



End User Connection Requirements to Ameren's
Transmission System
(AmerenUE, AmerenCIPS, AmerenCILCO, and
AmerenIP)

This Document applies to the following NERC Reliability Standard

Standard Number & Revision	Registered Entity	NERC Functional Model
FAC-001-0	Ameren Services	Transmission Owner Transmission Planner Transmission Operator

Document Approvals

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NERC Standard to Ameren Document Cross Reference

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NERC Requirement or Measure	Document Section
R1.3 End-user facilities	Document as a whole
R2.1.1 Procedures for coordinated joint studies	Section 2 (Page 5)
R2.1.2 Procedures for notification of new or modified facilities	Section 11 (Page 8)
R2.1.3 Voltage level and MW, Mvar demand	Section 3 (Pages 5 and 6)
R2.1.4 Breaker duty and surge protection	Appendix A, Section 1 b. 3). (Page 10)
R2.1.5 System Protection and coordination	Appendix A, Section 1 (Pages 9 and 10)
R2.1.6 Metering and telecommunications	Appendix A, Section 3 (Page 11 and 12)
R2.1.7 Grounding and safety issues	Appendix A, Section 7 (Page 14)
R2.1.8 Insulation and insulation coordination	Appendix A, Section 2 (Page 11)
R2.1.9 Voltage, Reactive Power, and power factor control	Section 3 (Pages 5 and 6)
R2.1.10 Power quality impacts	Appendix A, Section 4 (Page 13)
R2.1.11 Equipment Ratings	Appendix A, Section 5 (Page 14)
R2.1.12 Synchronizing of facilities	Appendix A, Section 6 (Page 14)
R2.1.13 Maintenance coordination	Appendix A, Section 8 (Page 15)
R2.1.14 Operational issues (abnormal frequency and voltages)	Appendix A, Section 12 (Page 16)
R2.1.15 Inspection requirement for existing or new facilities	Appendix A, Section 10 (Page 15)
R2.1.16 Communications and procedures during normal and emergency operating conditions	Appendix A, Section 11 (Page 16)
R3 Maintain and update facility connection requirements as required. Make documentation of requirements available to users of transmission system, SERC, and NERC on request within 5 business days.	Section 1 (Page 5)

SERC Supplement – Facility Connection Requirements	Document Section
II. General Requirements for Compliance	Section 2 (Page 5)
Self Application Statement	Section 2 (Page 5)
1. Impact Study Requirements	Section 5 (Pages 6 and 7)
2. Provision for Future Changes	Section 11 (Page 8)
3. Voltage and Power Factor Control	Section 3 (Pages 5 and 6)
4. Generation Control	Refer to MISO Generator Connection Procedures
5. Short Circuit Conditions	Appendix A, Section 1 b. (Pages 9 and 10)
6. System Protection and Other Controls	Appendix A, Section 1 (Pages 9 and 10)
7. Telemetry and Metering	Appendix A, Section 3 (Pages 11 and 12)
8. Supervisory Control and Data Acquisition (SCADA)	Appendix A, Section 3 b. (Page 11)
9. System Grounding	Appendix A, Section 7 (Pages 14 and 15)
10. Equipment Ratings	Appendix A, Section 5 (Page 14)
11. Reactive Power Requirements	Section 3 (Pages 5 and 6)
12. Power Quality	Appendix A, Section 4 (Pages 13 and 14)
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15. Maintenance Requirements	Appendix A, Section 1 (Page 9) Appendix A, Section 1 c. (Page 10) Appendix A, Section 8 (Page 15)
16. Abnormal Frequency and Voltage Operation	Appendix A, Sections 12 and 13 (Page 16)
17. Inspection Requirements	Appendix A, Section 10 (Page 15)
18. Communications During Normal and Emergency Conditions	Appendix A, Section 11 (Page 16)
19. Responsibilities During Emergency Conditions	Appendix A, Section 11 (Page 16)

Document Distribution List

Recipient	Company
Transmission & Interconnections Group	Ameren Services
Operations Planning Group	Ameren Services
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T&D Design Groups	Ameren Services
System Protection Groups	Ameren Services
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1. Introduction

