

TO-FAC-001 Transmission Facility Interconnection Requirements

Organization: Transmission Owner

APPROVAL

Transmission Director

Steve Martin
Signature


2-19-2019
Date

Garland Power & Light
217 N Fifth St
Garland, TX 75040

Use, duplication or disclosure is subject to restrictions by the U.S. Government as set forth in subdivision (b) (3) (ii) of the Rights In Technical Data and computer clause at 52.227-7013 (48 CFR 252).

PROPRIETARY NOTICE:

This document and the information disclosed herein are the property of Garland Power and Light and shall not be disclosed or used for any other purposes except as specified. Recipient agrees not to reproduce, copy, or transmit this document in whole or in part, for any purpose, except with the appropriate approval of Garland Power and Light.

	Document Number	Revision	Release Date	Page
	TO-FAC-001 Transmission Interconnection Requirements	6	02/19/2019	1

Applicability

This guideline applies to all City of Garland business functions performed under applicable ERCOT Registrations, NERC registrations, Joint Registration Agreements, Coordinated Functional Registration Agreements, or Delegation Agreements.

This guideline applies to Transmission Facilities owned by Texas Municipal Power Agency (TMPA) that are operated and maintained by the City of Garland.

This document shall be applicable to the City of Garland:

- Transmission Owner

Scope

The City of Garland has established the following generation facility connection requirements to ensure compliance with North American Electric Reliability Corporation (NERC) Standard FAC-001 and applicable Regional Reliability Organization (Electric Reliability Council of Texas, or ERCOT) planning criteria. The requirements follow the outline of FAC-001 and use a modified form of the outline numbering system of FAC-001. Elements of FAC-002 have been incorporated throughout this document. A written summary of plans to achieve required system performance throughout the planning phase for new connections shall be developed as necessary.


Reference Documents

North American Electric Reliability Corporation (NERC) Standard FAC-001

Garland Power and Light Transmission Facility Connection Requirements

The City of Garland has established the following generation facility interconnection requirements in compliance with North American Electric Reliability Corporation (NERC) Standard FAC-001 and other applicable ERCOT and the City of Garland planning criteria. The requirements follow the outline of FAC-001 and use a modified form of the requirement numbering system of FAC-001. Elements of FAC-002 have been incorporated throughout this document. A written Summary of plans to achieve required system performance throughout the planning phase for new interconnections shall be developed as necessary.

Coordinated joint studies of new or materially modified existing interconnections and their impacts on affected system(s).

	Document Number	Revision	Release Date	Page
	TO-FAC-001 Transmission Interconnection Requirements	6	02/19/2019	2

The impact of the generation facility connection on the reliability of the interconnected transmission system shall be evaluated. This evaluation shall include independent steady-state, short-circuit, and dynamic studies of the affected transmission line by the City of Garland and by the other Transmission Owner (TO) in accordance with Reliability Standard TPL-001 or subsequent standards as such standards are adopted. Documentation of the studies, including study assumptions, system performance, and alternatives considered shall be retained for a minimum of three (3) years.

The studies shall be compared by personnel from both entities to determine a joint assessment of the reliability impacts of the new facilities on the interconnected transmission system. Documentation of coordinated and cooperative assessment shall be retained for a minimum of three (3) years. The studies shall be conducted using the ERCOT load flow models as modified to include the construction of the proposed facilities.

Notification those responsible for the reliability of affected systems(s) of new or materially modified existing interconnections.

The City of Garland and the TO shall coordinate submission of the proposed connection to ERCOT following the approved procedures published by ERCOT. The submission shall be made as soon as feasible following joint confirmation that the proposed connection has no adverse reliability impact.

The City of Garland and the interconnecting TO shall each be responsible for providing load flow, short circuit and transient stability model information on their proposed facilities to ERCOT to allow the development of appropriate regional load flow, short circuit and transient stability models for projects for which an Interconnection Agreement has been signed.

At the appropriate time as outlined in the ERCOT Protocols, the City of Garland and the TO shall each be responsible for providing their operational models to ERCOT to develop State Estimator and other models used by ERCOT.


Confirming with those responsible for the reliability of affected systems of new or materially modified transmission Facilities are within a Balancing Authority Area's metered boundaries.

End interconnecting TO shall notify the City of Garland through email or other written communication that it has verified the facilities are within the Balancing Authority Area's metered boundaries.

Voltage Level and MW and MVAR Capacity or Demand at Point of Connection

All studies shall document the anticipated voltage level and the anticipated MVA, MW, and MVAR capacity and demand at the connection point. The City of Garland and the TO shall compare this data to ensure correlation, and shall resolve any discrepancies. Documentation shall be retained for a minimum of three (3) years.

