



GENERATOR INTERCONNECTION APPLICATION

Category 2

**For All Projects with Aggregate Generator Output of
More Than 20 kW but Less Than or Equal to 150 kW**

ELECTRIC UTILITY CONTACT INFORMATION		FOR OFFICE USE ONLY	
Consumers Energy Interconnection Coordinator 1945 West Parnall Road (Room P14-205) Jackson, MI 49201 (517)788-1432 Interconnection E-mail: customer_generation@cmsenergy.com		Application Number Date and Time Application Received	
CUSTOMER / ACCOUNT INFORMATION <small>Electric Utility Customer Information (As shown on utility bill)</small>			
Customer Name (Last, First, Middle)		Customer Mailing Address	
Customer Phone Number ()		Customer E-mail Address (Optional)	
Electric Service Account Number		Electric Service Meter Number	
Are you interested in selling Renewable Energy Credits (REC's)? <input type="checkbox"/> Yes <input type="checkbox"/> No			
GENERATION SYSTEM SITE INFORMATION			
Physical Site Service Address (If Not Billing Address)			
Annual Site Requirements Without Generation in kWh kWh/year	Peak Annual Site Demand in kW (only for customers billed on Demand Rates) kW	Attached Site Plan Page # _____	
Attached Electrical One-Line Drawing Page # _____ (Per MPSC Order in Case No. U-15787 – The One-Line Drawing 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.) <ul style="list-style-type: none"> See page 5 for sample Site Plan See Page 6 for sample of Inverter Generator Electrical One-Line Drawing See Page 7 for sample of Synchronous Generator Electrical One-Line Drawing See Page 8 for sample of Induction Generator Electrical One-Line Drawing 			
GENERATION SYSTEM MANUFACTURER INFORMATION			
System Type (Solar, Wind, Biomass Methane Digester, etc.)		Generator Type (Inverter, Induction, Synchronous)	
Total Generator(s) Nameplate DC Rating (Solar Only) kW		Total Generator(s) Nameplate AC Rating kW	
A.C. Operating Voltage		Wiring Configuration (Single Phase, Three Phase)	
Expected Annual Output in Kilowatt Hours		Is the Inverter tested to IEEE 1547.1? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not Applicable	

INVERTER GENERATOR - BASED SYSTEMS

Manufacturer	Model (Name/Number)	Inverter Power Rating (kW)	Number of Inverters
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SYNCHRONOUS AND INDUCTION GENERATOR - BASED SYSTEMS
(Must complete either Page 3 or Page 4 and attach Electrical One-Line Drawing)

The following information on these system components shall appear on the Electrical One-Line Drawing:

- 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

Manufacturer	Model Name	Model Number
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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 Contractor (Name of Firm or Self)		
Contractor Name (Last, First, MI)	Contractor Phone Number	Contractor E-mail

CUSTOMER AND PROJECT DEVELOPER/CONTRACTOR SIGNATURES AND FEES

Attached \$100 Interconnection Application Fee

Check # _____ Money Order # _____

Sign and Return Completed 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 Signature _____ Date _____

Project Developer/Contractor Signature (If Applicable) _____ Date _____

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

SYNCHRONOUS GENERATORS**GENERATOR INFORMATION**

Generator Nameplate Voltage	Generator Nameplate Watts or Volt-Amperes
Generator Nameplate Power Factor (pf)	RPM

TECHNICAL INFORMATION

Minimum and Maximum Acceptable Terminal Voltage	Direct Axis Sub-Transient Reactance (saturated)
Direct Axis Reactance (saturated)	Direct Axis Sub-Transient Reactance (unsaturated)
Direct Axis Reactance (unsaturated)	Leakage Reactance
Quadrature Axis Reactance (unsaturated)	Direct Axis Transient Open Circuit Time Constant
Direct Axis Transient Reactance (saturated)	Quadrature Axis Transient Open Circuit Time Constant
Direct Axis Transient Reactance (unsaturated)	Direct Axis Sub-Transient Open Circuit Time Constant
Quadrature Axis Transient Reactance (unsaturated)	Quadrature Axis Sub-Transient Open Circuit Time Constant
Open Circuit Saturation Curve	
Reactive Capability Curve Showing Overexcited and Underexcited Limits (Reactive Information if Non-Synchronous)	
Excitation System Block Diagram with Values for Gains and Time Constants (Laplace Transforms)	
Short Circuit Current Contribution From Generator at the Point of Common Coupling	
Rotating Inertia of Overall Combination Generator, Prime Mover, Couplers and Gear Drives	
Station Power Load When Generator is Off-Line, Watts, pf	
Station Power Load During Start-Up, Watts, pf	
Station Power Load During Operation, Watts, pf	

