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IMEM Manual

Metering Standards and Procedures Issue 1.0

Abstract	This manual presents the metering procedures and standards for the Interim Mindanao Electricity Market.
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IMEM-BSM-001	IMEM Billing and Settlement Manual 1.0
IMEM-DRM-001	IMEM Dispute Resolution Manual 1.0
	Philippine Electrical Code

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SECTION 1 INTRODUCTION

1.1 PURPOSE

- 1.1.1 This *IMEM Manual* is developed pursuant to Clause 4.2.2.2 of the *IMEM Rules* and implements relevant provisions of Chapter 4 of the *IMEM Rules*.
- 1.1.2 The purpose of this *IMEM Manual* is to provide *IMEM Members* with guidelines and procedures related to *IMEM* metering activities. As such, this *IMEM Manual*:
- a) Defines the *Metering Installation* standards that all *Metering Installations* located at the *Connection Point* of a facility of an *IMEM Trading Participant* must comply with to be eligible for registration in accordance with Section 4.3.2 of the *IMEM Rules*;
 - b) Describes the standard numbering system that *IMEM Metering Services Providers* must follow when numbering and identifying their *Metering Installations*;
 - c) Describes the procedures that the *IMEM Operator* and *IMEM Metering Services Providers* must follow when registering *Metering Installations* in the *IMEM* in accordance with Clause 4.3.2.1 of the *IMEM Rules*;
 - d) Defines the information that must be contained in the *Metering Services Provider Database* of an *IMEM Metering Services Provider* and the *Metering Database* of the *IMEM Operator*;
 - e) Describes the procedures that the *IMEM Operator* and the *IMEM Metering Services Providers* must follow to ensure *Metering Data* is collected in a timely and efficient manner for the purposes of settlement;
 - f) Describes the procedures that the *IMEM Operator* and *IMEM Metering Services Providers* must follow in the validation and substitution of *Metering Data* to make it settlement-ready;
 - g) Describes the procedures to be followed by the *IMEM Operator* and *IMEM Metering Services Providers* if the *IMEM Operator* discovers errors in the *Metering Data* submitted by the *IMEM Metering Services Provider*; and
 - h) Describes the procedures to be followed by the *IMEM Operator* and *IMEM Metering Services Providers* when de-registering *Metering Installations*.

1.2 SCOPE OF APPLICATION

- 1.2.1 This *IMEM Manual* covers the metering procedures and standards related to *Meters* and *Metering Installations* registered in the *IMEM*.
- 1.2.2 This *IMEM Manual* does not cover:
- a) The procedures for the registration of IMEM Metering Services Providers, which are provided in the IMEM Registration Manual; and
 - b) *Dispute Resolution* procedures related to *Metering Data*, or the tampering of any *Metering Installation* that is detrimental to the integrity of the *Metering Data*, which are provided in the IMEM Dispute Resolution Manual.

1.3 CONVENTIONS

The standard conventions to be followed in this *IMEM Manual* are as follows:

- a) The word 'shall' denotes a mandatory requirement;
- b) Unless otherwise defined or the context implies otherwise, the italicized terms used in this *IMEM Manual* which are defined in the *IMEM Rules*, *Grid Code* or *Distribution Code* will bear the same meaning as defined in the *IMEM Rules*, *Grid Code* or *Distribution Code*. Italicized terms that are used in this *IMEM Manual* but are not defined in the *IMEM Rules*, *Grid Code* or *Distribution Code* are defined in the Glossary of this *IMEM Manual*.
- c) Double quotation marks are used to indicate titles of publications, legislation, forms, and other documents;
- d) Any procedure-specific convention(s) shall be identified within the specific document itself; and
- e) Any reference to a Section or Clause in any Chapter of this *IMEM Manual* shall refer to the particular Section or Clause of the same Chapter in which the reference is made, unless otherwise specified or the context provides otherwise.

1.4 RESPONSIBILITIES

- 1.4.1 The *IMEM Operator* shall be responsible for the development, validation, maintenance, publication, and revision of this *IMEM Manual* in coordination with *IMEM Members*.
- 1.4.2 The *IMEM Metering Services Provider* shall provide the necessary information and references for subsequent revisions and validation of this document.

1.5 EFFECTIVITY AND PUBLICATION

This *IMEM Manual* shall take effect upon approval by the *DOE*. Thereafter, it shall be published on the *Market Information Website*¹.

¹[http://www.wesm.ph/inner.php/the_market/interim_mindanao_electricity_market_\(imem\)](http://www.wesm.ph/inner.php/the_market/interim_mindanao_electricity_market_(imem))

SECTION 2 METERING INSTALLATION STANDARDS

2.1 COVERAGE

- 2.1.1 This Section defines the *Metering Installation* standards that all *Metering Installations* located at the *Connection Point* of a facility of an *IMEM Trading Participant* must comply with to be eligible for registration in accordance with Section 4.3.2 of the *IMEM Rules*. Specifically, *IMEM Metering Services Providers* shall ensure that their *Metering Installations* are compliant with the accuracy, safety and technical standards prescribed in this Section.
- 2.1.2 For clarity and for the remainder of this Section, the term *Metering Installations* cover both *Metering Installations* of facilities directly connected to the *Mindanao Grid* and *Metering Installations* of facilities directly connected to *Mindanao Distribution Systems* and *User Systems*. Moreover, the term *Meter* shall also cover both *Meters* within the *Mindanao Grid* and *Meters* within *Distribution Systems* and *User Systems*.

2.2 OVERVIEW OF METERING INSTALLATION REQUIREMENTS

2.2.1 Minimum Standards

Clause 4.3.2.2 of the *IMEM Rules* prescribes minimum standards that registered *Metering Installations* must comply with. In particular, Clause 4.3.2.2 of the *IMEM Rules* states that a *Metering Installation* shall:

- a) Be accurate in accordance with Chapter 4 of the *IMEM Rules*, the *Grid Code*, the *Distribution Code* and relevant *IMEM Manual*;
- b) Contain a device which has a visible or an equivalently accessible display of *Metering Data* and which allows *Metering Data* to be accessed and read at the same time by portable computer or other equipment of a type or specification reasonably acceptable to all entities who are entitled to have access to that *Metering Data*;
- c) Have electronic data recording facilities such that all *Metering Data* can be measured and recorded in all *IMEM Intervals*;
- d) Where bi-directional active energy flows occur, be capable of separately registering and recording flows in each direction;
- e) Have a *Meter* having an internal data logger capable of storing the *Metering Data* for at least sixty (60) days and have a back-up storage facility enabling *Metering Data* to be stored for at least forty-eight (48) hours in the event of external power failure;

- f) Have an active energy meter, and, if required in accordance with the *Grid Code* or *Distribution Code*, a reactive energy meter having an internal data logger;
- g) Have protection from unauthorized interference, both intentional and inadvertent, by having a secure housing for metering equipment or have the security at its *Metering Point* be adequate to protect against such interference; and
- h) Have protection of its *Metering Data* from local or remote electronic access or manipulation of data by having suitable security electronic access controls.

The metering standards prescribed in this Section are aligned with and supplement the above minimum requirements specified in the *IMEM Rules*, the *Grid Code* and the *Distribution Code*.

2.2.2 Structure of SECTION 2

The remainder of this Section is structured as follows:

- a) Section 2.3 addresses the requirements in Clause 4.3.2.2 of the *IMEM Rules* by describing the technical standards, including redundancy, accuracy, technical and communications requirements that *Meters* must comply with;
- b) Section 2.4 describes the technical, accuracy, security and configuration standards that *Instrument Transformers* within *Metering Installations* must comply with;
- c) Section 2.5 specifies the security standards that the *Metering Installations* must comply with;
- d) Section 2.6 specifies the configuration standards for the *Metering Installations* must comply with; and
- e) Section 2.7 specifies the grandfathering provisions for existing *Metering Installations* unable to meet the requirements of this Section.

2.3 METER STANDARDS

This Section describes the technical standards that all *Meters* must comply with. These standards cover redundancy, accuracy, technical and communications requirements and address the requirements in Clause 4.3.2.2 of the *IMEM Rules*.

2.3.1 Redundancy Requirement

A *Grid-Connected Metering Installation* shall have a main *Meter* and a backup *Meter* of different brands (i.e. different make and model). An

Embedded Metering Installation shall have a main *Meter* and may have a backup *Meter*.

2.3.2 Accuracy and Technical Requirements

Main *Meters* and backup *Meters* shall meet the minimum requirements listed in Table 1. Unless otherwise specified, all requirements apply to *Meters* in *Grid-Connected Metering Installations* and *Embedded Metering Installations*.

Table 1 Minimum Technical Requirements for Main and Backup Revenue Meters

ITEM	SPECIFICATIONS		REFERENCE DOCUMENTS
	MAIN METER	BACKUP METER	
Accuracy Class	IEC 687 Class 0.2 / ANSI 12.20 Class 0.3 or better	Same as the main <i>Meter</i>	ANSI or IEC
No. of Stators	Corresponds to the service type and complying with <i>Blondel's Theorem</i>	Same as the main <i>Meter</i>	ANSI
Voltage Rating	Corresponds to the secondary voltage rating of <i>Voltage Transformers</i> used	Same as the main <i>Meter</i>	<i>Grid Code Distribution Code IEEE C57.13 IEC 60044</i>
Current Rating	Corresponds to the secondary current rating of <i>Current Transformers</i> used (typically 1A or 5A)	Same as the main <i>Meter</i>	<i>Grid Code Distribution Code IEEE C57.13 IEC 60044</i>
Frequency	60 Hz	Same as the main <i>Meter</i>	<i>Grid Code Distribution Code</i>
Measurement	For <i>Grid-Connected Meters</i> : Unidirectional active metering (delivered and 2-quadrant reactive metering) or, where bi-directional energy flows, bi-directional active metering For <i>Embedded Meters</i> : Bi-directional energy (active metering)	Same as the main <i>Meter</i>	<i>Grid Code Distribution Code , IMEM Rules 4.3.2.2</i>
Interval Data	Programmable to 5-, 15-, or 30-minute interval	Same as the main <i>Meter</i>	<i>Distribution Code Grid Code</i>
No. of Channels	For <i>Grid-Connected Meters</i> , eight (8) channels. For <i>Embedded Meters</i> , at least four (4) channels for unidirectional meters (kW, kWh delivered, kVAR, kVarh delivered) or for bi-directional meters (kWh delivered, kVARh delivered, kWh received, kVARh received)	For <i>Grid-Connected Meters</i> , Four (4) channels. For <i>Embedded Meters</i> = same as the main meter	<i>Grid Code Distribution Code</i>
Mass Memory	For <i>Grid-Connected Meters</i> , minimum of sixty- (60) day recording of a 15-minute time-stamped demand interval for 8 recording channels. For <i>Embedded Meters</i> , minimum of sixty- (60) day recording of a 15-minute time-stamped demand interval for 4 recording channels.	For <i>Grid-Connected Meters</i> , same as the main <i>Meter</i> except for four (4) recording channels only. For <i>Embedded Meters</i> , same as the main <i>Meter</i> .	<i>Grid Code Distribution Code</i>
Recording Billing Quantities	Display and record TOU energy and power parameters (kWh, kVARh)	Same as the main <i>Meter</i>	<i>Distribution Code Grid Code</i>

