



AESO Measurement System Standard

Revision 1.0

September 18, 2007



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1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this **Standard** is to define the accountabilities and obligations of the:

- (a) **AESO**, and
- (b) **Metering Service Providers**, and
- (c) **Metering Data Providers**

in respect to the provision and operation of the **measurement system** required for the measurement, acquisition, processing and delivery of the **measurement data** as required by the **Data Recipients**.

1.2 APPLICATION

This **Standard** applies to the **AESO** and any **Metering Data Providers** and **Metering Service Providers** who currently have a valid **service agreement** with the **AESO**.

1.3 DEFINITIONS

Defined terms are indicated in **bold italic** typeface. Appendix 11 contains all of the definitions in this **Standard**.

1.4 MODIFICATIONS

In respect to this **Standard**, the **AESO** must:

- (a) make and manage all changes and additions to the **Standard**;
- (b) seek and consider the input and feedback of any **affected parties** prior to making changes or additions to the **Standard**;
- (c) make this **Standard** publicly available via the **AESO's** website.

1.5 REQUIREMENTS FOR REVIEW

This **Standard** expires and must be reviewed within five (5) years of the effective date given below. This **Standard** may, at the request of the **AESO**, stay in force during the review period, but shall automatically cease to have force twelve (12) months after the five (5) year expiry date.

The in-service or effective date for this **Standard** is July 1, 2004.

1.6 STAKEHOLDER REVIEW COMMITTEE

The original version of this **Standard** has been reviewed and accepted by committee members from the following companies:

AltaLink Management Ltd.
Aquila Networks Canada
ATCO Electric Limited
City Of Lethbridge
City Of Medicine Hat

City Of Red Deer
ENMAX Power Corporation
EPCOR Distribution Inc.
MIDAS Metering Services Ltd.
Trackflow

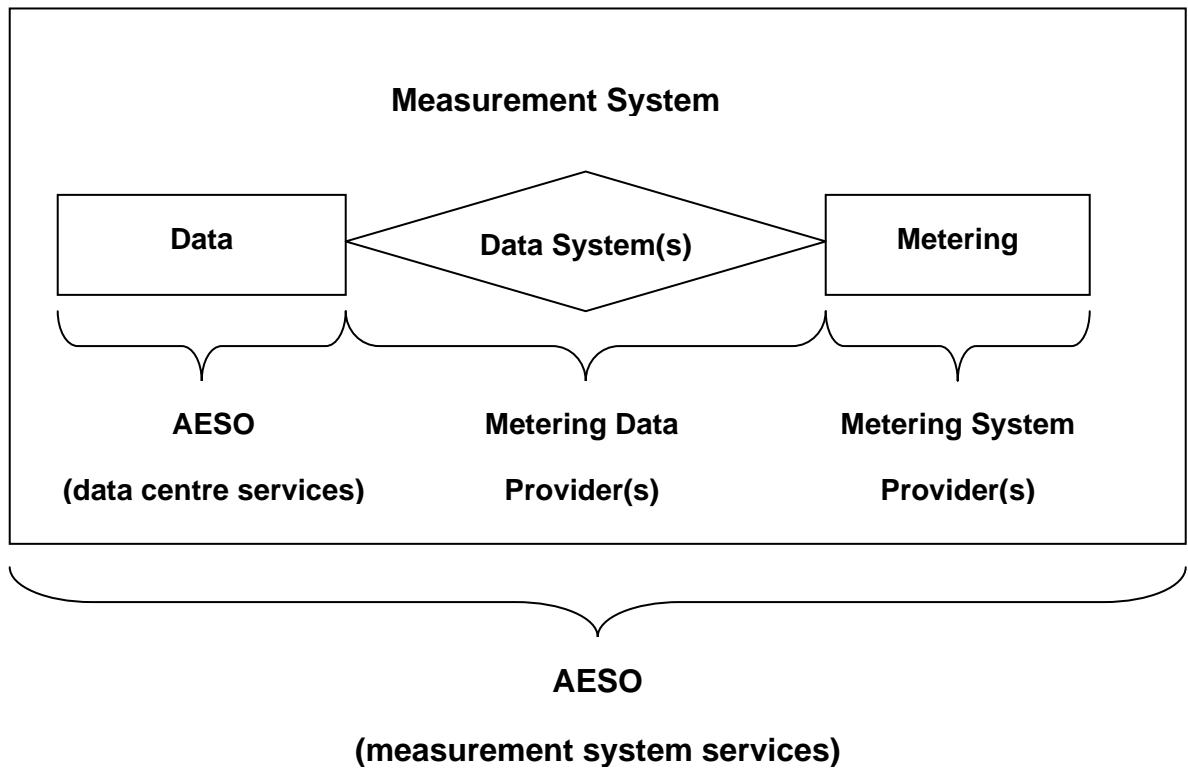
2.0 ROLES & ACCOUNTABILITIES

2.1 SCOPE

The purpose of this section is to define the general accountabilities associated with the various roles involved in the operation of the **Measurement System**.

2.2 OVERVIEW

The roles and accountabilities associated with the **Measurement System** can be viewed as follows:



2.3 MEASUREMENT SYSTEM

- (a) The **AESO** is accountable for the administration of the **Measurement System** and shall make whatever arrangements are necessary and prudently sufficient to provide all the **measurement system services**, as defined and required by this **Standard**.
- (b) The **AESO** is accountable for the administration and maintenance of all **service agreements**.

2.4 DATA CENTRE

- (a) The **AESO** is accountable for the administration and operation of the **Data Centre**.
- (b) The **AESO** shall make whatever arrangements are necessary and prudently sufficient to provide all the **data centre services**, as defined and required by this **Standard**.

2.5 DATA SYSTEMS

- (a) A **Metering Data Provider** is accountable to the **AESO** for the administration and operation of one or more **data systems**.
- (b) A **Metering Data Provider** shall make whatever arrangements are necessary and prudently sufficient to provide the **metering data services**, as defined and required by this **Standard**, for those **metering points** and **measurement points** for which a **metering data services agreement** exists with the **AESO**.

2.6 METERING SYSTEMS

- (a) A **Metering System Provider** is accountable to the **AESO** for the administration and operation of one or more **metering systems**.
- (b) A **Metering System Provider** shall make whatever arrangements are necessary and prudently sufficient to provide the **metering system services**, as defined and required by this **Standard**, for those **metering points** for which a **metering system services agreement** exists with the **AESO**.

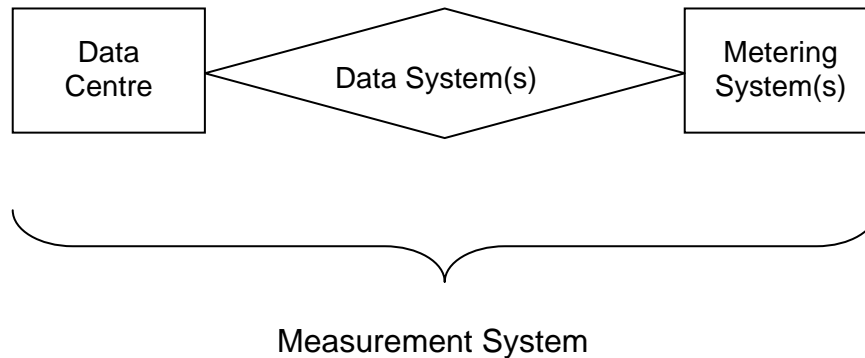
3.0 MEASUREMENT SYSTEM

3.1 SCOPE

The purpose of this section is to define the system and service requirements related to the provision of **measurement system services**.

3.2 FUNCTIONAL OVERVIEW

A **measurement system** can be represented as follows:



where, in general, the **AESO** is responsible to:

- (a) administer and enforce this **Standard**;
- (b) ensure the consistent and continuous operation of the overall **measurement system**;
- (c) administer the development of and issue final approval on all **measurement point definition records** for all **measurement points**;
- (d) coordinate all audits and disputes concerning the **measurement data**.

3.3 SERVICE REQUIREMENTS

The **AESO** is responsible to provide whatever infrastructure is required to meet the following service requirements:

3.3.1 Measurement Point Definition Record

Appendix 9 contains an overview of the general process flow associated with the development and management of a **measurement point definition record**.

In respect to the **measurement point definition record**, the **AESO** will have operational policies, procedures and/or processes that:

- (a) ensure that the **measurement point** that it defines for a **Data Recipient** meets the business requirements of the **Data Recipient**;
- (b) define the number and type of **measurement points** that it requires in order to receive the **measurement data** from the **Data Systems**;
- (c) define the attributes (location, polarity,...) of any and all **measurement points** that it requires in order to receive the **measurement data** from the **Data Systems**;
- (d) specify the **measurement point definition record** by which real **metering data** and/or estimated data is manipulated to produce **measurement data**;
- (e) allow the **AESO** to exempt any **metering point** from requiring **metering equipment** when, in the **AESO's** opinion, the cost of providing **metering equipment** would be unjustified with respect to the commensurate gain in the accuracy of the associated **measurement data**.

3.3.2 Audits

In respect to a request by any person requesting to audit **measurement data**, the **AESO** will establish if such a person is an **affected party** with respect to the **measurement data** and, if so, will:

- (a) coordinate the efforts of all parties required to acquire the requested **measurement data**;
- (b) make whatever arrangements or agreements are necessary to ensure the security of the provided **measurement data**;
- (c) assess the cost(s) associated with providing the **measurement data** and, if warranted, levy and recover those costs in a mutually agreeable manner.

3.3.3 Check Metering

In respect to a request by any person requesting the installation of **check metering** the **AESO** will establish if such a person is an **affected party** with respect to the related **measurement data** and, if so, will:

- (a) ensure that the requirements of Appendix 6 are understood and adhered to by the requesting party;
- (b) coordinate the efforts of all parties required to install the **check metering**.

3.3.4 Disputes

The **AESO** will coordinate the resolution of any and all disputes that arise and are related to the accuracy of the **measurement data**. Such disputes will be administered in accordance with the following guidelines:

- (a) Any disputes that arise with respect to measurement data must be communicated in writing to the **AESO** by the **Data Recipient** filing the dispute;
- (b) Whenever possible disputes will be resolved by mutual agreement between the **AESO** and all **affected parties**;
- (c) In the event that a resolution by mutual agreement, as per (b) above, cannot be reached within twenty (20) **business days** of being first communicated to the **AESO**, as per (a) above, the dispute may then be raised by either the **AESO** or any **affected party** to:
 - (i) Arbitration conducted in accordance with the Arbitration Act R.S.A., c. A-43.1.3, or
 - (ii) Measurement Canada to be resolved in accordance with the **Electricity & Gas Inspection Act** and subject to the terms and condition of any applicable dispensation(s).

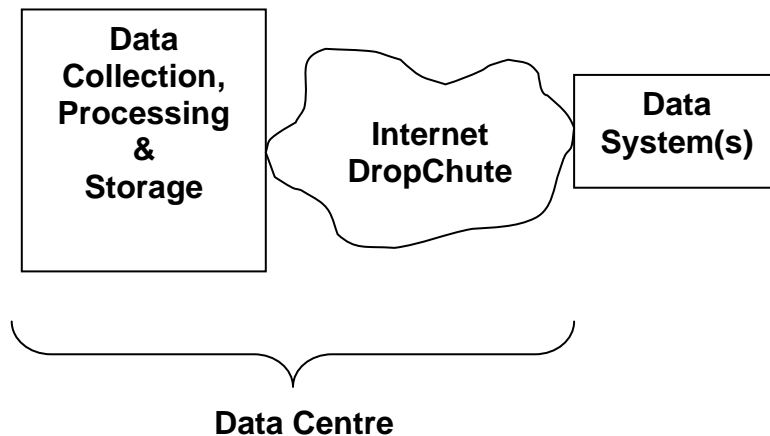
4.0 DATA CENTRE

4.1 SCOPE

The purpose of this section is to define the system and service requirements related to the provision of **data centre services**.

