-1)

UL-1741 Certified, non-islanding inverter based generating facilities of 10kW or less will be automatically approved for interconnection when the following provisions are met:

- (1) A completed application has been received by OG&E including the inverter manufacturer's proof of UL-1741 testing and certification. (OAC 165:40-5-1(c))
- (2) A visible break isolation device is provided by the producer between the inverter source and the OG&E supply circuit and shall be located outdoors within 10 feet of the main utility meter or DER meter. The disconnect must also be installed between 48" and 66" from ground level and shall be capable of being padlocked open by OG&E personnel during emergencies and/or for equipment maintenance. (OAC 165:40-5-11)
- (3) OG&E has installed appropriate metering for the installation. An additional meter base will be provided by OG&E to be installed by the Producer adjacent to the isolation device for metering the power production (DER Meter). (OAC 165:40-5-5)
- (4) The Producer and OG&E have signed a Purchase Agreement. (OAC 165:40-5-1)

### 4.2 Expedited Review of Installations Less Than or Equal to 1 Megawatt (1000kW) (OAC 165:40-5-7(c))

After receipt of a completed application and all necessary information, OG&E will screen the application to determine if the proposed facility qualifies for Expedited Review.

For an Expedited Review of a proposed interconnection to an OG&E feeder, the total nameplate capacity of all proposed generation must be no larger than 1MW and meet **ALL** of the following requirements:

- (1) The aggregate total of all non-utility generation (including the proposed facility and other pre-existing facilities) must be less than 10% of the line section's maximum peak load as last measured or calculated by OG&E.
- (2) The short circuit current contribution of the proposed facility, at the point of interconnection, must be less than 10% of the total available short circuit current.
- (3) The addition of the proposed facility shall not cause the available short circuit current to rise above 80% of the short circuit interrupt ratings of OG&E or the Producer's equipment, nor can any addition be approved (during the expedited review process) to a circuit that already exceeds this level.
- (4) Single phase installations that are to be interconnected on the center tap of a 240V secondary service shall not create an imbalance between windings of greater than 20% of the service transformer nameplate rating. If the secondary is to be shared with another customer, the aggregate of all generation on the shared secondary cannot exceed 20kW.
- (5) Proposed three phase interconnections to OG&E's primary distribution feeder must be connected four wire, grounded-wye with ground overcurrent protection. A Producer-supplied grounding transformer may be substituted for a grounded-wye connection.
- (6) No construction of facilities or expense by OG&E (other than metering) is required to accommodate the Distributed Resource interconnection.
- (7) Equipment must be certified by a Nationally Recognized Testing Laboratory to meet all IEEE Std. 1547 requirements.
- (8) The provisions described in section 4.1 shall also apply to the expedited review.

If the proposed facility fails the Expedited Review screening, the Producer may withdraw the application or continue to the Full Study Process. OG&E may elect to present options that could allow the Producer to pass the Expedited Review screening with only minimal cost to the Producer.

#### 4.3 **Full Study Process** (OAC 165:40-5-7(c))

The Full Study process is used by OG&E for review of proposed interconnection facilities:

- (1) with aggregate nameplate capacity above 1 MW.
- (2) that did not meet the 10KW and below Inverter based system requirements.
- (3) that are not greater than 1 MW but did not pass the Expedited Review Process.

If the parties agree to proceed, OG&E will perform detailed studies as required to investigate the feasibility, impact and the facilities cost of the interconnection. OG&E may elect to ask for earnest money to cover the cost of such studies. The interconnection analysis will include the preparation of a site specific technical document and detailed cost analysis for presentation to the Producer. This

document will become an appendix to a Parallel Operating Agreement (POA) to be negotiated with the Producer.

Proposed facilities larger than 1MW (1000kW) will be evaluated by OG&E on a case by case basis. Appendix 2 lists some of the possible system impacts that OG&E may consider. Additional protective equipment may be required at the OG&E substation or sectionalizing device to transfer trip the Producer's generator breaker or interconnect circuit breaker for OG&E feeder faults or when the source substation becomes isolated from the OG&E transmission grid.

Proposed facilities rated more than 50% of the OG&E feeder circuit kVA rating will require an OG&E feeder circuit dedicated solely to the Producer. OG&E will perform a feasibility analysis and determine availability at the requested location. If the location is viable, OG&E will provide a cost estimate to the Producer for constructing the new feeder. Refer to Appendix B-4 for typical requirements.

For installations where the Producer wishes to sell energy to OG&E, a communications channel with telemetering of continuous generated kW to the OG&E System Control Center is required for installations with aggregate generation above 5,000kW (5MW). Supervisory Control and Data Acquisition (SCADA) indication and/or control may be required in some circumstances.

Facilities greater than 20MW must connect to a substation that is dedicated solely to the Producer. While such installations are beyond the scope of this guide, Appendix B-5: Typical Technical and Protection Requirements for Dedicated Substations has been included for reference.

