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| SMOGRR Number |  | SMOGRR Title | EPS Metering for Three-Wire Wye Configurations |
| Date Posted | | [DATE] | |
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| Requested Resolution | | Normal | |
| Settlement Metering Operating Guide Sections Requiring Revision | | 1.3 Current Transformers; 1.4 Voltage Transformers | |
| Related Documents Requiring Revision/Related Revision Requests | | None. | |
| Revision Description | | This Revision Request allows an EPS Meter to be installed for a facility that is connected to a three-wire wye, high or low impedance grounded distribution system, if the high or low impedance ground is installed as part of a fault monitoring system for the facility and no phase to ground loads or phase to ground sources are connected behind the metering point. | |
| Reason for Revision | | Addresses current operational issues.  Meets Strategic goals (tied to the [ERCOT Strategic Plan](http://www.ercot.com/content/news/presentations/2013/ERCOT%20Strat%20Plan%20FINAL%20112213.pdf) or directed by the ERCOT Board).  Market efficiencies or enhancements  Administrative  Regulatory requirements  Other: (explain)  *(please select all that apply)* | |
| Business Case | | This SMOGRR will facilitate efficient Private Use Network (PUN) configurations without adversely impacting the integrity or safety of the EPS Metering requirements.  The existing Settlement Metering Operating Guides only allow an EPS Meter to be installed for a facility connected to a three-wire wye system if the system is neutral grounded and nophase-to-ground loads or phase-to-ground sources are connected between the metering point and the power transformer primary windings.  Certain Private Use Networks have a transformer configuration where the primary is at 138 KV and is a 3-wire delta connection. The secondary is at 14.4 KV and is a 3-wire Y connection with high impedance ground as shown below. The ground is of insufficient size to carry any load.    The operational benefit of this configuration is that it allows a fault to be easily isolated, and prevents cascading outages within the PUN. It also provides benefits in terms of safety and distribution system monitoring. This particular configuration prohibits any phase to ground loads. Any neutral currents will disable the protection scheme.  Allowing EPS Metering for this configuration will facilitate appropriate, efficient metering for affected PUNs, which is essential to the business operations of the loads within the PUN. Air Liquide, Dow and ERCOT have evaluated this configuration and verfied that metering accuracy is maintained as long as the high or low impedance ground is installed as part of a fault monitoring system for the facility and no phase to ground loads or phase to ground sources are connected behind the metering point. TIEC developed this SMOGRR with assistance from ERCOT, and understands that ERCOT is comfortable with the technical aspects of the proposal in light of the certification and verification requirements imposed on the TDSP and the Resource Entity. | |
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| Proposed Settlement Metering Guide Language Revision |

## 1.3 Current Transformers

### 1.3.1 Fault Withstand

Current transformers shall be capable of withstanding available fault current levels.

### 1.3.2 Quantity

(1) Current transformers shall be installed, one in each phase, for metering of an ERCOT-Polled Settlement (EPS) Metering Facility, which is connected to a four-wire wye neutral grounded system or in two phases for metering of an EPS Metering Facility, which is connected to a three-wire ungrounded system.

(2) Current transformers may be installed in two phases for metering of an EPS Metering Facility which is connected to a three-wire wye, neutral grounded transmission system ifphase-to-ground loads or phase-to-ground sources are not connected between the metering point and the power transformer primary windings.

(a) The EPS Metering Facility may have power equipment connected that does not provide a path for ground current (e.g. three phase power transformers with delta or ungrounded wye winding connection, phase-to-phase connected single phase power transformers, etc.). Exclusions are:

(i) Potential transformers; and/or

(ii) Surge protectors.

(b) The Transmission and/or Distribution Service Provider (TDSP) shall verify that all power transformer primary connections behind the metering point are ungrounded delta, ungrounded wye or phase to phase. This verification shall be performed by the TDSP on an annual basis, at each required site certification and any time changes are made to the circuit configuration.

(c) The EPS Metering Design Proposal one-line drawing will need to include designation of all connected power transformers.