ITEM	SPECIFICATIONS		REFERENCE DOCUMENTS
	MAIN METER	BACKUP METER	
Security	Have provisions for securing the <i>Metering Data</i> , <i>Meter</i> configurations and programs by electronic means and/or passwords; also be secured physically by way of security seals.	Same as the main <i>Meter</i>	<i>IMEM Rules</i>
Communication Capability	For <i>Grid-Connected Meters</i> , two (2) independent communication ports in addition to the optical port. For <i>Embedded Meters</i> , one (1) independent communication ports in addition to the optical port.	Same as the main <i>Meter</i>	<i>IMEM Rules</i> , <i>Distribution Code</i> <i>Grid Code</i>
Internal Clock/Battery	With long life lithium battery for clock/calendar maintenance	Same as the main <i>Meter</i>	<i>Distribution Code</i>
Time Synchronization	Crystal synchronization time-based. The internal clock shall be capable of being reset/set by the data collection software during normal collection operations.	Same as the main <i>Meter</i>	<i>IMEM Rules</i>
Digital Display	Minimum of five (5) integer digits.	Same as the main <i>Meter</i>	<i>IMEM Rules</i> , <i>Distribution Code</i> <i>Grid Code</i>
Codes and Standards Compliance	Adherence to established International Standards (e.g. <i>IEC</i> , <i>ANSI</i> , <i>IEEE</i>)	Same as the main <i>Meter</i>	<i>IEC</i> , <i>ANSI</i> , <i>IEEE</i>
Enclosure	With the necessary cover to protect the internal component against the harmful elements of environment that may affect its measuring circuit and operation.	Same as the main <i>Meter</i>	<i>ANSI</i>
Minimum Metering Data Deviation	The <i>Metering Data</i> recorded by the main <i>Meter</i> and the backup <i>Meter</i> shall not deviate by more than 0.6%. In the event that the deviation exceeds this value, the <i>IMEM Metering Service Provider</i> shall immediately investigate and correct the causes of such deviations.	Same as the main <i>Meter</i>	N/A

2.3.3 Communication Requirements

The *IMEM Metering Services Provider* shall ensure that a dedicated communication link, either line or wireless, is installed in their respective *Metering Installations*.

2.4 INSTRUMENT TRANSFORMER STANDARDS

This Section describes the technical, accuracy, security and configuration standards that *Instrument Transformers* within the *Metering Installation* must comply with.

The remainder of this Section is structured as follows:

- a) Section 2.4.1 addresses the general requirements related to *Instrument Transformers*;
- b) Section 2.4.2 prescribes specifications around the use of *Instrument Transformers*;

- c) Section 2.4.3 prescribes *Instrument Transformer Ratios*;
- d) Section 2.4.4 prescribes the minimum accuracy standards that *Instrument Transformers* must comply with;
- e) Section 2.4.5 specifies the safety requirements that *Instrument Transformers* must comply with;
- f) Section 2.4.6 specifies technical requirements for *Instrument Transformers*; and
- g) Section 2.4.7 prescribes configuration specifications for *Instrument Transformers*.

2.4.1 General Requirement

A Metering Installation shall include Instrument Transformers.

2.4.2 Use of Instrument Transformers

Instrument Transformers supplying the *Meter* shall be used solely for the purposes in this provided in this *IMEM Manual* and not for any other purposes, such as, but not limited to, the attachment of other devices. Moreover, the following schemes shall not be allowed:

- a) The use of one (1) *Instrument Transformer* for two (2) or more *Metering Points*; and
- b) Paralleling of *Current Transformers*.

2.4.3 Instrument Transformer Ratios

2.4.3.1 *Current Transformer Ratios* shall be selected according to the following factors:

- a) The maximum sustained primary current in a *Current Transformer* shall not exceed the primary tap multiplied by the primary factor of the *Current Transformer*; and
- b) The minimum sustained primary current during normal operation shall not be less than ten percent (10%) of the primary tap.

2.4.3.2 *Voltage Transformer Ratios* shall be selected such that operation at the minimum or maximum sustained secondary voltage shall not affect *Meter* accuracy or function.

2.4.4 Accuracy Requirements

Table 2 prescribes the accuracy requirements that *Instrument Transformers* in *Metering Installations* must comply with. Unless otherwise specified, all requirements apply to *Current Transformers* in *Grid-Connected Metering Installations* and *Embedded Metering Installations*.

Table 2. Accuracy requirements for Instrument Transformers.

Item		Requirement
I. Current Transformers		<i>Current Transformers</i> shall conform to the IEC 44-1 Class 0.2 or ANSI C57.13 Class 0.3 or better of any <i>Instrument Transformer</i> .
II. Voltage Transformers		<i>Voltage Transformers</i> shall conform to the IEC 6044-2 Class 0.2 or ANSI C57.13 Class 0.3 of any <i>Instrument Transformer</i> .
III. Accuracy Tests	Requirements	Tests shall adhere with the following guidelines: <ul style="list-style-type: none"> a) Tests shall be carried out by a third-party testing agency using equipment traceable to International Standards; b) Tests shall be conducted with the suitable <i>Burdens</i> connected to each <i>Current Transformer</i>; c) Additional tests shall be conducted at other suitable <i>Burdens</i> if the existing <i>Burden</i> is expected to change in the future; d) Tests shall include ratio and phase-angle error tests; e) Ratio and phase-angle tests of <i>Current Transformers</i> shall be measured over a range of secondary current from one percent (1%) of rated primary current up to and including the maximum current as defined by the rating factor; and f) Test results shall provide correction factors to be applied to both active and reactive power at each test point.
	Instrument Transformer Burdens	<i>Burdens</i> shall include the following considerations: <ul style="list-style-type: none"> a) Every device connected to every <i>Instrument Transformer</i>; b) The <i>Burden</i> imposed by each device; and c) The size of the conductors in the secondary cabling and the length of the path followed by the cabling.
	Current Transformers Burden Calculation	The <i>Burden</i> calculation for a <i>Current Transformer</i> shall include: <ul style="list-style-type: none"> a) The impedance of the secondary wiring; b) The impedance of all devices connected to the <i>Current Transformer</i>; c) The apparent impedance associated with the interconnection of <i>Current Transformer</i> secondaries; d) The apparent impedance associated with the sharing of a common current path through a measuring device with another <i>Current Transformer</i>; e) The apparent impedance associated with the sharing of an approved common-return conductor; f) The apparent impedance associated with the impedance of any other current transformer(s) connected in parallel with subject <i>Instrument Transformer</i>; g) <i>Burden</i> under balanced power system conditions; and h) Worst-case imbalance, including single-phase power The measurement of calculation shall verify that actual <i>Burdens</i> in service do not exceed the nameplate rated <i>Burden</i> limits for the IEC 44-1 Class 0.2 or ANSI C57.13 Class 0.3 of any <i>Instrument Transformer</i> .
	Voltage Transformers Burden Calculation	The <i>Burden</i> calculation for a <i>Voltage Transformer</i> shall include the apparent power and power factor at the secondary terminals of the <i>Instrument Transformer</i> . The measurement of calculation shall verify that actual <i>Burdens</i> in service do not exceed the nameplate rated <i>Burden</i> limits for IEC 6044-2 Class 0.2 or ANSI C57.13 Class 0.3 of any <i>Instrument Transformer</i> .

2.4.5 Safety Requirements and Grounding System

The safety and grounding system of *Instrument Transformers* in a *Metering Installation* shall conform to the requirements of:

- a) The *Philippine Electrical Code*; and
- b) The *IEC* or *ANSI/IEEE C57.13-1983 IEEE Guide for Grounding of Instrument Transformer Secondary Circuits and Cases*.

2.4.6 Technical Specifications

This Section provides the minimum technical specifications for:

- a) *Current Transformers* of the main *Meter*;
- b) *Voltage Transformers* of the main *Meter*; and
- c) The lightning arresters connected to the *Meter*.

2.4.6.1 Current Transformer

Current Transformers installed at the main *Meter* shall meet the minimum requirements listed in Table 3. Unless otherwise specified, all requirements apply to *Current Transformers* in *Grid-Connected Metering Installations* and *Embedded Metering Installations*.

Table 3. Minimum Technical Specifications for Current Transformers.

ITEMS	SPECIFICATIONS	REFERENCE DOCUMENTS
Type	Outdoor Type; Minimum oil-filled, Dry Type or Gas-filled	
Cooling	Oil-immersed, Self-cooled; Butyl, Cast resin	
Construction	Single-phase, wound type, free standing	
Accuracy Class	<i>IEC 44-1</i> Class 0.2 / <i>ANSI C57.13</i> Class 0.3 or better	<i>Grid Code</i> , <i>Distribution Code</i>
Burden	Shall not exceed the rated <i>Burden</i> limit of 12.5 VA for the <i>IEC 44-1</i> Class 0.2 / <i>ANSI C57.13</i> Class 0.3 (Refer to Table A-1 of the Appendix)	<i>Grid Code</i>
Rated Primary Current	The thermal rating factor shall not be less than 1.0.	
Secondary Current	1A or 5A	<i>IEC 4.2</i> Standard values of rated secondary currents
Rating Factor	Minimum of 1.0 at 30°C	
Frequency	60 Hz	
Ambient Air Temperature	-5°C and 50°C for very hot climate	<i>IEC 3.2.1</i> 1996
BIL	Refer to Table A-2of the Appendix for applicable BIL	
Creepage Distance	Refer to Table A-3of the Appendix for applicable creepage distance	
Number of Cores	For <i>Current Transformers</i> within <i>Grid-Connected Metering Installations</i> : At least two (2) metering cores For <i>Current Transformers</i> within <i>Embedded Metering Installations</i> : A minimum of one (1) metering core	
Mounting	Depends on the applications	

ITEMS	SPECIFICATIONS	REFERENCE DOCUMENTS
Grounding	Must have adequate grounding	
Security	Seal holder shall be provided to the <i>Current Transformer</i> secondary terminal box (See Figure C-1)	

2.4.6.2 Voltage Transformer

Voltage Transformers installed at the main *Meter* shall meet the minimum requirements listed in Table 4. Unless otherwise specified, all requirements apply to *Voltage Transformers* in *Grid-Connected Metering Installations* and *Embedded Metering Installations*.