FUNCTIONAL OVERVIEW

The **data centre** can be represented as follows:



where, in general, the **AESO** is responsible to:

- (a) collect, verify and load **daily system measurement files**;
- (b) process **measurement data**;
- (c) store **measurement data**.

4.3 SYSTEM REQUIREMENTS

The **AESO** is responsible to provide data collection, processing, storage and access systems that meet the following requirements:

4.3.1 Data Collection

The **Data Centre** must incorporate data collection facilities that:

- (a) provide a common, accessible, secure interface through which all **Metering Data Providers** can present **daily system measurement files**;

- (b) accept a **daily system measurement file** as defined in Appendix 7;
- (c) provide an email receipt to the **Metering Data Provider** for each **daily system measurement file** received.

4.3.2 Data Processing

The **Data Centre** must incorporate data processing facilities that:

- (a) verify the structure and integrity of the **daily system measurement file**;
- (b) load the **daily system measurement file** data into the measurement system database;
- (c) provide an email receipt, within the same **business day**, to the **Metering Data Provider** to confirm the success or failure of the data loading process for each **daily system measurement file** processed.

4.3.3 Data Storage

The **Data Centre** must incorporate data storage facilities that provide at least:

- (a) one (1) year of on-line, on-site measurement data available to a **Metering Data Provider**, and
- (b) six (6) years of archived, off-site measurement data available to a **Metering Data Provider**.

4.3.4 Data Access

- (a) Provide the **Metering Data Providers** with a month-end summary report;
- (b) Provide the **Metering Data Providers** with ad-hoc reports on request within 3 **business days** of the request.

5.0 METERING DATA SERVICES

5.1 PURPOSE

The purpose of this section is to define the *metering data services* that are required of a *Metering Data Provider*.

5.2 SERVICE SCOPE

A *Metering Data Provider* is responsible to provide *metering data services* which include:

- (a) collecting metering data from *metering systems*;
- (b) validating, verifying, estimating and editing *metering data*;
- (c) storing *metering data*;
- (d) processing metering data to produce *measurement data*;
- (e) transferring and verifying *measurement data*.

5.3 SERVICE REQUIREMENTS

A *Metering Data Provider* is responsible to provide *metering data services* that meet all of the following specific requirements:

5.3.1 Data Collection

- (a) collect metering data from all *metering systems* (or sources) specified as part of any and all *metering data services agreements* to which the *Metering Data Provider* is party, and
- (b) unless specifically excluded from the applicable *metering data services agreement*, ensure that the *metering system interval time-stamping* clock date and time are maintained within +/- 1 minute from quarter hour boundary as referenced to a *standard clock*, and
- (c) communicate and coordinate with the applicable *Metering System Provider* to resolve any *metering system* issues that affect the collection of *metering data* from the *metering systems*.

5.3.2 Data Validation, Verification, Estimation & Editing

- (a) provide *metering data* validation, verification, estimation and editing systems and/or processes that meet all of the requirements defined in Appendix 8, and

- (b) provide email notification to the **AESO** of any situation that requires, or has the potential to require, the on-going estimation or editing of **metering data**.

5.3.3 Data Storage

- (a) maintain **metering data** in electronic format for a period of no less than six (6) years and provide reasonable access to that data to the **AESO** upon request, and
- (b) maintain a record of any estimates of, or adjustments made to, the **metering data** for a period of six (6) years and provide reasonable access to those records to the **AESO**, and
- (c) maintain a record of all information necessary to support the method used to estimate or adjust **metering data** or **measurement data** for a period of six (6) years and provide reasonable access to those records to the **AESO**.

5.3.4 Data Processing

- (a) process **metering data** in accordance with any associated **measurement point definition record** algorithms for each **measurement point** that is defined as part of a **metering data service agreement** to which the **Metering Data Provider** is a party, and
- (b) create **daily system measurement files** in the form as defined in Appendix 7.

5.3.5 Data Transfer

- (a) send the **daily system measurement files** to the **AESO** as per the timing requirements defined in Appendix 7, in a manner defined by the **AESO**, and
- (b) verify, using summary data and/or reports provided by the **AESO**, that the **measurement data** received by the **AESO** and transacted by them into their database is correct with respect to the **measurement data** actually transferred via the **daily system measurement files**.

5.3.6 General

- (a) provide email notification to the **AESO** of any significant events or issues that may adversely impact the ability of the **Metering Data Provider** to meet any of its obligations with respect to the provision of **metering data services**, and
- (b) cooperate with the **Metering System Provider** to complete any and all testing required to confirm the correct operation of the **data system** or the **metering system**, and

- (c) cooperate with the **AESO** in conducting audits of the **metering data** or **measurement data**, and
- (d) cooperate with the **AESO** in the resolution of disputes related to **measurement data**, and
- (e) cooperate with the **AESO** in conducting reviews and revisions of **measurement point definition records** for **measurement points** specified as part of any and all **metering data services agreements** to which the **Metering Data Provider** is party, and
- (f) ensure all systems used to meet the requirements of this **Standard** are secure from unauthorized access, and
- (g) provide access to the **metering data** to only those persons or entities that are specifically granted access to the **metering data** as per the applicable **metering data services agreements**.

6.0 METERING SYSTEM SERVICES

6.1 PURPOSE

The purpose of this section is to define the *metering system services* that are required of a *Metering System Provider*.

6.2 SERVICE SCOPE

A *Metering System Provider* is responsible to provide *metering system services* which include:

- (a) designing *metering systems*;
- (b) installing *metering systems*;
- (c) testing and maintaining *metering systems*;
- (d) restoring *metering systems*.

6.3 SYSTEM REQUIREMENTS

A *Metering System Provider* is responsible to provide *metering system services* that meet all of the following specific system requirements:

- (a) provide the *AESO* with a written *metering system(s)* design overview that describes, or otherwise indicates, the manner in which the requirements of the *measurement point definition record* will be met by the *metering system(s)* design;
- (b) receive pre-approval from the *AESO*, that the *metering system(s)* will meet the requirements of the *measurement point definition record* prior to commencing the installation of the *metering system(s)*;
- (c) ensure that all the required *metering system(s)* are installed and operational prior to the operation of any *power transmission equipment* that would cause *active energy* or *reactive energy* to be transferred in a manner that would otherwise have been registered by the *metering system(s)* had it (they) been installed;
- (d) ensure that the *metering system* design will allow for the measurement and collection of the *metering data* necessary to derive the *measurement data* as defined by the *measurement point definition record*;
- (e) inform the *AESO* of any modifications to either the *metering system* for any *metering point* or the *metering point(s)* associated with any *measurement point* that would result in changes to the associated *measurement point definition record*;

- (f) involve the **Metering Data Provider** in the design and installation process to whatever degree may be necessary to ensure that the **data system** is fully functional and operational;
- (g) inform the **Metering Data Provider** of any modifications to any aspect of the **metering system(s)** that could, either directly or as a consequence, affect the ability of the **Metering Data Provider** to gain access to or acquire the **metering data** in a timely and efficient manner;
- (h) gain the express written approval of the **AESO** to provide, or cause to be used, any **metering point(s)**, **metering data** or **readings** that are not otherwise allowed for by this **Standard** including, but not necessarily be limited to the use of, readings from unsealed **interval meters**, **check meters**, non-interval **meters** etc;
- (i) ensure that the **metering system** is configured, installed and operated in accordance with generally accepted Canadian utility metering practices as per Appendix 3;
- (j) be commissioned in accordance with the process set out in Appendix 4.

6.3.1 General

The **metering equipment** must:

- (a) conform to the most recent version of the **Electricity and Gas Inspection Act** and this **Standard**;
- (b) be suitable for use in the environmental conditions reasonably expected to occur, at the installation site, over the course of a typical year;
- (c) be appropriate for the power system characteristics reasonably expected to exist at the installation site under all power system conditions and events;
- (d) have a single ground point.

6.3.2 Measurement Transformers

The applicable winding(s) of the current and potential instrument transformers must:

- (a) be Measurement Canada approved under Section 9(1), Section 9(2) or Section 9(3) of the **Electricity and Gas Inspection Act**;
- (b) be selected for optimum accuracy and resolution with respect to the expected values of the **energy metrics** to be measured;
- (c) be burdened to a degree that does not compromise the accuracy required by this **Standard**;
- (d) be located and connected in a manner that, wherever practically possible, avoids compensation methods and produces a **real metering point**;

- (e) have an **accuracy class** rating that equals or exceeds the values specified in Appendix 1 for **non-dispensated metering equipment**;

The current and potential instrument transformer arrangement must:

- (f) be configured as either 2 element or 3 element depending upon the electrical arrangement being metered (Note: 2 ½ element configurations are not acceptable.);
- (g) include a test switch that enable the isolation of potentials and the shorting of all currents to the meter;
- (h) employ wiring that is colour coded or clearly and unambiguously labeled at all interfaces.

6.3.3 Meter

The **meter** must:

- (a) be Measurement Canada approved under Section 9(1), Section 9(2) or Section 9(3) of the **Electricity and Gas Inspection Act**;
- (b) be (re)verified and sealed in accordance with the **Electricity and Gas Inspections Act** subject to the terms and conditions of any applicable dispensation(s).
- (c) measure all quantities required to determine **active energy** and **reactive energy** transferred in both directions at the **metering point**;
- (d) provide a separate register to maintain the continuously cumulative readings of the **active energy** and **reactive energy** transferred in the required directions at the **metering point**;
- (e) provide reasonable security against unauthorized access for all methods of local access to the **meter**;
- (f) provide a communications port if the **meter** provides the remote communications equipment interface;
- (g) have an **accuracy class** rating for **active energy** measurement that equals or exceeds the values specified in Appendix 1 for **non-dispensated metering equipment** and Appendix 2 for **dispensated metering equipment**;
- (h) have an **accuracy class** rating for **reactive energy** measurement that equals or exceeds the values specified in Appendix 1 for **non-dispensated metering equipment** and Appendix 2 for **dispensated metering equipment**.
- (i) be labeled as being loss compensated if transformer and/or line losses are calculated internally by the **meter** and affect displayed and/or recorded energy values;

- (j) be labeled with an overall multiplier if the **meter** bases its displayed or recorded energy values on unity current transformer and/or potential transformer ratios;

6.3.4 Recorder

The **recorder** may be or may not be an integral part of the **meter** but must:

- (a) be Measurement Canada approved under Section 9(1), Section 9(2) or Section 9(3) of the **Electricity and Gas Inspection Act**;
- (b) be (re)verified and sealed in accordance with the **Electricity and Gas Inspections Act** subject to the terms and conditions of any applicable dispensation(s);
- (c) include an **interval time-stamping** clock, if the recorder provides the **interval data** time-stamping function, capable of maintaining the **interval** boundaries within 60 seconds of the hour and every quarter hour thereafter;
- (d) have sufficient storage to store **interval data** for a period of at least fourteen (14) days;
- (e) retain **readings** and, if applicable, all clock functions for at least fourteen (14) days in the absence of line power;
- (f) provide reasonable security against unauthorized access for all methods of local access to the **recorder**;
- (g) provide a communications port if the **recorder** provides the remote communications equipment interface.

6.3.5 Remote Communications Equipment

The remote communications equipment may or may not be an integral part of the **meter** or the **recorder** but must:

- (a) be of sufficient reliability to meet the data transfer requirements of this **Standard**;
- (b) provide reasonable security against unauthorized access for all methods of remote access to the **metering equipment**;
- (c) incorporate protocol schemes suitable for the type/nature of the communications media/path that will prevent the corruption of data during **interval data** transmission.

