

PJM Interconnection, L.L.C. Original Sheet No. 61

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24 Metering and Power Factor Correction at Receipt and Delivery Points(s)

24.1 Transmission Customer Obligations: Unless otherwise agreed, the Transmission Customer shall be responsible for installing and maintaining compatible metering and communications equipment to accurately account for the

capacity and energy being transmitted under Part II of the Tariff and to communicate the information to the Transmission Provider. Such equipment shall remain the property of the Transmission Customer.

24.2 Transmission Provider Access to Metering Data: The Transmission Provider

shall have access to metering data, which may reasonably be required to facilitate measurements and billing under the Service Agreement.

24.3 Power Factor: Unless otherwise agreed, the Transmission Customer is required

to maintain a power factor within the same range as the Transmission Owners pursuant to Good Utility Practices. The power factor requirements are specified in the Service Agreement where applicable.

to Section 8.

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Section 4: Billing Metering Standards

Welcome to the *Billing Metering Standards* section of the PJM Manual for *Control Center*

Requirements. In this section you will find the following information:

A general description of the purpose of having billing metering standards (*see "Purpose & Criteria"*).

The overall requirements for the billing metering (*see "General Guidelines"*).

The method of resolving any differences regarding billing metering (*see "Dispute Resolution"*).

The basic metering requirements in terms of accuracy, backup, location, alternative installation methodology, tie circuits, non-contiguous load, and maintenance (*see "Primary Metering Requirements"*).

Purpose & Criteria

All electricity recording metering equipment is operated and maintained to assure, to the maximum extent possible, that the equipment provides an accurate record of the quantities

supplied to and received by all parties. Each PJM Member is responsible for properly maintaining its metering and telemetering equipment in accordance with applicable ANSI standards.

This section provides the minimum standard requirements for the billing metering for new meter installations to be used in transactions with the PJM OI. The standards apply to new meter installations, replacement meter installations, or upgrades to existing installations. The standards in this section are a minimum requirement and do not supersede more restrictive agreements. In cases in which standards differ, the most restrictive criteria takes precedence. More specific standards may be required by local, state, or federal regulations, host utilities, service providers, or as are mutually agreed upon.

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General Guidelines

All PJM Members involved with any interface with the PJM OI abide by the following general guidelines for Billing Meter Standards:

Reliable and compliant operational metering equipment is in place for any metered service that is billed.

Meter information is automatically electronically communicated to the PJM OI by either the producer, host utility, or transmitter in order to ensure timely accounting and billing. This enables the PJM OI to identify and resolve erroneous information and to account and bill for services. Communication between PJM Members other than the PJM OI may utilize any method, such as voice notification or paper document, that is mutually agreeable.

Billing metering systems are capable of collecting and storing bi-directional information for intervals as determined by the parties involved. The expense and practicality of reporting information for small data intervals may not be cost effective or prudent. The average of instantaneous values can be used, providing a mutually agreed upon accuracy is obtained and applicable standards are achieved. Meter intervals can be of lesser duration for some services, but common intervals are fifteen minutes, thirty minutes, and sixty minutes. Collected meter information may be transmitted to the appropriate parties with a different frequency than it is collected, as communications systems permit.

The megawatt-hour (MWh) is the standard unit of service measurement. Service may be measured in kilowatt-hours (kWh) if required by specific services, local or state regulations, host utilities, service providers, or as are mutually agreed upon by the parties involved. kWh information may be used by the parties involved but must be converted to MWh information before transmission to the PJM OI.

All metered generator data values are to be supplied to the required parties in “net”

form. “Net” shall be defined as “gross” output minus unit station light and power components. When metering limitations require “gross” values to be used, the “gross” to “net” calculation method must be approved by the PJM Operating Committee for use by PJM Members in the calculation of “net” data values.

All meter records and associated documentation are retained for a period of seven years for independent auditing purposes.

Any dispute involving any aspect of the billing metering standards or their application are resolved as described in the PJM Manual for *Administrative Services for Operating Agreement of PJM Interconnection, L.L.C.*

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Primary Metering Requirements

The primary metering requirements are:

For billing purpose, watt-hour meters are recognized as the official source of meter information.

Metering devices must be capable of collecting and storing information for intervals required by the service provided, and as mutually agreed upon by the parties involved.

Any generation unit participating in the PJM Energy Market is required to have independent metering devices that are capable of recording generation net MWh output. When metering limitations require variance from this standard, the metering system must be mutually agreed upon by the parties involved.

All manual or additional meter reading or comparisons required to ensure consistent valid meter information (“true-up”), are performed prior to the billing cycle, as mutually agreed by the parties involved. Current billing cycles are monthly.

Each meter must follow the specific metering requirements associated with:

- Accuracy
- Backup Metering Requirements
- Location of Meter Points
- Alternative Approach
- PJM Member-to-PJM Member Tie Circuits
- Geographically Non-Contiguous Load
- Pool-to-Pool Tie Circuits
- Maintenance

Accuracy

The minimum metering accuracy for each measuring device is defined by prevailing ANSI

standards. The standards in this attachment are a minimum requirement, and do not supersede more restrictive agreements. In cases in which standards differ, the most restrictive criteria takes precedence.

The manufactured accuracy class of all energy interchange billing devices should be accurate within $\pm 0.3\%$ of full scale.

An individual metering system at a metering point location includes all components from the

meter location through to the system operator destination. The accuracy of the total energy

interchange billing metering system, at each generator or transformer location, is to be within 1.0%. More restrictive standards may be required by local or state regulations, host

utilities, service providers, or as are mutually agreed upon by the parties involved.

