

# **Document**

## **C0**

### **Use for:**

**Connection of Electric Generation**  
that will operate with an  
**Open Transition (Category 1) between the Ameren System and**  
**the Generator**  
or operate with a  
**Synchronized Closed Transition (Category 2) between the**  
**Ameren System and the Generator of Less than 100**  
**Milliseconds**

- Following is the cover letter, connection request form, and technical requirements for generators that operate in either an open transition with Ameren or a synchronized closed transition with Ameren for a duration of less than 100 milliseconds.
- Note that no connection agreement is required.
- There is no generator size limitation for this type of connection.
- Press F11 to enter information into the gray boxes.

[Date]

[Name]

[Company]

[Address] [City, State, Zip]

Re: [Title of Connection Request]

Dear :

Thank you for contacting Ameren regarding your plans to connect backup generation located at [describe proposed location] in [name of state]. The attached documents reflect the process for connecting generation that falls under one of two categories:

- A Category 1 generator only operates when there is an open transition between the Ameren electric system and the generator.
- A Category 2 generator operates with a synchronized closed transition between the Ameren electric system and the generator for no more than 100 milliseconds.

Generally, Ameren requires that customers interconnecting their electric generator to the electric distribution system fund an interconnection study performed by Ameren and then enter into an interconnection agreement regarding the design, operation and testing of the interconnection facilities. However, Ameren will not require generators falling under one of the two categories above to fund such a study or enter into an interconnection agreement, provided the equipment owner (“Customer”) abides by the conditions and requirements outlined in the following two documents, both attached hereto:

- Generator Connection Request Form (Section E) – Outlines the requirements regarding the use, testing and documentation of the generator installation; and
- Specifications and Requirements for the Connection of Electric Generation – Outlines the operating requirements of the generator installation and associated transfer switch equipment.

In addition, Ameren will not impose its standby service tariff on the Customer if the generator unit is installed for emergency operation and the time duration of the closed transition is less than 100 milliseconds.

The Customer must submit the documentation required as soon as available. Upon receiving this information from the Customer, Ameren will review and provide any applicable comments to the Customer. Comments from Ameren may require modifications and resubmission of the documentation.

In order to formally begin the connection process, the Customer must submit the completed Generator Connection Request Form attached hereto.

We are available to meet either at the generator site or at one of our central or division offices to discuss your project prior to beginning the application and approval process. This will allow us to become more familiar with your generation plans and allow you to present any questions or concerns you may have.

Please direct all inquiries to:

Name of Ameren Contact  
Ameren Corporation  
MC  
P.O. Box 66149  
St. Louis, MO 63166-6149

Or you can contact me at Phone      if you have any questions.

We look forward to working with you on this project.

Sincerely,

Name of Ameren Contact

**Generator Connection Request Form**  
for the  
**Connection of Electric Generation**  
that will operate with an  
**Open Transition (Category 1) between the Ameren System and  
the Generator**  
or operate with a  
**Synchronized Closed Transition (Category 2) between the  
Ameren System and the Generator of Less than 0.1 Seconds**

**A. Customer Information**

Name: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Service/Street Address (if different from above): \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Daytime Phone: \_\_\_\_\_ Fax: \_\_\_\_\_ E-Mail: \_\_\_\_\_

Emergency Contact Phone: \_\_\_\_\_

Company Account No. (from Utility Bill): \_\_\_\_\_

**B. Customer's Generator & Transfer Switch System Information**

Manufacturer Nameplate AC Power Rating: \_\_\_\_\_ kW and Voltage: \_\_\_\_\_ V.

System Type: (describe) \_\_\_\_\_

Service/Street Address: \_\_\_\_\_

Transfer Switch Equipment Manufacturer: \_\_\_\_\_

Transfer Switch Equipment Model No.: \_\_\_\_\_

System Plans & Specifications Attached Must to be included.