Table 4. Minimum Requirements for Voltage Transformers.

ITEM	SPECIFICATIONS	REFERENCE DOCUMENTS
Type	Outdoor Type; Minimum Oil-Filled, Dry-Type or Gas-Filled	
Cooling	Oil-immersed, Self-cooled; Butyl, Cast resin	
Construction	Single-phase, Inductive type, single bushing	
Termination	Line-to-ground	
Accuracy Class	<i>IEC</i> 6044-2 Class 0.2 / <i>ANSI</i> C57.13 Class 0.3 or better	<i>Grid Code, Distribution Code</i>
Burden	Shall not exceed the rated <i>Burden</i> limit for the <i>IEC</i> 6044-2 Class 0.2 / <i>ANSI</i> C57.13 Class 0.3 or better. (Refer to Table A-4of the Appendix)	
Ratio	Refer to Table A-5 of the Appendix	
Secondary Voltage	Refer to Table A-5 of the Appendix	
Frequency	60 Hz	
Operating Temperature	55°C average ambient temperature, with max ambient temperature not exceeding 65°C	
BIL	Refer to Table A-2 of the Appendix for applicable BIL	
Creepage distance	Refer to Table A-3 of the Appendix for applicable creepage distance	
Number of Core	At least two (2) cores	
Mounting	Depend on the applications	
Grounding	Must have adequate grounding	
Security	Seal holder shall be provided to the <i>Current Transformer</i> secondary terminal box (See Figure C-1)	

2.4.6.3 Lightning Arrester

Lightning arresters installed at the main *Meter* shall meet the minimum requirements listed in Table 5.

Table 5. Minimum Requirements for Lightning Arresters.

Nominal System Voltage	Max. Rated Voltage	Standard Lightning Impulse Withstand Voltage	Max. Continuous Operating Voltage	Max. Nominal Discharge Current	Maximum Line Discharge Class		Long Duration Current Impulse Withstand Capability
					IEC	ANSI	
[KV]	[KV]	[KV]	[KV]	[KA]	IEC	ANSI	[KVA]

13.8	15	95	12	10	CL 2	Station	100
34.5	36	170	29	10	CL 2	Station	100
69	72.5	325	58	10	CL 2	Station	100
115	123	550	98	10	CL 2	Station	100
138	145	650	116	10	CL 2	Station	100
230	245	900	196	10	CL 2	Station	100
500	525	1550	420	20	CL 4	Station	100

2.4.7 Configuration Standards for Instrument Transformers

This section specifies the configuration standards for *Instrument Transformers* within a *Metering Installation*. The configuration standards are specified for:

- a) The primary connections – see Table 6; and
- b) The secondary connections – see Table 7.

Table 6. Configuration Standards - Primary Connections

Item		Standard
A. Location of Primary Terminals	<i>Current Transformer</i>	The primary terminals of each <i>Current Transformer</i> shall be located as close as practicable to the <i>Metering Point</i> .
	<i>Voltage Transformer</i>	The primary terminals of each <i>Voltage Transformer</i> shall be: <ol style="list-style-type: none"> a) At the same potential as the <i>Current Transformer</i>, and b) As close as practicable to the primary terminals of the <i>Current Transformer</i> of the same phase
B. Connection to the <i>Mindanao Power System</i>		With respect to any physical separation of the points at which the <i>Voltage Transformer</i> and the <i>Current Transformer</i> of each phase are connected to the <i>Mindanao Power System</i> , the <i>Metering Installation</i> shall: <ol style="list-style-type: none"> a) Minimize the voltage drop between the <i>Voltage Transformer</i> and the <i>Current Transformer</i>, and b) Minimize the leakage current between the <i>Voltage Transformer</i> and the <i>Current Transformer</i>.
C. Location/Arrangement of <i>Instrument Transformers</i>		With respect to the physical arrangement of the <i>Instrument Transformers</i> , the <i>Current Transformer</i> shall be located at the load side based on the normal flow of current (See Figure C-2) or standards as set by the distributors and guidelines set out by <i>ERC</i> .
D. Distances, clearances between <i>Instrument Transformers</i>		The distances between <i>Instrument Transformers</i> and the prescribed clearances shall follow the distances and clearances shown in Table A-6, Figure C-3, Figure C-4 and Figure C-5.
E. Primary Cable	Quality of Materials and Workmanship	The primary cable terminations connected to the high-voltage terminals of an <i>Instrument Transformer</i> shall be in good quality and of accepted workmanship
	Electrical Location of Primary Connections	Primary connections of the <i>Instrument Transformer</i> shall be located such that operation of power system equipment does not degrade the following elements: <ol style="list-style-type: none"> a) Accuracy of measurement; b) Data required for validation or settlement; and c) Monitoring of metering equipment condition

Table 7. Configuration Standards - Secondary Connections.

Item		Standard
A. Size of Secondary Cabling	<i>Current Transformer</i>	The secondary cabling between the <i>Current Transformers</i> and the <i>Meter</i> test switch / block shall be of a sufficient size that the rated <i>Burden</i> for the IEC 0.2 or ANSI 0.3 accuracy class is not exceeded when rated current flows in the secondary winding.
	<i>Voltage Transformer</i>	The secondary cabling between the <i>Voltage Transformers</i> and the <i>Meter</i> test switch/block shall be of correct size such that the voltage drop in each phase does not exceed 0.2 V.
B. Codes and Conditions		<p><i>Instrument Transformer</i> secondary cabling and cabling accessories shall comply with the following codes or conditions:</p> <ol style="list-style-type: none"> The Philippine Electrical Code; The main Meter shall be supplied from dedicated Current Transformers used for no other purpose; Voltage Transformers with one secondary winding shall be dedicated to the main Meter and used for no other purpose; Voltage Transformers with more than one secondary winding shall have one winding dedicated to the main Meter and shall be used for no other purpose; Electrical connection to the Instrument Transformer secondary terminals shall not be outside of the Meter box; Cabling from the Instrument Transformers to the Meter enclosure shall be routed in dedicated conduit, and the route shall be visually traceable; and Each secondary terminal of each Instrument Transformer shall be brought to the test block on a separate conductor

2.5 SECURITY STANDARDS FOR METERING INSTALLATIONS AND METERING DATA

This Section specifies the security standards that the *Metering Installations* must comply with and addresses both physical security requirements and *Metering Data* security requirements. Table 8 summarizes these security requirements.

Table 8. Security Standards – Physical and Metering Data Security.

Item		Standard
Physical Security - A <i>Metering Installation</i> shall be secure, tamper-proof, and conforms to the following applicable security requirements:	<i>Instrument Transformers Connections</i>	Secondary cabling shall be secured, tamper-proof, and compliant with the <i>Distribution Code</i> requirements on the security of registered revenue <i>Metering Installations</i> and <i>Metering Data</i> .
	Conduit Systems	All wiring from the secondary terminal box of <i>Instrument Transformers</i> to the <i>Meter</i> box shall be placed in a conduit consistent with the provisions in the <i>Distribution Code</i> (See Figure C-6).
	Secondary Terminal Box	Secondary terminal boxes of the <i>Current Transformers</i> and <i>Voltage Transformers</i> shall be sealed and placed as far as practicable to ensure the detection of unauthorized access to the <i>Instrument Transformer</i> connections(See Figure C-1)
	<i>Meter</i> Enclosure	<p>All <i>Meters</i>, test links and communication equipment shall be contained within a <i>Meter</i> enclosure similar to Figure C-7. The <i>Meter</i> enclosure shall comply with the following requirements:</p> <ol style="list-style-type: none"> The <i>Meter</i> enclosure shall be secured by the <i>IMEM Metering Services Provider</i>; The <i>IMEM Metering Services Provider</i> shall have access to the <i>Meter</i> enclosure at all times;

Item		Standard
		<ul style="list-style-type: none"> c) Persons other than the <i>IMEM Metering Services Provider</i> shall not be given access to the <i>Meter</i> enclosure; d) The <i>Meter</i> enclosure shall be padlocked and sealed as far as practicable in a manner approved by the <i>IMEM Operator</i>; and e) The <i>Meter</i> enclosure shall be weatherproof.
	Meter Test Block/Switch	<p><i>Meter</i> test block/switch (see Figure C-8) shall be installed inside the <i>Meter</i> enclosure to allow the current and voltage from each <i>Instrument Transformer</i> and <i>Meter</i> to be individually determined. The <i>Meter</i> test block/switch shall have the following technical description:</p> <ul style="list-style-type: none"> a) Test Points: 10 points, (4 potential & 6 current points) b) Pole Arrangement: P-CC-P-CC-P-CC-P c) Rating: 600 VAC, 20 Amperes d) Current carrying parts are made of non-corrosive resistant material preferably non-tarnishing nickel silver e) Switches are of the open knife-blade type f) Current switch poles are provided with an auto-shortening jaw and the other has a shunted jack which is adaptable to a test plug g) Base is a one piece resistant moulding. <p>The <i>Meter</i> test block/switch shall also be provided with the standard cover: a one-piece molded high-impact removable cover preferably of styrene type.</p>
	Meter Seals	<p>The requirements for <i>Meter</i> seals are:</p> <ul style="list-style-type: none"> a) Seals shall have unique serial numbers; b) Seals shall be traceable to the <i>IMEM Metering Services Provider</i> or <i>ERC</i> personnel that installed the seals; and c) The <i>IMEM Metering Services Provider</i> shall maintain a record of seal serial numbers and log subsequent changes, including reasons, for the seal change.
	Meter Padlock	<p>The requirements for padlocks are:</p> <ul style="list-style-type: none"> a) Padlock shall be heavy-duty; b) Padlock shall have only one security key and placed on a secured area; c) Security key shall be controlled by <i>IMEM Metering Services Provider</i>; and d) Use of security key shall be documented and monitored.
	Metering Perimeter	<p>For a <i>Metering Installation</i> directly connected to the <i>Mindanao Grid</i>, it shall be secured by a perimeter fence similar to Figure C-9 if applicable and its gate properly padlock, sealed and secured. Metering perimeter shall also be well-lighted and free from any unwanted materials, equipment, vegetation, and other entities. For <i>Metering Installation</i> directly connected to a <i>Mindanao Distribution System</i> or <i>User System</i>, it shall be secured or placed in a cubicle, sealed and locked in accordance with Section 8.4.5 of the <i>Distribution Code</i>. Refer to Table A-7, Table A-8 and Table A-9 for minimum heights and clearances.</p>
Metering Data Security		<p><i>Metering Data</i> shall be secured using the following guidelines:</p> <ul style="list-style-type: none"> a) Each <i>IMEM Metering Service Provider</i> shall ensure that the <i>Metering Data</i> recorded in their <i>Metering</i>