6.4 SERVICE REQUIREMENTS

A **Metering System Provider** is responsible to provide **metering system services** that meet all of the following specific service requirements:

6.4.1 General

The **Metering System Provider** must:

- (a) provide **written notification** to the **AESO** of any situation pertaining to the integrity or operation of the **metering system** that will result, or has the potential to result, in the continued loss or corruption of **metering data**;
- (b) provide reasonable response to a **Metering Data Provider's** requests related to the checking or repair of any remote communications equipment that affects that **Metering Data Provider's** ability to acquire the **metering data** in a timely and efficient manner;

6.4.2 Security & Access

In relation to insuring the physical security of the **metering system**:

- (a) the **Metering System Provider** must make a reasonable effort to protect the **metering system** from unauthorized access or interference by other persons;
- (b) the **Metering System Provider** must provide seals and other appropriate devices to detect such interference where such seals may be broken only by the **Metering System Provider** or its authorized **representative**;
- (c) any person that finds that a **metering system meter** seal has been broken, other than by the **Metering System Provider**, must notify the **Metering System Provider**, within one (1) **business day**;
- (d) the **Metering System Provider** must, upon being notified of a broken **metering system meter** seal, ensure that testing is carried out in accordance with Section 6.4.3;
- (e) any person who has broken a seal or otherwise interfered with a **metering system** without approval of the relevant **Metering System Provider** must pay the relevant **Metering System Provider** its reasonable costs of the repair, replacement and testing of the affected **metering equipment**. In the event that the person which caused the breakage or interference cannot be identified, the **Metering System Provider** must pay such costs.

In relation to physical access to the **metering system**:

- (f) the **Metering System Provider** must provide access to the **metering system** installation site to any representative(s) of the **AESO**, for the purpose of verifying that the **metering equipment** complies with this **Standard** by visual inspection, witnessing of tests or checking of seals;
- (g) the **AESO** must ensure that its representatives do not interfere with operation of the **metering system** except as required to fulfill its obligations under this **Standard**.

In relation to remote communications access to the *metering system* for the purpose of acquiring *metering data*:

- (h) the *Metering System Provider* must provide preferential read access, via the remote communications equipment, to the metering system to the *Metering Data Provider* and ensure that such access is available at all reasonable times except when the equipment is being maintained or tested;
- (i) the *Metering System Provider* must provide reasonable read-only access, via the remote communications equipment, to the *metering system*, to any person granted the right to such access by the *AESO* subject to conditions defined by, and at the sole discretion of, the *AESO*;
- (j) any person granted read-only access to a *metering system* via the remote communications equipment must be provided with all information required to enable that person to access and acquire the associated *metering data*, including details of computer software required, any special procedures which must be used, telephone numbers for *meters/recorders* and passwords by the *Metering System Provider*;
- (k) the *Metering System Provider* is under no obligation to provide remote communications equipment other than at the site of the *metering system*;
- (l) any person granted the right to access a *metering system* via the remote communications equipment must bear all communication charges related to the acquisition of the *metering data* that they themselves initiate;
- (m) any person granted the right to access a *metering system* via the remote communications equipment must only download *metering data* that is associated with their energy transfers.

6.4.3 Testing

In relation to general matters related to *metering equipment* and *metering system* testing, the *Metering System Provider* must:

- (a) pay the costs of all tests on its *metering equipment*. Testing costs will be reimbursed by the *AESO* to the *Metering System Provider* for any and all test(s), not defined by this *Standard*, that were specifically requested by the *AESO* where such test(s) show that the *metering equipment* complies with the relevant sections of this *Standard*.

In relation to the shop testing of *meters* and *recorders*, the *Metering System Provider* must:

- (b) ensure that the **meter** and/or **recorder** are tested and sealed as required by Measurement Canada and that the **meter** complies with the accuracy requirements in Section 6.3.3 of this **Standard** prior to placing such **meter** or **recorder** into service;
- (c) provide **written notification** of, and test results for, any re-tested **meter** that demonstrates an error of measurement of more than three (3) times the error permitted in Section 6.3.3 of this **Standard** to the **AESO** within five (5) **business days** of the test results first becoming available;
- (d) maintain a record of all **metering equipment** tests to verify that its **metering equipment** complies with this **Standard** (including details of the equipment tested, **measurement point**, the reference standards used, test procedure, **meter** register readings, test certificate and test results);
- (e) at the request of the **AESO**, undertake and complete tests on any **metering equipment**, specified by the **AESO**, within thirty (30) **business days** of receiving such a request;
- (f) at the request of the **AESO**, forward a copy of the test results related to any **metering equipment**, specified by the **AESO**, within thirty (30) **business days** of receiving such a request;

In relation to the **in-situ testing** of **metering systems**, the **Metering System Provider** must:

- (g) perform an **in-situ test**, in accordance with the procedures described in Appendix 5, when the **metering system** is commissioned and at the intervals specified in Appendix 5 thereafter, for all instrument type interval **metering systems**. Self contained and/or cumulative **metering systems** do not fall under these testing standards;
- (h) file an **in-situ Metering System Test Form** with the **AESO**, in accordance with Appendix 5
- (i) file an Annual Metering Systems Testing Compliance Plan with the **AESO**, in accordance with Appendix 5;
- (j) provide written notification of, and test results for, any **in-situ test** that demonstrates an error of measurement of more than ten (10) times the error permitted in Section 6.3.3 of this **Standard** to the **AESO**;
- (k) maintain a record of all **metering system** tests to verify that its **metering system** complies with this **Standard** (including details of the equipment tested, **measurement point**, reference standards used, test procedures, **meter** register readings, test results);
- (l) at the request of the **AESO**, undertake and complete tests, as specified by the **AESO**, on the **metering system** within thirty (30) **business days** of receiving such a request;

- (m) at the request of the **AESO**, forward a copy of the test results related to a **metering system**, as specified by the **AESO**, within thirty (30) **business days** of receiving such a request;

6.4.4 Restoration

A **metering system** is considered to have failed if:

- (a) any of the associated **metering equipment** has failed in a manner that causes the **metering system** to be unable to measure, record or transfer the **metering data** as required by this **Standard**;
- (b) any of the associated **metering equipment** is found to operate in a manner, or under any condition, that compromises, or has the potential to compromise, the ability of the **metering system** to measure, record or transfer the **metering data** as required by this **Standard**;
- (c) any of the associated **metering equipment** fails to pass any of the tests as required by this **Standard**;
- (d) the **AESO** deems the **metering system** to have failed.

In response to first becoming aware of the failure, or alleged failure, of a **metering system**, the **Metering System Provider** must notify the **AESO** immediately and within five (5) **business days**:

- (e) investigate and determine the exact nature and extent of the **metering system** failure;
- (f) provide the **AESO** with **written notification** detailing the nature and extent of the failure as well as the plan to restore the **metering system**;

In respect to the restoration of a failed **metering system**, the **Metering System Provider** must, within a time frame proposed by the **Metering System Provider** and approved by the **AESO**:

- (g) restore the failed **metering system** to meet requirements of this **Standard** or provide an alternate **metering system**, that meets the approval of the **AESO**, until such a time as the repairs of, or replacements to, the normal **metering system** can be affected.

6.4.5 Alternative Metering Data Sources

In the event that **metering data** is unavailable for a **metering point**, the **Metering System Provider** must cooperate with and support both the **Metering Data Provider** and the **AESO** in whatever manner may be required to:

- (a) establish the best acceptable alternative source for the **metering data** required to determine the missing **measurement data**, or if no such source is available;

- (b) assist the ***Metering Data Provider*** and ***AESO*** in establishing a basis from which to estimate or adjust the ***metering data*** or ***measurement data*** based upon the best available information until either an alternative ***metering data*** source is established or the failed ***metering system*** is restored.

APPENDIX 1 SCHEDULE OF ACCURACIES FOR METERING EQUIPMENT APPROVED UNDER SECTION 9(1) OF THE ELECTRICITY AND GAS INSPECTION ACT

(NON-DISPENSATED METERING EQUIPMENT)

Metering Point Capacity (MVA)	Wathour Meter Accuracy Class	Varhour Meter Accuracy Class	Measurement Transformers Accuracy Class
1.0 and Above	0.2 %	0.5 %	0.3 %
Below 1.0	0.5 %	1.0 %	0.3 %

Notes:

1. The columns apply to requirements set out in Section 6.3.2 and 6.3.3.
2. If an alternate measurement is used to determine **reactive energy**, the **accuracy class** of the alternate measurement must be equal to or better than the **accuracy class** set out for **reactive energy**.
3. This schedule applies only to all new **metering systems** installed on or after July 1, 2004.

**APPENDIX 2 SCHEDULE OF ACCURACIES FOR METERS
APPROVED UNDER SECTION 9(3) OF THE
ELECTRICITY AND GAS INSPECTION ACT
(DISPENSATED METERING EQUIPMENT)**

Meter Accuracy		
Metering Point Capacity (MVA)	Points of Delivery	Points of Supply
10 and Above	1.0 %	1.0 %
Below 10	1.0 %	1.0 %

Notes:

1. The columns apply to requirements set out in Section 6.3.3.
2. If an alternate measurement is used to determine **reactive energy**, the **accuracy class** of the alternate measurement must be equal to or better than the **accuracy class** set out for **reactive energy**.

APPENDIX 3 GENERALLY ACCEPTED UTILITY METERING PRACTICES

The following are a number of 'key' generally accepted utility metering practices for instrument transformer-rated *interval metering* systems:

- Sealed revenue approved *meter(s)/recorder(s)* are used on all installations
- Revenue approved instrument transformers or cores are used on all installations
- Either 2 element or 3 element metering configuration are used depending upon the electrical arrangement being metered (no 2 ½ element configurations are used)
- A test switch is provided that enables the isolation of potentials and the shorting of all currents to the *meter*
- Wiring from instrument transformers is either colour coded or clearly and unambiguously labeled at all interfaces
- All *meter* enclosures are lockable and kept locked.
- Test switch covers are sealed.
- Metering and instrument transformer cabinets are sealed.
- *Meter* demand reset mechanisms are sealed.
- Wherever possible, the *meter/recorder* always remain powered.
- *Recorders* have a *interval data* storage capacity of no less than 14 days.
- *Meters/recorders* have a backup battery (or other) system that will maintain data and clock integrity for no less than 14 days in the absence of line power.
- Instrument transformers are not over burdened by the *meter* and any other devices/wiring that may be included as part of the instrument transformer/*meter* circuit.
- *Meters* that are loss compensated are labeled as such.
- *Meters* that have unity PT and or CT ratios have the appropriate multiplier labeled.
- Local *meter* clock displays should be in prevailing clock time.