## 5.0 Technical Requirements

A visible break isolation device is provided by the producer between the DER source and the OG&E supply circuit and shall be located outdoors within 10 feet of the main utility meter or DER meter. The disconnect must also be installed between 48" and 66" from ground level and shall be capable of being padlocked open by OG&E personnel during emergencies and/or for equipment maintenance. All 3 phase disconnect switches shall be 3 pole - gang operated. (OAC 165:40-5-11)

Interconnected DER installations shall conform to all applicable safety standards, rules and guidelines contained in the National Electric Code, NFPA 70. (OAC 165:40-5-1(b))

All Interconnected DER installations must conform to the safety, protection and power quality requirements of IEEE 1547 - Standard for Interconnecting Distributed Resources with Electric Power Systems. (OAC 165:40-5-1(d))

Inverter Based DERs with nameplate ratings 300kW or less must be certified to meet UL Standard 1741 - Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources. (OAC 165:40-5-1(c))

The Producer will be responsible for providing reactive power supply requirements for any induction generator installed on the distribution system. The generator power factor at the interconnection point shall be 100%. Any power factor correction equipment must be accessible by the utility, and



must have the capability to be disconnected for safety concerns. Power factor correction equipment should be placed on the DER source side of the DER meter. (OAC 165:40-5-30)

When required, the Producer shall provide an easement to OG&E for any property required to establish the interconnection. The easement shall be at no cost to OG&E. (OAC 165:40-5-7)

Interference Complaints. When it is determined that the Producer’s generation system is the source of interference to the Company, its customers, or other utilities and their customers, it shall be the responsibility of the Producer to bear the cost of making necessary modifications to its system or to discontinue parallel operation until the problem is resolved. (OAC 165:40-5-32)

The Producer shall be aware that changes to the OG&E system or the addition of other customers with generation in the vicinity may require modifications to the interconnection protective devices. If such changes are required, the Producer may be subject to future charges for these modifications. (OAC 165:40-5-20, OAC 165:40-5-21)

**TABLE 1**

REQUIREMENTS FOR AUTOMATIC APPROVAL OF 10KW OR LESS INVERTER BASED SYSTEMS

Visible break lockable disconnect switch outdoors within 10 ft. of meter	√
Additional meter base installed for DER meter	√
Proof of UL-1741 Non-Islanding Certification	√
Shared secondary (OG&E 120/240V service transformer shared with neighbors)	Allowed

**TABLE 2**

REQUIREMENTS FOR SMALL SYSTEMS - 300KW OR LESS

300kW or less aggregate capacity and 10kW or less Inverters not qualified for automatic approval	UL – 1741 Certified Non-Islanding Inverter	Self Excited / Stand Alone Inverters	Induction Machine	Synchronous Machine
IEEE Std. 1547 Compliant	(1)	√	√	√
Visible break lockable disconnect switch outdoors within 10 ft. of meter	√	√	√	√
Additional meter base installed for DER meter	√	√	√	√
Under & Over voltage protection	(1)	√	√	√
Under & Over frequency protection	(1)	√	√	√
Overcurrent protection	(1)	√	√	√
Synchronizing provisions	(1)	Manual or Automatic		Manual or Automatic
Shared secondary (OG&E 120/240V service transformer shared with neighbors).	Allowed if rating ≤ 20kW	Allowed if rating ≤ 20kW	Allowed if rating ≤ 20kW	Allowed if rating ≤ 20kW

Table 2 Notes:

1. UL 1741 certification assures compliance with this requirement.

**TABLE 3****REQUIREMENTS FOR MEDIUM SYSTEMS GREATER THAN 300KW AND UP TO 1000KW (1MW)**

Greater than 300kW aggregate capacity & less than or equal to 1000kW	UL – 1741 Certified Non-Islanding Inverter	Self Excited / Stand Alone Inverters	Induction Machine	Synchronous Machine
IEEE Std. 1547 Compliant	(1)	√	√	√
Visible break lockable disconnect switch	√	√	√	√
Additional meter base installed for DER meter	√	√	√	√
Under & Over voltage protection	(1)	√	√	√
Under & Over frequency protection	(1)	√	√	√
Overcurrent protection	(1)	√	√	√
Synchronizing provisions	(1)	Automatic		Automatic
Reverse power protection		(2)	(2)	(2)
Effectively grounded on utility side	(3)	(3)	(3)	(3)
OG&E dead line reclose restriction		(4)	(4)	(4)
Producer's close blocked for dead line		√	√	√
Fault detection at OG&E substation and Transfer Trip of Producer's equip	(5)	(5)		(5)

## Table 3 Notes:

1. UL 1741 certification assures compliance with this requirement.
2. Reverse power protection is not required if Producer is selling electricity to OG&E. Directional overcurrent relays may be used in lieu of reverse power protection.
3. If a 3 phase transformer is utilized as part of the interconnection equipment, it must have a grounded neutral or grounding transformer on the utility side and have neutral overcurrent protection.
4. If DER nameplate kW is greater than 10% of the line section peak kVA load, but less than 10% of the total feeder load, OG&E may elect to install a pole mounted reclosing device with a dead line reclose restriction in lieu of transfer trip from the substation.
5. Transfer Trip is normally not required if aggregate generating capacity (including pre-existing capacity of other Producers) is less than 10% of the total circuit peak load as last measured.

