

**THUMB ELECTRIC COOPERATIVE**  
**CAT 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**



**THUMB ELECTRIC COOPERATIVE**  
 Clint Seid  
 2231 Main Street  
 Ubly, MI 48475  
 989-658-8571  
 tec@tec.mi.coop

<b>For Office Use Only</b>
Application No. _____
Date & Time Application Received _____

REV. 1/16/2023

**Member / Account Information**

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

Member's Name ( Last, First, Middle):  
 Member's Mailing Address and Phone Number:


Member's E-Mail Address: ( optional )  
 Electric Service Account #  
 Electric Service Meter Number:

**CAT 2 Program (Select One Program Option)**

- Distributed Renewable Energy Program (Tariff D23.30)
- Buy All / Sell All (Tariff D27.00) **NOTE: Maximum 50 KW in Size**

**Generation System Site Information**

Physical Site Service Address (if not Billing Address):

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Annual Site Requirements Without Generation in Kilowatthours  
 Peak Annual Site Demand in Kilowatts (only for member's billed on demand rates)

	kWh/year
	kW/year

Attached Site Plan:

Page #
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.)

**Synchronous/Induction Generators: Must fill out Appendix A or B and provide a Detail One-Line Diagram**  
 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

Page #
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- 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

**ATTN: TEC MEMBERS**  
**PLEASE CONTACT TEC PRIOR TO EXECUTION OF APPLICATION**  
**TO ENSURE FULL UNDERSTANDING OF PROGRAM.**

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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 DC Rating (Solar Only):  
 Total Generator(s) Nameplate AC Rating:  
 Expected Annual Output in Kilowatthours  
 AC Output Operating Voltage:  
 Generator Wiring Configuration ( Single Phase, Three Phase):  
 Is the Inverter tested to IEEE1547.1?

kW
kW
kWh/year

Yes    No    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:

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Licensed Professional Engineer Name (If applicable)  
 Licensed Electrical Contractor Name (If applicable)  
 Electrical Contractor/PE Phone #:  
 Electrical Contractor/PE E-Mail:


**Member and Contractor Signature and Fees**

Attached \$100 Interconnection Application Fee (Non-refundable)

(Check # / Money Order #)

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

\_\_\_\_\_  
**Member's Signature**

\_\_\_\_\_  
**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.

**ATTN: TEC MEMBERS**  
**PLEASE CONTACT TEC PRIOR TO EXECUTION OF APPLICATION**  
**TO ENSURE FULL UNDERSTANDING OF PROGRAM.**

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

a.
b.
c.
d.

**Technical Information**

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

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u.
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z.
aa.

## Appendix B

### Induction Generators

**Generator Information**

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

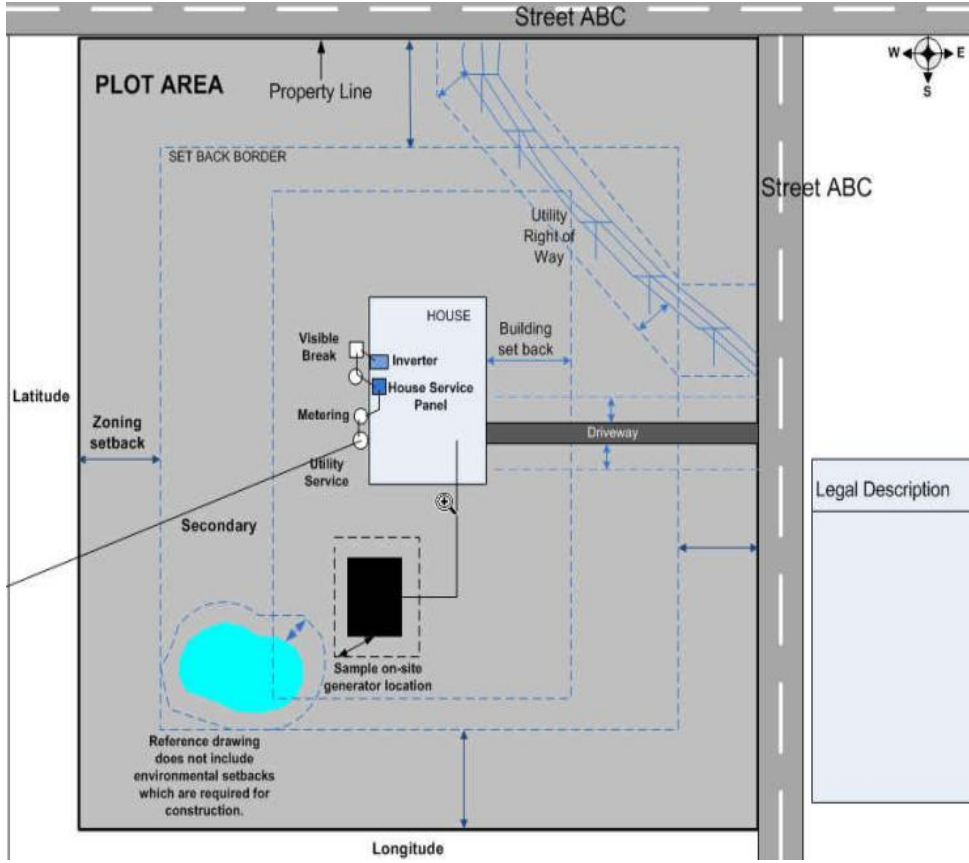
a.
b.
c.
d.