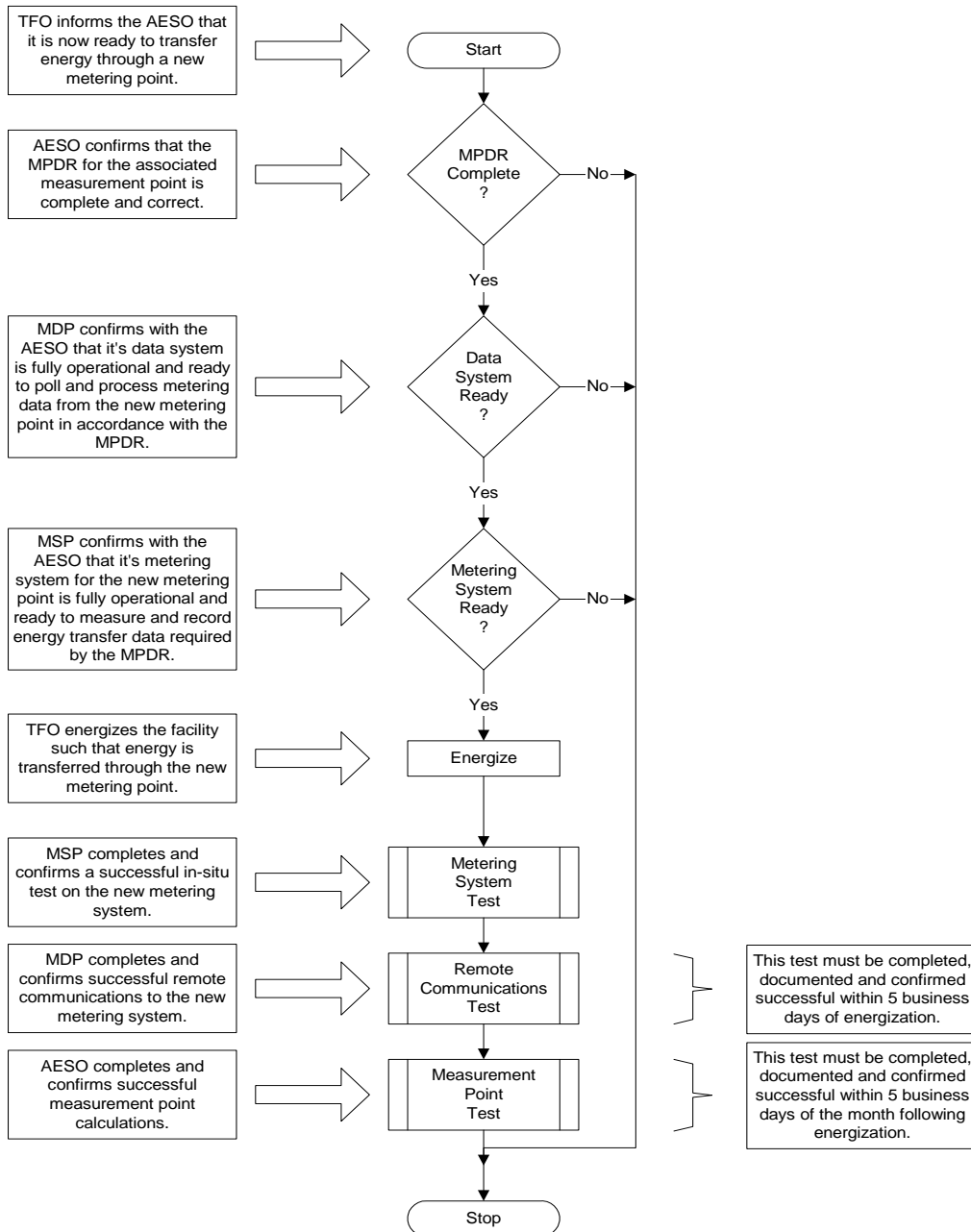
Alberta Electric System Operator Measurement System Standard

- Metering enclosures that contain voltages in excess of 120V are clearly labeled as containing 'High Voltage' (277/480, 347/600).
- **Metering system** wiring diagrams should either be included within the metering enclosure or available upon request.
- The **metering system** must have a single ground point.

APPENDIX 4 END-TO-END COMMISSIONING PROCESSES

This document contains a flowcharts that outlines and describes the **AESO** end-to-end commissioning process for *metering points*.

NEW METERING POINT



APPENDIX 5 METERING SYSTEM IN-SITU TESTING

A **metering system in-situ test** is an on site test of the **metering system** and is intended to verify and document the proper installation and operation of the **metering system**. It should be noted that an **in-situ test** is NOT intended or designed to verify the accuracy of a **meter** to the manufacturer’s specifications. The accuracy of the **meter** itself is tested as part of the (re)-verification process that occurs under the supervision of an accredited **meter** shop prior to sealing.

1. METERING SYSTEM TESTING FREQUENCY

The **metering system provider** must perform a test on a **metering system** at each of the following trigger points:

- a) Prior to the energization of a new **metering system** (commissioning tests only).
- b) Within four weeks of the energization of a new or altered **metering system**.
- c) Upon the change of any equipment associated with a **metering system**.
- d) Within the time period specified in the following table:

MW Class	MW Range	Testing Interval
A	< 1	6 years
B	1 up to 10	3 years
C	10 up to 20	2 years
D	20 up to 50	1 year
E	50 +	6 months

- This frequency table refers to individual **metering systems**.
- MW Range refers to the average MW flowing through an individual **metering system**, where the methodology used to determine the average MW will be documented in the Annual Metering Systems Testing Compliance plan as detailed in Appendix 5 Section 4.
- Testing Interval refers to the amount of time allowed between tests of an individual **metering system**. This time period begins on the first of the calendar month following the completion of a test of that **metering system**. The next test of that **metering system** must be completed by the end of the calendar month determined by the table.

2. METERING SYSTEM TESTING PROCEDURES

The **metering system provider** is required to perform each of the listed procedures as part of a test on a **metering system**. Pass/Fail criteria and exemptions/alternatives to these procedures must be included as part of the Annual Metering Systems Testing Compliance Plan filed with the **AESO** under Appendix 5 Section 4. Note that not all procedures are possible to perform during every test, depending on the physical limitations of the installation at the site. Tests are not to be performed if clearance or safety is considered an issue.

Metering System Test Procedures

1. Confirm that the metering equipment installed matches that documented on the current **Measurement Point Definition Record**. To be performed on all equipment at installation, and on visible equipment afterwards. Meters must always be verified, while Current Transformers (CTs) and Potential Transformers (PTs) may not be accessible.
2. Check the wiring connections:
 - a. on all equipment at installation or on the changing of instrument transformers, check that the wiring connections from the meter to each piece of metering equipment are correct.
 - b. during scheduled tests, a visual inspection of the meter connection wiring to ensure that appropriate connections apply must be performed.
3. Check to confirm that the inventory taken during the test matches the inventory in the **metering system provider** main database and the inventory that was last submitted to the **AESO** for that point. The meter number must always be explicitly confirmed. To be performed on all equipment at installation, whenever equipment is changed and during regularly scheduled tests.
4. Check of the CT ratios by all of the following:
 - a. Injection test. To be performed at installation or lab tested prior to installation.
 - b. Comparison of primary clip on to metering secondary, only if a primary clip on is physically possible. To be performed during all tests.
 - c. Comparison of metering secondary to a second independent source (such as protection). To be performed during all tests.
5. Check of the CT performance by measuring the burden of the CT circuit to ensure that it falls within manufacturing accuracy specifications. To be performed at installation. The burden may also be calculated from drawings and specs when additional pieces of equipment are added to the CT circuit.
6. Check to confirm that the voltage reading is reasonable compared to the rated voltage. To be performed during all tests.

7. Check to confirm that the meter has a valid seal from Measurement Canada, in accordance with Measurement Canada requirements. To be performed during all tests.
8. Check of power measurements compared to test equipment validated against a test standard for reasonability. To be performed during all tests. There may be limitations to this test when there is extremely low load, or rapidly fluctuating load. If the analyzer can accept pulses this should be used to calculate the accuracy (works well under fluctuating loads).
9. Check of the central data collection system (i.e. MV-90 operators) to ensure that the load measured on site in engineering units based on the test equipment validated against a test standard (ie PT x CT x test standard measurement) is within reason of the load recorded by the data collection system (ie MV-90), and that the channel mapping in the central data collection system match those of the meter. To be performed during all tests. There may be limitations to this test when there is extremely low load, or rapidly fluctuating load.

The above test procedures do not limit any other tests that the meter system provider may wish to perform.

3. METERING SYSTEM TESTING REPORTING

Each time a **metering system** has undergone a test the **AESO** requires the **metering system provider** to file a Metering System Test Form with the **AESO** by the end of the quarter following the month in which the test was performed. This form is not intended to replace the detailed metering **in-situ test** records used by the **metering system provider**.

The Metering System Test Form must contain the following components:

- a) The **AESO's** Real Metering Point ID associated with the **metering system**, as referred to in the **Measurement Point Definition Records**.
- b) The date the test was performed on the **metering system**.
- c) A list of which tests specified in Appendix 5 Section 2 were performed, and an explanation for any tests that were not performed.
- d) A list of which tests specified in the Testing Procedures passed, and an explanation of any test that did not pass, including planned/taken remedial action.

The above information must be filed with the **AESO** electronically in a standardized form, available on the **AESO** website.

Upon receipt of the Metering System Test Report the **AESO** will:

- a) File the report in an **AESO** tracking system.
- b) Issue a Request For Information to the **metering system provider** for any tests that have failed. The information requested by the **AESO** may vary depending on the nature of the failure described in the Metering System Test Form.
- c) File the report with the EUB.

4. METERING SYSTEM TESTING COMPLIANCE

The **metering system provider** must file an Annual Metering Systems Testing Compliance Plan for approval by the **AESO** and the EUB between October 1st and December 31st of each year. This plan must include the following components:

- a) A list of **metering systems** that the **metering system provider** will be responsible for as of December 31st of the year of filing, identified by the **AESO** Real Metering Point ID associated with each **metering system** as referred to in the **Measurement Point Definition Records**.
- b) The installation type of each **metering system** described in part a).
- c) The associated MW Class for each **metering system** described in part a), as described in Appendix 5 Section 1 d), for those **metering systems** described as being instrument type installations in part b).
- d) The date of the most recent test that was carried out in accordance with the testing procedures listed in Appendix 5 Section 2, on each **metering system** described in part a), for those metering systems described as being instrument type installations in part b).
- e) An indication of any **metering systems** that will be out of compliance with either Appendix 5 Section 1 or 2 as of December 31st of the year of filing, an explanation of the non-compliant status of those **metering systems**, and a plan to bring those **metering systems** into compliance.
- f) The methodology used by the **metering system provider** to determine the MW Class identified in part b).
- g) A description of the testing procedures followed by the **metering system provider** in accordance with the testing procedures described in Appendix 5 Section 2, including the pass/fail criteria of each test. Testing procedures that differ from those described in Appendix 5 Section 2 must be shown to be of equivalent or superior functionality. These are the procedures that are to be used for testing in the following calendar year.

The information described in part a) to part e) must be filed with the **AESO** electronically in a standardized form, available on the **AESO** website. The information for part f) and part g) may be filed in a format chosen by the **metering system provider**.

Upon receipt of the Annual Metering Systems Testing Compliance Plan, the **AESO** will communicate the following to the **metering system provider** and the EUB no later than March 1st:

- a) Conditions or requirements not met in the submitted Annual Metering Systems Testing Compliance Plan.
- b) Acceptance of the Annual Metering Systems Testing Compliance Plan as any conditions and requirements identified in a) are met.
- c) A summary of Metering Systems from the previous calendar year that were not tested in compliance with either Appendix 5 Section 1 or 2.

5. METERING SYSTEM IN-SITU TEST RECORD

The following information shall be included in the **metering point in-situ test** record:

1. General
 - Date test completed.
 - Name of person completing the **in-situ test** record.
2. Site Data
 - **Measurement point** identification.
 - **Metering point** identification.
3. **Meter** Data
 - Company #, Serial #, Make, Model, Ampere rating, Voltage rating, # of Elements, Kh, Kp, Multiplier, Seal Date
4. Instrument Transformer Data
 - Company #, Serial #, Make, Model, Voltage Class, Ratio, Accuracy
5. Metering Equipment Physical Checks
 - **Meter**: Seals, Wiring, Displays.
 - **Recorder**: Seals, Wiring.
 - CTs: Wiring, polarity, other checks.
 - PTs: Wiring, polarity, other checks.
6. Operational Checks
 - Current Transformers:
 - i. Measure secondary current and using the CT ratio, calculate primary current. Compare this primary current with primary current from other source if available and calculate % error. If current is stable, the acceptable error would be +/- 3%.
 - Potential Transformers:
 - i. Measure secondary voltage and using the PT ratio, calculate primary voltage. Compare this primary voltage with primary

voltage from other source if available and calculate % error.
The acceptable error would be +/- 3%.