**TABLE 4****REQUIREMENTS FOR LARGE SYSTEMS ABOVE 1000KW (1MW) UP TO 20MW**

Producer's aggregate nameplate capacity greater than 1000kW.	Inverters	Induction Machine	Synchronous Machine
Dedicated OG&E feeder circuit required	If kW > 50% of Circuit kVA	If kW > 50% of Circuit kVA	If kW > 50% of Circuit kVA
Visible break lockable disconnect switch	√	√	√
Additional meter base installed for DER meter	√	√	√
Utility Grade Protective Relaying		√	√
Under & Over voltage protection (27/59)	(1)	√	√
Under & Over frequency protection (81 U/O)	(1)	√	√
Phase Overcurrent protection (50/51)	(1)	√	√
Neutral overcurrent protection (50/51N)		√	√
Negative Phase sequence current & voltage (46/47)		√	√
Synchronizing provisions (25A)	Automatic		Automatic
Reverse power protection (32)	(2)	(2)	(2)
Effectively grounded on utility side	(3)	(3)	(3)
OG&E dead line reclose restriction	(4)	(4)	(4)
Producer's close blocked for dead line	√	√	√
Fault detection at OG&E substation and Transfer Trip of Producer's equip	kW>10% cct. peak load or >1MW (12 or 24kV) or > 2.5MW (34.5kV)	(5)	kW>10% cct. peak load or >1MW (12 or 24kV) or > 2.5MW (34.5kV)
Telemetry / SCADA	If >5MW	If >5MW	If >5MW

## Table 4 Notes:

1. UL 1741 certification assures compliance with this requirement.
2. Reverse power protection is not required if Producer is selling electricity to OG&E. Directional overcurrent relays (67) shall be used in lieu of reverse power protection.
3. If a 3 phase transformer is utilized as part of the interconnection equipment, it must have a grounded neutral or a grounding transformer with neutral overcurrent protection.
4. If DER nameplate kW is greater than 10% of the line section peak kVA load, but less than 10% of the total feeder load, OG&E may elect to install a pole mounted reclosing device with a dead line reclose restriction in lieu of transfer trip from the substation.
5. Induction generators may be able to stand alone / Island when enough power factor correction capacitors are present. OG&E reserves the right to witness an Anti-Islanding test in accordance with IEEE 1547 Section 4. Transfer Trip will be required for installations failing the test.

## 6.0 Energization and Disconnect

Upon completion, the customer's facility will be inspected and certified by a municipal, state, or federal government authority having jurisdiction. If self-installed or no government party has jurisdiction, the facility shall be inspected by a licensed electrician or licensed professional engineer. OG&E reserves the right to witness commissioning tests or operation of interconnect and related equipment, as well as inspect the producer's facilities during normal business hours. At the time of energization, OG&E will collect a certificate of completion signed by the producer and inspector. (OAC 165:40-5-8, OAC 165:40-5-31)

The utility reserves the right to refuse connection or to disconnect the producer for failure to comply with these guidelines or the applicable law, rules, and regulations. The utility also reserves the right to shed customer's load or generation to stabilize the system during emergencies, or as part of system maintenance. The producer is liable if an inability to disconnect creates hazardous conditions resulting in damage or injury. (OAC 165:40-3-30, OAC 165:40-5-1, OAC 165:40-5-32)

## 7.0 Customer Responsibilities

The producer is responsible for complying with all applicable laws, rules and regulations. Producer is also responsible for synchronization with the distribution system, and OG&E is not responsible for damages resulting from out-of-phase reclosing. The customer shall never energize a de-energized distribution circuit. The customer shall not authorize anyone to change, remove, or tamper with OG&E property, including tags or locks used for utility operations procedures. (OAC 165:40-5-2, OAC 165:40-3-31)

The customer is responsible for the easement, licensing, design, equipment, studies, protection, maintenance, and operation by qualified personnel required to accommodate power generation and/or storage. The customer will be responsible for the cost of adverse system affects, investigation, and system hardening required, as well as future modifications due to utility changes in system protection, system load, or type of service provided. After an application has been approved, any changes in project scope including but not limited to equipment type, size or rating will require that an updated application be resubmitted for approval. (OAC 165:40-5-20, OAC 165:40-5-21, OAC 165:40-5-32)

Commissioning tests and maintenance of interconnection and related equipment shall conform to the requirements of IEEE 1547. For large installations using utility grade interconnecting protective equipment, OG&E will require testing on a regular basis. All distribution generation certifications, maintenance, test results, production outage records, technical drawings, design specifications, equipment, and equipment settings must be kept up to date and be provided to OG&E upon request. (OAC 165:40-5-9)

## **Appendix 1**

### **Applicable Industry Standards**

The Producer's equipment and operation must comply with all applicable sections of the following industry standards:

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

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

IEEE Std. 1547.2 Application Guide for IEEE Standard 1547 - Standard for Interconnecting Distributed Resources with Electric Power Systems

UL Std. 1741 Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources.