INDUCTION GENERATORS**GENERATOR INFORMATION**

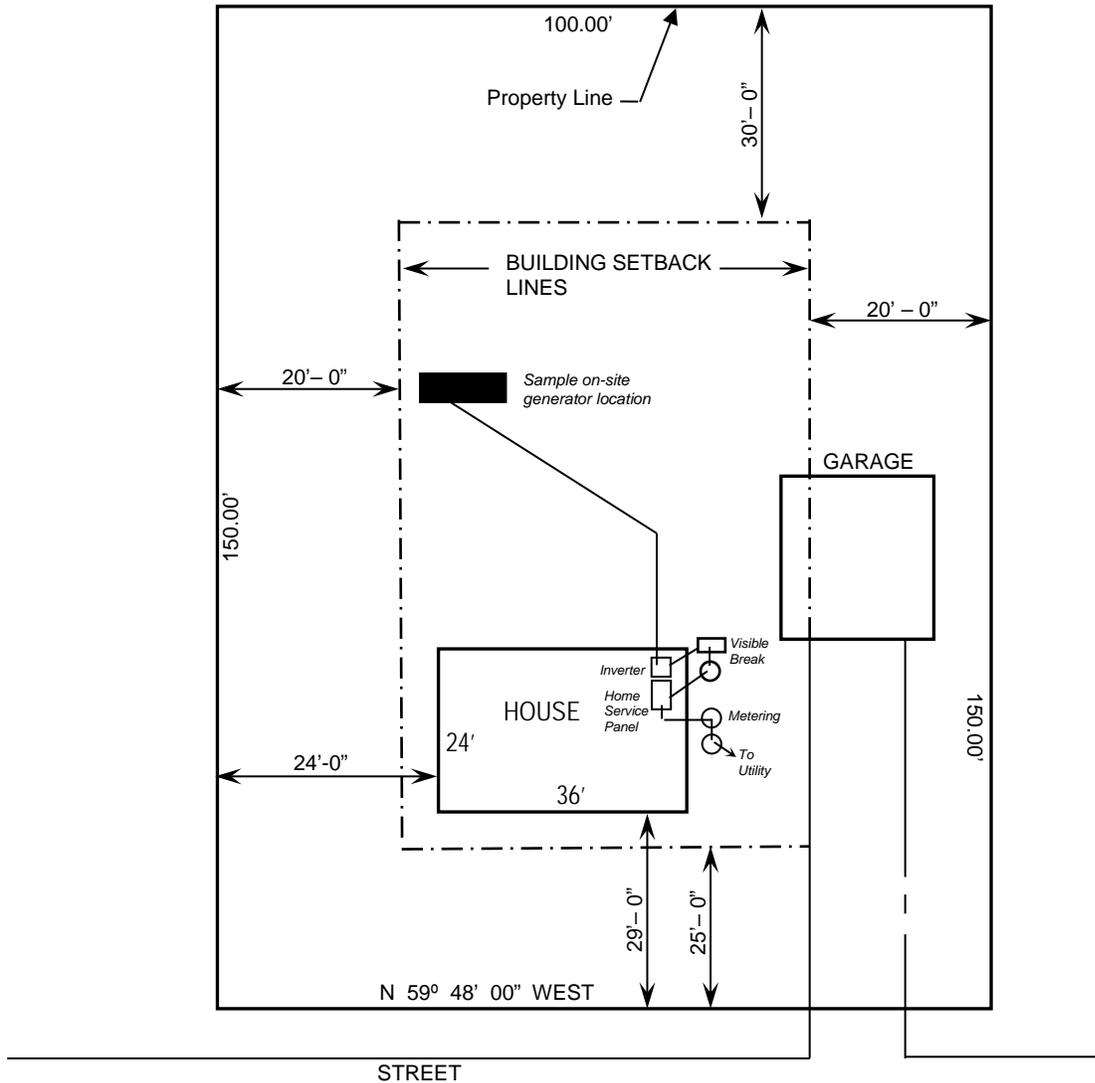
Generator Nameplate Voltage	Generator Nameplate Watts or Volt-Amperes
Generator Nameplate Power Factor (pf)	RPM