Item		Standard
		<p><i>Installations</i> are protected from direct local or remote electronic access, including during the transfer of such <i>Metering Data</i> to the communication interface of the <i>Metering Database</i> of the <i>IMEM Operator</i>. The <i>IMEM Metering Service Provider</i> shall implement suitable passwords and other security controls.</p> <p>b) The <i>IMEM Metering Service Provider</i> shall protect the <i>Metering Data</i> during delivery to the <i>IMEM Operator</i> other than electronic means and from access by persons other than itself regardless of the medium such as, but not limited to, diskettes, CDs or paper on or in which such <i>Metering Data</i> is transcribed, transferred or stored for purposes of such delivery.</p> <p>c) Each <i>IMEM Metering Service Provider</i> shall keep all records of passwords for electronic access to <i>Metering Data</i> confidential.</p> <p>d) The <i>IMEM Metering Service Provider</i> shall provide, for each <i>Metering Installation</i>, passwords to the <i>IMEM Operator</i> providing read-only access.</p> <p>e) The <i>IMEM Metering Service Provider</i> may, or at the request of the <i>IMEM Operator</i> shall, change one or more of the passwords relating to a <i>Metering Installation</i> in which it is the <i>IMEM Metering Service Provider</i>.</p>

2.6 CONFIGURATION OF METERING INSTALLATION

A *Metering Installation* shall have one of two configurations; a *Metering Installation* shall either have:

- a) Dual metering using two independent sets of *Instrument Transformers* approved by the *IMEM Operator* where the main *Instrument Transformers* are connected to the main *Meter* and the alternate *Instrument Transformers* are connected to the backup *Meter*; or
- b) Partial redundant metering using a single set of *Instrument Transformers* approved by the *IMEM Operator* where both the main *Meters* and backup *Meters* are connected to either common or separate core.

2.7 GRANDFATHER PROVISIONS FOR EXISTING METERING INSTALLATIONS

An existing *Metering Installation* that does not fully comply with the requirements of this *IMEM Manual* shall be permitted by the *IMEM Operator* to remain in service subject to the following conditions:

- a) The *Meter* has a mass memory capable of recording 15-minute demand intervals and have communication ports for remote and manual data retrieval;
- b) The *ERC* has tested or verified and sealed the *Meter*;
- c) All non-compliant *Meters* shall be replaced within six (6) months from the effectivity of its registration in the *IMEM*; and

- d) All non-compliant *Instrument Transformers* shall be replaced within two (2) years from the effectivity of its registration in the *IMEM*.

SECTION 3 SITE EQUIPMENT IDENTIFICATION NUMBER (SEIN)

3.1 COVERAGE

This Section describes the standard numbering system that *IMEM Metering Services Providers* must follow when numbering and identifying their *Metering Installations* and its individual equipment.

3.2 OBJECTIVES

The objectives of establishing a standard numbering system for identifying and numbering *Metering Installations* and its individual equipment are:

- a) To facilitate the location of *Metering Installations* for administrative purposes by reflecting the geographical location of the *Metering Installation* in its *Site Equipment Identification Number*, and
- b) To facilitate the identification of *Metering Installations* whose details are recorded in the *Metering Database* administered by the *IMEM Operator* under *IMEM Rules* Clause 4.4.3.

3.3 GUIDELINES

The *IMEM Metering Services Providers* shall follow the procedures listed in this Section when numbering and identifying *Metering Installations* and its individual equipment. This SECTION 3 specifies the naming convention that *IMEM Metering Service Provider* must comply with when naming their *Metering Installations*. These standards are prescribed in the *Grid Code* under provisions 7.11.1.1 to 7.11.1.3 and 7.11.2.1 to 7.11.2.2 and in the *Distribution Code* under provisions 7.12.1.1 to 7.12.1.3.

The remainder of this SECTION 3 is structured as follows:

- a) Section 3.4 provides the procedures for determining the different IDs used in naming a *Metering Installation*.
- b) Section 3.5 specifies the naming convention for *Grid-Connected Metering Installations* and their components.
- c) Section 3.6 specifies the naming convention for *Embedded Metering Installations* of and their components.

3.4 NAMING PROCEDURES

3.4.1 Station or Plant ID

The following guidelines shall be followed when determining the Station or Plant ID of a substation or a *Generating Plant*, respectively:

- 3.4.1.1 The Station or Plant ID of all substations and *Generating Plants* connected to the *Mindanao Grid* shall be the first three (3) letters of their name.

Example:

Substation or <i>Generating Plant</i>	Station or Plant ID
Abaga	ABA
Babatngon	BAB
BCI	BCI
Cadiz	CAD
CIP	CIP

- 3.4.1.2 On instances where substations and *Generating Plants* will have identical Station or Plant IDs based on the procedure above, the Station or Plant ID of the succeeding substations or *Generating Plants* alphabetically shall be the first letter of their name followed by two consonant letters in their name. The consonant letters that will be prioritized are those that are nearest to the start of the name. The consonant letters shall also appear in the Station or Plant ID in the order that it appears in the name of the substation or *Generating Plant*.

Example:

Substation or <i>Generating Plant</i>	ID 1	ID 2	ID 3	ID 4	ID 5	Station or Plant ID
Balanga	BAL					BAL
Balatoc	BAL	BLT				BLT
Balingoan	BAL	BLN				BLN
Balintawak	BAL	BLN	BLT	BLW	BLK	BLK
Baliwag	BAL	BLW				BLW

- 3.4.1.3 Subject to the Clause 3.4.1.2 and if no combination of consonant letters from the name of a substation or *Generating Plant* provides it a unique Station or Plant ID, the Station or Plant ID of the substation or *Generating Plant* shall be the first letter of its name followed by the next consonant in its name and the farthest letter in the alphabet that would provide the substation or *Generating Plant* a unique Station or Plant ID.

Example:

Substation or <i>Generating Plant</i>	ID 1	ID 2	ID 3	ID 4	ID 5	Station or Plant ID
Cabacungan	CAB					CAB
Cabagan	CAB	CBG				CBG

Substation or Generating Plant	ID 1	ID 2	ID 3	ID 4	ID 5	Station or Plant ID
CAT	CAT					CAT
Catbalogan	CAT	CTB				CTB
Catigbi-An	CAT	CTG				CTG
Catubig	CAT	CTB	CTG	CBG	CTZ	CTZ

- 3.4.1.4 For *Generating Plants* that form a complex, their Plant ID shall be the first letter of the name of the complex followed by the next consonant in the name of the complex and the first letter in the alphabet that would provide the Generating Plant a unique Plant ID.

Example:

Substation or Generating Plant	Station or Plant ID
Mak-Ban Plant A	MKA
Mak-Ban Plant B	MKB
Mak-Ban Plant Ormat	MKO

- 3.4.1.5 For substations or *Generating Plants* whose name begins with La, Mt., San or Sta., their Station or Plant ID shall be the first letter of the words La, Mt., San or Sta. followed by the first two letters of the word after the words La, Mt., San or Sta.

Example:

Substation or Generating Plant	Station or Plant ID
La Trinidad	LTR
Mt. Apo	MAP
San Roque	SRO
Sta. Clara	SCL

3.4.2 Metered Participant ID

The following guidelines shall be followed when determining the Metered Participant ID of an *IMEM Trading Participant*:

- 3.4.2.1 The Metered Participant ID of *IMEM Trading Participants* shall be identified by four (4) alphanumeric characters except for cases cited in Clauses 3.4.2.5 and 3.4.2.6 of these guidelines.
- 3.4.2.2 The Metered Participant ID of *IMEM Trading Participants* whose full name corresponds to a three-letter abbreviation shall be that three-letter abbreviation appended by the zero (0) character.

Example:

IMEM Trading Participant	Metered Participant ID
American Power Conversion	APC0
Bank of the Philippine Islands	BPI0
Cultural Center of the Philippines	CCP0

- 3.4.2.3 The Metered Participant ID of *IMEM Trading Participants* whose corporate name is composed of only one or two words shall be the first letter of the first word, the succeeding two (2) consonants of the first word, and the first letter of the second word or the zero (0) character.

Example:

IMEM Trading Participant	Metered Participant ID
Amerton, Inc.	AMRI
Ayala Corp.	AYLC
Lancaster	LNC0
Magic Mall	MGCM
TIMEX	TMX0

- 3.4.2.4 The Metered Participant ID of *IMEM Trading Participants* whose name consists of four (4) letters or less shall be its name itself appended by the zero (0) character, if necessary.

Example:

IMEM Trading Participant	Metered Participant ID
PHPC	PHPC

- 3.4.2.5 The Metered Participant ID of *IMEM Trading Participants* that have numeric characters in its corporate name shall be the numeric characters and the abbreviation of the alphabetic characters.

Example:

IMEM Trading Participant	Metered Participant ID
14-678 PROPERTY HOLDINGS INC.	146PH
1590 ENERGY CORPORATION	159EC
18-2 PROPERTY HOLDINGS INC	182PH
19-1 REALTY CORPORATION	191RC
6-24 PROPERTY HOLDINGS INC.	624PH
6-3 PROPERTY HOLDINGS INC.	63PHI
21ST CENTURY STEEL MILLS, INC.	21CSM

- 3.4.2.6 The Metered Participant ID of *IMEM Trading Participants* that have several facilities in their name shall be composed of six (6) alphanumeric characters. The Metered Participant ID shall be the combination of three (3) alpha-numeric characters corresponding to the abbreviation of their corporate name, two (2) numeric characters corresponding to the facility number, and one (1) numeric character corresponding to the *Metering Installation* in that location.

