CATEGORY 2 GENERATOR INTERCONNECTION APPLICATION

FOR ALL PROJECTS WITH AGGREGATE GENERATOR OUTPUT OF
MORE THAN 20 KW BUT LESS THAN OR EQUAL TO 150 KW

Electric Utility Contact Information

Alger Delta Cooperative Electric Association
Interconnection Coordinator
426 N. 9th St.
Gladstone, MI 49837
Interconnection Hotline: 906.428.4141
Interconnection Email: tharrell@algerdelta.com

For Office Use Only
Application No._____
Date & Time Application Received

Customer / Account Information

Electric Utility Customer Information: (As shown on utility bill)

Customer Name (Last, First, Middle):	
Customer Mailing Address:	
Customer E-Mail Address: (optional)	
Electric Service Account #	
Electric Service Meter Number:	

Are you interested in selling Renewable Energy Credits (REC's) ☐ Yes ☐ No

Generation System Site Information

Physical Site Service Address (if not Billing Address):	
Annual Site Requirements Without Generation in Kilowatthours	kWh/year
Peak Annual Site Demand in Kilowatts (only for customers billed on demand rates)	kW/year
Attached Site Plan:	Page #
Attached Electrical One-Line Drawing (See the Appendix D for a sample Inverter Type Project) (Per MPSC Order in Case No. U-15787- The one-line diagram must be signed and sealed by a licensed professional engineer, licensed in the State of Michigan or by an electrical contractor licensed by the State of Michigan with the electrical contractor's license number noted on the diagram.)	Page #

Synchronous/Induction Generators: Must fill out Appendix A or B and provide a Detail One-Line Diagram Page #
See Appendix E and F for a sample the Detail One-Line Diagram for Synchronous or Induction projects
Note: The following information on these system components shall appear on the preliminary Detail One-Line Diagram

- Breakers - Rating, location and normal operating status (open or closed)
- Buses - Operating voltage
- Capacitors - Size of bank in Kvar
- Circuit Switchers - Rating, location and normal operating status (open or closed)
- Current Transformers - Overall ratio, connected ratio
- Fuses - normal operating status, rating (Amps), type
- Generators - Capacity rating (kVA), location, type, method of grounding
- Grounding Resistors - Size (ohms), current (Amps)
- Isolating transformers - Capacity rating (kVA), location, impedance, voltage ratings, primary and secondary connections and method of grounding
- Potential Transformers - Ratio, connection
- Reactors - Ohms/phase
- Relays - Types, quantity, IEEE device number, operator lines indicating the device initiated by the relays.
- Switches - Location and normal operating status (open or closed), type, rating
- Tagging Point - Location, identification

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Generation System - Manufacturer Information

System Type (Solar, Wind, Biomass, Methane Digester, etc):	
Generator Type (Inverter, Induction, Synchronous):	
Total Generator(s) Nameplate AC Rating:	kW
Total Generator(s) Nameplate DC Rating (solar only):	kW
Expected Annual Output in Kilowatthours	kWh/year
AC Output Operating Voltage:	
Generator Wiring Configuration (Single Phase, Three Phase):	
Is the Inverter tested to IEEE1547.1?	☐ Yes ☐ No o Not Applicable

Inverter Based Systems:

Manufacturer	
Model (Name / Number)	
Inverter Output Power Rating (kW)	
No. of Inverter(s)	

Induction & Synchronous Based Systems

Manufacturer	
Model (Name / Number)	

Installation Information

Project Single Point of Contact: (Electric Utility Customer, Developer, or other)

Name:	
Company (If Applicable):	
Phone Number:	
E-Mail Address:	
Requested In Service Date:	
Licensed Professional Engineer Name (If applicable)	
Licensed Electrical Contractor Name (If applicable)	
Electrical Contractor/PE Phone #:	
Electrical Contractor/PE E-Mail:	

Customer and Contractor Signature and Fees

☐ Attached $100 Interconnection Application Fee

(Check # / Money Order #) _____

(Sign and Return complete application with Application Fee to Electric Utility Contact)
To the best of my knowledge, all the information provided in this Application Form is complete and correct.

_____ **Customer**

_____ **Project Developer/Contractor (If Applicable)**

Note: Refer to the applicable "Michigan Electric Utility Generator Interconnection Procedures" for a detailed explanation of the Interconnection Process, Fees, Timelines, and Technical Requirements.