Breaker Duty and Surge Protection

	Document Number	Revision	Release Date	Page
	TO-FAC-001 Transmission Interconnection Requirements	6	02/19/2019	3

The City of Garland and the End User shall ensure that the circuit breaker(s) installed to provide the proposed connection at 345 kV shall meet the following minimum standards:

- Voltage rating: 362kV
- BIL: 650kV
- Continuous current rating: 5kA
- Interrupting current (short circuit) rating: 40kA.
- 4 sets of: 5000/5 multi-ratio C-800 relay class CT with TR=2.
- The breaker(s) shall be rated to interrupt available fault current at the connection point.

The City of Garland and the End User shall ensure that the circuit breaker(s) installed to provide the proposed connection at 138kV shall meet the following minimum standards:

- Voltage rating: 145kV
- BIL: 650kV
- Continuous current rating: 3kA
- Interrupting current (short circuit) rating: 63kA.
- 4 sets of: 3000/5 multi-ratio C-800 relay class CT with TR=2.
- The breaker(s) shall be rated to interrupt available fault current at the connection point.

The City of Garland and the End User shall ensure that the circuit breaker(s) installed to provide the proposed connection at 69kV shall meet the following minimum standards:


- Voltage rating: 72.5kV
- BIL: 350kV
- Continuous current rating: 2kA
- Interrupting current (short circuit) rating: 50kA.
- 4 sets of: 2000/5 multi-ratio C-800 relay class CT with TR=2.
- The breaker(s) shall be rated to interrupt available fault current at the connection point.

System Protection and Coordination

The City of Garland and the TO shall review the proposed system protection schemes of each entity to ensure compatibility of the schemes. Both entities shall abide by NERC and ERCOT requirements which address protective relaying. In the event of a conflict the City of Garland reserves the right to specify relays and equipment interconnections to be installed by the TO for any protection scheme which directly affects the City of Garland facilities. Both entities shall ensure that relaying schemes and coordination are appropriate for the proposed connection. The TO shall install fault recording equipment per ERCOT requirements, and both entities shall provide facilities for time stamping recorded events to ensure correct sequencing of events for analysis.

Metering and Telecommunications

The City of Garland and the TO shall ensure that installed meters and related circuitry and equipment (CT's, PT's, etc.) meet or exceed NERC and ERCOT requirements. Telecommunications and relay channels between the City of Garland facilities and the TO's facilities shall be fiber optic connections, unless otherwise agreed and shall meet the City of

	Document Number	Revision	Release Date	Page
	TO-FAC-001 Transmission Interconnection Requirements	6	02/19/2019	4

Garland standards and equipment so that no modification of the City of Garland's existing communication other than adding components is necessary.

Grounding and Safety Issues

Facility grounding shall be designed in conformance with best engineering practice and NERC and ERCOT requirements. The grounding associated with all generation facilities shall be sufficient to minimize impact on the interconnected transmission system and ensure the safety of personnel and passers-by.

Personnel of both the City of Garland and the TO shall be made aware of the safety practices of both entities, and shall be required to meet said requirements when visiting the other entities facilities.

Insulation and Insulation Coordination

Insulation of 345 kV bus and transmission lines shall be at 650 kV BIL unless otherwise agreed.

Insulation of 138 kV bus and transmission lines shall be at 650 kV BIL unless otherwise agreed.

Insulation of 69 kV bus, transmission lines and transformers shall be at 350 kV BIL unless otherwise agreed.

Insulation of transformers or other equipment operated at 138 kV shall be rated no higher than 650 kV BIL except by mutual agreement.

Voltage, Reactive Power and Power Factor Control

The Transmission Facility shall operate within voltage, frequency, and reactive power limits established by ERCOT and NERC, including the requirements of NERC Standards VAR-001 and VAR-002. The TO shall at all times maintain the appropriate reactive power input or output to meet the seasonal voltage profile requirements established by ERCOT or as modified by the TOP as required by the ERCOT Protocols and Operating Guides.

Power Quality Impacts


The City of Garland and the TO shall maintain power quality sufficient to prevent any adverse effect on the interconnected transmission system. All Federal State, or Local Regulations, Statutes, and Guidelines shall apply.

Equipment Ratings

Rating for all substation equipment installed by the City of Garland or the TO will be as follow:

- 345 kV service shall be rated to carry a minimum of 5 kA of continuous load current.
- 138 kV service shall be rated to carry a minimum of 3 kA of continuous load current.
- 69 kV service shall be rated to carry a minimum of 2 kA of continuous load current.