UL Std. 1008 Transfer Switch Equipment

IEEE Std. 519 Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems

IEEE Std. 929 Recommended Practices for Utility Interface of Photovoltaic (PV) Systems

IEEE Std. C37.90 Standard for Relays and Relay Systems Associated with Electric Power Apparatus

IEEE Std. C37.90.1 Standard for Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus

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

NFPA 70 National Electrical Code

NEMA MG 1 Motors and Generators

## **Appendix 2**

### **Effect of Large DERs on Feeder Protection and Power Quality**

During the Full Study Process, OG&E will evaluate the system impact of large (>1MW) Distributed Energy Resources (DER), considering (but not limited to) the items listed below. Some impacts may not be apparent until the DER is commissioned and in service. If such problems arise, additional study will be required and the Producer may be required to cease operation until a solution is implemented.

Possible Impacts and Considerations:

1. The sum total of fault current from the Producer's generation and that from the OG&E substation may exceed the short circuit interrupt rating of OG&E's and/or the Producer's equipment.
2. Increased fault current from the Producer's generation may desensitize the existing feeder protection for phase faults. OG&E protective equipment may need to be adjusted to "reach", i.e. protect to the end of the feeder when generators are on-line.
3. Interconnection transformers connected delta on the Producer's side and Grounded-Wye on the Utility side may increase ground fault currents and desensitize protective equipment response to ground faults.
4. A fuse coordination study on the entire interconnected feeder may be required to assure that the increase in available fault current from the Producer does not cause nuisance fuse blowing or line recloser miscoordinations.
5. OG&E Voltage Regulators or Load Tap Changers may not work properly when power flows from the Distributed Resource towards the OG&E substation. Line drop compensation in the regulator controls may require adjustment or disabling or the regulator station may need to be moved downstream of the DER point of interconnection.
6. Wind turbines or other Distributed Resources that have rapidly varying output may cause excessive operations of Voltage Regulators, Load Tap Changers or Switched Capacitors. Switching setpoints and time delays may require adjustment.
7. Single phase equipment such as fuses, switches or reclosers that are upstream of the Producer (between the OG&E substation and the Producer) may cause operating problems for the Producer. OG&E may elect to relocate single phase equipment or replace single phase equipment with 3 phase, gang operated devices.
8. The possibility of transferring the Producer's DER to one or more other feeder circuits during maintenance or emergencies will require that any special protection installed on the normal source feeder be duplicated for all other possible sources.
9. The Producer's voltage regulation may require adjustment to assure feeder voltage is maintained between +/- 5% of nominal.

10. Inverter based DERs may cause voltage flicker or harmonic distortions that are objectionable to other OG&E customers on the interconnected feeder. OG&E may require the Producer to work with the equipment manufacturer to bring voltage flicker and harmonic content within the acceptable levels established in IEEE Standard 519.
11. Induction machines that require starting power from OG&E to bring the machine rotor up to system frequency speed may require a motor starting calculation to assure voltage flicker will be within acceptable limits.
12. OG&E's technical requirements are fashioned to greatly reduce the possibility of the Producer's DER "Islanding" with other customer loads on the interconnected line section. However, if Islanding should occur, OG&E may require the installation of additional protective equipment at the Producer's expense.