Location of Lockable Visible Open/Main Disconnect Device (describe):  
\_\_\_\_\_

Existing Electrical Service Capacity: \_\_\_\_\_ Amperes      Voltage: \_\_\_\_\_ Volts  
Service Character:    Single Phase \_\_\_\_\_    Three Phase \_\_\_\_\_

**C. Installation Information/Hardware and Installation Compliance**

Person or Company Installing: \_\_\_\_\_

Contractor's License No. (if applicable): \_\_\_\_\_

Approximate Installation Date: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Daytime Phone: \_\_\_\_\_ Fax: \_\_\_\_\_ E-Mail: \_\_\_\_\_

Person or Agency Who Will Inspect/Certify Installation: \_\_\_\_\_

**D. Type of Connection (Section E)**

Customer is proposing to connect generation that falls under the following category:

\_\_\_\_ Category 1 – Open Transition

\_\_\_\_ Category 2 – Synchronized Closed Transition of Less than 0.1 Seconds

**E. Conditions and Required Testing**

For Category 1 and 2 generators:

1. Where the associated Ameren service is less than 600V, install a main service disconnect capable of being padlocked in the open position. Also submit a drawing indicating the nature and physical location of this equipment or device. This equipment shall meet Ameren's Specifications and Requirements for the Connection of Electric Generation attached;

2. Where the associated Ameren service is greater than 600V, install padlockable equipment capable of establishing a “visible disconnect” between the Ameren system and the generator. *A visible disconnect is a switching device that enables one to physically see an open air gap that is created by either the disconnect device itself or by its being drawn out from a “seated” or “racked in” position.* Also submit a drawing indicating the nature and physical location of this equipment or device. This equipment shall meet Ameren’s Specifications and Requirements for the Connection of Electric Generation attached;
3. Provide signage in the immediate vicinity of Ameren’s revenue meter indicating that a generator exists on the premises and that a lockable main service disconnect or lockable visible open disconnect is available. Similarly, provide signage at the disconnect device itself for identification purposes;
4. Agree not to operate the generator in parallel with Ameren’s electric system for purposes of peak shaving, serving normal loads, or testing the capability of the generator to carry electric load. Prolonged operation of the generator in parallel with the utility electric system when it is de-energized creates a safety hazard for utility employees, to the point of being potentially fatal.

For Category 2 generators only:

5. If the generator is equipped with “Fast Transfer Capability,” i.e. relaying and controls that limit the duration of synchronized closed transition between the generator and Ameren’s electric system to less than 100 milliseconds during startup and shutdown of the unit, the generator must demonstrate, through equipment supplier information, that the equipment is designed to achieve the fast transfer in less than 100 milliseconds;
6. Demonstrate that the transfer switch complies with all of Ameren’s Specifications and Requirements for the Connection of Electric Generation, including the provision for a transfer failure scheme, which will cause the opening of one of the sources within two (2.0) seconds of the start of the paralleling condition;
7. Demonstrate that the equipment can achieve the fast transfer by providing an on-site start-up and commissioning test procedure for the fast transfer capability of the hardware. Ameren and the customer shall agree on this procedure as well as on the date and time of the testing. The test procedure shall:
  - A. Provide sufficient notice to Ameren of the fast transfer testing in order to allow Ameren the opportunity to both attend (if desired) and take any operational or safety precautions deemed necessary (contact Name of Ameren Contact at Phone Number );

- B. Test the fast transfer capability per manufacturer’s recommendations and verify that the closed transition transfer takes place within 100 milliseconds;
- C. Test the transfer failure scheme and verify that one of the sources opens subsequent to an extended paralleling condition of greater than two (2.0) seconds;
- D. Require immediate notification to Ameren of any periods during testing when the fast transfer equipment is out of service or fails to achieve transfer in 100 milliseconds, or when the transfer failure scheme fails to operate properly; and
- E. Arrange for the appropriate follow-up testing (and notification to Ameren) in the case where any part of the original commissioning procedure couldn’t be satisfied.

**F. Signature**

I hereby certify that, to the best of my knowledge, all the information provided on this Generator Connection Request Form is true and correct. After the installation and testing of the generator and upon proper submission or resubmission of the documentation required by Ameren, I agree to operate the generator in compliance with the conditions stated above.