APPENDIXES

Appendix A: Technical Information for Synchronous-Type Generators
Appendix B: Technical Information for Induction-Type Generators
Appendix C: Sample Site Plan
Appendix D: Sample One-Line diagram for Inverter Type Project
Appendix E: Sample One-Line diagram for Synchronous Type Project
Appendix F: Sample One-Line diagram for Induction Type Project

Appendix A

Synchronous Generators

Generator Information

a. Generator Nameplate Voltage	a.
b. Generator Nameplate Watts or Volt-Amperes	b.
c. Generator Nameplate Power Factor (pf)	c.
d. RPM	d.

Technical Information

e. Minimum and Maximum Acceptable Terminal Voltage	e.
f. Direct axis reactance (saturated)	f.
g. Direct axis reactance (unsaturated)	g.
h. Quadrature axis reactance (unsaturated)	h.
i. Direct axis transient reactance (saturated)	i.
j. Direct axis transient reactance (unsaturated)	j.
k. Quadrature axis transient reactance (unsaturated)	k.
l. Direct axis sub-transient reactance (saturated)	l.
m. Direct axis sub-transient reactance (unsaturated)	m.
n. Leakage Reactance	n.
o. Direct axis transient open circuit time constant	o.
p. Quadrature axis transient open circuit time constant	p.
q. Direct axis subtransient open circuit time constant	q.
r. Quadrature axis subtransient open circuit time constant	r.
s. Open Circuit saturation curve	s.
t. Reactive Capability Curve showing overexcited and underexcited limits (Reactive Information if non-synchronous)	t.
u. Excitation System Block Diagram with values for gains and time constants (Laplace transforms)	u.
v. Short Circuit Current contribution from generator at the Point of Common Coupling	v.
w. Rotating inertia of overall combination generator, prime mover, couplers and gear drives	w.
x. Station Power load when generator is off-line, Watts, pf	x.
y. Station Power load during start-up, Watts, pf	y.
z. Station Power load during operation, Watts, pf	z.

Appendix B

Induction Generators

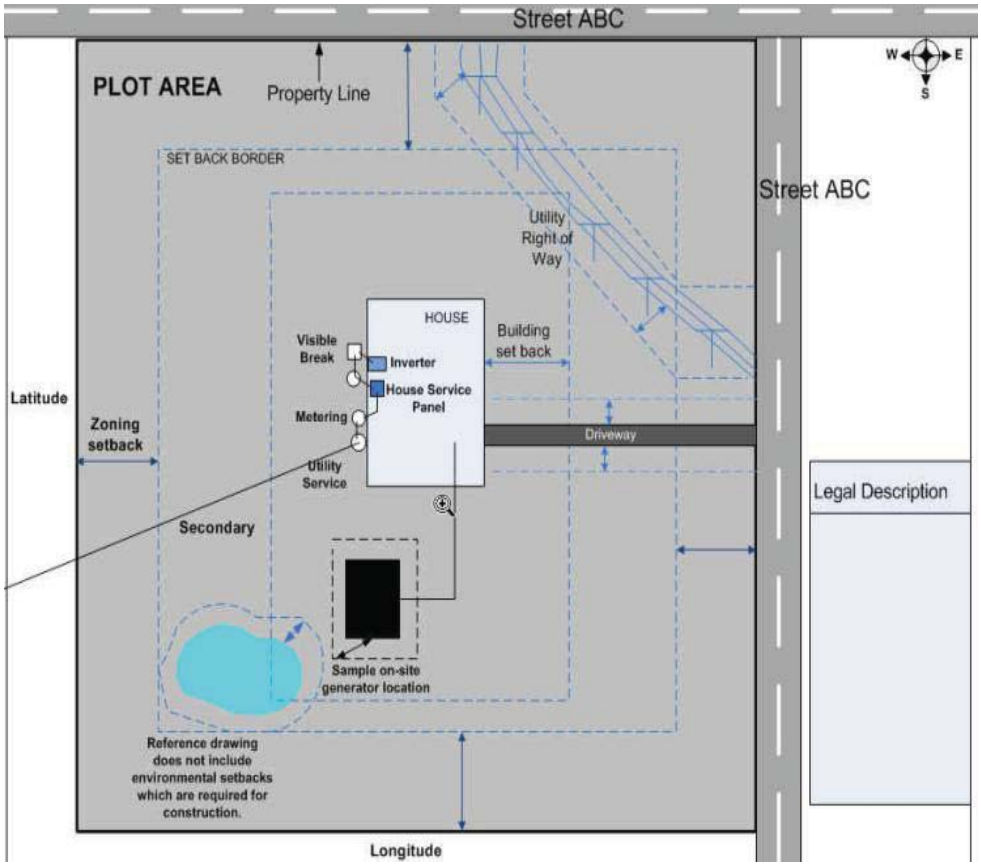
Generator Information

a. Generator Nameplate Voltage	a.
b. Generator Nameplate Watts or Volt-Amperes	b.
c. Generator Nameplate Power Factor (pf)	c.
d.RPM	d.