**Technical Information**

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

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Appendix C: Sample Site Plan - Provided for Reference Only



Member's Name: \_\_\_\_\_

Project Site Address: \_\_\_\_\_

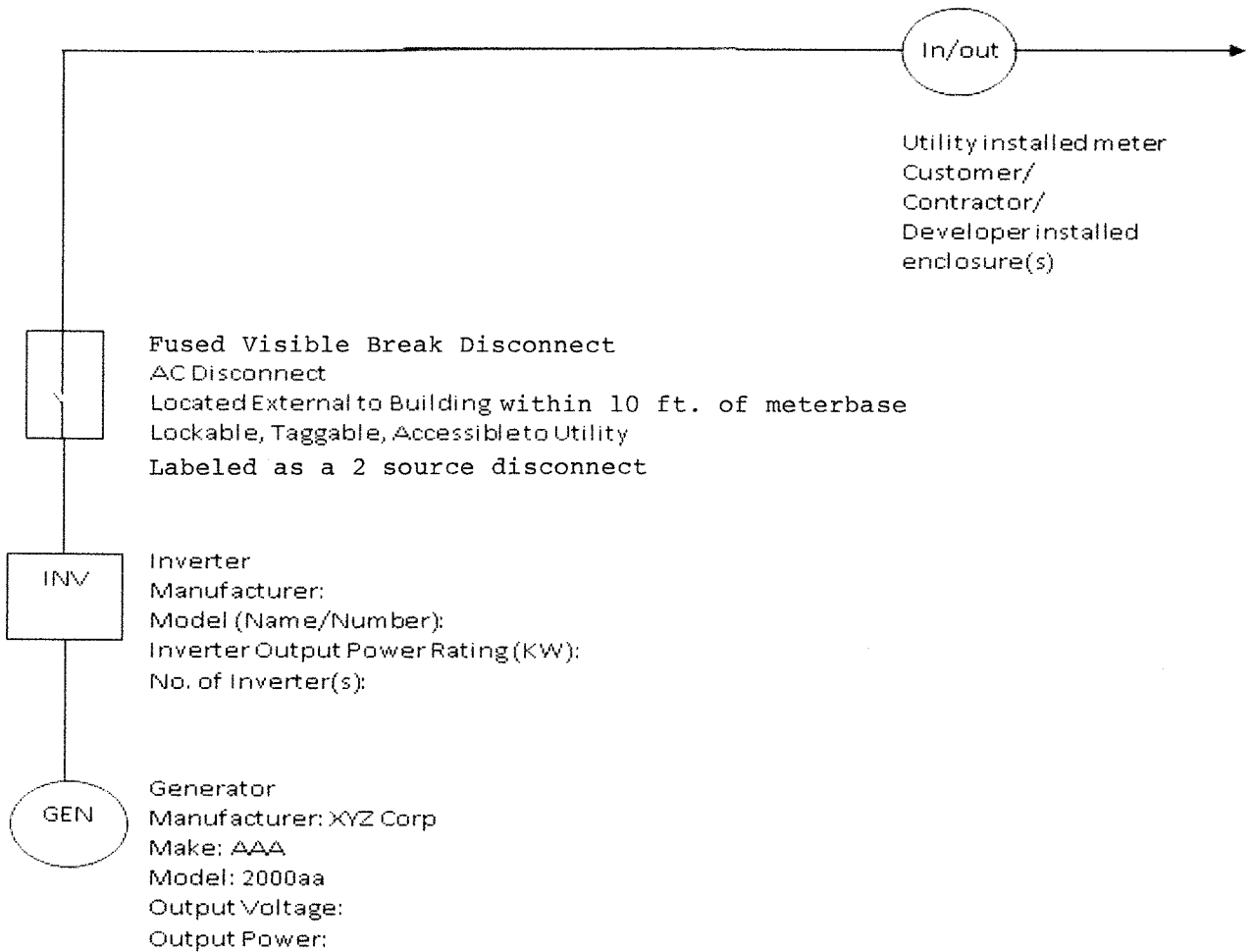
Site Plan Prepared By: \_\_\_\_\_

Prepared Date: \_\_\_\_\_

APPENDIX D - Sample One Line Drawing for Inverter Based Generators

Note: Legible Hand drawn One - Line Drawings are acceptable

Member Name:	
Member Address:	
Site Plan Prepared By:	
Date:	