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Each individual metering system at each metering point location used for billing is tested by

the owner of the equipment at intervals of two years and its accuracy of registration maintained in accordance with good practice. At the request of any party, an individual meter system will be tested, but, if an error of less than 1.0% is observed, the requesting party will pay for the test. The PJM OI is to be notified of the error for auditing purposes.

Backup Metering Requirements

The backup metering system is of sufficient accuracy to serve as a replacement for the primary metering system. The average of instantaneous values may be used as a backup source, provided mutually agreed upon accuracy is obtained and applicable standards are achieved.

The backup metering system is capable of collecting interchange data and logically comparing data with the primary meter system so that material differences may be detected

in a reasonable time.

If any test of an individual metering system discloses an error of greater than 1.0%, the accounts of the parties shall be adjusted for no more than two months for which the inaccuracy is estimated to have occurred. Longer correction periods, if confirmed by recorded information or defined as a result of the dispute resolution process, may be mutually agreed upon by the parties involved. All errors of the above magnitude shall be reported to the PJM OI and documented for auditing purposes.

Location of Meter Points

Interchange billing metering is provided on the system as follows:

Transformers: Through-Transmission — EHV interchange metering points are provided from the secondary side of all through-transmission transformers connected to the 500 kV EHV system. For example, interchange metering is provided on the 230 kV side of a 500/230 kV through-transmission transformer.

Generators and Transformers Radically Tapped — Generators and transformers that are not through transmission (including unit station service transformers) and that are tapped directly on the 500 kV EHV system are provided with interchange metering on the primary side (500 kV) of the step-up, station service or radial transformer. For instance, a generator connected to the EHV system has an interchange metering point on the 500 kV side of the unit step-up transformer. All other generators and transformers not connected to the 500 kV system provide information as received from the high side of the unit transformer.

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Alternative Approach

In lieu of providing interchange billing metering, an PJM Member may elect to install a watt-hour metering system on the opposite side of the transformer than directed above (the

500 kV side of the through-transmission transformer or the 230 kV side of the radial transformers) provided that a compensation system is included to capture and adequately adjust interchange values to account for transformer losses. Any design for alternative metering approaches shall be documented and made known to the PJM OI and all parties involved. Any alternative approach must be approved by the PJM OI.

For through-transmission transformers, interchange values may be determined from the 500

kV side if compensation is installed which subtracts transformer losses when power is imported to the PJM Member or adds transformer losses for exported power.

PJM Member-to-PJM Member Tie Circuits

PJM Member-to-PJM Member tie circuits not associated with the EHV system and under the direction of PJM have interchange metering provided at one terminal end with or without the agreed upon compensation circuitry per agreement between the two PJM Members. This terminal is regarded as the official source for interchange values.

Geographically Non-Contiguous Load

Any PJM Member serving a load which is geographically non-contiguous to its defined service area documents and makes known to the PJM OI, and all other parties involved, any

metering and system conventions implemented in order to meter the load. Metering devices

may be met by contractual arrangement with any party involved. Any alternative approach

must be approved by the PJM OI prior to implementation. This enables the PJM OI to monitor and control the transmission system, to identify and resolve erroneous information,

to account and bill for services, and to take appropriate action for reliability concerns.

Control Area-to-Control Area Tie Circuits

The requirements for documentation for any Control Area-to-Control Area tie circuit interchange delivery and metering point is set forth in the agreements between the PJM OI

and applicable parties. The requirements for the metering of these points conforms to the standards contained in this document, except in the case of existing equipment. If existing equipment is used in metering of these points, and the equipment does not comply with these standards, both parties then mutually agree to accept the metering. For billing purposes, watt-hour meters are recognized as the official source of meter information.

Section 5: Meter Accuracy Standards

Welcome to the *Meter Accuracy Standards* section of the PJM Manual for **Control Center**

Requirements. In this section you will find the following information:

A general description of the purpose and applicability of metering standards (see “*Purpose*”).

The overall requirements for telecommunications metering (see “*General Guidelines*”).

Requirements for data needed for system control data (see “*System Control Monitoring Requirements*”).

Requirements for data used in system security monitoring (see “*Real-Time Analysis Monitoring Requirements for System Security*”).

A description of the Normal and Analog modes for data telemetry (see “*Data Modes*”).

A definition of desired transducer accuracy (see “*Metering Accuracy*”).

Purpose

This section provides the minimum standard requirements for telecommunications metering,

such as MW, MVAR, and kW values, to be used when communicating information to the PJM OI. The standards apply to new meter installations, replacement meter installations, or

upgrades to existing installations. The requirements for billing meters are covered in Section

4.

These standards are a minimum requirement and do not supersede more restrictive agreements. In cases in which standards differ, the most restrictive criteria takes precedence.

More specific standards may be required by local, state, or federal regulations, host utilities,

service providers, or as are mutually agreed upon.

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Section 5: Meter Accuracy Standards

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General Guidelines

All PJM Members involved with any interface with the PJM OI abide by the following general guidelines for telecommunications metering:

All electric measurement equipment is operated and maintained so as to assure, to the maximum extent possible, that it provides an accurate record of the quantities supplied to and received by all parties.

Each PJM Member is responsible for properly maintaining its metering and telemetering equipment in accordance with applicable ANSI standards.

Metered information is automatically electronically communicated to the PJM OI by either the producer, host utility, or transmitter in order ensure system security and reliability.

It is important to recognize the importance of accurate data as well as the need to meet deadlines associated with updating this data, since the failure to provide accurate and timely data affects reliable system operations.