Technical Information

e. Synchronous Rotational Speed	e.
f. Rotation Speed at Rated Power	f.
g. Slip at Rated Power	g.
h. Minimum and Maximum Acceptable Terminal Voltage	h.
i. Motoring Power (kW)	i.
j. Neutral Grounding Resistor (If Applicable)	j.
k. I_2^2t or K (Heating Time Constant)	k.
l. Rotor Resistance	l.
m. Stator Resistance	m.
n. Stator Reactance	n.
o. Rotor Reactance	o.
p. Magnetizing Reactance	p.
q. Short Circuit Reactance	q.
r. Exciting Current	r.
s. Temperature Rise	s.
t. Frame Size	t.
u. Design Letter	u.
v. Reactive Power Required in Vars (No Load)	v.
w. Reactive Power Required in Vars (Full Load)	w.
x. Short Circuit Current contribution from generator at the Point of Common Coupling	x.
y. Rotating inertia, H in Per Unit on kVA Base, of overall combination generator, prime mover, couplers and gear drives	y.
z. Station Power load when generator is off-line, Watts, pf	z.
aa. Station Power load during start-up, Watts, pf	aa.
bb. Station Power load during operation, Watts, pf	bb.

Appendix C: Sample Site Plan - Provided for Reference Only



Customer Name: _____

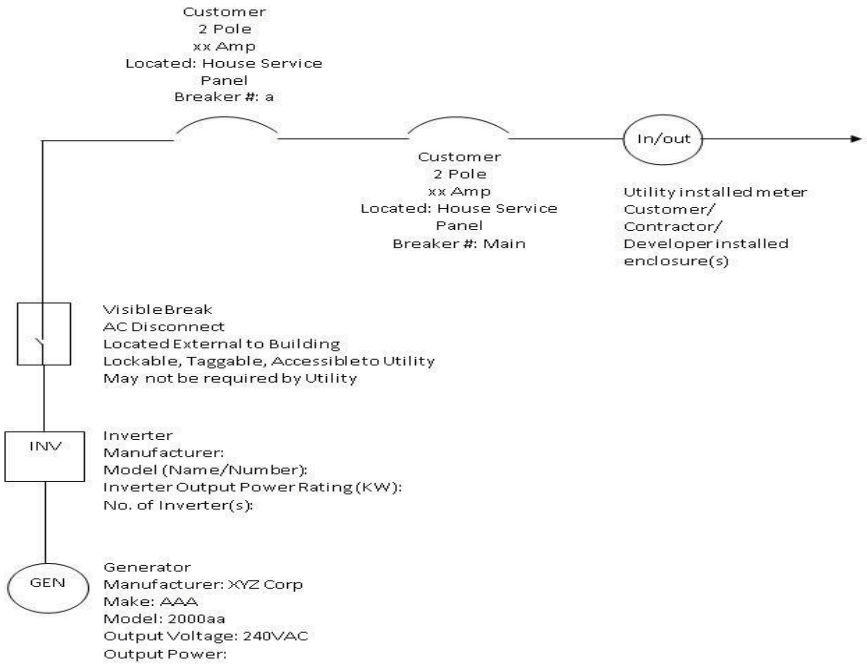
Project Site Address: _____

_____

Site Plan Prepared By: _____

Prepared Date: _____

Appendix D - Sample One Line Drawing for Net Metering Inverter Based Generators



NOTE: One-line diagram must be signed and sealed by a licensed Professional Engineer, licensed in the State of Michigan or by an electrical contractor licensed by the State of Michigan