7. **Meters:**
 - Measure W, Wh, Var, Varh, pf, Q, Qh or other quantities (as required) in each applicable direction and compare them to the equivalent quantities measured with the **field metering test standard**. Calculate % errors. If the load is stable, the acceptable error between the **meter** and the test standard would be +/- 3% for each measured quantity.
8. **Recorders:**
 - Check the recorder for accurate pulse recording.
9. Vector Checks:
 - With phase A as reference, at the **meter** test switch, check voltage and current vectors for proper phase sequence and direction of measurement.
10. Communications:
 - Verify that the **Metering Data Provider** is able to successfully poll the **meter/recorder** and successfully collect **metering data**.
11. **Data System**
 - Verify that the units of measure for each channel of the meter correspond to the same units of measure for each channel collected by the data collection system.
 - Verify that the **interval** energy data collected from each energy channel by the **Metering Data Provider** is equivalent to the difference between the corresponding energy register values over one or more consecutive **intervals**.

With respect to the **in-situ test** records for **metering systems** a **Metering System Provider** must:

- (a) store the **in-situ test** reports for a period of no less than six (6) years, and
- (b) provide the **AESO** with a copy of any requested **in-situ test** reports or **metering system** wiring diagrams within five (5) **business days** of that request.

APPENDIX 6 CHECK METERING

Subject to Section 3.3.4, any **affected party** may at its own cost provide **metering** approved and installed by the **Metering System Provider** at or near a **metering point** to which it is an **affected party**, for the purpose of checking the **measurement system metering** or substitution for readings thereof. Existing **measurement systems metering measurement transformers** may be shared provided the additional burden does not exceed the limits of the **measurement transformers**.

The provider of **check metering** must notify the **Metering System Provider** of its intention to install **check metering** at least ninety (90) days prior to the installation date and must ensure that its **check metering** complies with the requirements of this **Standard**.

In the event that **check metering** equipment is transferred between **affected parties**, all obligations of the provider of that equipment transfer to the **affected party** to which the equipment is transferred.

An owner of **metering equipment** forming part of **check metering** must notify the **Metering System Provider** of any transfer of its **check metering** to another **affected party**.

The **Metering System Provider** who owns or controls the site at which the **metering point** is located must co-operate with any **affected party** connected at that **metering point** wishing to install **check metering** at that site.

The **Metering System Provider** who owns or controls the site at which the **metering point** is located has the right to remove from service the **check metering** causing physical problems with the **measurement system metering equipment**. The **Metering System Provider** must notify the **affected party** as soon as reasonably possible that the **parties** equipment has been removed from service.

The **Metering System Provider** who owns or controls the site at which the **metering point** is located must install, operate and maintain the **check metering** equipment for the **affected party** and charge all reasonable costs to the **affected party**.

The **Metering System Provider** and the **affected party** must have an agreement for all costs prior to commencing any **check metering** work.

APPENDIX 7 DAILY SYSTEM MEASUREMENT FILE FORMAT & SCHEDULE

FILE FORMAT

The **daily system measurement files**, as sent from the **Metering Data Providers** to the **Data Centre**, must have the format as described in schedule B.6.2.4 System Level Measurement Data Provision of the Settlement System Code.

Notes:

1. All **measurement data** must be transferred as fifteen minute **interval data** regardless of the **interval** at which it may have been metered, recorded or aggregated.
2. **Measurement data** (zero or non-zero) must be transferred for every interval of every hour of every day for all active **measurement points**.
3. There should only be 96 records per day per **measurement point** transferred on all days that are not also days on which DST time changes take place. There should be 92 records (in 23 hours) transferred per **measurement point** on the spring DST time change day and 100 records (in 25 hours) transferred per **measurement point** on the fall DST time change day.
4. The term "net energy" implies the difference between the amount of energy transfer that took place in one direction at a **measurement point** in a particular fifteen minute **interval** and the amount of like energy transfer that took place in the opposite direction at that same **measurement point** during the same fifteen minute **interval**.
5. The naming of daily files will be as described in schedule B.4.2 File Naming Convention of the Settlement System Code.
6. The MWh and MVARh source flags are defined as follows:
 - M: The value is derived from metered data only (normal condition).
 - E: The value is derived, in whole or in part, from estimated data due to the failure of a **metering system** or **data system** (abnormal condition).

FILE DELIVERY SCHEDULE

Daily

A **Metering Data Provider** must complete the transmission of all the **measurement data** day to the **Data Centre** by 23:59 on the 3rd **business day** following the day of flow, as described in section 4.4.2 (A) Initial Daily Settlement of the Settlement System Code

For non-**business days**, the daily schedule may be postponed to the first **business day** following the non-**business day(s)**. Any **Metering Data Provider** choosing this option will provide a daily file for the previous day and for each postponed day.

Monthly

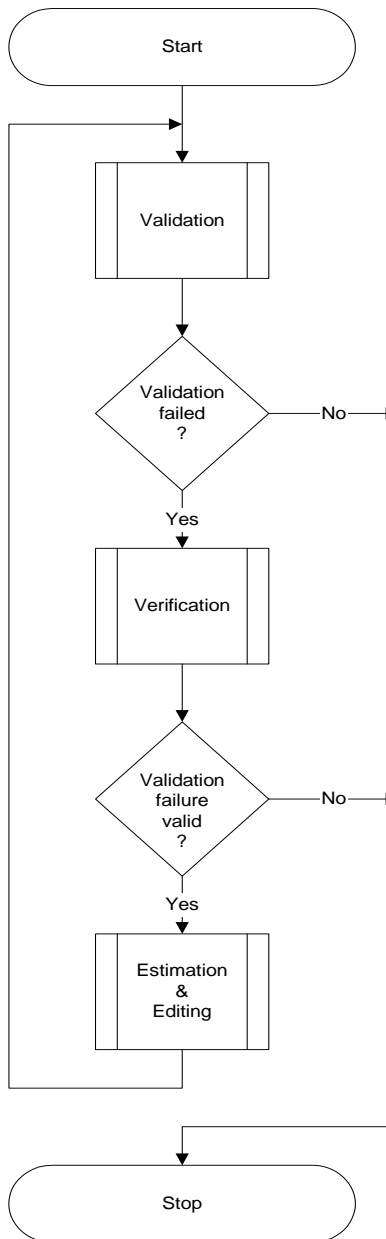
A **Metering Data Provider** has the option to provide the previous month's reconciled **measurement data** to the **Data Centre**; however, this **measurement data** must be received by the **Data Centre Provider** by 23:59 on the 7th **business day** following the last day of the month to be settled, as described in section 4.4.3 (A) Initial Monthly Settlement of the Settlement System Code

After the 8th **business day**, changes to the **measurement data** will be accepted only by exception and approval of the **Measurement System Provider**.

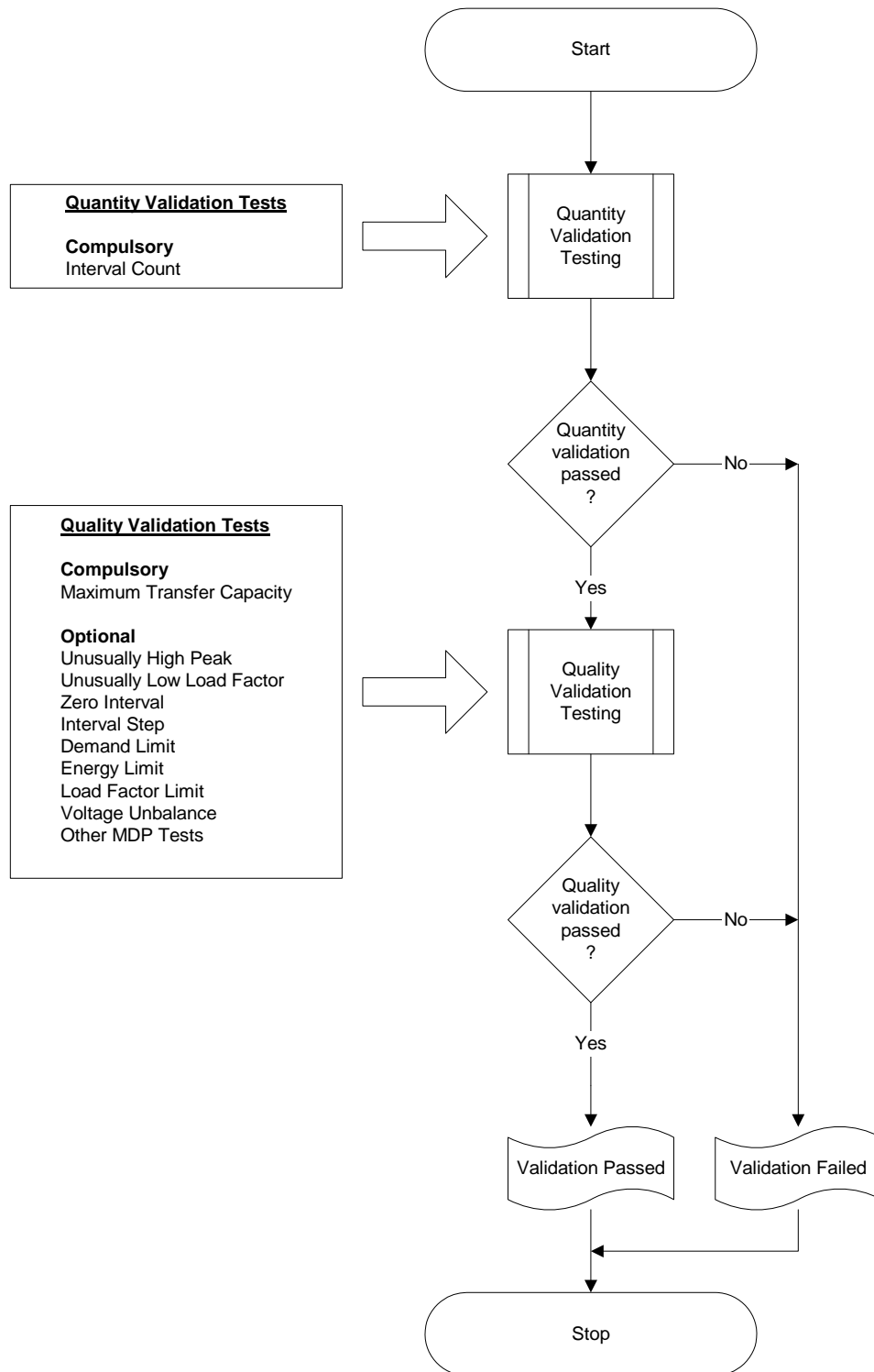
APPENDIX 8 VALIDATION, VERIFICATION, EDITING & ESTIMATING PROCESSES

The following flowcharts outline and describe the overall validation, verification, editing and estimating (V2E2) guidelines that the **AESO** requires **Metering Data Providers** to incorporate into their validation systems and processes.