Example:

IMEM Trading Participant	Metered Participant ID
ROBINSONS LAND CORP., Batangas	RLC011
ROBINSONS LAND CORP., Cavite	RLC021
ROBINSONS LAND CORP., Cavite	RLC022
ROBINSONS LAND CORP., Laguna	RLC031
ROBINSONS LAND CORP., Makati City	RLC041
ROBINSONS LAND CORP., Mandaluyong	RLC051
ROBINSONS LAND CORP., Mandaluyong	RLC052
ROBINSONS LAND CORP., Mandaluyong	RLC053
ROBINSONS LAND CORP., Mandaluyong	RLC054
ROBINSONS LAND CORP., Mandaluyong	RLC055
ROBINSONS LAND CORP., Mandaluyong	RLC056
ROBINSONS LAND CORP., Mandaluyong	RLC057
ROBINSONS LAND CORP., Manila	RLC061
ROBINSONS LAND CORP., Manila	RLC062
ROBINSONS LAND CORP., Manila	RLC063
ROBINSONS LAND CORP., Pasig City	RLC071
ROBINSONS LAND CORP., Quezon City	RLC081
ROBINSONS LAND CORP., Rizal	RLC091
ROBINSONS LAND CORP., Bacolod	RLC101
ROBINSONS LAND CORP., Cebu	RLC111

3.5 GRID-CONNECTED METERING INSTALLATION

A *Metering Installation* of a facility that is directly connected to the *Mindanao Grid*, or a *Grid-Connected Metering Installation*, and its equipment shall be labeled in accordance with this Section.

- 3.5.1 *Grid-Connected Metering Installations* shall be labeled as:

A-BBB-CCCC-XX

Where,

- A Shall be a one-letter (1) designation of the purpose or function of the *Metering Installation*. Refer to Table B-1 for the designation of the *Meter* purpose.

- BBB Shall be a three-letter (3) designation of the substation or *Generating Plant* where the *Metering Installation* is connected to. Refer to Section **Error! Reference source not found.** for the procedure on the determination of the Station or Plant ID of a substation or *Generating Plant*.
- CCCC Shall be a four-letter (4) designation of the *IMEM Trading Participant*. Refer to Section 3.4.2 for the procedure on the determination of the Metered Participant ID of an *IMEM Trading Participant*.
- XX Shall be a two-digit (2) number identifying the delivery or receiving point of the grid-connected *IMEM Trading Participant*. Starting from 01, this number shall increase in accordance with the number of delivery or receiving points of the same *IMEM Trading Participant* on the same substation or *Generation Plant*.

Example:

M-CAR-CEPA-01

Where,

- M Main *Grid-Connected Metering Installation* Purpose Designation
CAR Station ID of Carmen Substation
CEPA Metered Participant ID of CEPALCO
01 Receiving Point No. 1 of CEPALCO in Carmen Substation

3.5.2 *Grid-Connected Meters* shall be labeled as:

DDY-(A-BBB-CCCC-XX)

Where,

- DD Shall be a two-letter (2) designation of the purpose of the *Meter*. Refer to Table B-1 for the designation of *Meter* purposes.
- Y Shall be a one-digit (1) designation for the purpose or function of the *Meter* (1 – Delivered or OUT, 2 – Received or IN, 3 – Bi-directional or IN & OUT)
- (A-BBB-CCCC-XX) Shall be the Standard Equipment Identification Number of the Metering Installation where the Meter box is located. Refer to Section 3.5.1 for details.

Example:

MF3-(M-CAR-CEPA-01)

Where,

MF	Multi-Function Electronic Meter Designation
3	Bi-Directional (IN & OUT) Designation
(M-CAR-CEPA-01)	Site Equipment Identification Number of the <i>Metering Installation</i> where the <i>Meter</i> is located (See sample in Section 3.5.1 for details)

3.5.3 *Meter* boxes shall be labelled as:

DD-(A-BBB-CCCC-XX)

Where,

DD	Shall be the two-letter (2) designation for <i>Meter</i> box. Refer to Table B-2 for the designation of metering equipment, devices and auxiliaries.
(A-BBB-CCCC-XX)	Shall be the Standard Equipment Identification Number of the <i>Metering Installation</i> where the <i>Meter</i> box is located. Refer to Section 3.5.1 for details.

Example:

MB-(M-CAR-CEPA-01)

Where,

MB	<i>Meter</i> Box Designation
3	Bi-Directional (IN & OUT) Designation
(M-CAR-CEPA-01)	Site Equipment Identification Number of the <i>Metering Installation</i> where the <i>Meter</i> box is located (See sample in Section 3.5.1 for details)

3.5.4 *Meter* test switches shall be labelled as:

DDYY-(A-BBB-CCCC-XX)

Where,

DD	Shall be the two-letter (2) designation for <i>Meter</i> test switch. Refer to Table B-2 for the designation of metering equipment, devices and auxiliaries.
----	--

YY	Shall be a two-digit (2) designation for the equipment number.
(A-BBB-CCCC-XX)	Shall be the Standard Equipment Identification Number of the <i>Metering Installation</i> where the <i>Meter</i> test switch is located. Refer to Section 3.5.1 for details.

Example:

TS01-(M-CAR-CEPA-01)

Where,

TS	<i>Meter</i> Test Switch Designation
01	<i>Meter</i> Test Switch No. 1
(M-CAR-CEPA-01)	Site Equipment Identification Number of the <i>Metering Installation</i> where the <i>Meter</i> test switch is located (See sample in Section 3.5.1 for details)

3.5.5 *Current Transformers, Voltage Transformers* and lightning arresters shall be labelled as:

PDD-(A-BBB-CCCC-XX)

Where,

P	Shall be a one-letter (1) designation for the phase where the <i>Current Transformer, Voltage Transformer</i> or lightning arrester is connected(A – Phase A, B – Phase B, C – Phase C, Z – Three-Phase or 3 ϕ)
DD	Shall be the two-letter (2) designation for the <i>Current Transformer, Voltage Transformer</i> or lightning arrester. Refer to Table B-2 for the designation of metering equipment, devices and auxiliaries.
(A-BBB-CCCC-XX)	Shall be the Standard Equipment Identification Number of the <i>Metering Installation</i> where the <i>Current Transformer</i> is located. Refer to Section 3.5.1 for details.

Example:

ACT-(M-CAR-CEPA-01)

Where,

A	Phase A Designation
---	---------------------

CT	Current Transformer Designation
(M-CAR-CEPA-01)	Site Equipment Identification Number of the <i>Metering Installation</i> where the <i>Current Transformer</i> is located (See sample in Section 3.5.1 for details)

3.6 EMBEDDED METERING INSTALLATION

A *Metering Installation* of a facility that is directly connected to a *Mindanao Distribution System* or *User System*, or an *Embedded Metering Installation*, and its equipment shall be labeled in accordance with this Section.

3.6.1 *Embedded Metering Installations* shall be labelled as:

WWW-XXXX-YY-CCCC-NN

Where,

WWW	Shall be a three-letter (3) designation of the grid-connected substation where the <i>Mindanao Distribution Utility</i> or <i>Grid-Connected End-User</i> that owns the <i>Metering Installation</i> is connected to. Refer to Section Error! Reference source not found. for the procedure on the determination of the Station ID of a substation.
XXXX	Shall be a four-letter (4) designation of the <i>IMEM Trading Participant</i> that is also the <i>IMEM Network Service Provider</i> of the <i>Metering Installation</i> . Refer to Section 3.4.2 for the procedure on the determination of the Metered Participant ID of an <i>IMEM Trading Participant</i> .
YY	Shall be a two-digit (2) number identifying the delivery/receiving point of the <i>IMEM Network Service Provider</i> . Starting from 01, this number shall increase in accordance with the number of delivery or receiving points of the same <i>IMEM Trading Participant</i> on the same substation.
CCCC	Shall be a four-letter (4) designation of the <i>IMEM Trading Participant</i> that the <i>Metering Installation</i> relates to. Refer to Section 3.4.2 for the procedure on the determination of the Metered Participant ID of an <i>IMEM Trading Participant</i> .
NN	Shall be a two-digit (2) number identifying the <i>Metering Installation</i> of the <i>IMEM Trading Participant</i> . Starting from 01, this number shall increase in accordance with the number of <i>Metering Installations</i> of the same facility of the <i>IMEM Trading Participant</i> .

Example:

DAV-DLPC-06-SMDA-01

Where,

DAV	Station ID of Davao Substation
DLPC	Metered Participant ID of Davao Light and Power Company
06	Receiving Point No. 6 of DLPC on Davao Substation
SMDA	Metered Participant ID of SM City in Davao City
01	<i>Metering Installation</i> No. 1 of SM City

3.6.2 *Embedded Meters* shall be labeled as:

BE-(WWW-XXXX-YY-CCCC-NN)

Where,

B	Shall be a one-letter (1) designation of the purpose of the <i>Meter</i> . Refer to Table B-1 for the designation of <i>Meter</i> purposes.
E	Shall be one-digit (1) designation of the function of the <i>Meter</i> (1 – Delivered or OUT, 2 – Received or IN, 3 – Bi-directional or IN & OUT)
(WWW-XXXX-YY-CCCC-NN)	Shall be the Standard Equipment Identification Number of the <i>Metering Installation</i> where the <i>Meter</i> is located. Refer to Section 3.6.1 for details.

Example:

I3-(DAV-DLPC-06-SMDA-01)

Where,

I	Main <i>Embedded Meter</i> Purpose Designation
3	Bi-Directional Function Designation
(DAV-DLPC-06-SMDA-01)	Site Equipment Identification Number of the <i>Metering Installation</i> where the <i>Meter</i> is located (See sample in Section 3.6.1 for details)

3.6.3 *Meter* boxes and modems shall be labeled as:

DD-(B-WWW-XXXX-YY-CCCC-NN)

Where,

DD	Shall be a two-letter (2) designation for the <i>Meter</i> box or modem. Refer to Table B-2 for the designation of metering equipment, devices and auxiliaries.
----	---

- (B) Shall be a one-letter (1) designation of the purpose of the *Meter*. Refer to Table B-1 for the designation of *Meter* purposes.
- WWW-XXXX-YY-CCCC-NN) Shall be the Standard Equipment Identification Number of the *Metering Installation* where the *Meter* box or modem is located. Refer to Section 3.6.1 for details.