TECHNICAL INFORMATION

Synchronous Rotational Speed	Stator Resistance
Rotation Speed at Rated Power	Stator Reactance
Slip at Rated Power	Rotor Reactance
Minimum and Maximum Acceptable Terminal Voltage	Magnetizing Reactance
Motoring Power (kW)	Short Circuit Reactance
Neutral Grounding Resistor (If Applicable)	Exciting Current
½ 2t or K (Heating Time Constant)	Temperature Rise
Rotor Resistance	Frame Size
Design Letter	
Reactive Power Required in Vars (No Load)	
Reactive Power Required in Vars (Full Load)	
Short Circuit Current Contribution from Generator at the Point of Common Coupling	
Rotating Inertia, H in Per Unit on kVA Base, of Overall Combination Generator, Prime Mover, Couplers and Gear Drives	
Station Power Load When Generator is Off-Line, Watts, pf	
Station Power Load During Start-Up, Watts, pf	
Station Power Load During Operation, Watts, pf	

SAMPLE SITE PLAN – PROVIDED FOR REFERENCE ONLY

SITE PLAN
Applicant
Project Site Address
City/Town
Sight Plan Prepared By
Prepared Date



Weblink to State of Michigan / Plats:

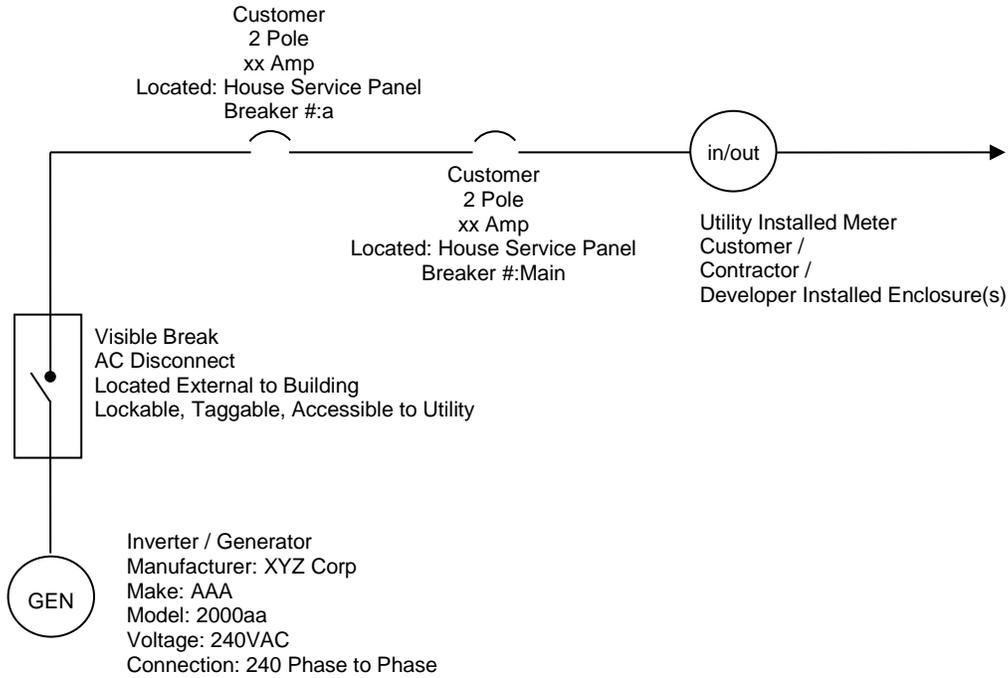
http://www.cis.state.mi.us/platmaps/sr_subs.asp

Note: Legible hand drawn site plans are acceptable.