## Appendix 3

### Labeling Requirements

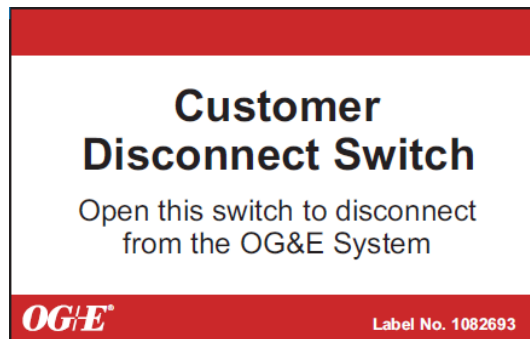


Figure 1 - Label for Customer Disconnect Switch

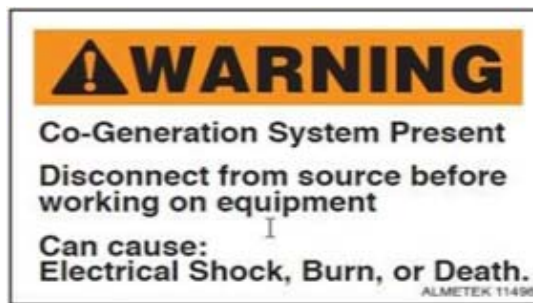


Figure 2 - Label for Net Meter Base

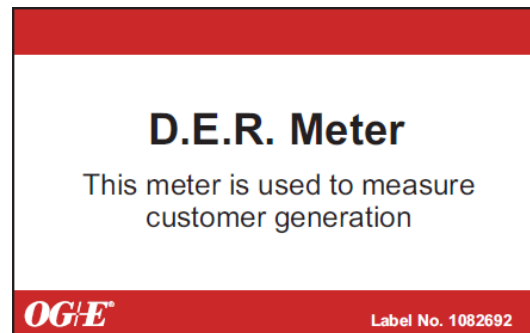


Figure 3 - Label for Generation (DER) Meter Base

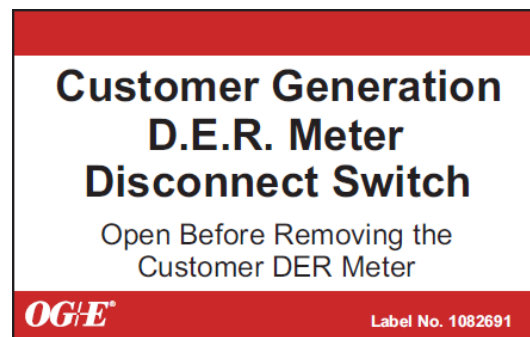


Figure 4 - Label for Generation (DER) Disconnect Switch



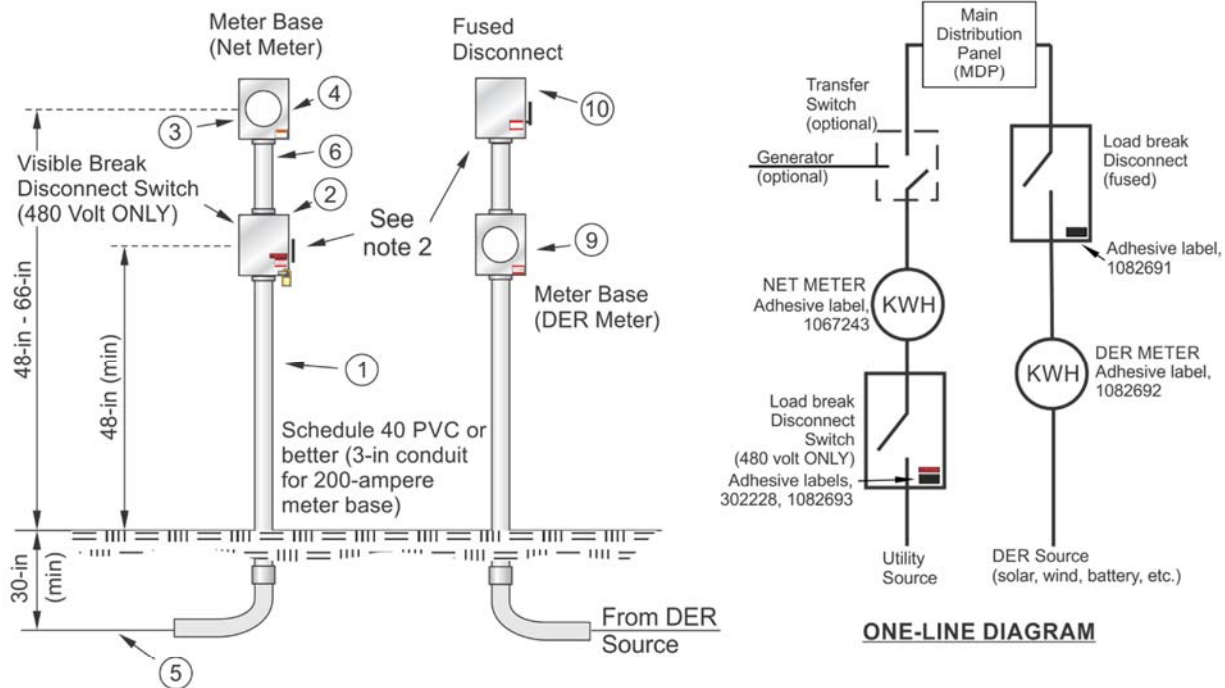
# Appendix 4

**U763.00**

UNDERGROUND STANDARD  
FIRST ISSUE - AUG 2019

OG&E Electric Services<sup>®</sup>

## OKLAHOMA ONLY



ITEM NO	DESCRIPTION	FURNISHED BY		INSTALLED BY	
		O.G. & E.	CONSUMER	O.G. & E.	CONSUMER
1.	Service Lateral Raceway		X		X
2.	Load-Break Disconnect (480 Volt Only)		X		X
3.	Meter Base	X			X
4.	Self contained meter, NET	X		X	
5.	Service Lateral	X		X	
6.	Service Raceway		X		X
* 7.	Service Equipment		X		X
* 8.	Grounding Electrode & Grounding Electrode Conductor		X		X
9.	Self-contained meter, DER	X		X	
10.	Fused Disconnect		X		X