For all voltage class, the short circuit current rating of 40kA for 30 cycles is the minimum. Relays and metering equipment shall withstand a secondary current of 125 amps for 30 cycles.

	Document Number	Revision	Release Date	Page
	TO-FAC-001 Transmission Interconnection Requirements	6	02/19/2019	5

Transmission lines at the interconnection should be designed for a minimum of 1400 amps unless otherwise agreed.

The City of Garland and the TO shall be responsible for developing and communicating equipment ratings as required under NERC Standard FAC-008.

Synchronization

The City of Garland and the TO shall each install facilities to ensure that connection of the new facilities to the interconnected transmission system shall occur only when the new facilities and associated facilities and the bulk electric system are in synchronization with each other.

Maintenance Coordination

The City of Garland and the TO shall coordinate maintenance activities for the facilities of both entities to ensure minimum reliability impact on the interconnected transmission system. Each facility shall document both its maintenance schedule for all equipment, and compliance with said schedule. Documentation shall be retained for a minimum of three (3) years.

Operational Issues (abnormal frequency and voltage)

The TO shall install appropriate systems to ensure that abnormal frequencies, voltage swings, or current levels shall not impact the reliability of the interconnected transmission system. In particular the generator should note the ERCOT requirements for Low Voltage Ride through for generators and minimum frequency and time protection settings for generation separation from the transmission system.

Inspection Requirements for Existing or New Facilities

The City of Garland and the TO shall each establish and maintain inspection programs to ensure the integrity and serviceability of all installed facilities to minimize impact on the reliability of the interconnected transmission system. Documentation of said programs and compliance with said programs shall be maintained for a minimum of three (3) years.


Communications and Procedures during Normal and Emergency Operating Conditions

Methods of communication and joint operating procedures for both normal and emergency conditions shall be developed and documented. These shall be published to all necessary personnel of the City of Garland and the TO.

Compliance with Standards, Operating Guides and Protocols

the City of Garland and the TO shall each be responsible to ensure compliance with NERC Reliability Standards and applicable Regional, sub regional, Power Pool, and individual system planning criteria and facility connection requirements for their own facilities. Documentation of such compliance shall be retained for a minimum of three (3) years.

Compliance with Standards, Operating Guides and Protocols

	Document Number	Revision	Release Date	Page
	TO-FAC-001 Transmission Interconnection Requirements	6	02/19/2019	6

the City of Garland and the TO shall each be responsible to ensure compliance with NERC Reliability Standards and applicable Regional, subregional, Power Pool, and individual system planning criteria and facility connection requirements for their own facilities. Documentation of such compliance shall be retained for a minimum of three (3) years.

Design by Registered Professional Engineer

Design of all TO facilities shall be done by a Registered Professional Engineer licensed to practice in the State of Texas. All specifications, drawings, and documents related to the design shall be duly stamped and signed in accordance with the laws of the State of Texas. All designs shall be done in conformance with best engineering practice, ANSI and IEEE standards, OSHA, and other applicable Federal, State or local regulations. The TO shall submit 1-line and 3-line relaying and metering diagrams to the City of Garland for approval. The City of Garland shall provide the same diagrams of the relevant the City of Garland facilities to the TO for review.

Modification of Requirements


Any of these requirements and responsibilities can be changed by mutual agreement of the City of Garland and the TO.

Update of Requirements / Provide Documents Upon Request

GP&L shall maintain and update these facility connection requirements as necessary to account for changes in relevant Reliability Standards, changes in technology, or increased demand or capacity of either the interconnected transmission system or the new transmission facilities.

Revision History

Revision	Date	Change
0	06/08/2009	Initial release.
1	08/19/2009	Updated Format
2	10/28/2009	Added Revision 0 to Revision History, Updated title page
3	02/11/2010	Added specifications for 69 kV breakers and requirement for metering accuracy CT's
4	08/18/2010	Added Headings, reordered paragraphs to track standard.
5	01/01/2019	Updated agreement to meet FAC-001-5 version, removed the Terms and Definition section, updated the voltage class and current ratings, updated GP&L logo, modified fonts and format. (mn)
6	02/19/2019	Added " APPLICABILITY " section to include TMPA. Replaced "GP&L" with "The City of Garland. (mn)

	Document Number	Revision	Release Date	Page
	TO-FAC-001 Transmission Interconnection Requirements	6	02/19/2019	7