SAMPLE ELECTRICAL ONE-LINE DRAWING – PROVIDED FOR REFERENCE ONLY

INVERTER GENERATOR

ONE-LINE DRAWING	
Customer Name	Licensed PE/Contractor (if applicable)
Project Site Address	Electrical Contractor License Number
Licensed PE/Contractor Signature	Date

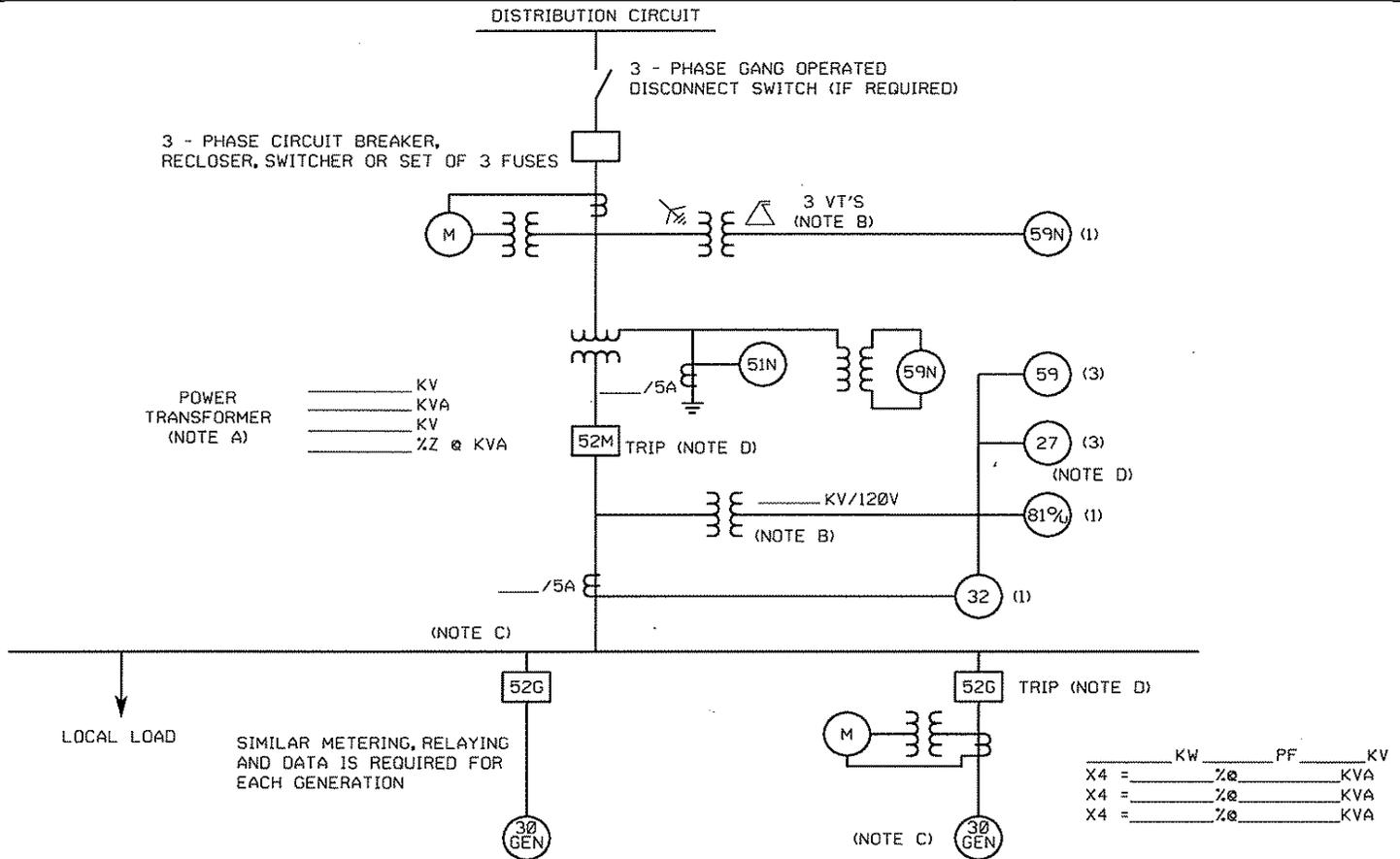


Note: Legible hand drawn one-line drawings are acceptable. It must be signed and sealed by a Licensed Professional Engineer, licensed in the State of Michigan or by an electrical contractor licensed by the State of Michigan.

SAMPLE ELECTRICAL ONE-LINE DRAWING – PROVIDED FOR REFERENCE ONLY

TYPICAL ISOLATION AND FAULT PROTECTION FOR SYNCHRONOUS GENERATOR INSTALLATIONS

ONE-LINE DRAWING	
Customer Name	Licensed PE/Contractor (if applicable)
Project Site Address	Electrical Contractor License Number
Licensed PE/Contractor Signature	Date



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 drawing 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. VT's 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). VT's 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 VT's 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.
- E) One-line drawing 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.