An End User for the purposes of this procedure is defined as any customer, including Ameren and Ameren affiliates, desiring to connect to Ameren's Transmission System for the purpose of connecting a distribution load. Connection to Ameren's Transmission System by an End User facility must be in compliance with the MISO Open Access Transmission Tariff (OATT) or successor RTO OATT. The following information provides a general procedure and requirements for connecting End User facilities to the Ameren Transmission System. A transmission system is defined as those electrical system facilities that do not satisfy the FERC seven factor test for determining distribution facilities and is not generator GSU or lead line and associated equipment. If an End User connection also includes generation, then the MISO Attachment X: Generator Interconnection Procedures (GIP) takes precedence over this "End User Procedures and Requirements"; however, the "End User Procedures and Requirements" must still be followed as appropriate where applicable.

This document will be reviewed every 3 years or as appropriate for possible revision. The existing or revised document will be re-certified. Ameren shall make documentation of these requirements available to the users of the transmission system, SERC, and NERC on request within five business days.

2. General Requirements

These general requirements apply to all new End User ("Customer") facilities, including those of Ameren and its affiliates, connected to the Ameren ("Company") Transmission System, and material changes to existing connections. The End User facilities start at the point of ownership change; that is, where Ameren transmission facilities end and Customer facilities start. Customer load is defined as any retail or wholesale load that takes service from the Ameren transmission system while utilizing connecting nontransmission facilities (as defined by the FERC Seven Factor Test) to supply Customer load. Such Customer connections shall comply with all applicable codes, standards, government regulations, environmental regulations, siting requirements, contracts, operating agreements, and tariff requirements related to the proposed Customer facility. Ameren Services Company must perform all analysis and/or work associated with the proposed Customer connection such as planning, design, construction, maintenance, and operation for facilities which will be owned by Ameren. Ameren follows applicable NERC Reliability Standards and SERC Supplements, or their successors. The point of connection is at the change of ownership.

Ameren will perform coordinated joint studies of the new facilities to investigate their impacts on the interconnected transmission systems. The results of such studies will be provided as joint recommendations from all parties involved with the study.

3. Making Connection Request

Requests to connect Customer's load to the Company's Transmission System are controlled by Ameren Services Company. When a customer decides to pursue a Customer load connection

to Company's Transmission System, that entity should submit a request in writing. That request should be sent to:

Manager, Electric Planning
Ameren Services Company
P.O. Box 66149, MC 691
St. Louis, MO 63133-6149

Telephone No. (314) 554-3763
FAX Telephone No. (314) 554-3260

Requests to connect Customer's generation to the company's Transmission System are controlled by the Midwest ISO. When a customer decides to pursue a Customer generation connection to Company's Transmission System, that entity should submit a request in writing to the Midwest ISO.

The transmission facilities applicable to this procedure are those that are not classified as distribution facilities under the FERC seven-factor test. The likely voltage levels that are possible for consideration on the Ameren system are 138 kV, 161 kV, 230 kV, and 345 kV. The request must include:

- Location of the Customer facility;
- Identification of the Company Transmission System facility to which Customer desires to connect and the facility voltage;
- Load MW, Mvar, and power factor – The Customer is required to provide the maximum real power demand required for its facility, the actual peak real power demand for existing load which will be supplied through a new connection point, and a ten-year load projection on an annual basis. The Customer is also required to provide the load power factor and maximum Mvar requirement of the demand to be connected to the Company's Transmission System. ;
- Power Factor Control – If the facility load power factor projections are not in the range of 95% lag to 95% lead, the Customer shall install controlled power factor correction device(s) on its side of the meter to maintain the required load power factor range, consistent with Good Utility Practice and system needs.
- Proposed In-service Date;
- Customer generation, if any; state intended use; i.e., wholesale or self-use; and
- Other information as appropriate.