\* Not Shown

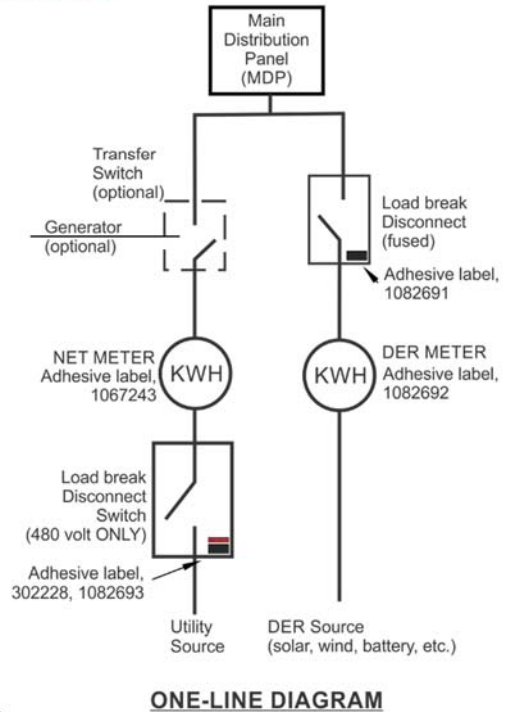
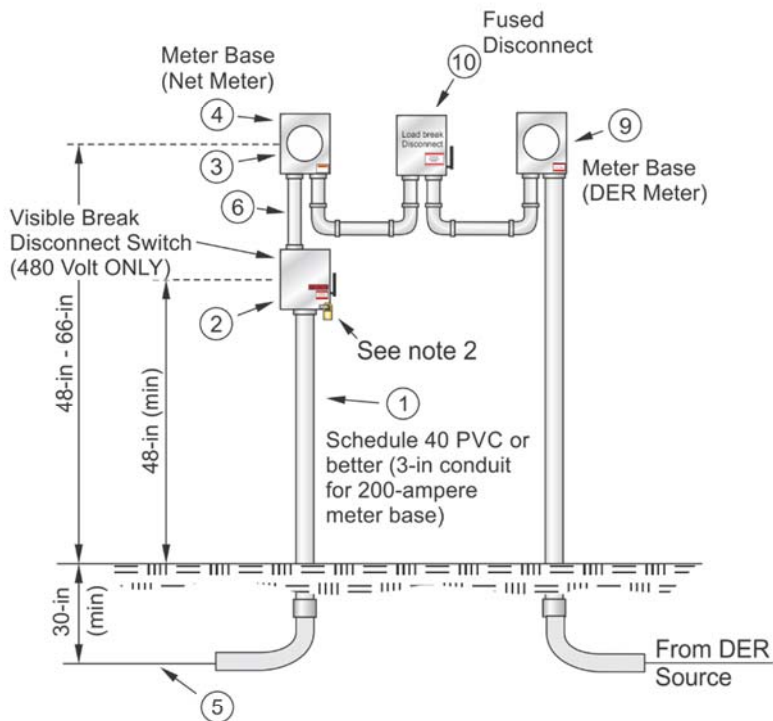
**Notes:**

1. Must comply with OG&E DER Interconnection Standards
2. OG&E to secure load-break disconnect box with series 1 lock (stk#301236).
3. OG&E equipment is to be installed on outside surface of structure and is not to be recessed.
4. Refer to U16 for proper identification and marking.
5. Refer to U760 & U760.1 for Metering Guidelines.
6. Testing and certification with completed application must be received.
7. Visible Break Isolation Device must be within 10' of main or DER Meter.
8. Meters are to be bi-directional.

**DISTRIBUTED ENERGY RESOURCE (DER) METER INSTALLATION FOR SELF-CONTAINED METERS  
120/240 & 120/208 400-AMPERES MAXIMUM, 277/480-VOLTS 200-AMPERES MAXIMUM  
DER CONNECTED THROUGH CUSTOMER MDP**

FIRST ISSUE APPROVED

## OKLAHOMA ONLY



ITEM NO	DESCRIPTION	FURNISHED BY		INSTALLED BY	
		O.G. & E.	CONSUMER	O.G. & E.	CONSUMER
1.	Service Lateral Raceway		X		X
2.	Load-Break Disconnect (480 Volt Only)		X		X
3.	Meter Base	X			X
4.	Self contained meter, NET	X		X	
5.	Service Lateral	X		X	
6.	Service Raceway		X		X
* 7.	Service Equipment		X		X
* 8.	Grounding Electrode & Grounding Electrode Conductor		X		X
9.	Self-contained meter, DER	X		X	
10.	Fused Disconnect		X		X