V2E2 OVERVIEW



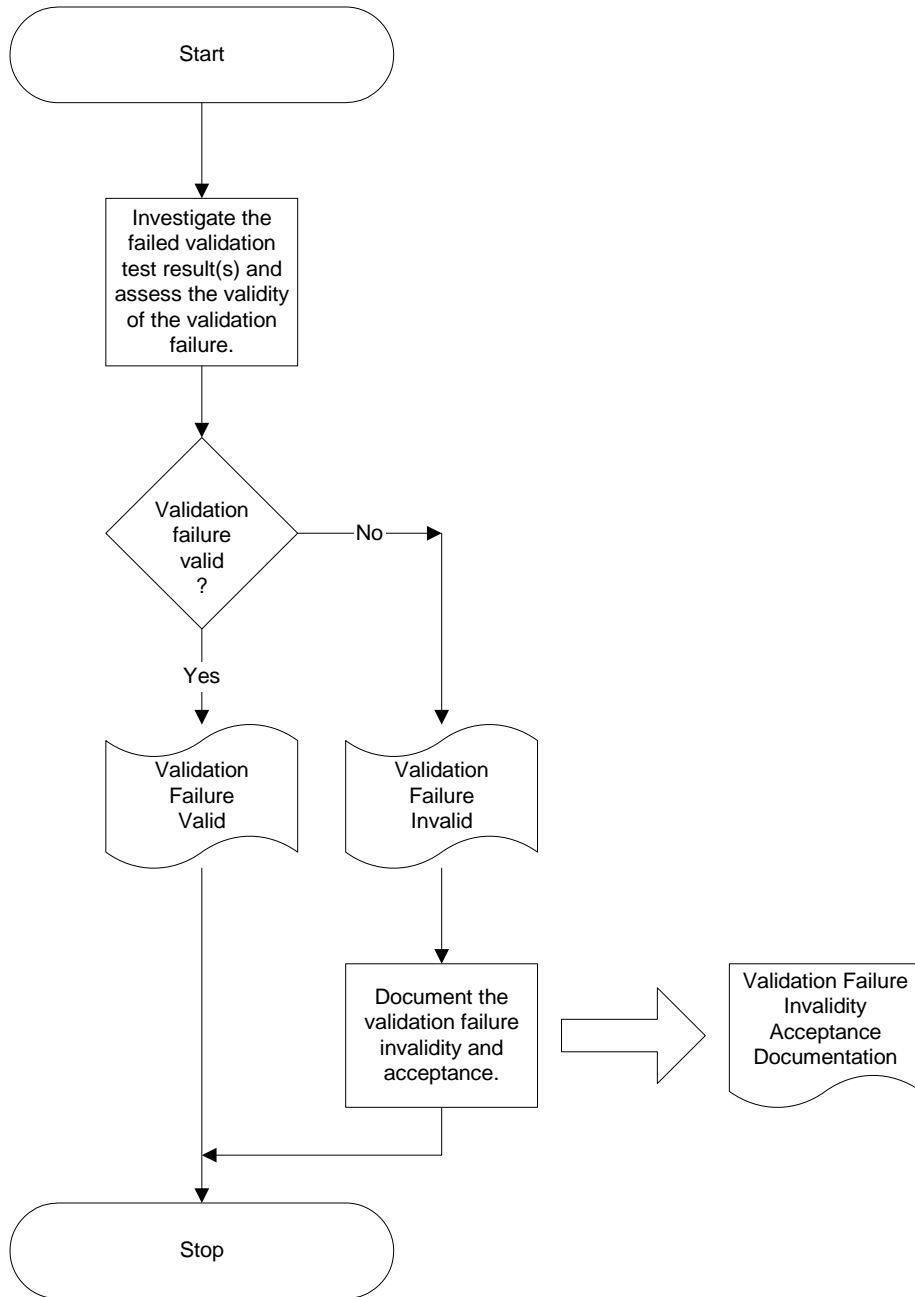
VALIDATION



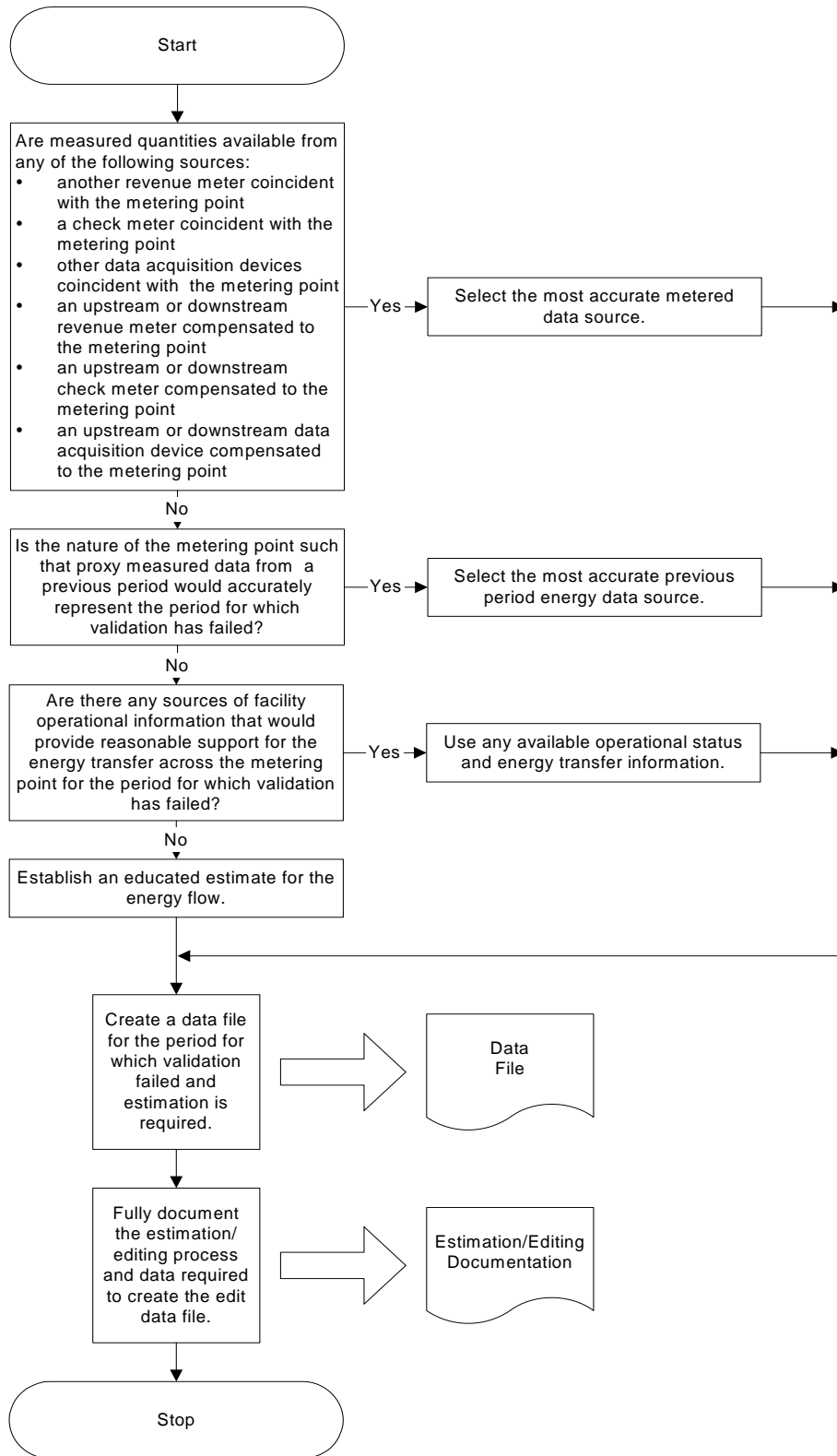
VALIDATION TEST DESCRIPTIONS

Test Basis	Test Name	Description
Interval	Interval Count	Determines if the correct number of interval records have been received for the metering point for the day.
	Zero Interval	Determines if the number of consecutive interval records that report a zero active energy volume exceeds a user-defined value for the metering point for the day.
	Interval Step	Determines if the interval-to-interval step change exceeds a user-defined value for any interval for the metering point for the day.
	Demand Limits	Determines if the active energy based demand falls outside a user-defined range for any interval for the metering point for the day.
	Voltage Unbalance	Determines if there is an unbalanced voltage present which is usually indicative of a loss of phase potential to the meter
Day	Energy Limits	Determines if the active energy volume falls outside a user-defined range for the metering point for the day.
	Load Factor Limits	Determines if the load factor (Average Demand/ Peak Demand) falls outside a user-defined range for the metering point for the day.