4. Cost to Study Customer Requested Connection

Customer will pay cost (actual cost) of Ameren's engineering time to evaluate impact. Company will assess engineer-hour charges for all study work regarding its request. Engineer-hour charges will be assessed at the prevailing rate of such engineering work. If Customer expresses its desire to continue its request for a Customer load connection to the Company's Transmission System, then Company will send to Customer an agreement stating its obligations and request that it sign the agreement.

5. Receiving Request and Agreement to Perform Study

Upon Company's receipt of the fully executed agreement and the Section 3 information above, Company will perform an analysis of the requested connection in a timely fashion. This

agreement will contain the assumptions of the engineering study and the work to be accomplished by Company and Customer. With the agreement executed, the Company will start its work as defined in the agreement.

Customer connections are handled on a case by case basis. The initial analysis will consist of power flow modeling. The system performance evaluation will be based on NERC Reliability Standards TPL-001 through TPL-003 as a minimum, and the Entity's and Ameren's "Transmission Planning Criteria and Guidelines" if more restrictive. The basis for the connection requirements are Ameren's "Transmission Planning Criteria and Guidelines", which are included in the most recent FERC 715 filing. This document includes criteria for general transmission planning as well as transmission interconnection planning.

Short circuit modeling, stability, or other analysis such as a switching study or EMTP study will be performed if applicable, under an addendum to the agreement. System performance evaluation of such additional analysis will also be based on NERC Reliability Standards TPL-001 through TPL-003 as a minimum and the Entity's and Ameren's "Transmission Planning Criteria and Guidelines" if more restrictive.

Company will provide a draft report on the results of its analysis that identifies the Customer's general connection requirements. In addition to these general connection requirements, the Customer will be required to abide by the following requirements, as appropriate and applicable, and include in its facility design engineering specifications that will allow adherence to these requirements¹:

- 1) Power Quality impacts
- 2) System protection and coordination
- 3) Insulation, Insulation Coordination, Surge Protection, and Shielding
- 4) Metering and telecommunications
- 5) Equipment ratings
- 6) Synchronizing of facilities
- 7) Grounding and safety issues
- 8) Maintenance coordination
- 9) Operational issues (jurisdictional and functional authority)
- 10) Inspection requirements for existing or new facilities
- 11) Communications and procedures during normal and emergency operating conditions
- 12) Underfrequency load shedding
- 13) Undervoltage load shedding

See Appendix A for a description of the above requirements.

Company reserves the right to design, build, construct, own, operate, and/or maintain, any equipment that becomes part of the Company's Transmission System or that can have an impact on the Company's Transmission System as a result of the Customer connection.

¹ These requirements are based upon NERC Reliability Standard FAC-001-0.

6. Provide Opportunity for Customer to Make Comments

The Customer will be given an opportunity to respond to Company's draft report and requirements. Upon receiving the Customer's comments, Company will work with Customer to resolve the issues resulting from Customer's comments if possible. After resolving appropriate issues, Company will issue a final report of the study and state the conditions under which the Customer connection will be allowed.

7. Customer Determines Value of Connection

If Customer wishes to continue with the connection, Company will work with Customer to place the required facilities in service in accordance with a mutually agreed to schedule. If the Customer does not wish to pursue the connection, the remaining charges for the engineering study will be billed to the Customer and Company's involvement will end.

8. Customer Connection Agreement

Once Customer decides to proceed with the connection, Company will prepare and forward a written agreement ("Construction Agreement") for execution. The Construction Agreement identifies the specific facilities that would be provided by both parties. Included in this agreement would be the point of connection, a one-line diagram, and agreement to adhere to the applicable requirements specified in section 5 on pages 6 and 7 and detailed in Appendix A of this document.

9. Internal Release of New Project

Once the Load Connection Agreement has been executed, a Job Description will be issued internally to inform other groups within the Company that agreement has been reached on new facilities, to inform them on the nature of the new facilities, and to specify the in-service date. The Job Description also informs the electrical engineering and design groups within the Company to the conceptual design of the new facilities so that these groups can begin detailed engineering, design, and material procurement.