\* Not Shown

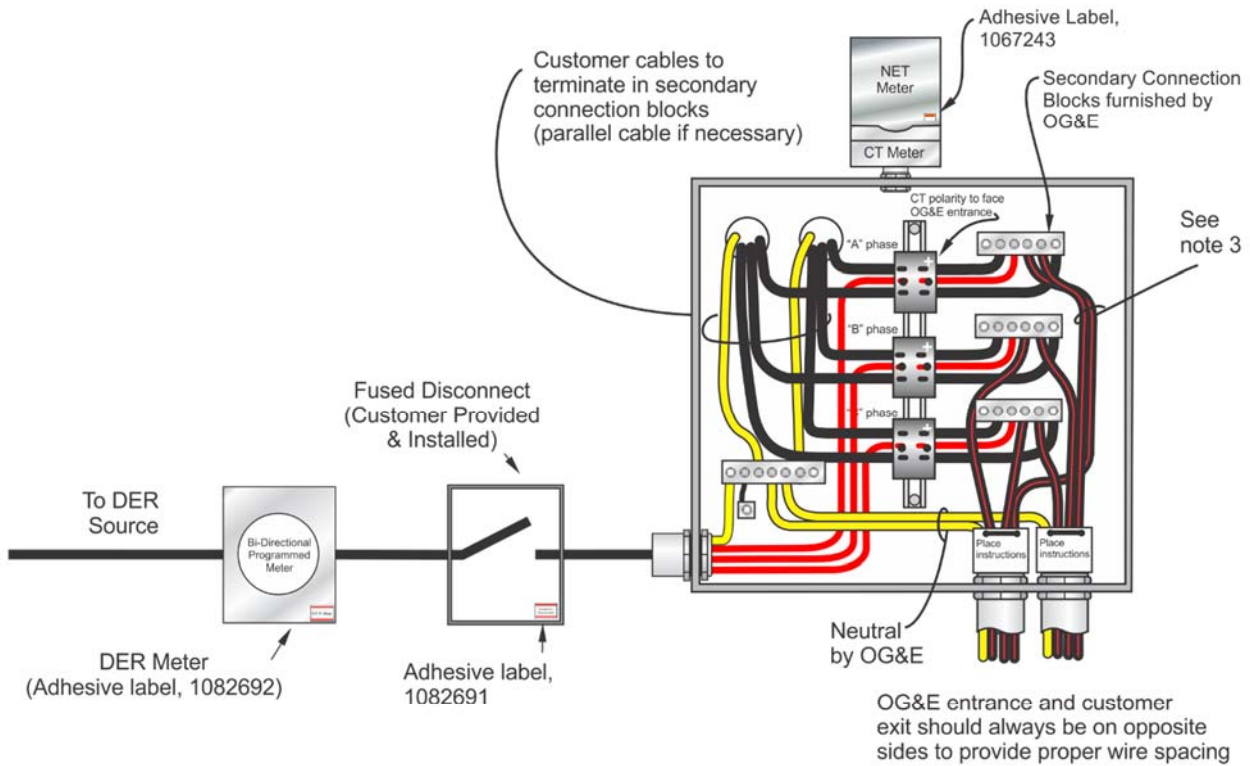
Notes:

1. Must comply with OG&E DER Interconnection Standards.
2. OG&E to secure load-break disconnect box with series 1 lock (stk#301236).
3. OG&E equipment is to be installed on outside surface of structure and is not to be recessed.
4. Refer to U16 for proper identification and marking.
5. Refer to U760 & U760.1 for Metering Guidelines.
6. Testing and certification with completed application must be received.
7. Visible Break Isolation Device must be within 10' of main or DER meter.
8. Meters are to be bi-directional

### DISTRIBUTED ENERGY RESOURCE (DER) METER INSTALLATION FOR SELF-CONTAINED METERS 120/240 & 120/208 400-AMPERES MAXIMUM, 277/480-VOLTS 200-AMPERES MAXIMUM DER NOT CONNECTED THROUGH CUSTOMER MDP

FIRST ISSUE APPROVED Signatures on File

## OKLAHOMA ONLY



**NOTES:**

1. Must comply with OG&E DER Interconnection Standards.
2. Service and metering connections made by OG&E.
3. Verify that customer has established a driven ground at their main switch panels.
4. Position supply cable to center of connector block.
5. OG&E to bond CT cabinet to neutral block using #6AWG copper wire.
6. Secure connection box #428962 with (3) Mac-It head bolts (3/8" x 1") #301404 upon energizing. Secure connection box #1009107 with series #1 padlock #301236 upon energizing.
6. See U765.1 for connection diagram for 3 phase CT Meter installation.