(1)Customer Signature: \_\_\_\_\_

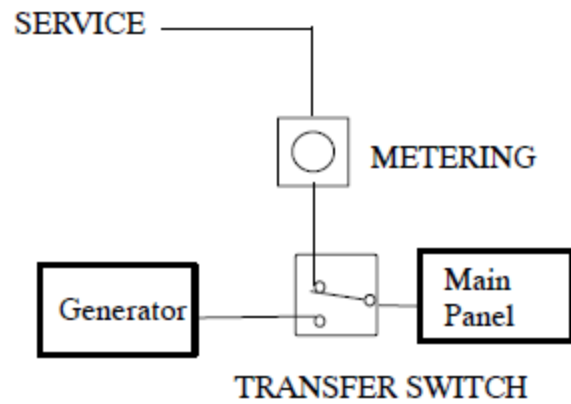
Printed Name: \_\_\_\_\_

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

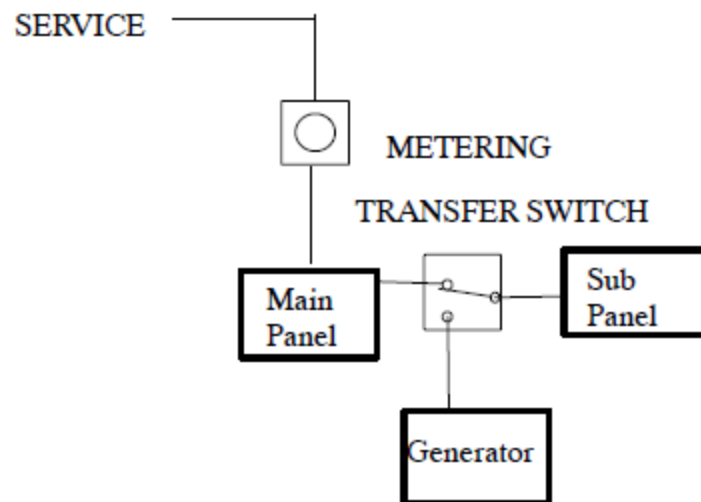
Note: (1) To be signed by the customer, not installation contractor.

## MO – PLACEMENT OF CUSTOMER EQUIPMENT

### (a) SERVICE ENTRANCE RATED



### (b) NON-SERVICE ENTRANCE RATED





**Specifications and Requirements**  
**for the**  
**Connection of Electric Generation**  
**that will operate with an**  
**Open Transition (Category 1) between the Ameren System and**  
**the Generator or operate with a**  
**Synchronized Closed Transition (Category 2) between the**  
**Ameren System and the Generator of Less than 100**  
**Milliseconds**

Approval shall be obtained from Ameren Corporation for all generation installations.

This document relates to the connection of generation that will synchronize with the Ameren electric system for less than 100 milliseconds. If you are proposing a synchronization time greater than 100 milliseconds, this procedure does not apply. Radial Ameren distribution systems are assumed.

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## 1. Definitions

- 1.1 **Automatic Transfer** – The switching between an Ameren-provided electrical source and customer-provided generation without the need for human operator intervention.
- 1.2 **Manual (Non-Automatic) Transfer** – The switching between an Ameren-provided electrical supply and customer-provided generation by human operator intervention.
- 1.3 **Open Transition** – The transfer of an electrical load from one power source to another through the use of a double throw switch or interlocks which prevent the closing of the second source before the first source opens.
- 1.4 **Closed Transition** – The transfer of an electrical load from one power source to another by closing the second source before opening the first.
- 1.5 **Parallel Operation** – The closing of the electrical source from customer-provided generation without opening the Ameren-provided electrical source.
- 1.6 **Visible Open Disconnect** – A switching device that enables one to physically see an open air gap that is created by either the disconnect device itself or by its being drawn out from a “seated” or “racked in” position. Molded case circuit breakers, solid state switching devices, static transfer switches and switch status indicators (e.g. lights, operating handle positions, etc.) do not qualify as visible open disconnects.