(i) One-line detail must show all tapped power transformers.

(ii) When new power transformers are tapped, a new design proposal must be submitted to ERCOT showing the additional tapped power transformer.

(d) A professional engineer registered in the State of Texas shall provide a certification that the three voltage transformer - two current transformer metering is an accurate metering configuration for the specific EPS metering point as specified in this document. Such certification should be based on the TDSP detailed drawings submitted with the site approval request, with confirmation of site certification by an approved TDSP EPS Meter Inspector.

## (e) TDSP shall be responsible for confirming that the facility meets the requirements outlined above. For metering an EPS Metering Facility connected to a three-wire wye neutral grounded transmission system and not meeting these requirements, current transformers shall be installed in each phase.

(3) Current transformers may be installed in two phases for metering of an EPS Metering Facility which is connected to a three-wire wye, high or low impedance grounded distribution system, if phase to ground loads or phase to ground sources are not connected behind the metering point and the high or low impedance ground is installed as part of a fault monitoring system for the facility.

(a) The Transmission and/or Distribution Service Provider (TDSP) shall verify the existence of the high or low impedance ground and the existence of the fault monitoring system during initial site certification and at least every three years thereafter. Such verification shall be documented on either the EPS Metering Test Report or the EPS Metering Site Certification Form.

(b) The Resource Entity shall provide written certification, sealed by a professional engineer registered in the State of Texas, that all power transformer primary connections behind the EPS metering point are ungrounded delta, ungrounded wye or phase to phase and that the system configuration, as connected behind the EPS metering point, will not support a phase to ground load connection. Such certification shall be submitted with the EPS Metering Design Proposal.

(c) For metering an EPS Metering Facility connected to a three-wire wye, high or low impedance grounded distribution system and not meeting these requirements, current transformers shall be installed in each phase.

## 1.4 Voltage Transformers

### 1.4.1 Quantity

(1) Voltage transformers for a four-wire wye neutral grounded system (three single-phase units or one three-phase unit) shall be installed, one from each phase conductor to the circuit neutral.

(2) Voltage transformers (two single-phase units) for a three-wire ungrounded system shall be installed from phase to common phase.

(3) Voltage transformers (three single-phase units or one three-phase unit) for a three-wire wye, neutral grounded transmission system may be installed from phase to ground on the primary and be used for two-stator metering. The Transmission and/or Distribution Service Provider (TDSP) must ensure the following conditions:

(a) The ERCOT-Polled Settlement (EPS) Metering Facility does not have equipment that provides a path for ground current (except insulators, surge arresters, voltage transformers) connected to the three-wire wye neutral grounded transmission system.

(b) The three metering voltage transformers must be connected to the grounding system of the transmission facility for the voltage reference.

(c) The meter potential elements shall be connected from phase to common phase on the secondary of the voltage transformers.

(d) The secondary circuit of the metering potentials shall be connected to the grounding system of the transmission facility.

(4) Voltage transformers (two single-phase units) may be installed from phase to common phase for metering of an EPS Metering Facility which is connected to a three-wire wye, high or low impedance grounded distribution system, if phase to ground loads or phase to ground sources are not connected behind the metering point and the high or low impedance ground is installed as part of a fault monitoring system for the facility.

(a) The Transmission and/or Distribution Service Provider (TDSP) shall verify the existence of the high or low impedance ground and the existence of the fault monitoring system during initial site certification and at least every three years thereafter. Such verification shall be documented on either the EPS Metering Test Report or the EPS Metering Site Certification Form.

(b) The Resource Entity shall provide written certification, sealed by a professional engineer registered in the State of Texas, that all power transformer primary connections behind the EPS metering point are ungrounded delta, ungrounded wye or phase to phase and that the system configuration, as connected behind the EPS metering point, will not support a phase to ground load connection. Such certification shall be submitted with the EPS Metering Design Proposal.

(c) For metering an EPS Metering Facility connected to a three-wire wye, high or low impedance grounded distribution system and not meeting these requirements, voltage transformers shall be installed from each phase conductor to the circuit neutral.