Customer Name: _____

Project Site Address: _____

_____

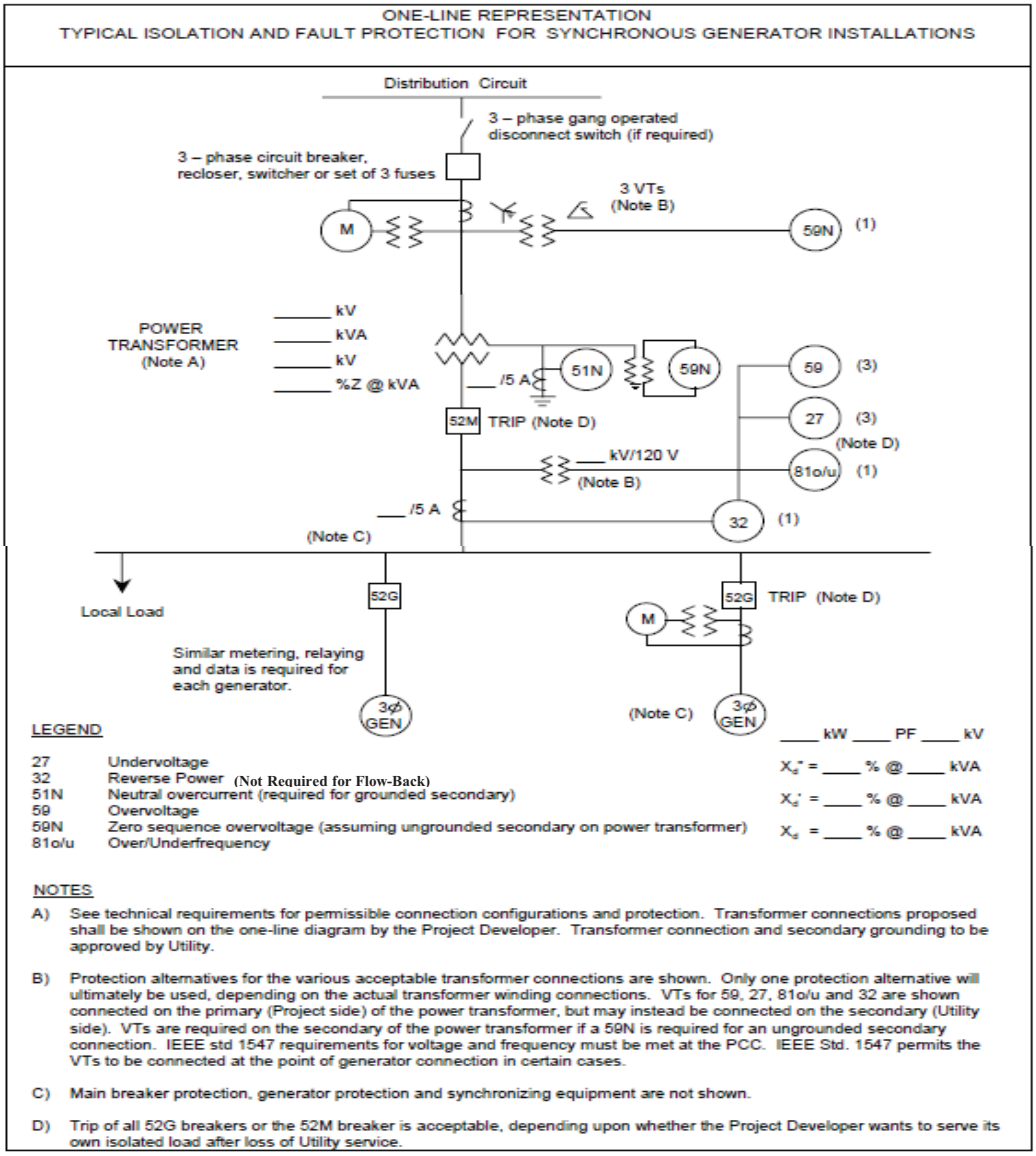
Licensed Professional Engineer Name (If applicable): _____

Licensed Professional Engineer Signature: _____

Electrical Contractor License Number: _____

Date: _____

Appendix E: Sample One-Line Drawing for Synchronous Generators



NOTES

A) See technical requirements for permissible connection configurations and protection. Transformer connections proposed shall be shown on the one-line diagram by the Project Developer. Transformer connection and secondary grounding to be approved by Utility.

B) Protection alternatives for the various acceptable transformer connections are shown. Only one protection alternative will ultimately be used, depending on the actual transformer winding connections. VTs for 59, 27, 81o/u and 32 are shown connected on the primary (Project side) of the power transformer, but may instead be connected on the secondary (Utility side). VTs are required on the secondary of the power transformer if a 59N is required for an ungrounded secondary connection. IEEE std 1547 requirements for voltage and frequency must be met at the PCC. IEEE Std. 1547 permits the VTs to be connected at the point of generator connection in certain cases.

C) Main breaker protection, generator protection and synchronizing equipment are not shown.