## 2. Requirements for all Generation Installations

- 2.1. Transfer equipment shall be designed and installed to prevent inadvertent continuous interconnection and operation of the normal and emergency power sources. This equipment can take many forms depending on the voltage of the associated Ameren service and whether the installation is designed for open or closed transition transfer (ref. Sections 3 and 4 below).
- 2.2. The transfer switch shall be UL listed and the entire transfer equipment installation shall be approved by the proper inspection authorities having jurisdiction and satisfy all applicable building and electrical codes.
  - 2.2.1. If the transfer switch is also being used as the main service disconnect, the transfer switch shall be UL listed specifically for this purpose per the specifications in UL Standard 1008 (Transfer Switch Equipment). UL 1008 specifies that such a transfer switch shall be marked “Suitable [only] for use as service equipment” and shall carry a pressure-sensitive label marked “Service Disconnect.”

- 2.2.2. It is not an Ameren requirement that the transfer equipment be capable of switching or disconnecting the grounded circuit conductor (neutral), though there are circumstances in which Ameren will require that an exception to this be made. Such a determination will be made during Ameren's review of the customer's plan.
- 2.3. Per National Electric Code (NEC) requirements, service entrance conductors and generation supply conductors shall not occupy a common raceway other than in the transfer equipment.
- 2.4. If the Ameren service being backed up by the generator is less than 600V, then the associated main service disconnect device shall be padlockable in the open position for the safety and protection of Ameren personnel.
  - 2.4.1. A sign shall be permanently installed at the associated revenue metering location that states, "Backup Generation Present – Lockable Main Service Disconnect Available for Isolation." The sign shall have minimum dimensions of 5"x 7", be permanently secured with bolts, and shall be both waterproof and ultraviolet resistant.
  - 2.4.2. A sign shall also be permanently installed at the main service disconnect device itself stating, "Lockable Main Service Disconnect for Isolation from Generator" for purposes of identification by Ameren field personnel. It shall be similar in size, make and color to the sign at the revenue meter so that an association can be easily made. All other NEC and building code requirements around electric facility-related signage shall be followed.
  - 2.4.3. *For pre-existing main service disconnects only:* If the Ameren service being backed up is a self-contained metered service (i.e. no metering CT's) and the pre-existing main service disconnect is unable to be padlocked in the open position, the self-contained meter, being a "visible open disconnect" device (ref. Section 1.6) shall satisfy this requirement.
- 2.5. If the Ameren service being backed up by the generator is greater than 600V, then at least one "visible open disconnect" device (ref. Section 1.6) shall be required for the safety and protection of Ameren personnel.
  - 2.5.1. Each visible open disconnect device shall isolate one or more of the customer's generating units from the rest of the system. All generating units shall be associated with at least one of these devices.
  - 2.5.2. The visible open disconnect device shall be accessible to Ameren personnel at all times. While the device does not have to be under Ameren's exclusive control, it shall have provisions for being padlocked

in the open position or in the “drawn out” position by Ameren personnel should the need for temporary electrical isolation present itself.

- 2.5.3. A sign shall be permanently installed at the associated revenue metering location that states, “Backup Generation Present – Lockable Visible Open Disconnect Available for Isolation.” The sign shall have minimum dimensions of 5”x 7”, be permanently secured with bolts, and shall be both waterproof and ultraviolet resistant.
- 2.5.4. A sign shall also be permanently installed at the visible open disconnect device itself stating, “Lockable Visible Open Disconnect for Isolation from Generator” for purposes of identification by Ameren field personnel. It shall be similar in size, make and color to the sign at the revenue meter so that an association can be easily made. All other NEC and building code requirements around electric facility-related signage shall be followed.

### **3. Requirements Specific to Open Transition Transfer (Category 1)**

- 3.1. An open transition between the Ameren system and customer generator(s) can be achieved with any of the following:
  - 3.1.1. An integral transfer switch with mechanical interlocking provisions (e.g. a double throw configuration, mechanical locking bar, etc.) to prevent the closing of both sources at the same time;
  - 3.1.2. A pair of Kirk key-interlocked disconnect switches or circuit breakers;  
or
  - 3.1.3. A pair of circuit breakers with electrical interlocking provisions to prevent the closing of both sources at the same time, provided that the interlocking scheme is backed up with hard-wired protection directly from the breaker auxiliary contacts.
- 3.2. If the open transition between the Ameren system and customer generator(s) is being achieved via automatic transfer means, then the following shall apply:
  - 3.2.1. Voltage-sensing capability or other means for detecting the loss and recovery of the Ameren source shall be required.
  - 3.2.2. A manual “bypass” (i.e. auto disable) feature is not required, but it is highly recommended for use in the event of a malfunction in the automatic transfer between sources in either direction. If this provision exists, it shall be open transition in nature and mechanically interlocked (e.g. a double throw configuration, mechanical locking bar, etc.) to

prevent the closing of both sources at the same time. If the bypass switch is separate from the transfer switch, it shall also be mechanically interlocked against its being switched to one source while the transfer switch is switched to the other.

- 3.2.3. The automatic transfer controller shall be “supervised” by the status of the transfer switch (and that of the bypass switch if it exists) so that if either switch is manually tripped, automatic control will be disabled.

#### **4. Requirements Specific to Closed Transition Transfer (Category 2)**

- 4.1. A closed transition between the Ameren system and customer generator(s) can be achieved either with an integral automatic transfer switch set or with two or more circuit breakers or motor-operated solid blade disconnects.
- 4.2. Synchronizing capability shall be required in order for the Ameren-provided source and the customer-provided generation to be safely tied together. All synchronized transfer times shall be held to less than 100 milliseconds in duration.
- 4.3. A transfer failure scheme shall be required that activates when the period of synchronized closed transition exceeds a set time delay that is no longer than two (2.0) seconds.
  - 4.3.1. Upon activation, the transfer failure scheme will open one of the two sources being paralleled and lock out the control circuit from any further transfer operation.
  - 4.3.2. For cases with a maximum time delay relay range greater than two (2.0) seconds, Ameren will also require Device 32 (directional power) and Device 67 (directional overcurrent) relays. These relays shall be of a draw-out type with built-in test devices. Otherwise, external test devices (such as the ABB FT-1) are required for the isolation of trip contacts and PT/CT inputs as well as the injection of secondary voltages and currents during testing.
  - 4.3.3. If the transfer switch has the capability of providing a hard-wired signal that could trip a device that is separate from the transfer switch equipment in order to interrupt a paralleling event exceeding 100 milliseconds, the customer shall see to it that this feature is utilized. The control scheme shall trip the device and then block it from closing. The time delay on the trip signal shall not exceed two (2.0) seconds.
  - 4.3.4. If the Ameren service being backed up by the generator is greater than 600V, an additional independent hard-wired breaker auxiliary contact

scheme may be required to break up extended paralleling of the two sources. Ameren prefers this type of backup scheme and will only accept another scheme pending a detailed evaluation.

- 4.3.5. There shall be no intended or built-in provision for the customer to disable the transfer failure scheme.
- 4.4. An undervoltage protection provision shall be required which prevents a closed transition transfer in the event that the Ameren source is not present.
- 4.5. In the event of a malfunction in the automatic transfer between sources in either direction, the transfer switch shall be able to be manually switched to the desired source.
- 4.6. A manual “bypass” (i.e. auto disable) feature is not required, but it is highly recommended for use in the event of a malfunction in the automatic transfer between sources in either direction. If this provision exists, it shall be open transition in nature and mechanically interlocked (e.g. a double throw configuration, mechanical locking bar, etc.) to prevent the closing of both sources at the same time. If the bypass switch is separate from the transfer switch, it shall also be mechanically interlocked against its being switched to one source while the transfer switch is switched to the other.
- 4.7. The automatic transfer controller shall be “supervised” by the status of the transfer switch (and that of the bypass switch if it exists) so that if either switch is manually tripped, automatic control will be disabled.

## **5. Programmable Logic Controllers (PLC)**

- 5.1. For purposes of establishing the requirements herein, Ameren defines a programmable logic controller (PLC) as any solid-state microprocessor-based controller that needs to be programmed by the user with the logic necessary for it to supervise and execute the control functions for which it is being utilized. This is separate from a factory-programmed controller whose logic restricts the system to a single “proprietary” mode of operation, the parameters of which need merely to be configured by the user. It is understood that the PLC can exist as a stand-alone unit or as a permanent component of an integral automatic transfer switch.
- 5.2. Ameren will allow the use of PLCs for automatic transfer control between an Ameren-provided supply and customer-provided generation with the following requirements:
  - 5.2.1. A backup control scheme shall be provided to prevent the extended paralleling operation of the generator with the Ameren system. The

backup control shall be completely independent of the PLC. Software contacts or backup logic are not acceptable.