Example:

MB-(I-DAV-DLPC-06-SMDA-01)

Where,

- MB *Meter* Box Designation
- (I Main *Embedded Meter* Purpose Designation
- DAV-DLPC-06-SMDA-01) Site Equipment Identification Number of the *Metering Installation* where the *Meter* box is located (See sample in Section 3.6.1 for details)

3.6.4 *Meter* test switches shall be labelled as:

DDYY-(B-WWW-XXXX-YY-CCCC-NN)

Where,

- DD Shall be a two-letter (2) designation for the *Meter* test switch. Refer to Table B-2 for the designation of metering equipment, devices and auxiliaries.
- YY Shall be a two-digit (2) designation for the equipment number.
- (B) Shall be a one-letter (1) designation of the purpose of the *Meter*. Refer to Table B-1 for the designation of *Meter* purposes.
- WWW-XXXX-YY-CCCC-NN) Shall be the Standard Equipment Identification Number of the *Metering Installation* where the *Meter* box or modem is located. Refer to Section 3.6.1 for details.

Example:

TS01-(I-DAV-DLPC-06-SMDA-01)

Where,

- TS *Meter* Test Switch Designation
- 01 *Meter* Test Switch No. 1

(I	Main <i>Embedded Meter</i> Purpose Designation
DAV-DLPC-06-SMDA-01)	Site Equipment Identification Number of the <i>Metering Installation</i> where the <i>Meter</i> box is located (See sample in Section 3.6.1 for details)

3.6.5 *Current Transformers, Voltage Transformers* and lightning arresters shall be labeled as:

PDD-(B-WWW-XXXX-YY-CCCC-NN)

Where,

P	Shall be a one-letter (1) designation for the phase where the <i>Current Transformer, Voltage Transformer</i> or lightning arrester is connected (A – Phase A, B – Phase B, C – Phase C, Z – Three-Phase or 3 ϕ)
DD	Shall be the two-letter (2) designation for the <i>Current Transformer, Voltage Transformer</i> or lightning arrester. Refer to Table B-2 for the designation of metering equipment, devices and auxiliaries.
(B	Shall be a one-letter (1) designation of the purpose of the <i>Meter</i> . Refer to Table B-1 for the designation of <i>Meter</i> purposes.
WWW-XXXX-YY-CCCC-NN)	Shall be the <i>Standard Equipment Identification Number</i> of the <i>Metering Installation</i> where the <i>Meter</i> box or modem is located. Refer to Section 3.6.1 for details.

Example:

ACT-(I-DAV-DLPC-06-SMDA-01)

Where,

A	Phase A Designation
CT	<i>Current Transformer</i> Designation
(I	Main <i>Embedded Meter</i> Purpose Designation
DAV-DLPC-06-SMDA-01)	Site Equipment Identification Number of the <i>Metering Installation</i> where the <i>Meter</i> box is located (See sample in Section 3.6.1 for details)

SECTION 4 METERING INSTALLATION REGISTRATION

4.1 COVERAGE

Pursuant to *IMEM Rules* Clause 4.3.1.1, *IMEM Metering Services Providers* shall be responsible for registering *Metering Installations* with the *IMEM Operator*².

This Section provides the procedures to be followed by the *IMEM Operator* and *IMEM Metering Services Providers* in the registration of *Metering Installations* located at the *Connection Points* of facilities of *IMEM Trading Participants*.

4.2 OVERVIEW

In order for a *Metering Installation* to be successfully registered in the *IMEM*, *IMEM Metering Service Providers* must be able to demonstrate the following requirements to the *IMEM Operator*:

- a) The *Metering Installation* being registered in the *IMEM* is compliant with the *IMEM Rules* and Section SECTION 2 of this *IMEM Manual*;
- b) The *Metering Installation* being registered and all of its components are named in accordance with Section SECTION 3 of this *IMEM Manual*;
- c) The *Metering Installation* has successfully undergone commissioning tests certified by the *ERC*; and
- d) The *Metering Installation* successfully passes an *End-to-End Test* requested by the *IMEM Operator*.

4.3 METERS FOR REGISTRATION

The *IMEM Metering Services Provider* shall register both the main *Meter* and backup *Meter* of a *Metering Installation* with the *IMEM Operator*.

4.4 REGISTRATION PROCEDURES

4.4.1 Submission of Application Form and Pertinent Documents

To initiate the registration of a *Metering Installation* at the *Connection Point* of the facility of an *IMEM Trading Participant*, its *IMEM Metering Services Provider* shall submit the following to the *IMEM Operator*:

- a) Accomplished *Metering Installation* Registration Form as published in the *Market Information Website*³ signed by both

² See also the *IMEM Registration Manual*

³[http://www.wesm.ph/inner.php/the_market/interim_mindanao_electricity_market_\(imem\)](http://www.wesm.ph/inner.php/the_market/interim_mindanao_electricity_market_(imem))

IMEM Metering Services Provider and the *IMEM Trading Participant* to whom the *Metering Installation* relates;

- b) Hourly metered demand for the previous twelve (12) months from the *Metering Point* associated with the *Metering Installation* being registered as well as its maximum and minimum hourly demand;
- c) Single Line Diagrams from the Grid Off-Take *Meter* to the *Metering Point* of the *IMEM Trading Participant*;
- d) Certification of *Meter* commissioning test results from the *ERC* with its corresponding seal, which indicates compliance of the *Metering Installation* with the standards set out in SECTION 2 of this *IMEM Manual*;
- e) *IMEM Metering Services Provider* test and calibration reports of the *Instrument Transformers* and *Meters*;
- f) Pro-forma Agreement between the *IMEM Trading Participant* and its *IMEM Metering Services Provider*; and
- g) Documentation of other special features of the *Meter*.

4.4.2 Validation of Documents

- 4.4.2.1 Upon receipt of the *Metering Installation* Registration Form, the *IMEM Operator* shall inspect and validate the submitted documents for completeness and conformance to the standards established in SECTION 2 and SECTION 3 of this Manual.
- 4.4.2.2 If the *IMEM Operator* deems that the submitted documents are incomplete or non-compliant or with the requirements set out in Sections 4.2 and 4.4.1, the *IMEM Operator* shall request the relevant *IMEM Metering Service Provider* to provide further clarifications within two (2) *Business Days* of receiving the documents from the *IMEM Metering Services Provider*.
- 4.4.2.3 To proceed with the registration process, the *IMEM Metering Services Provider* shall resubmit all necessary documents requested by the *IMEM Operator* within five (5) *Business Days* of receiving the clarification request from the *IMEM Operator* in Clause **Error! Reference source not found.** of this Manual.

4.4.3 End-to-End Testing

- 4.4.3.1 In addition to commission testing (certified by the *ERC* – see Section 4.4.1), the *IMEM Operator* shall also require the *IMEM Metering Services Provider* to undertake *End-to-End Tests* on the *Metering Installation* being registered.

- 4.4.3.2 The *IMEM Operator* shall instruct the *IMEM Metering Services Provider* to conduct *End-to-End Tests* on the *Metering Installation* being registered within one (1) *Business Days* of receiving complete registration documentation in Sections 4.4.1 and 4.4.2.3.
- 4.4.3.3 The *IMEM Metering Services Provider* shall conduct and complete the required tests within two (2) *Business Days* of being notified by the *IMEM Operator* in 4.4.3.2.
- 4.4.3.4 If the *Metering Installation* being registered satisfactorily passes all required tests, the *IMEM Metering Services Provider* shall submit all relevant reports to the *IMEM Operator* within one (1) *Business Days* of being notified by the *IMEM Operator* in 4.4.3.2.
- 4.4.3.5 If the *Metering Installation* being registered fails any of the required tests, the *IMEM Metering Services Provider* shall inform the *IMEM Operator* within one (1) *Business Days* of being notified by the *IMEM Operator* in 4.4.3.2.
- 4.4.3.6 The *IMEM Metering Services Provider* shall rectify the defects or problems uncovered and repeat the required tests until all tests have passed and shall submit all relevant reports to the *IMEM Operator* within one (1) *Business Days* of notifying the *IMEM Operator* in 4.4.3.5 above.

4.4.4 Approval of Application

- 4.4.4.1 If the requirements submitted under Sections 4.4.1 and 4.4.2 are compliant with the *IMEM Operator's* requirements, and the testing under Section 4.4.3 has been undertaken successfully, the *IMEM Operator* shall approve the registration of the *Metering Installation*.
- 4.4.4.2 The *IMEM Operator* shall notify the *IMEM Metering Services Provider* of the approval within three (3) *Business Days* of receiving complete documentation from Sections 4.4.1, 4.4.2 and 4.4.3.

SECTION 5 METERING DATA COLLECTION

5.1 COVERAGE

Pursuant to *IMEM Rules* Clause 4.4.1, the *IMEM Metering Services Provider* shall retrieve the *Metering Data* from the *Meter* and transmit the same to the *IMEM Operator*.

This section provides the procedures to be followed by the *IMEM Operator* and the *IMEM Metering Services Providers* in the retrieval and submission of *Metering Data* under Clause 4.4.1 of the *IMEM Rules*.

In particular, this Section includes:

- a) The specification of the information that must be contained in the *Metering Service Provider Database* of an *IMEM Metering Services Provider* and the *Metering Database* of the *IMEM Operator*; and
- b) *Metering Data* retrieval and submission procedures:
 - i. Under normal circumstances;
 - ii. Under emergency conditions, where:
 - a. The *IMEM Metering Service Provider's Metering Data* retrieval systems fail; or
 - b. Emergency conditions require the *IMEM Operator* to transfer between their main and emergency back-up servers for metering operations.

5.2 INFORMATION SPECIFICATION OF DATABASES

This Section prescribes the information that must be contained in the *Metering Services Provider Database* of an *IMEM Metering Services Provider* and the *Metering Database* of the *IMEM Operator*.

5.2.1 Metering Database of the IMEM Operator

Pursuant to *IMEM Rules* Clause 4.4.3.1, the *IMEM Operator* shall create, maintain and administer a *Metering Database*, which shall include a metering register containing information for each *Metering Installation* registered with the *IMEM Operator* and should be consistent with the *Metering Installation* registration data of the *IMEM Metering Services Provider*.

5.2.1.1 Data Inclusions

The *Metering Database* of the *IMEM Operator* shall include *Metering Data* (transmitted by *IMEM Metering Services Providers* in accord with the provisions of SECTION 5 of this Manual), data substituted in accordance with Clause 4.4.5 of the

IMEM Rules, and all calculations made for settlement purposes⁴.

5.2.1.2 Meter Time

The *IMEM Metering Services Provider* shall ensure that all *Metering Installations* and data logger clocks are referenced to *Philippine Standard Time*.⁵

5.2.1.3 Storage Duration

Data shall be stored in the *Metering Database* of the *IMEM Operator*⁶:

- a) For sixteen (16) months in accessible format; and
- b) For ten (10) years in archive.