D) Trip of all 52G breakers or the 52M breaker is acceptable, depending upon whether the Project Developer wants to serve its own isolated load after loss of Utility service.

NOTE: One-line diagram must be signed and sealed by a licensed Professional Engineer, licensed in the State of Michigan or by an electrical contractor licensed by the State of Michigan

Customer Name: _____

Project Site Address: _____

_____

Licensed Professional Engineer Name (If applicable): _____

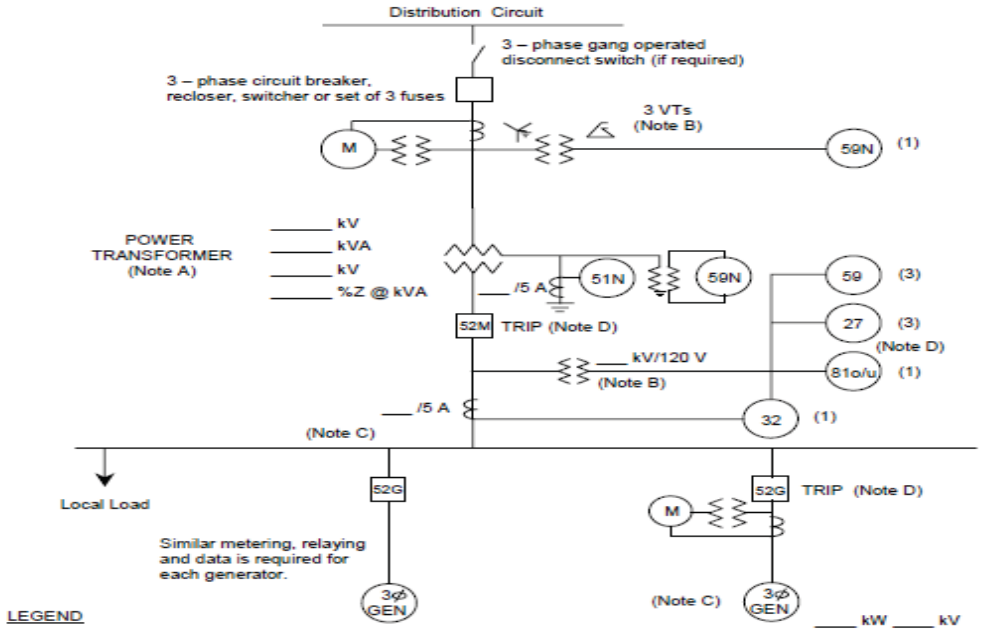
Licensed Professional Engineer Signature: _____

Electrical Contractor License Number: _____

Date:

Appendix F: Sample One-Line Drawing for Induction Generators

ONE-LINE REPRESENTATION
TYPICAL ISOLATION AND FAULT PROTECTION FOR INDUCTION GENERATOR INSTALLATIONS



LEGEND

27	Undervoltage
32	Reverse Power (Not Required for Flow-Back)
51N	Neutral overcurrent (required for grounded secondary)
59	Overvoltage
59N	Zero sequence overvoltage (assuming ungrounded secondary on power transformer)
81o/u	Over/Underfrequency

NOTES

A) See technical requirements for permissible connection configurations and protection. Transformer connections proposed shall be shown on the one-line diagram by the Project Developer. Transformer connection and secondary grounding to be approved by Utility.

B) Protection alternatives for the various acceptable transformer connections are shown. Only one protection alternative will ultimately be used, depending on the actual transformer winding connections. VTs for 59, 27, 81o/u and 32 are shown connected on the primary (Project side) of the power transformer, but may instead be connected on the secondary (Utility side). VTs are required on the secondary of the power transformer if a 59N is required for an ungrounded secondary connection. IEEE std 1547 requirements for voltage and frequency must be met at the PCC. IEEE Std. 1547 permits the VTs to be connected at the point of generator connection in certain cases.

C) Main breaker protection, generator protection and synchronizing equipment are not shown.

D) Trip of all 52G breakers or the 52M breaker is acceptable, depending upon whether the Project Developer wants to serve its own isolated load after loss of Utility service.

NOTE: One-line diagram must be signed and sealed by a licensed Professional Engineer, licensed in the State of Michigan or by an electrical contractor licensed by the State of Michigan

Customer Name: _____

Project Site Address: _____

_____

Licensed Professional Engineer Name (If applicable): _____

Licensed Professional Engineer Signature: _____

Electrical Contractor License Number: _____

Date: