



**FACILITY INTERCONNECTION REQUIREMENTS  
FOR INTERCONNECTION TO THE CPS ENERGY  
BULK ELECTRIC SYSTEM**

**Effective Date: January 1, 2019**

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*The revision history below reflects changes to the document or its structure.*

**Revision History**

<b>Revision</b>	<b>Reason for Issue</b>	<b>Issue Date</b>	<b>Next Review Date</b>
1.0	Facility Connection Requirements Created In Response To New NERC FAC-001-0 Reliability Standard.	11/29/2007	As needed
1.1	Added NERC FAC-001-0 Requirement Numbers And Changed Verbiage To More Closely Match The Standard.	02/11/2009	As needed
1.2	Added References To ERCOT Guides And Protocols.	05/01/2011	As needed
1.3	Minor Change To Metering References.	09/01/2011	As needed
2.0	Major Revisions In Document Structure and Verbiage In Response To New NERC FAC-001-2 Reliability Standard.	12/09/2016	As needed
3.0	Added NERC FAC-001-3 requirements		

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## INTRODUCTION

This document is organized to correspond with the NERC FAC-001-3 Reliability Standard and provides minimum requirements to interconnect with the CPS Energy BES. Other specific requirements may be determined at the time of interconnection.

## Definitions and Acronyms

<i>CPS Energy BES</i>	Consistent with the NERC definition of BES (Bulk Electric System), with all inclusions and exclusions contained therein, the CPS Energy BES includes the 138 kV and 345 kV transmission Facilities owned by CPS Energy.
<i>End-User Facility</i>	An Interconnecting Facility that serves an Interconnecting Entity's customer load and is directly connected to the CPS Energy BES.
<i>ERCOT</i>	Electric Reliability Council of Texas, Inc.
<i>ERCOT BES</i>	Consistent with the NERC definition of BES, the ERCOT BES includes the 138 kV and 345 kV transmission Facilities of all Interconnecting Entities interconnected with the ERCOT grid, including the CPS Energy BES.
<i>FERC</i>	Federal Energy Regulatory Commission
<i>Good Utility Practice</i>	Has the same meaning as described in PUCT Substantive Rule §25.5.
<i>Interconnecting Entity</i>	An entity that currently interconnects or is proposing to interconnect Generation, Transmission or End-User Facilities to the CPS Energy BES.
<i>Interconnecting Facility</i>	Facilities owned by an Interconnecting Entity that are either currently interconnected or proposed to be interconnected with the CPS Energy BES.
<i>Materially Modified</i>	Refers to substantial changes to the manner in which the interconnecting Facility interconnects with the CPS Energy BES. For an existing generation Facility, this refers to a proposed change of 10 MW or greater in generator output. For an existing transmission Facility, this refers to a change in the endpoint (other than looping or tapping in a new load-serving substation) or addition of transmission Facilities at either endpoint that would substantially affect the power flow over the Interconnecting Facility. For an existing End-User Facility, this refers to the addition of equipment or addition of a large customer within the End-User Facility that is projected to substantially impact the available capacity of the CPS Energy BES.
<i>NERC</i>	North American Electric Reliability Corporation
<i>NESC</i>	National Electric Safety Code
<i>OSHA</i>	Occupational Safety and Health Administration
<i>Party or Parties</i>	CPS Energy and the Interconnecting Entity may be singularly referred to as "Party" or jointly referred to as "Parties" within this document.
<i>Point Of Interconnection (POI)</i>	The point(s) where ownership of the Interconnecting Facility changes from CPS Energy to the Interconnecting Entity.
<i>Power Quality</i>	The quality of the voltage and current waveforms at the POI.
<i>PUCT</i>	Public Utility Commission of Texas

## **REQUIREMENTS**

### **R1. Transmission Owner Facility Interconnection Requirements**

This document outlines CPS Energy's Facility Interconnection Requirements for entities wishing to interconnect with the CPS Energy BES. This document will be updated as needed and will be made available upon request.

All proposed Interconnecting Facilities shall be designed and operated in accordance with the Facility Interconnection Requirements contained herein and any applicable requirements of ERCOT, FERC, NERC, NESC, OSHA and the PUCT. Addition of an Interconnecting Facility or changes to an existing Interconnecting Facility shall not negatively impact system stability, reliability, operability, maintainability or utility of the CPS Energy BES. The CPS Energy Facility Interconnection Requirements, contained herein, address interconnection requirements for:

#### **1.1. GENERATION FACILITIES**

#### **1.2. TRANSMISSION FACILITIES**

#### **1.3. END-USER FACILITIES**

### **R2. Generator Owner Facility Interconnection Requirements**

CPS Energy, as a Generator Owner, does not own BES equipment with which a third party could interconnect. Therefore, CPS Energy is exempt from the requirement to have a Facility interconnection requirement.

### **R3. Transmission Owner Interconnection Study Procedures**

The CPS Energy Facility Interconnection Requirements, contained herein, address the following:

#### **3.1. Procedure to Coordinate System Studies**

Procedures for coordinated studies of new or Materially Modified existing Interconnecting Facilities and their impact on the ERCOT and CPS Energy BES vary depending upon the type of Interconnecting Facility for which the Interconnecting Entity is seeking interconnection.

##### *Generation Interconnecting Facility*

CPS Energy performs a Full Interconnection Study for new (10 MW or greater planned capacity) or Materially Modified generation Interconnecting Facilities, in accordance with ERCOT Planning Guide Section 5 [Generation Resource Interconnection or Change Request] and specifically Section 5.4 [Study Processes and Procedures].

##### *Transmission Interconnecting Facility*

CPS Energy follows ERCOT processes to develop a coordinated study to determine the impact on both the ERCOT and CPS Energy BES when either ERCOT, an Interconnecting Entity or CPS Energy identifies a potential need to add or Materially Modify an existing transmission Interconnecting Facility. ERCOT processes are defined in ERCOT Nodal Protocol Section 3.11.4 [Regional Planning Group Project Review Process].

End-User Interconnecting Facility

The process to study the impact of new or Materially Modified End-User Interconnecting Facilities on the CPS Energy BES begins with a request by the End-User Interconnecting Facility to either add a new Facility or to change an existing Facility. These requests should be sent directly to CPS Energy Key Account Managers or to the manager of Distribution Planning, who, in turn, will email the request to Transmission Planning at [transmissionplanning@cpsenergy.com](mailto:transmissionplanning@cpsenergy.com) to perform the appropriate studies. If it is determined that changes to the CPS Energy BES or neighboring Interconnecting Entity's BES are necessary to accommodate the new or Materially Modified End-User Interconnecting Facility, then the process defined in ERCOT Nodal Protocol Section 3.11.4 [Regional Planning Group Project Review Process] will be followed.

**3.2. Notification**

When it is determined through coordinated studies that the addition or Material Modification of an Interconnecting Facility affects the reliability of a neighboring Interconnecting Entity's BES, CPS Energy notifies the affected Party by following the appropriate ERCOT processes, which include responsibility of communicating and coordinating studies through appropriate ERCOT email lists, as described below for each type of Interconnecting Facility.

Generation Interconnecting Facility

ERCOT Planning Guide Section 5.4.8 (1) requires Transmission Service Providers (TSPs) to share results of the Full Interconnection Study with ERCOT TSP's via the confidential Transmission Owner Generation Interconnection email list. The email list is managed by ERCOT (Planning Guide Section 5.4.2 (4))

Transmission Interconnecting Facility

ERCOT Nodal Protocol Section 3.11.4 [Regional Planning Group Project Review Process] allows TSPs to submit project proposals to the Regional Planning Group, through ERCOT. All stakeholders that are members of the Regional Planning Group have the opportunity to comment on the proposed project (Planning Guide Section 3.1.5 [Regional Planning Group Comment Process]). All neighboring Interconnecting Entities are members of the Regional Planning Group.

End-User Interconnecting Facility

When a new or Materially Modified End-User Interconnecting Facility causes the need for a change to the CPS Energy or neighboring Interconnecting Entity's BES, then a project will be submitted to the ERCOT Regional Planning Group for review and comment.

**3.3. Confirming**

All CPS Energy Facilities are bounded by ERCOT Poll Settlement meters and therefore are within the ERCOT Balancing Authority. The process for confirming any interconnecting third party requesting to interconnect new or materially modified Facilities to CPS Energy shall provide evidence that ERCOT has recognized them to reside within the ERCOT metered boundaries prior to energization of the Interconnecting Facilities.

#### **R4. Generator Owner Interconnection Study Procedures**

As stated in R2, CPS Energy, as a Generator Owner, does not own BES equipment with which a third party could interconnect. Therefore, CPS Energy is exempt from the requirement to have Facility interconnection requirements.

- 4.1. Procedure To Coordinate System Studies do not apply to CPS Energy as a Generator Owner**
- 4.2. Interconnection Coordination do not apply to CPS Energy as a Generator Owner**
- 4.3. Procedures for Confirming do not apply to CPS Energy as a Generator Owner**

### **GUIDELINES AND TECHNICAL BASIS**

Facilities interconnecting to the CPS Energy BES shall adhere to the following guidelines.

#### **Procedures For Requesting an Interconnection**

Procedures vary for requesting an interconnection based on the type of Interconnecting Facility.

##### Generation Interconnecting Facility

ERCOT Planning Guide Section 5 [Generation Resource Interconnection or Change Request] defines the process for an Interconnecting Entity to request interconnection of new or Materially Modified Interconnecting Facilities.

##### Transmission Interconnecting Facility

Interconnecting Entities can submit a request for interconnection of a transmission Interconnecting Facility to the ERCOT Regional Planning Group or directly to CPS Energy Transmission Planning at [transmissionplanning@cpsenergy.com](mailto:transmissionplanning@cpsenergy.com).

##### End-User Interconnecting Facility

Interconnecting Entities can submit a request for interconnection of an End-User Interconnecting Facility through CPS Energy Key Account Managers or to the manager of Distribution Planning.

#### **Data Requirements For Interconnection Studies**

Certain data is required to be able to study the effects of an Interconnecting Facility on the ERCOT and CPS Energy BES.

##### Generation Interconnecting Facility

ERCOT Planning Guide Section 5 [Generation Resource Interconnection or Change Request] defines the necessary minimum data needed to perform interconnection studies.

##### Transmission Interconnecting Facility

Data requirements will be determined at the time of study for transmission Interconnecting Facilities since the type and scope of equipment being added or changed can vary widely.

##### End-User Interconnecting Facility

The minimum data needed to study the impact of a new or materially modified End-User Interconnecting Facility is the location, a load ramp schedule and the anticipated in-service date.



## **Voltage Level and Power Capacity or Demand at POI**

### *Voltage*

The CPS Energy BES is comprised of 138 kV and 345 kV Facilities. Proposed Interconnecting Facilities will be interconnected at one of these voltage levels.

### *Power Capacity or Demand*

Allowable power capacity or demand (MVA, MW, MVAR, PF) to be interconnected with the CPS Energy BES will be determined from the interconnection study.

## **Breaker Duty and Surge Protection**

### *Breaker Duty*

Breaker duty of AC high voltage circuit breakers is determined in accordance with ANSI/IEEE Standards C37 series for breakers rated on a “Symmetrical Current Basis” through breaker rating studies performed by CPS Energy. Breakers interconnecting with the CPS Energy BES shall not exceed 100% of their interrupting rating. For existing Interconnecting Facilities, Interconnecting Entities shall schedule replacement of breakers expected to exceed 95% of their interrupting rating. For new Interconnecting Facilities, breakers shall be procured and installed with adequate margin to allow for system growth, as determined by CPS Energy breaker rating studies. Interconnecting Entities shall supply CPS Energy with breaker nameplate information for all breakers and fault-interrupting devices interconnected with the CPS Energy BES.

### *Surge Protection - Substation Equipment*

Voltage sensitive devices used to protect equipment and systems from high voltage surges (such as lightning, switching, or temporary over-voltages) shall comply with CPS Energy Specification No. 774-07<sup>1</sup> [Arresters, Surge, Station Class, Metal-Oxide Varistor] and IEEE C62.11-2012 [IEEE Standard for Metal-Oxide Surge Arresters for AC Power Circuits (>1 kV)]. The Interconnecting Entity shall provide CPS Energy with a location plan and a simplified one-line diagram of the proposed Interconnecting Facilities illustrating surge protection devices.

### *Surge Protection - Transmission Equipment*

Either Party shall provide pertinent information to the other Party regarding surge protection (such as arrester size, configuration, etc.), if applicable.

## **System Protection and Coordination**

Interconnecting Entities are required to provide dependable and secure protective relay systems for their portion of the Interconnecting Facility. The protective relay systems shall be designed to meet applicable NERC and ERCOT requirements and in accordance with Good Utility Practices. The design must provide coordination for speed and sensitivity and shall not degrade the reliability of

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<sup>1</sup> This standard can be found by searching for 774-07 at the following website:  
<https://www.cpsenergy.com/content/corporate/en/developers-builders/customer-engineering/standards-and-specifications.html>

the CPS Energy BES. CPS Energy reserves the right to specify relay types and setting requirements for interconnection with the CPS Energy BES. CPS Energy may require submittal of operational and relay one-line diagrams, relaying schematics, relay types, proposed settings and equipment short circuit parameters for review and approval. Additionally, the Interconnecting Entity may be required to install under-frequency or under-voltage load shedding protection to meet NERC and ERCOT requirements.

### **Metering, Telecommunications and Remote SCADA Systems**

#### Metering

The Interconnecting Entity shall provide metered quantities of MW, MVAR, and voltage at the POI. These values are allowed to have “relay accuracy” and will be used for SCADA and regulatory purposes. Other meter point quantities and/or installations may be required for generation, load or special applications located at the Interconnecting Facility. CPS Energy will specify the accuracy, equipment type and location for these metering points. CPS Energy may require the installation of ERCOT settlement metering at the Interconnecting Facility. This will depend on the location of the POI and will be determined at the time of application.

Reasonable access must be provided by Interconnecting Entity for the installation, testing and repair of metering equipment owned by CPS Energy. All meter points shall be shown on the relay one-line diagram and schematic drawings, indicating ratios, device types and accuracies. All metered points shall conform to NERC, state and local requirements. Under no circumstances shall metering facilities constrain the CPS Energy BES.

The meter point design shall conform to all applicable ERCOT guides, protocols and procedures. All devices used in metering shall conform to or exceed applicable ANSI/IEEE standards and ERCOT requirements. In the absence of appropriate ANSI/IEEE standards, the devices shall conform to the latest edition of the “EEI Handbook for Electrical Metering.”

#### Telecommunications

Each Party is responsible for the design, purchase, installation, testing, maintenance, and replacement of the RTU equipment, telemetry equipment, and communications circuits owned by that Party. Reasonable access must be provided by the Interconnecting Entity for the installation, testing and repair of RTU equipment, telemetry equipment, and communications circuits owned by CPS Energy.

Dedicated communications circuits are required for premise equipment (i.e. Remote Terminal Units (RTUs), telemetry equipment, etc.). Voice communications shall be established via normal telephone lines or mutually agreed upon circuits. Design of communication system should include redundancy and backup protection in accordance with Good Utility Practices. The Interconnecting Entity shall provide adequate and reliable telecommunication facilities to ensure reliable exchange of interconnection and operational information and, where applicable, shall be redundant and diversely routed.

### Remote SCADA Systems

DNP3 is the required protocol to be used for the exchange of data between the two Interconnecting Entities. The Interconnecting Entity shall provide CPS Energy a RS232 (DB-9) serial port on their RTU to be used for this DNP3 data exchange. The Interconnecting Entity shall provide all cabling necessary for this data exchange.

## **Grounding and Safety Issues**

### Substation Equipment

Interconnecting Facilities shall follow ANSI/IEEE standards for grounding<sup>2</sup>. Interconnecting Facility safety requirements shall address the grounding of all exposed metal parts of switches, structures, transformers tanks, metal walkways, fences, steelwork of buildings, panels, etc., so that a person touching or near any of this equipment cannot receive a dangerous shock if high-tension conductors flash over or come in contact with any of the equipment listed. This means that each individual piece of equipment shall have its own connection to the station grounding system, made of heavy copper, protected against mechanical damage, bonded together, and tied into the main station ground. The Interconnecting Entity shall provide CPS Energy with a location plan and a simplified one-line diagram that illustrate the grounding of the Interconnecting Facilities and shall provide a grounding study, if applicable.

### Transmission Equipment

All new transmission line Interconnecting Facilities shall have one or more overhead shield wires as follows: Single circuit transmission lines, in vertical or delta configurations, shall have at least one shield wire; horizontally configured single, double and triple circuit transmission lines shall have at least two shield wires. If required by CPS Energy, the Interconnecting Entity shall provide adequate transmission line grounding to mitigate lightning and surge flashovers by lowering foundation impedances with counterpoise and/or lightning rods, lightning arrestors or other design implementations.

## **Insulation and Insulation Coordination**

### Substation Equipment

Interconnecting Entities shall follow ANSI, IEEE and NEMA standards<sup>3</sup> for insulation and insulation coordination of equipment for normal operating voltages and for temporary over-voltages caused by switching or lightning.

### Transmission Equipment

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<sup>2</sup> ANSI/IEEE Std. 80 [Guide for Safety in AC Substation Grounding];

ANSI/IEEE Std. 142 [Recommended Practice for Grounding of Industrial and Commercial Power Systems-Green Book];

ANSI Std. C33.8 [Standard for Grounding and Bonding Equipment]

<sup>3</sup> NEMA/IEEE Std. C29.1 – C29.9 [High Voltage Insulation Standards], ANSI C92.1 [Insulation Coordination], IEEE 1313.1 [Insulation Coordination], IEEE 1313.2 [Guide for the application of Insulation Coordination]

Transmission line insulators shall be sufficiently sized for the applicable voltage level. Insulator CFO values shall be communicated between both Parties.