10. Notification to Neighboring Electric System of Interconnection

If Customer agrees to proceed with the connection to Company's Transmission System, Company will contact neighboring electric systems to inform them of this future connection if perceived to have an impact on their system. At that time, Company will also make available to these neighboring electric systems a copy of the final report upon request.

11. Notification by Customer to Company Regarding Material Changes to Existing Connection(s)

Customer shall notify Company of any changes or modifications that occur or are planned to occur which may affect system operations or reliability. To facilitate updating system studies involving the Connection(s), Customer is required to provide information on such changes as outlined under Item 3.

Description of Requirements for Connection

1. System Configuration, Protection, and Coordination

Ameren requires that its transmission system be protected and that customer reliability and system integrity be maintained when customer connections are made to its transmission system. As part of this requirement, Ameren will unilaterally determine what configuration will be utilized for connections. Ameren will also unilaterally determine what protection and coordination facilities are required and the ownership of these protection facilities for all connections to Ameren's transmission system. Such coordination, including any remote tripping schemes, underfrequency or undervoltage load shedding schemes, or special protection systems, will be required regardless of the location of the Customer's connection with respect to boundaries of Balancing Authority Areas. Ameren would perform or cause to be performed all appropriate study work related to Customer's connection.

General principles to be followed in designing and operating the protection system equipment include:

- Public safety
- Prevention/minimization of equipment damage
- Minimization of equipment outage time
- Minimization of system area exposed to outage
- Minimization of system voltage disturbances
- Adequate protective system coverage for abnormal conditions

For the following devices, the customer is responsible for paying for these facilities, but Ameren may be the ultimate owner. For those facilities that Ameren will own and for which the Customer pays, Ameren will perform installation, operation, and maintenance. Following are typical requirements for configuration and for protection devices:

a. System Configuration: Load connections to the Ameren transmission system will generally be provided through the establishment of a breaker station consisting of a ring bus configuration for the connection point. If it is expected the new station is likely to become a major transmission hub, a straight bus or breaker-and-a-half configuration may be selected.

b. Disconnecting and Interrupting Devices: Customer shall provide at a location or locations agreed to by the Company a disconnecting and interrupting device or devices which:

- 1) Provide a manually operated visible disconnecting device as a means of electrically isolating Customer's facility from the Company's Transmission System. The manually operated disconnecting device shall have a means for locking the device in the open position with Company's padlocks.
- 2) Provide automatic isolation of the Customer's system from the Company's Electric System for faults or abnormal conditions on the Customer's system so as to maintain network flow and reliability to the transmission system, and
- 3) Provide automatic isolation of the Customer's system from the Company's Electric System for faults or abnormal conditions on the Company's Electric system so as to protect customer facilities from faults or abnormal condition on the transmission system.

Interrupting devices must have sufficient interrupting capacity to interrupt the maximum available fault current at each device location. Company reserves the right to require Customer to open all interrupting devices Company deems necessary to fulfill the power and authority granted to Company under the terms of the "Construction Agreement", and upon such a request by Company, Customer shall open such interrupting devices immediately.

- c. Fault and Loss of Utility Protection: Customer shall provide, install, operate and maintain all of the Protection System and Control Devices required by Company, in accordance with Good Utility Practice, to safely, efficiently and reliably integrate Customer's facility with the Company's Transmission System. The Protection and Control Devices required by Company shall include, but not be limited to the following: i) main fault protection relay(s) and associated equipment capable of detecting a fault within Customer's facility and automatically isolating Customer's facility from the Company's Transmission System when such faults occur; ii) fault protection relay(s) and associated equipment capable of detecting faults on the Company's Transmission System and automatically isolating Customer's facility from the Company's Transmission System to prevent the facility from contributing to such faults; and iii) loss of Company's Transmission System supply relay(s) and associated equipment capable of detecting Company's Transmission System isolation events and isolating Customer's facility from the Company's Transmission System to prevent unsafe or unreliable feedback from Customer's facility into the Company Transmission System. All of the relays required for safe, efficient and reliable operation of the facility with the Company's Transmission System shall be equipped with built-in test provisions. Customer's Protection Systems shall be designed with adequate redundancy to meet the above requirements under the single contingency loss of a protective relay, CT or VT circuit, dc circuit, auxiliary or lockout relay, or Protection System communications equipment.

d. Additional Protection for Customer's Facility: If Customer desires a greater level of reliability, additional protection system equipment required would be installed at Customer's expense.

2. **Insulation, Insulation Coordination, Surge Protection, and Shielding**

BIL of substation and equipment shall be in accordance with Company practices. Customer transmission tap and substation shall be shielded from direct lightning strikes in accordance with Company practices and latest version of IEEE Standard 998 "Guide for Direct Lightning Stroke Shielding of Substations". Substation non self-restoring insulation should be protected against incoming surges per Company practices and latest version of IEEE C62.22.

In addition, for customer transmission line taps and line structures with multi-grounded lightning protection wires, the individual structure footing resistances shall be commensurate with Company standards. Also, it is preferred that two shield wires be employed to shield transmission lines from direct lightning strikes.

3. **Metering and Telecommunications**

a. For Ameren customers taking service under an Ameren bundled retail service tariff, meters and associated instrument transformers shall be provided and owned by Ameren. Metering equipment shall be installed in accordance with Ameren service equipment specifications. Ameren will install the meters, perform final wiring connections and verify proper metering installation. All metering equipment will be sealed with Ameren seals and only Ameren authorized personnel will have access to the metering equipment for other than reading the meter.

For customers taking other than bundled retail service, installation and ownership of the metering equipment will be agreed to by the customer and Ameren. For cases where Ameren does not own, install, or maintain the metering equipment, metering equipment and metering design must be approved by Ameren prior to purchase and installation.

b. Customer will, at Company's request and if required by Good Utility Practice, provide, install, own and maintain in accordance with Good Utility Practice equipment to telemeter the following data continuously from the Metering Equipment to Company using Harris 5000 protocol, or if agreed to by Company, its operational equivalent:

- Real power in megawatts ("MW");
- Reactive power in megavolt-ampere-reactive ("Mvar");
- Current in Amperes
- Voltage in kV

c. For customers owning and maintaining the metering equipment, the customer shall test the metering equipment at least one (1) time each calendar year at Customer's expense and at any other mutually agreeable and reasonable time requested by Company at Company's expense. Customer shall provide Company with at least fourteen (14) calendar days advance notice of any testing to be performed on the Metering Equipment, and Company shall have the right to be present during all such testing and shall be furnished with all testing results in a timely manner. Company shall make no further dissemination of meter reading data to third parties other than the RTO to which they are associated. Ameren may require that the meter and metering equipment be sealed with Ameren provided seals along with any seals required by the Customer

d. For customers owning and maintaining the metering equipment, the metering equipment shall be considered accurate if the meter error percentage does not exceed plus or minus three tenths of one percent (+/- 0.3%). If testing of the metering equipment reveals any measurement inaccuracies greater than the meter error percentage permitted above, the affected metering equipment shall be recalibrated, repaired or replaced promptly by Customer such that any such measurement inaccuracies are rectified. If either Party believes that there has been a meter inaccuracy, failure, or stoppage, that Party shall immediately notify the other.

Instrument transformer error percentage of the metering CT's and PT's should be less than +/- 0.3%.

e. Additional design requirements that should be addressed with the SCADA and metering equipment as appropriate for Customer's connection include:

- Loss compensation
- Bi-directionality
- Ancillary equipment specifications (such as CT's and PT's)
- Mode of data transmission (such as fiber optic cable, phone line, etc.)
- Control functionality (breakers, switches, etc.)
- Provisions for maintaining continuity and meeting reliability criteria (such as dual DC sources, dual port RTUs)

f. If, for any reason, any metering equipment is out of service or malfunctions so that the amount of energy delivered cannot be ascertained or computed from the readings thereof, the energy delivered during the period of such outage shall be estimated and agreed to by both Customer and Company upon the best data available, including, but not limited to, other meters, operational logs, and real-time communications data of the meter results, as mutually determined by the Parties.

g. At intervals requested by Company and upon reasonable advance notice, Customer shall provide to Company actual readings of the metering equipment to verify the accuracy of the metering equipment data being telemetered to Company.

h. If a telecommunication connection is utilized for sending Customer Substation electrical metered quantities to a control center, different meters are required for the revenue meters and for those meters utilized for the RTU's.