5.2.2 Metering Services Provider Database of the IMEM Metering Services Provider

Pursuant to *IMEM Rules* Clause 4.4.2.1, an *IMEM Metering Services Provider* shall create, maintain and administer a *Metering Services Provider Database*.

5.2.2.1 Data Inclusions

The *Metering Services Provider Database* shall include:

- a) Energy data including:
 - i. Active energy (kWh)
 - ii. Active power (kW)
 - iii. Reactive energy (kVARh)
 - iv. Reactive power (kVAR)
- b) Data substituted in accordance with Clause 4.4.5 of the *IMEM Rules*.

5.2.2.2 Resolution

IMEM Metering Services Providers shall ensure that the energy data contained within its *Metering Services Provider Database* have a 15-minute resolution.

5.2.2.3 Meter Time

⁴*IMEM Rules* Clause 4.4.3.2

⁵*IMEM Rules* Clause 4.3.5.1

⁶*IMEM Rules* Clause 4.4.3.3

The *IMEM Metering Services Provider* shall ensure that all *Metering Installations* and data logger clocks are referenced to *Philippine Standard Time*.⁷

5.2.2.4 Access

In accordance with *IMEM Rules* Clause 4.4.2.2, an *IMEM Metering Services Provider* shall ensure that each associated *IMEM Trading Participant* as well as the *IMEM Operator* is given access to the information in its *Metering Services Provider Database* at all reasonable times and:

- a) In the case of data sixteen (16) months old or less, within seven (7) *Business Days* of receiving written notice from the person or entity seeking access; and
- b) In the case of data more than sixteen (16) months old, within thirty (30) *Business Days* of receiving written notice from the person or entity seeking access.

5.3 METERING DATA RETRIEVAL AND SUBMISSION

5.3.1 Overview

This Section 5.3 describes the procedures that the *IMEM Operator* and *IMEM Metering Services Providers* must follow in the retrieval and submission of *Metering Data* under Clause 4.4.1 of the *IMEM Rules*.

The remainder of this Section 5.3 is structured as follows:

- a) Section 5.3.2 describes the content and format of *Metering Data* that *IMEM Metering Services Providers* shall submit to the *IMEM Operator*.
- b) Section 5.3.3 describes the frequency with which *IMEM Metering Services Providers* must submit *Metering Data*.
- c) Section 5.3.4 describes the daily, weekly and monthly processes that *IMEM Metering Services Providers* shall follow when submitting *Metering Data* to the *IMEM Operator*.
- d) Section 5.3.5 describes the procedures that the *IMEM Metering Services Providers* shall follow during emergency conditions.

5.3.2 Content and Format of Metering Data

5.3.2.1 Content of Metering Data

The *Metering Data* submitted by the *IMEM Metering Services Provider* to the *IMEM Operator* shall contain the following:

⁷*IMEM Rules* Clause 4.3.5.1

- a) Date and time of the *Meter* readings received for each *IMEM Trading Participant Meter*;
- b) Active energy (kWh), active power (kW), reactive energy (kVARh), and reactive power (kVAR) data in 15-minute resolution with assigned channel number; and
- c) *Site Equipment Identification Number* of the *Meter*.

5.3.2.2 Format of Metering Data

IMEM Metering Services Providers shall adhere to the following guidelines with regard to the format of *Metering Data*.

- a) The *IMEM Metering Services Provider* shall submit to the *IMEM Operator* the *Metering Data* in meter data format (MDEF) in a daily manner for *Grid-Connected Meters*.
- b) For *Meters* under the franchise of a *Mindanao Distribution Utility*, the *IMEM Metering Services Provider* shall submit to the *IMEM Operator* the *Metering Data* in .csv, or .xls format in a daily or weekly manner.
- c) All *IMEM Metering Services Provider* shall submit to the *IMEM Operator* the above monthly *Metering Data* in .xls format for *Grid-Connected Meters* and for *Embedded Meters*.

5.3.3 Frequency of Submission

5.3.3.1 *IMEM Metering Services Providers* shall transmit *Metering Data* from *Grid-Connected Meters* on a daily basis.

5.3.3.2 *IMEM Metering Services Providers* shall transmit *Metering Data* from *Embedded Meters* on a weekly basis.

5.3.3.3 *IMEM Metering Services Providers* may transmit *Metering Data* from *Embedded Meters* on a daily basis if they are able to do so.

5.3.3.4 All *IMEM Metering Services Providers* shall transmit complete monthly *Metering Data* covering all *IMEM Intervals* in a *Billing Period*.

5.3.3.5 The *IMEM Operator* shall utilize *Metering Data* submitted on a daily and weekly basis for informational purposes only.

5.3.3.6 The *IMEM Operator* shall utilize *Metering Data* submitted on a monthly basis for the purposes of settlement.

5.3.4 Procedures under Normal Conditions

This Section 5.3.4 prescribes the daily, weekly and monthly procedures that *IMEM Metering Services Providers* shall follow when submitting *Metering Data* to the *IMEM Operator*.

5.3.4.1 Daily and Weekly Procedures

The following procedures shall be performed by the *IMEM Metering Services Provider* or the *IMEM Operator* on a daily or weekly basis:

- a) *IMEM Metering Services Providers* shall collect the *Metering Data* from the *Meters* of all its associated *IMEM Trading Participants* on a daily or weekly basis as required in Clauses 5.3.3.1, 5.3.3.2 and 5.3.3.3.
- b) *IMEM Metering Services Providers* shall submit *Metering Data* related to all the *Metering Points* of their associated *IMEM Trading Participants* to the *IMEM Operator* through secure file transfer protocol (SFTP).
- c) For *Metering Data* collected on a daily basis, the *IMEM Metering Services Provider* shall transmit the collected *Metering Data* pertaining to all *IMEM Intervals* on any given day to the *IMEM Operator* at 0400H of the succeeding day. For example, the *IMEM Metering Services Provider* would transmit *Metering Data* collected from 2400H of day D-1 to 2359H of day D at 0400H of day D+1.
- d) For *Metering Data* collected on a weekly basis, the *IMEM Metering Services Provider* shall transmit the collected *Metering Data* pertaining to all *IMEM Intervals* in the last seven (7) days to the *IMEM Operator* no later than eight (8) days after the date of the earliest reading. For example, the *IMEM Metering Services Provider* would transmit *Metering Data* collected from 2400H of day D-1 to 2359H of day D+6 no later than D+7.
- e) If there is communication failure between a *Meter* and the *IMEM Metering Service Provider's Metering Data* retrieval system, the *IMEM Metering Services Provider* shall retrieve the *Metering Data* manually through a *Meter* reader handheld device or laptop. The *IMEM Metering Services Provider* shall then upload the *Metering Data* to their *Metering Data* retrieval system and submit the *Metering Data* to the *IMEM Operator*. The timelines specified in Clauses 5.3.4.1(c) and 5.3.4.1(d) shall still apply.
- f) If the *IMEM Operator* does not receive *Metering Data* by the timelines specified in Clauses 5.3.4.1(c) and

5.3.4.1(d), the *IMEM Operator* shall immediately notify the *IMEM Metering Services Provider*. Upon notification, the *IMEM Metering Services Provider* shall immediately resend the missing *Metering Data* to the *IMEM Operator*.

- g) If *Metering Data* errors are discovered during the *IMEM Operator's* validation procedures (Refer to SECTION 6 for details) then the *IMEM Operator* shall issue a *Meter Trouble Report* to the *IMEM Metering Services Provider* in accord with the procedures outlined in SECTION 7.

5.3.4.2 Monthly Procedures

The following procedures shall be performed by the *IMEM Metering Services Provider* or the *IMEM Operator* on a monthly basis:

- a) *IMEM Metering Services Providers* shall submit monthly *Metering Data* through secure file transfer protocol (SFTP).
- b) *IMEM Metering Services Providers* shall submit monthly *Metering Data* in accordance with Clause 5.3.3.4 related to all the *Metering Points* of their associated *IMEM Trading Participants* to the *IMEM Operator* no later than three (3) days after the end of each *Billing Period*.
- c) In addition to the *Metering Data*, *IMEM Metering Services Provider* shall, no later than three (3) days after the end of each *Billing Period*:
 - i. Submit to the *IMEM Operator*, a transmittal letter that includes a tabulation of all associated *Metering Points* and their corresponding total *Metered Quantity* for the *Billing Period*.
 - ii. Report to the *IMEM Operator* all discrepancies between the monthly *Metering Data* and the daily *Metering Data* submitted under Section 5.3.4.1 along with justifications for the discrepancies.
- d) If *Metering Data* errors are discovered during the *IMEM Operator's* validation procedures (Refer to SECTION 6 for details) then the *IMEM Operator* shall issue a *Meter Trouble Report* to the *IMEM Metering Services Provider* in accordance with the procedures outlined in SECTION 7.

5.3.5 Procedures under Emergency Conditions

5.3.5.1 Overview

This Section 5.3.5 describes the *Metering Data* retrieval and submission procedures the *IMEM Operator* shall follow if:

- a) The *Metering Data* retrieval system of the *IMEM Metering Services Provider* fails; or
- b) Emergency conditions require the *IMEM Operator* to transfer between their main and emergency back-up servers for metering operations.

5.3.5.2 Failure of the Metering Data Retrieval System of the IMEM Metering Service Provider

If the Metering Data retrieval system of an IMEM Metering Services Provider fails:

- a) The *IMEM Metering Services Provider* shall immediately inform the *IMEM Operator* of the occurrence of a failure of its *Metering Data* retrieval system.
- b) The *IMEM Metering Services Provider* shall perform emergency restoration of its *Metering Data* retrieval system.
- c) The *IMEM Metering Services Provider* shall, while the *Metering Data* retrieval system is out of service, retrieve all required *Metering Data* using alternative methods of retrieval and submit it within seven (7) days of actual reading to the *IMEM Operator* in the file format prescribed in Section 5.3.2.2.
- d) The *IMEM Metering Services Provider* shall inform the *IMEM Operator* when its *Metering Data* retrieval system is ready to resume normal operation.
- e) The *IMEM Metering Services Provider* shall resume normal retrieval and transmittal of *Metering Data* as soon as normal operations resume.

5.3.5.3 IMEM Operator Transfer to Emergency Back-up System

This Section 5.3.5.3 describes the procedures that the *IMEM Operator* and *IMEM Metering Services Provider* shall follow if emergency conditions require the *IMEM Operator* to transfer between their main and emergency back-up servers (EBS) for metering operations.