**Voltage, Reactive Power and Power Factor Control**

Devices required to control voltage, reactive power flow and power factor, such as capacitor banks, reactor banks, transformer tap changers, and generator reactive capability, will be determined in accordance with applicable ERCOT protocols and guides prior to interconnection.

**Power Quality**

The Interconnecting Entity shall abide by the following Power Quality standards. Depending upon the terms and conditions defined between CPS Energy and the Interconnecting Entity, the Interconnecting Entity shall maintain Power Quality Event data for a minimum of two years and make this data available to CPS Energy upon request.

*Voltage:* Any deviation of ±5% from CPS Energy nominal voltage for longer than ten cycles (0.166 seconds) is considered a Power Quality Event.

*Voltage Unbalance:* A voltage unbalance<sup>4</sup> greater than 2.5% over a given demand period is considered a Power Quality Event.

$$\% \text{ Voltage Unbalance} = 100 * (\text{maximum deviation from average voltage}) / (\text{average voltage})$$

*Current Unbalance:* A current unbalance greater than 5% is considered a Power Quality Event.

$$\% \text{ Current Unbalance} = 100 * (\text{maximum deviation from average current}) / (\text{average current})$$

*Synchronization:* A phase angle difference of greater than ±10 degrees for greater than 15 cycles is considered a Power Quality Event.

*Voltage Total Harmonic Distortion:* Total Harmonic Distortion (THD) voltage in excess of limits defined in IEEE 519-1992 (and as shown in the table below) shall be considered a Power Quality Event.

Bus Voltage at the POI	Individual Voltage Distortion (%)	Voltage Total Harmonic Distortion (THD) (%)
69 kV and below	3.0	5.0
69.001 kV through 161 kV	1.5	2.5
161.001 kV and above	1.0	1.5

**Table 1:** THD Voltage Limits

*Current Harmonic Distortion:* Current Harmonic Distortion in excess of limits defined in IEEE 519-1992 Section 10.4 shall be considered a Power Quality Event.

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<sup>4</sup> As defined by ANSI C84.1–1989 [Voltage Rating for Electric Power Systems and Equipment]

*Flicker:* Measured voltage deviations of more than +5%, as defined by the IEEE 519-1992 Border Lines Of Irritation Curve is considered a Power Quality Event. A flicker meter designed in accordance with IEC 61000-4-15 is acceptable to measure flicker.

*Power Factor:* The Interconnecting Entity shall abide by ERCOT power factor requirements as defined in ERCOT Nodal Protocols.

### **Equipment Ratings**

Minimum equipment ratings will be determined by the interconnection study.

### **Synchronizing Of Facilities**

Interconnecting Entities that are interconnecting generation are responsible for synchronizing and properly interconnecting their Interconnecting Facilities to the CPS Energy BES. Each Interconnecting Facility shall have automatic or manual synchronizing capabilities with a “sync check” relay to supervise the synchronizing functions and shall be not be capable of interconnecting to a de-energized system unless given such authorization by CPS Energy.

### **Maintenance Coordination**

Maintenance coordination will be performed in accordance with applicable ERCOT protocols and guides. If a maintenance outage taken by either Party has the potential to impact the other Party’s BES, the affected Party must be contacted for approval of the outage prior to the device(s) being removed from service. When switching is required to isolate equipment owned by both Parties, appropriate switching orders will be issued by each Party. CPS Energy will issue a “Clearance” if protective grounds are to be installed. Otherwise, a “Procedure” will be issued to document the abnormal state. Both parties will install tags and locks on the associated field equipment and install tags on all SCADA controlled points. Recloser relays may be disabled for the safety of field personnel and for system reliability when agreed to by both Parties, and will be accompanied by the appropriate documentation and installation of tags, if applicable. CPS Energy will issue a “Procedure” for this situation.

### **Abnormal Operating Conditions**

Both Parties shall operate during abnormal conditions (frequency and voltage), as specified in ERCOT protocols and guides.

### **Inspection Requirements For Existing or New Facilities**

CPS Energy has no formal inspection requirements for Interconnecting Facilities.

### **Communication Procedures During Normal and Emergency Operating Conditions**

Normal and emergency operating procedures must be followed as specified in the ERCOT guides and protocols. The Interconnecting Entity will provide a 24 hour primary and secondary contact number to discuss real-time operational issues.