- 5.2.2. The backup control shall trip open a device that is separate from the transfer equipment and block it from closing in the event of extended parallel operation with the Ameren system.
  - 5.2.3. The PLC and backup control logic shall be enabled when the transfer scheme is placed in automatic operation and disabled when the transfer scheme is placed in manual operation.
  - 5.2.4. The automatic transfer switch shall be “supervised” by the status of the disconnect switch, circuit breaker or bypass switch controls so that if any of these switches is manually tripped, the PLC control will disable automatic transfer.
  - 5.2.5. The PLC shall not lose power at any time as a direct result of automatic transfer switching operations. This shall be confirmed during Ameren’s functional test of the automatic transfer equipment.
- 5.3. There are two preferred methods of PLC backup control:
- 5.3.1. The first method is through the use of the hard-wired auxiliary contacts of the associated breakers. The time delay shall be minimal and typically no longer than two (2.0) seconds in duration. The time delay range and setting shall be reviewed by Ameren.
  - 5.3.2. For those cases where the maximum time delay range exceeds two (2.0) seconds, Ameren will also require Device 32 (directional power) and Device 67 (directional overcurrent) relays. These relays shall be of a draw-out type with built-in test devices. Otherwise, external test devices (such as the ABB FT-1) are required for the isolation of trip contacts and PT/CT inputs as well as the injection of secondary voltages and currents during testing. The maximum time delay shall be absolutely no longer than thirty (30) seconds in duration.
  - 5.3.3. A second method for PLC backup control (provided a hard-wired auxiliary contact scheme is not possible) is to install Device 32 (directional power), Device 67 (directional overcurrent) and Device 59N (neutral overvoltage) relays that are approved by Ameren. The operation of all these relays shall trip and lock out the generator breaker or another disconnecting device that isolates the customer generator from the Ameren source. The Device 59N requires the installation of grounded wye to open delta potential devices on the delta high side of the distribution or substation transformer supplying the customer.

## 6. Drawing Requirements for Generator Installations

- 6.1. For generator installations utilizing integral transfer switches enclosed in a single compartment, the following documentation is required in triplicate:
  - 6.1.1. A one-line diagram is required showing the electrical location of the Ameren source as well as that of the generator, the transfer switch, and if applicable, the visible open disconnect device inside the customer facility.
  - 6.1.2. Details on the signage at both the revenue meter and the lockable main service disconnect or visible open disconnect, including size, wording and physical location, shall be required.
  - 6.1.3. A manufacturer's cut sheet, operations manual and other specifications are required for the particular transfer switch being installed. Among the more critical information therein are the manufacturer's model number, transfer scheme type (open or closed transition), locking provisions, interlock details, and if applicable, the time range of closed transition, and details on the auto/manual and manual bypass switches.
  - 6.1.4. Drawings on both the closed transition transfer and transfer failure schemes are required, which include the time delay setting and maximum range.
- 6.2. For generator installations utilizing circuit breakers or disconnect switches mounted in separate compartments, the following documentation is required in triplicate:
  - 6.2.1. A one-line diagram is required showing the electrical location of the Ameren source as well as that of the generator and associated transfer switch in the customer facility.
  - 6.2.2. Details on the signage at both the revenue meter and the lockable main service disconnect or visible open disconnect, including size, wording and physical location, shall be required.
  - 6.2.3. Detailed control schematics of the main breaker and generator breaker trip and close control circuits are required. These schematics shall show all protective relay functions and provide the information necessary to analyze and document the logic associated with the generator transfer scheme, transfer failure scheme, interlock controls and any other pertinent control functions.



6.2.4. Drawings on both the closed transition transfer and transfer failure schemes are required, which include the time delay setting and maximum range.