VERIFICATION

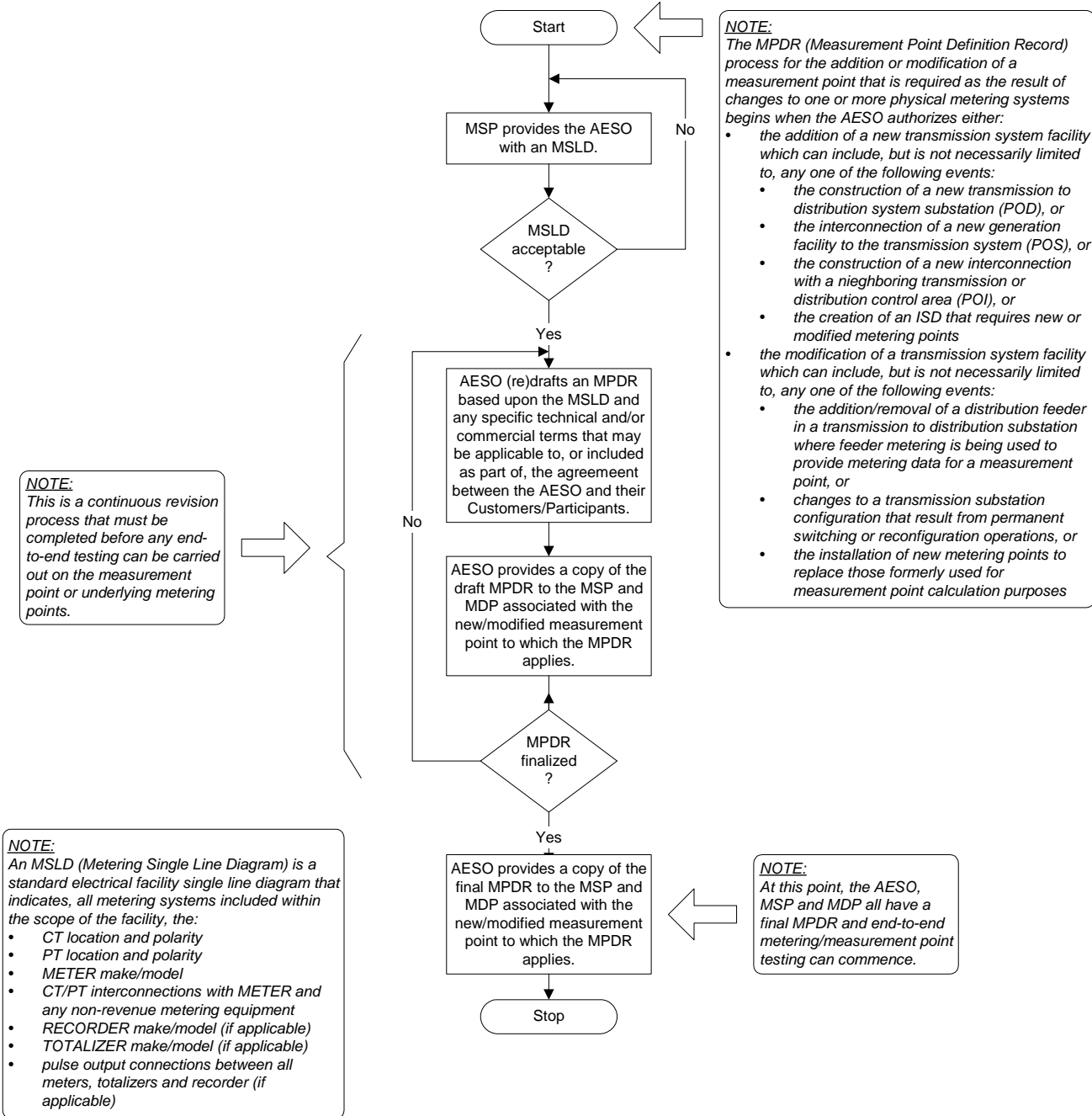


EDITING & ESTIMATING

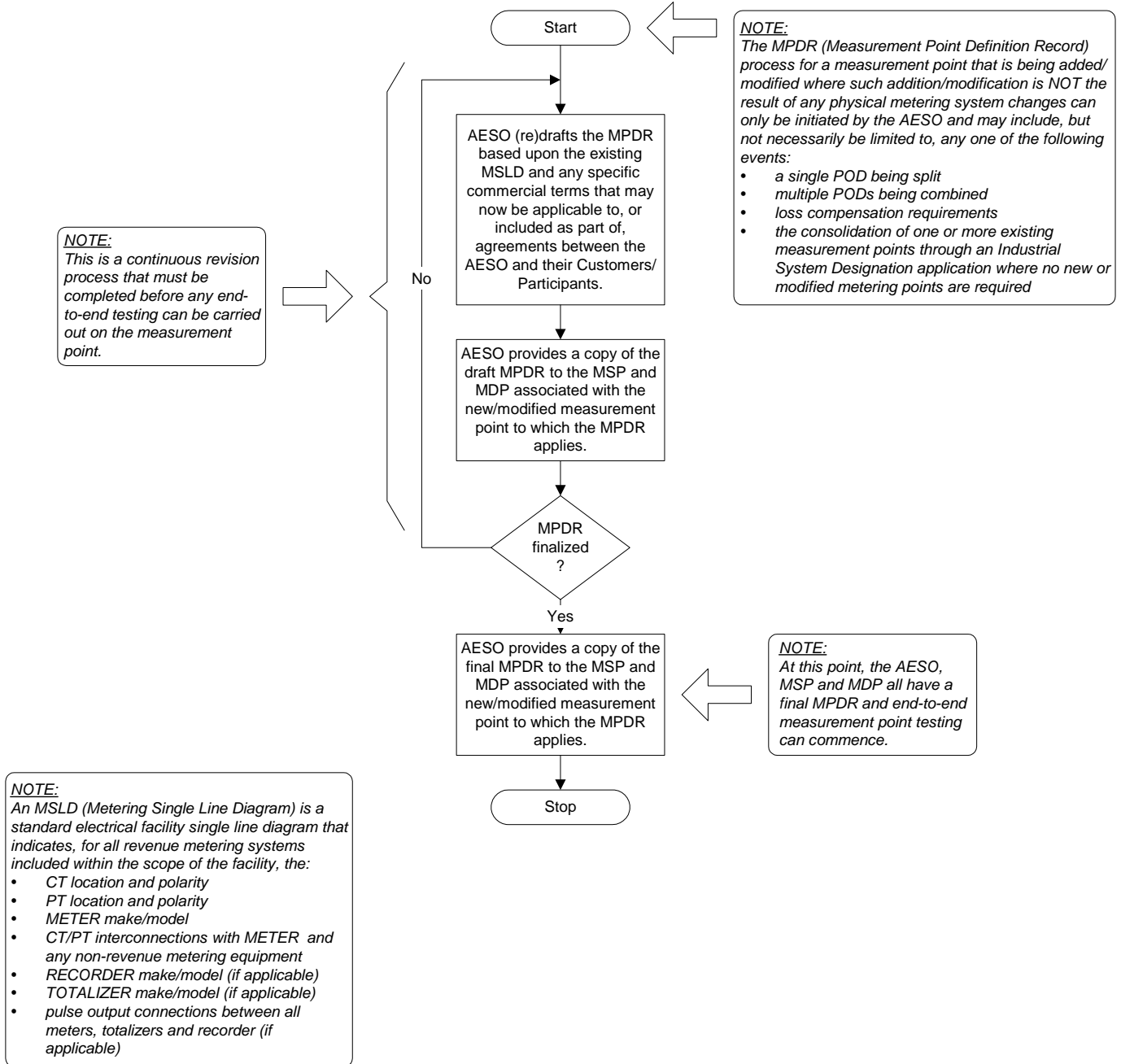


APPENDIX 9 MEASUREMENT POINT DEFINITION RECORD PROCESSES

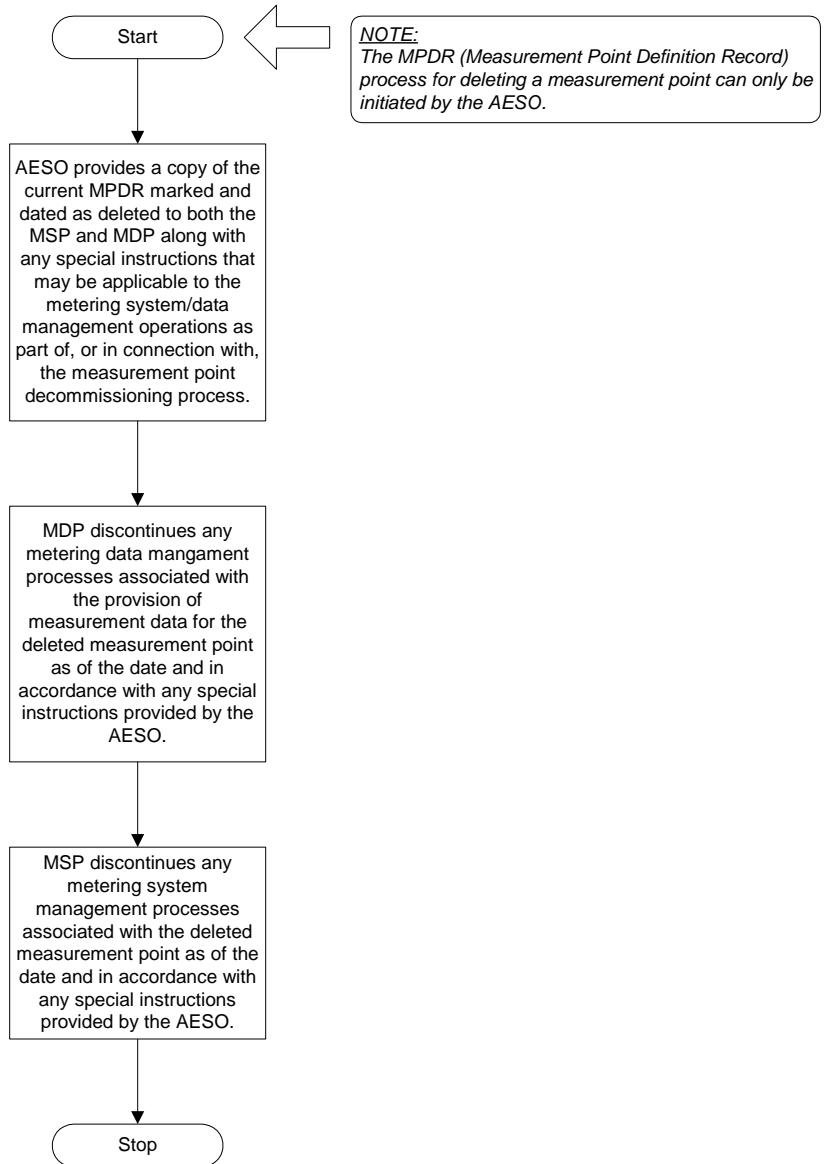
Process For Adding Or Modifying A Measurement Point Where The Addition Or Modification Is The Result Of Changes To One Or More Physical Metering Systems



Process For Adding Or Modifying A Measurement Point Where The Addition Or Modification Is NOT The Result Of Changes To Any Physical Metering Systems



Process For Deleting A Measurement Point



Measurement Point Definition Record

1

Identification:

MPDR Activation Date: 2004/01/01

The following table identifies the measurement point:

MPID	Measurement Point (MP) Name	Type	Contract Holder	LSA	MDP	Capacity
ABC1LOD	ABC Industrial Facility Load	POD	ANC	ANC	AL	1.2 MW

Definitions:

The following table defines the single line diagram real metering point references:

Number	Real Metering Point (RMP)	Meter Type	Recorder	
	Description		Type	Interval
1	Generator Output	Bi-Directional	Internal	15
2	Plant Load	Uni-Directional	Internal	15

where: , Real Meter Point (points in the direction of positive active energy flow)

Measurement Point Calculations:

$$MsrPtX = -\{G\}[VMP_1X]$$

where:

$$G = \begin{cases} 1; & VMP_1Wh > 0 \\ 0; & \text{otherwise} \end{cases}$$

$$VMP_1X = RMP_1X - RMP_2X$$

$$RMP_nX = RMP_nX^+ - RMP_nX^-$$

n = 1, 2, 3, ...

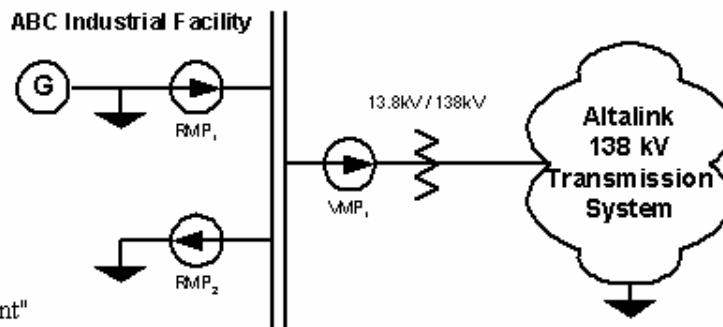
X = Wh or VARh

MsrPt stands for "Measurement Point"

MP stands for "Metering Point"

R stands for "Real"

V stands for "Virtual"



Measurement point Wh's are defined to include all net Wh's produced by the facility when the facility is a net Wh producer.

Measurement VARh's are defined to be all the VARh's flowing into (-) or out of (+) the facility including when the facility is a net Wh producer.

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Revised By: J. Fietz

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Measurement Point Definition Record

1

Identification:

MPDR Activation Date: 2004/01/01



The following table identifies the measurement point:

Measurement Point (MP)		Type	Contract Holder	LSA	MDP	Capacity
MPID	Name					
ABC1	ABC Industrial Facility Generation	POS	ABC	ANC	AL	1.2 MW

Definitions:

The following table defines the single line diagram real metering point references:

Real Metering Point (RMP)		Meter Type	Recorder	
Number	Description		Type	Interval
1	Generator Output	Bi-Directional	Internal	15
2	Plant Load	Uni-Directional	Internal	15

where: ,  Real Meter Point (points in the direction of positive active energy flow)

Measurement Point Calculations:

$$MsrPtX = (G) [VMP_1 X]$$

where:

$$G = \begin{cases} 1; & VMP_1 Wh > 0 \\ 0; & \text{otherwise} \end{cases}$$

$$VMP_1 X = RMP_1 X - RMP_2 X$$

$$RMP_n X = RMP_n X^+ - RMP_n X^-$$

n = 1, 2, 3, ...

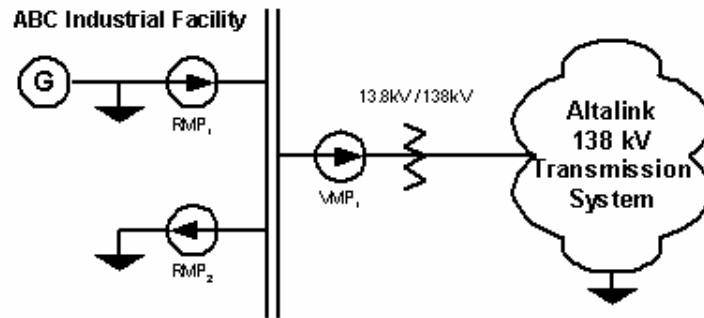
X = Wh or VARh

MsrPt stands for "Measurement Point"

MP stands for "Metering Point"

R stands for "Real"

V stands for "Virtual"



Measurement point Wh's are defined to include all net Wh's produced by the facility when the facility is a net Wh producer.

Measurement VARh's are defined to be all the VARh's flowing into (-) or out of (+) the facility including when the facility is a net Wh producer.