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

Member's Name: \_\_\_\_\_

Project Site Address: \_\_\_\_\_

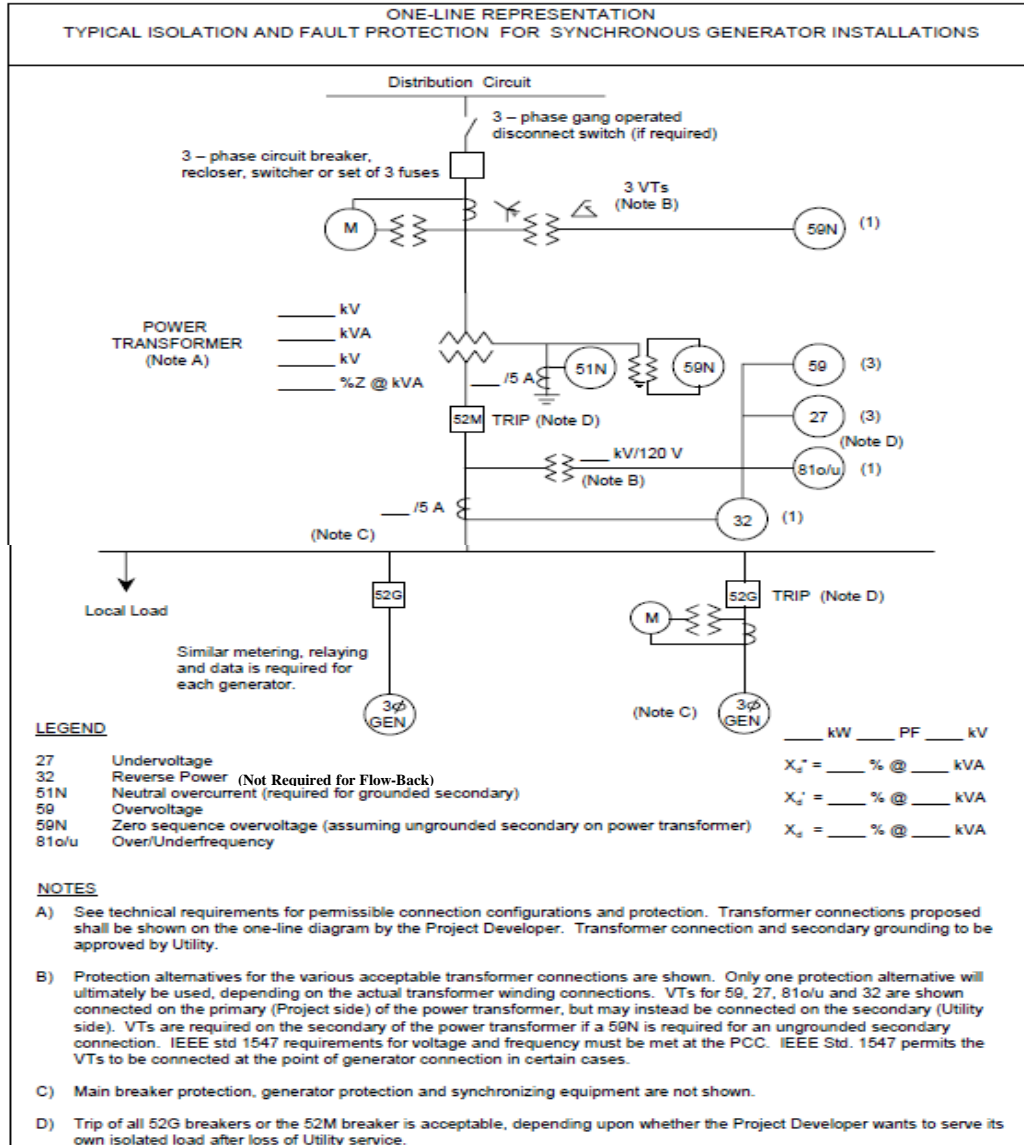
Licensed Professional Engineer Name (If applicable): \_\_\_\_\_

Licensed Professional Engineer Signature: \_\_\_\_\_

Electrical Contractor License Number: \_\_\_\_\_

Date: \_\_\_\_\_

Appendix E: Sample One-Line Drawing for Synchronous Generators



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

Member's Name: \_\_\_\_\_

Project Site Address: \_\_\_\_\_

Licensed Professional Engineer Name (If applicable): \_\_\_\_\_

Licensed Professional Engineer Signature: \_\_\_\_\_

Electrical Contractor License Number: \_\_\_\_\_

Date: \_\_\_\_\_