4. Power Quality Impacts

In general, the connection of the Customer to Company's transmission system should not unacceptably compromise or degrade the power quality provided to existing customers. If necessary, installation of power quality monitoring equipment by Company at Customer's expense will be performed to verify compliance with power quality performance requirements.

a. Harmonic Requirements: The harmonic content of the voltage and current waveforms injected into the Company's Transmission System by a Customer's facility shall be restricted to levels that are in accordance with the latest version of IEEE Standard 519 or its replacement and which will not cause excessive distortion of Company's waveform, telephone interference, carrier interference or equipment operating problems for Company or other users of the Company's Transmission System. Customer will, if required by Company and/or Good Utility Practice, reduce or eliminate the existence of any excessive harmonics caused by the operation of the Customer's facility at Customer's expense.

All equipment installed by Customer shall have operating characteristics, which enable Company to maintain a satisfactory standard of service to both the Customer being served and all other Customers in the immediate area. Also, Customer's internal plant electrical system design should not restrict any mode of operation of Customer's facility within Company's transmission system allowable voltage range. In cases of higher motor starting current, Customer loads resulting in harmonic distortions or significant loads with wide and/or frequent fluctuations, etc., Customer shall install, on Customer side of Company meter, all corrective equipment necessary to enable Company to maintain the integrity of its electric system. If Company determines it to be necessary, Customer shall permit Company to install applicable power quality monitoring equipment at Customer's facility to permit verification of compliance with power quality requirements. For Customers not voluntarily complying with this requirement, Company, where practical, may install corrective equipment on its side of the meter and charge Customer a lump sum amount for the cost of such equipment and the cost of any subsequent additions to or replacement of such equipment, whenever said future installations occur. Failure of Customer to install such corrective equipment or to pay for that installed by company currently, or in the future, shall be grounds for the disconnection of electric service.

b. Flicker Requirements: The acceptability of the voltage fluctuations caused by varying or switched loads, switched capacitors, motor starts, and other normally occurring events, which produce a sudden change in voltage, depends upon the

frequency and magnitude of the fluctuation of flicker. Most cases are evaluated with established flicker curves. Arc furnaces, however, are evaluated differently.

- i. **Flicker sources other than arc furnaces**
The flicker limits developed and published in the latest version of IEEE Standard 1453 are used as a general guide for evaluating the acceptability of expected flicker from causes other than arc furnaces. These limits show permissible flicker levels as a function of the frequency of occurrence.
 - ii. The primary criteria for evaluation of the expected flicker from an arc furnace load added to the Ameren system is based upon the charts presented in the AIEE paper "Survey of Arc Furnace Installation on Power Systems and Resulting Lamp Flicker," Transactions 57-9, September 1957. These charts indicate whether the resultant flicker would be objectionable, borderline, or nonobjectionable based on the furnace size and system impedance supplying the furnace(s). For a furnace installation to be rated "acceptable", the flicker with normal system conditions must be in the "non-Objectionable Flicker Zone" on the charts. This method does not consider the electrical characteristics of the particular furnace involved, other than the basic load rating. An evaluation method developed and presented in the ASEA Journal 1976, Volume 49, factors in the electrical characteristics of the furnace by specifying a maximum allowable voltage drop on the critical bus during a transition from an unloaded furnace to a 3-phase fault at the furnace electrodes. According to this study a calculated voltage dip of 2.0% is considered marginal.
5. **Equipment Ratings** – Commensurate with customer load and consistent with standard sizes used by customer. The MVA and current rating of all equipment from the Ameren point of ownership to the Customer's first supply bus are required. This information is used to coordinate protection of Company's supply. This information is used to coordinate protection of Company's supply. Applicable industry standards (ANSI/IEEE) would be used to determine ratings of the equipment. Company's general design parameters and practices should be identified and adhered to. Any special requirements due to atmospheric, geological, seismic, or environmental conditions should also be addressed.
 6. **Synchronizing of Facilities** – Not needed for the Customer connection application unless Customer has generation. If the Customer has generation, then the requirements identified in the MISO Generator Interconnection Procedure are superior to the "End-User Connection Procedures & Guidelines."
 7. **Grounding and Safety Issues** – Ameren has minimum requirements that the Customer must meet and so that the Customer operates its facility in accordance with National Electric Safety Code. Design requirements for system grounding that should be addressed as appropriate for Customer's connection include:
 - Grounding study
 - Compatibility with Company's transmission system