**TABLE 1**

STOCK ACCOUNT	CABINET DIMENSIONS	LOAD RATING
428962	30 x 36 x 14	Up to 800 AMP
1009107	42 x 48 x 14	801-1200 AMP

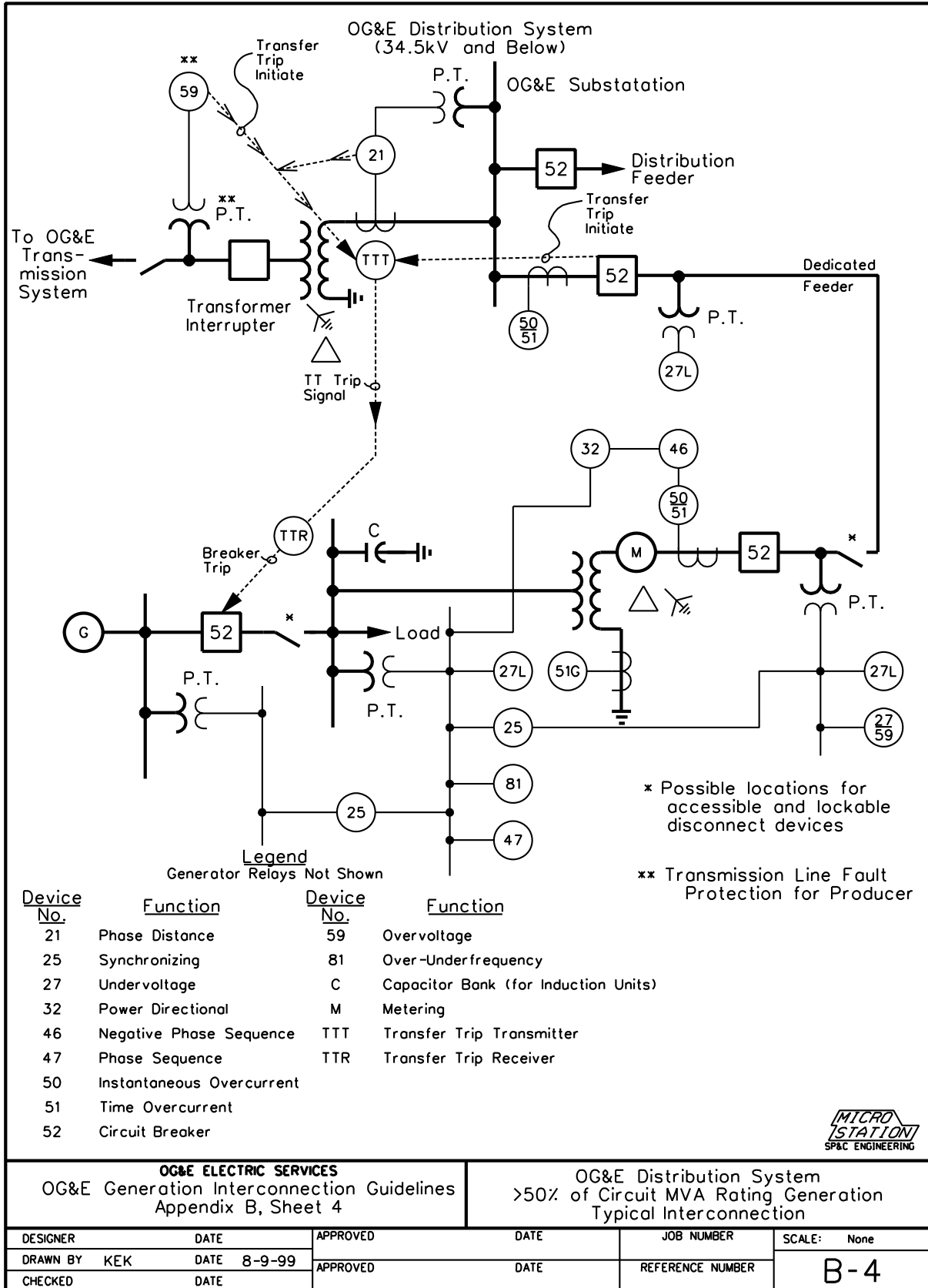
**CONNECTOR BLOCKS TABLE 2**

STOCK ACCOUNT	SECONDARY TAPS	SERVICE TAPS	MAX CURRENT
264358	2 6-AWG thru 350-KCMIL	2 6-AWG thru 350-KCMIL	600
264195	2 6-AWG thru 500-KCMIL	4 6-AWG thru 500-KCMIL	800
1019876	2 0-AWG thru 750-KCMIL	4 0-AWG thru 750-KCMIL	1200
264224	2 0-AWG thru 750-KCMIL	8 0-AWG thru 750-KCMIL	1200

**DISTRIBUTED ENERGY RESOURCE (DER) METER INSTALLATION  
FOR SINGLE OR 3 PHASE CT METERS 1200 AMP MAX.  
CONNECTION DIAGRAM**

FIRST ISSUE  
 APPROVED Signatures on File

# Appendix B-4: Typical Technical and Protection Requirements for Dedicated Feeders



OG&E ELECTRIC SERVICES  
OG&E Generation Interconnection Guidelines  
Appendix B, Sheet 4

OG&E Distribution System  
>50% of Circuit MVA Rating Generation  
Typical Interconnection

DESIGNER	DATE	APPROVED	DATE	JOB NUMBER	SCALE: None
DRAWN BY KEK	DATE 8-9-99	APPROVED	DATE	REFERENCE NUMBER	B-4
CHECKED	DATE				

# Appendix B-5: Typical Technical and Protection Requirements for Dedicated Substations