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1 **Activation date:** This date is when the MPDR comes into force, this date is based on any one of three things:

- The energization of the equipment that the MPDR refers to
- The starting date of the contract that the MPDR has been written to reflect
- The start of a contract that required changing the name or a change in the metering arrangement that is currently in place.

2 **Measurement Point (MP):** The Measurement Point refers to two parts of the MPDR:

MPID: This MPID is the identifier used by the AESO for billing purposes

Name: This is the name of the substation or facility that the MPDR refers to, usually the name given to a facility or substation by the contract holder.

3 **Type:** Type identifies the MPDR as either a POD or POS

POD: Point of Delivery. Where the electricity flows out of the Transmission system to meet load.

POS: Point of Supply. A point where electricity is generated.

4 **Contract Holder:** This indicates the company or entity that has signed a contract with the AESO (usually the owner of the facility) to buy and/or sell electricity.

5 **LSA:** Load Settlement agent. This indicates which company the contract holder has arranged to settle the financial details of this measurement point.

6 **MDP:** Meter data provider. Indicates the company that is responsible for collecting and transporting the data collected from revenue meters to the AESO.

7 **Capacity:** Indicates the capacity of the contract for either supply or demand that has been signed with the AESO. This number should be expressed as the MW value of the contract that has been signed with the AESO

APPENDIX 10 25KV FEEDER METERING UPGRADE CRITERIA

The following criteria will be used by the **AESO** in assessing the Transmission Facility Owner's (TFO) Proposals to Provide Service (PPS) for proposed upgrades to existing 25 kV **feeder** revenue metering and addition of 25kV feeders requiring revenue metering.

These criteria will be used in the development of **AESO** functional specifications as well as the PPS of the TFOs.

- (a) Revenue Metering is applied to two types of distribution circuits which can be classified as Urban and Rural. Urban circuits have lumped metering, i.e. the revenue metering is located on the secondary of the transformer which in turn feeds one or more feeders. Rural feeders cover a large geographic area and consequently require individual circuit metering, i.e. revenue meters are applied to each circuit.
- (b) New 25 kV feeders require Measurement Canada approved revenue class **metering equipment** as per the **AESO's** current revenue metering standard.
- (c) Upgrading of existing 25 kV feeders with **dispensated metering equipment** is required if the existing meter is a two and half element meter, i.e. revenue meters applied to the **AIES** are to be three element and the TFO is adding or changing equipment in a substation.
- (d) Changes to dispensated equipment (CT's and PT's) on existing 25 kV feeders is not required where the CT's and PT's are subject to the Measurements Canada dispensation obtained by the **AESO** and the equipment is functioning as designed. The use of existing dispensated (CT's and PT's) equipment is encouraged.
- (e) Existing 25 kV feeders will only have **metering equipment** (CT's and PT's) replaced where the existing **metering equipment** has failed and will be replaced in kind. That is, a failed dispensated CT or PT will be replaced by a dispensated CT or PT. Where this is not possible or practical, the **AESO** will give consideration to replacing the failed **metering equipment** with Measurement Canada approved equipment. The equipment owner will contact the **AESO** only for those cases where the **metering equipment** can not be replaced with like equipment.
- (f) Individual feeder metering shall be installed at all new Rural substations. Individual feeder metering may be applied to Urban feeders where the TFO requires such metering. Substation totalized metering will be achieved through the **Measurement Point Definition Record** (MPDR) and a virtual metering point.

- (g) All metering equipment on new feeders must be revenue class. **Metering equipment** must comply with Measurement Canada standards and be maintained by the TFO in accordance with those standards.
- (h) The **AESO** will review metering replacements as contained in the TFO's PPS on a case by case basis.

APPENDIX 11 DEFINITIONS

“**accuracy class**”: The upper limit of error demonstrated when a *meter* or *instrument transformer* is tested in accordance with this *Standard*.

“**Act**”: The Electric Utilities Act (Alberta) as amended from time to time.

“**active energy**”: The capability of electricity to do work. Expressed in units of watthours (Wh).

“**affected party**”: In relation to the *measurement data* for a *measurement point*.

- (a) the *AESO*, or
- (b) any *Metering Service Provider* who provides *metering services* that affect, or have the potential to affect, the *measurement data*, or
- (c) any *Operator* whose financial settlement with a *Data Recipient* is determined based upon the *measurement data*, or
- (d) any *Data Recipient* who uses the *measurement data* for financial settlement purposes.

“**AESO**”: The Alberta Electric System Operator.

“**AIES**”: The Alberta “interconnected electric system” as defined in the *Act*.

“**business day**”: A day other than a Saturday, a Sunday, a statutory holiday in the province of Alberta, or a Monday when a statutory holiday occurs on a Saturday or Sunday and the following Monday is a day during which financial banking privileges are suspended.

“**check metering**”: In relation to a *metering point*, a *metering system* provided for that *metering point* in accordance with Appendix 6 of this *Standard*.

“**data centre**”: All the computer and communications related equipment and systems, that are not part of either a *metering system* or a *data system*, necessary to provide *data centre services*.

“**Data Centre Provider**”: The person who is, by virtue of a *data centre services agreement*, accountable for the provision of *data centre services*.

“**data centre services**”: All services related to the operation of the *data centre* necessary to meet the requirements of this *Standard*.

“**data centre services agreement**”: An agreement between the *AESO* and the *Data Centre Provider* that defines the applicable *metering points* and *measurement*

points along with the terms and conditions of service related to the provision of the associated **data centre services**.

“**Data Recipient**”: Any person who has a **measurement services agreement** with the **AESO**.

“**data system**”: All the computer and communications related equipment, that is not part of either the **data centre** or any **metering system**, required to collect and process **metering data** from one or more **metering systems** and transfer the **metering data** or the resultant derived **measurement data** to the **data centre**.

“**dispensated metering equipment**”: Any **metering equipment** that has received Measurement Canada approval under Section 9(2) or 9(3) of the Electricity & Gas Inspection Act.

“**Electricity & Gas Inspection Act**”: The federal Electricity & Gas Inspections Act and Regulations.

“**energy metric**”: Either an **active energy** or **reactive energy** quantity.

“**daily system measurement file**”: An electronic data file, containing **metering data** and/or **measurement data** arranged in a pre-defined format, that is transferred from a **Metering Data Provider** to the **Data Centre Provider**.

“**in-situ test**”: A test made on equipment that is still installed at the site where it normally operates.

“**interval**”: A period of time over which an **energy metric** is accumulated.

“**interval data**”: A data set consisting of one or more records where each such record contains, as a minimum:

- (a) the volumes of one or more **energy metrics** that have accumulated over a common specific **interval**, and
- (b) an **interval time-stamp**

“**interval time-stamp**”: A **time-stamp** that indicates the end of an **interval**.

“**measurement data**”: The **interval data** associated with a **measurement point**.

“**measurement point**”: A **measurement point** is either a:

- (a) singular, physically realizable point on the **interconnected electric system** where **active energy** or **reactive energy** is measured, or deemed to have been measured, for the purpose of financial settlement with a **Data Recipient**, or

- (b) singular, non-physically realizable point considered to be effectively on the **interconnected electric system** where **active energy** or **reactive energy** is deemed to have been measured, for the purpose of financial settlement with a **Data Recipient**.

“**measurement point definition record**”: A specification that defines the physical arrangement of the **metering system(s)** as well as any algorithms used to manipulate the **metering data** to produce the **measurement data** associated with the **measurement point** to which the specification applies.

“**measurement services agreement**”: An agreement between the **AESO** and a **Data Recipient** that defines the applicable **measurement points** along with the terms and conditions of service related to the provision of the associated **measurement data**.

“**measurement system**”: The **data centre** in conjunction with a collection of one or more **data systems** and one or more **metering systems** such that:

- (a) for each **metering system** there exists one, and only one, related **data system**, and
- (b) for each **data system** there exists at least one related **metering system**.

“**measurement system metering**”: In relation to a **measurement point**, a **metering system** required to provide some or all of the **metering data** necessary to produce the **measurement data** for a **measurement point** that is defined as part of a **metering system services agreement**.

“**measurement system services**”: Includes all:

- (a) **data centre services**, and
- (b) **metering data services**, and
- (c) **metering system services**, and
- (d) maintenance and enforcement of all aspects of this **Standard**

“**measurement transformer**”: A current or voltage transformer required to connect high voltage equipment to a **meter**.

“**meter**”: The apparatus which measures **active energy** or **reactive energy** or both, including any internal **recorder**, **remote communications equipment**, clock or current or voltage transformers which are normally tested as a part of the apparatus.

“**metering data**”: The **interval data** associated with a **metering point**.

“**Metering Data Provider**”: A person who is, by virtue of a **metering data services agreement**, accountable for the provision of **metering data services**.

“**metering data services**”: All services related to the operation of the **data systems** necessary to meet the requirements of this **Standard**.

“**metering data services agreement**”: An agreement between the **AESO** and a **Metering Data Provider** that defines the applicable **metering points** and **measurement points** along with the terms and conditions of service related to the provision of the associated **metering data services**.

“**metering equipment**”: In relation to a **metering system** means all **measurement transformers, meters, recorders**, remote communication equipment and associated wiring provided for that **metering system**.

“**metering point**”: Either a **real metering point** or a **virtual metering point**.

“**Metering Service Provider**”: A **Metering System Provider** and/or a **Metering Data Provider**.

“**metering system**”: All the **metering equipment** required for the measurement and, if applicable, remote storage of the **active energy** and **reactive energy interval data** for a single **metering point**.

“**Metering System Provider**”: A person who is, by virtue of a **metering system services agreement**, accountable for the provision of **metering system services**.

“**metering system services**”: All services related to the design, installation, operation and maintenance of the **metering systems** necessary to meet the requirements of this **Standard**.

“**metering system services agreement**”: An agreement between the **AESO** and a **Metering System Provider** that defines the applicable **metering points** along with the terms and conditions of service related to the provision of the associated **metering system services**.

“**Mountain Daylight Time**”: **Mountain Standard Time** plus one hour.

“**Mountain Standard Time**”: The mean time at the 105th meridian of longitude west of Greenwich, England.

“**non-dispensated metering equipment**”: Any **metering equipment** that is not **dispensated metering equipment**.

“**Owner**”: “*Owner*” as defined in the **Act**.

“**power transmission equipment**”: Any electrical equipment that transfers electrical energy for the purpose of the distribution of electricity.

“reactive energy”: The power which performs no useful work, but which periodically shifts back and forth between the generator and the magnetic or dielectric field. Expressed in units of varhours (VARh).

“reading”: In relation to a *meter*, means the record made or quantity displayed by that *meter* of *active energy* or *reactive energy* transferred in a particular direction at a *real metering point* during a particular period of time.

“real metering point”: The physical point of electrical connection of the primary circuit of a current transformer that forms part of the *metering system* used to measure the *active energy* or *reactive energy* transferred through that point.

“recorder”: An apparatus that stores *interval data* records obtained through a direct internal or external connection to a *meter* that allows such *interval data* to be retrieved at a future point in time.

“representative”: In relation to a person, means any employee, agent or consultant of that person or of a third party contractor to that person.

“service agreement”: A *metering system services agreement*, *metering data services agreement* or a *data centre services agreement*.

“Standard”: This document, namely, the Measurement System Standard.

“standard clock”: An NSERC, or equivalent, clock reference.

“time-stamp”: A record of the date and time of an event in a format as defined by this *Standard*.

“virtual metering point”: An effective point of measurement, that may or may not be physically locatable, where *active energy* or *reactive energy* deemed to have been transferred through the point is derived from an algorithmical manipulation of the *active energy* and *reactive energy* data of one or more *metering points*.

“written notification”: Includes any written notice delivered via letter mail, courier, facsimile or email.