- Interconnection of grounding system to Company's grounding system(s)
- Transmission line shielding provisions
- Arrester applications
- Cathodic protection

8. **Maintenance Coordination.** Company is responsible for regular maintenance on all Company-owned transmission system equipment. Customer's maintenance practices for their transmission-connected equipment should be performed at a level that ensures the reliability of the interconnected transmission system. Definition of maintenance programs and performance objectives, as appropriate, should be addressed with Customer's connection. All necessary authorizations, notifications, and clearances relevant to the maintenance work to be performed must be obtained.

The facility owner, whether the Company or Customer, is responsible for the regularly scheduled calibration and/or maintenance of its equipment associated with the connection, as applicable, including, but not limited to:

- Circuit breakers
- Power transformers
- Protective relays
- Revenue metering
- Communications
- Trip circuits
- Interrupters
- Power DC sources
- Grounding system
- Transmission facilities

Relevant records of maintenance work performed should be maintained.

9. **Operational Issues** (jurisdictional and functional authority)
- Ameren will have jurisdictional authority over the equipment to the Customer side of the first breaker separating the Customer's load from the Company's Transmission System.
 - In general, the Customer will have functional authority on its equipment in its substation and in its facility.
 - Ameren will have functional authority on all Ameren equipment, except as conferred in writing to Customer by Ameren.
10. **Inspection Requirements for Existing or New Facilities – Commissioning Testing and Inspection.** Ameren reserves the right to witness testing of relays, breakers, instrument transformers, communications equipment, and DC station service prior to commencement of commercial operation. Company reserves the right to specify additional testing as appropriate, with Customer to modify operations as necessary to reasonably comply with Company's testing requirements. Customer's electrical equipment will be made available to Company for inspection upon two day written

request during nonemergency conditions, but will have immediate accessibility during emergency conditions.

11. **Communications and Procedures During Normal and Emergency Operating Conditions** – The Customer shall provide contacts for normal conditions and emergency situations and update as they change over time. These contact person(s) shall have the authority and capability to operate Customer's facilities according to the instructions of the appropriate operating authority. All Transmission Operators shall obtain proper clearances from the appropriate operating authority before commencing any work on the transmission facilities. All Transmission Operators shall have a provision for reliable communications with the appropriate operating authority. In addition, all Transmission Operators shall have provisions for reliable communications with other Transmission Operators as appropriate.

Customer shall communicate with and shall cooperate with Company to support recovery efforts during emergency conditions. Such actions Customer may be called upon to take may include, but may not be limited to, implementation of emergency communications procedures, switching operations, changes to status of reactive power support devices, and transmission facility restoration efforts.

12. **Underfrequency Load Shedding** – In accordance with the SERC Supplement on Under Frequency Load Shedding, underfrequency load-shedding relays are installed on selected feeder positions to drop load and prevent system collapse. Approximately 10% of the Ameren system load should be dropped at each of three frequencies (59.3, 59.0, and 58.7 Hz.).

Ameren reserves the right to unilaterally decide if load shedding for a Customer is required initially and Ameren has the right to require Customer loading shedding retrofits or modification in the future.

13. **Undervoltage Load Shedding** – At present, there are no undervoltage load shedding relay schemes associated with load connections to Ameren's transmission system. Such installations would be considered on a case-by-case basis as needed to maintain reliability of the transmission system as interim solutions prior to implementation of an upgrade to the transmission system.