- a) The *IMEM Operator* shall:
 - i. Inform the *IMEM Metering Services Providers*, and the *IMEM Trading Participants* of the need to transfer operations from the main server to the EBS;

- ii. Instruct *IMEM Metering Services Providers* to transmit *Metering Data* to the EBS;
 - iii. Perform emergency restoration of its main server;
 - iv. When the operations are ready to resume at the main server, inform the *IMEM Metering Services Providers* to resume *Metering Data* transmittal to the main server; and
 - v. Resume operations at the main server as soon as normal operations resume.
- b) The *IMEM Metering Services Provider* shall:
- i. Transmit the *Metering Data* to the EBS of the *IMEM Operator* when instructed under Clause 5.3.5.3(a)(ii); and
 - ii. Resume transmittal of *Metering Data* to the main server of the *IMEM Operator* when instructed under Clause 5.3.5.3(a)(iv).

SECTION 6 DATA VALIDATION, ESTIMATION AND SUBSTITUTION

6.1 COVERAGE

Pursuant to *IMEM Rules* Clause 4.2.2.2(b), the *IMEM Operator* shall define the procedures that the *IMEM Metering Service Providers* and *IMEM Operator* must undertake to validate, estimate, correct or substitute erroneous meter data.

This Section provides the procedures that the *IMEM Operator* and *IMEM Metering Services Providers* must follow when validating, estimating, and substituting *Metering Data* in accordance with *IMEM Rules* Clause 4.4.5.

6.2 RESPONSIBILITIES

6.2.1 Responsibilities of the IMEM Metering Service Provider

6.2.1.1 The *IMEM Metering Service Provider* shall perform validation of the *Metering Data* of *Metering Installations* it is responsible for in accordance with the procedures set out in this Section⁸.

6.2.1.2 In case of *Metering Data* error, the *IMEM Metering Services Provider* shall perform estimation in order to derive corrected *Metering Data* in accordance with the procedures set out in this Section⁹.

6.2.2 Responsibilities of the IMEM Operator

6.2.2.1 Prior to the issuance of *Preliminary Settlement Statements* (under *IMEM Rules* Clauses 5.1.2.4 and 5.5.1), the *IMEM Operator* shall perform final validation of the *Metering Data* submitted by the *IMEM Metering Services Providers* in accordance with the procedures set out in this Section¹⁰.

6.2.2.2 In case of *Metering Data* error and if corrected *Metering Data* has not been submitted by the *IMEM Metering Services Provider* to the *IMEM Operator* two (2) days prior to the deadline for transmittal of *Metered Quantity* data to *IMEM Trading Participants* (under *IMEM Rules* Clause 4.4.5.4), the *IMEM Operator* shall estimate and substitute *Metering Data* in accordance with the procedures set out in this Section¹¹. If the above date does not fall on a *Business Day*, the due date shall be the next *Business Day*.

⁸*IMEM Rules* Clause 4.4.5.1

⁹*IMEM Rules* Clause 4.4.5.2(a)

¹⁰*IMEM Rules* Clause 4.4.5.3

¹¹*IMEM Rules* Clause 4.4.5.4

6.3 OVERVIEW

The remainder of this SECTION 6 is structured as follows:

- a) Section 6.4 describes the procedures that:
 - i. The *IMEM Metering Services Providers* shall follow in validating *Metering Data* prior to transmittal to the *IMEM Operator* under *IMEM Rules* Clause 4.4.5.1; and
 - ii. The *IMEM Operator* shall follow in undertaking final validation of *Metering Data* under *IMEM Rules* Clause 4.4.5.3.
- b) Section 6.5 describes the estimation procedures that:
 - i. The *IMEM Metering Services Providers* shall follow to address *Metering Data* error under *IMEM Rules* Clause 4.4.5.2(a); and
 - ii. The *IMEM Operator* shall follow to address *Metering Data* error under *IMEM Rules* Clause 4.4.5.4.

6.4 VALIDATION PROCEDURES

This Section 6.4 prescribes the *Metering Data* validation procedures that *IMEM Metering Services Providers* and the *IMEM Operator* shall follow.

6.4.1 Procedures for IMEM Metering Services Providers

- a) *IMEM Metering Services Providers* shall perform the following validation checks on *Metering Data* and *Metering Installations* prior to transmittal to the *IMEM Operator* under SECTION 5 of this *IMEM Manual*:
 - i. *IMEM Metering Services Providers* shall undertake the checks summarized in Table 9 below.
 - ii. If any *Metering Data* fails the prescribed checks, the *IMEM Metering Services Provider* shall report the failed checks in the error categories summarized in Table 9 below.

Table 9. Summary of Validation Checks and Error Categories

Check	Description	Error Category for Reporting Purposes
Uncertain values	Any <i>Metering Data</i> value that falls outside the maximum and minimum range of the <i>Metering Data</i> associated with the <i>Metering Point</i> whose <i>Meter</i> that is being read shall be marked with the status 'uncertain'.	Uncertain Value
Missing Values	Zero values on consecutive intervals in the <i>Metering Data</i> that deviates from the historical <i>Metering Data</i> from the <i>Meter</i> from the last three (3) months shall result to this <i>Meter</i> error and have corresponding remarks such as "Lapse in Data" in each interval.	Missing Values

Check	Description	Error Category for Reporting Purposes
Historical check	Check for <i>Metering Data</i> values which fall outside the maximum and minimum range of the <i>Metering Data</i> within the last twelve (12) months. The historical data to be used in this check are as follows: a) Value during the same hour last week, b) Value during the same hour the previous day, and c) Average of the values during the whole previous day	Outside Historical Min/Max
Orphan check	Belongs to a new <i>Metering Point</i> , which is yet to be configured in the system and yet to be included to the list of <i>Metering Installations</i> contained within the <i>Metering Database</i> of the <i>IMEM Operator</i> .	Orphan values

- b) If the *IMEM Operator* notifies the *IMEM Metering Services Provider* of *Metering Data* error (through a *Meter Trouble Report* – see SECTION 7), the *IMEM Metering Services Provider* shall perform the validation tests prescribed in Table 10 on the *Metering Installations* to which the *Metering Data* error pertains.

Table 10 Metering Installation Validation Tests

Check	Purpose of check
Current and Voltage Check	This indicator detects the loss of voltage and/or current input to the <i>Meter</i> due to failure of the supply from one or more <i>Instrument Transformers</i> or tampering.
Load Profile vs. Meter Reading	These checks for corruption related to the <i>Meter</i> multiplier.
Intervals Found vs. Interval Expected	Check for missing intervals.
Time Synchronization	Checks for synchronism of meter clock to <i>Philippine Standard Time/Data Collection System</i> time.
Number of Power Outage Intervals	This indicator allows periods of zero primary power to be identified.
Cyclic Redundancy Check / Read-Only Memory / Random Access Memory	This is part of the internal components of a <i>Meter</i> , which is automatically flagged when failing.
Meter Clock Overflow	Flag generated by the <i>Meter</i> indicating failure of internal electronics.
Hardware Reset	Flag generated by the <i>Meter</i> indicating failure of internal electronics.
Time Reset	Indicates the interval in which the <i>Meter</i> clock time has been changed creating either a shorter or a longer interval.
Data Overflow on Interval	This indicates that the meter is creating more pulses than it can record in an interval or Data Collection System (DCS) can accommodate in an interval.
Number of Channels	The actual number of data channels from the <i>Meter</i> does not match the number expected at the DCS.
Changed Device ID	The internal device identifier does not match the value registered at the DCS.
Watchdog Time Out	This is the failure of the <i>Meter</i> to return data in response to a poll within the required timeframe. This is reported by some recorders when a watchdog register is tripped or activated.
Parity Error	This indicator determined by a parity error bit that is set by a recorder on a channel of data during status check or read/write function.

Event Log Check	Checks error messages and alarms recorded by the <i>Meter</i> .
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6.4.2 Procedures for the IMEM Operator

This Section 6.4.2 prescribes the procedures the *IMEM Operator* shall follow in performing final validation of the *Metering Data* submitted by the *IMEM Metering Services Providers* under *IMEM Rules* Clause 4.4.5.3. The *IMEM Operator* shall undertake the following checks on a monthly basis prior to the issuance of the *Preliminary Settlement Statements* under *IMEM Rules* Clauses 5.1.2.4 and 5.5.1.

- a) The *IMEM Operator* shall compare the values contained in the monthly *Metering Data* to the daily *Metering Data* of each *Metering Point* submitted by the *IMEM Metering Services Provider* under the provision of SECTION 5 of this *IMEM Manual*. If there are discrepancies between the values, the *IMEM Operator* shall issue a *Meter Trouble Report* to the *IMEM Metering Services Provider* (following the procedures outlined in SECTION 7 of this *IMEM Manual*).
- b) The *IMEM Operator* shall validate the *Metering Data* of *IMEM Trading Participants* directly connected to a *Mindanao Distribution System* with **respect to the *Metering Data* of the relevant *Mindanao Distribution Utility* at a *Metering Point***. In this validation, the *Metering Data* of the *Mindanao Distribution Utility* at a *Metering Point* is checked against the aggregate *Metered Quantity* of all *Meters* of *IMEM Trading Participants* associated with the said *Metering Point*. If the aggregate *Metered Quantity* of all *Meters* of *IMEM Trading Participants* deviates from the measurement at the associated *Metering Point* then the *IMEM Operator* shall issue a *Meter Trouble Report* to the *IMEM Metering Services Provider* (following the procedures outlined in SECTION 7 of this *IMEM Manual*).

6.5 ESTIMATION PROCEDURES

This Section 6.5 describes the estimation procedures that:

- a) The *IMEM Metering Services Providers* shall follow to address *Metering Data* error under *IMEM Rules* Clause 4.4.5.2(a); and
- b) The *IMEM Operator* shall follow to address *Metering Data* error under *IMEM Rules* Clause 4.4.5.4.

6.5.1 Procedures for IMEM Metering Services Providers

IMEM Metering Services Providers shall estimate and substitute *Metering Data*:

- a) On a daily or weekly basis:
 - iii. If prior to transmitting daily or weekly *Metering Data* to the *IMEM Operator* (under SECTION 5 of this *IMEM Manual*), the *IMEM Metering Services Provider* discovers erroneous or missing values; or
 - iv. If the *IMEM Operator* notifies the *IMEM Metering Services Provider* of a *Metering Data* error through a *Meter Trouble Report* (see SECTION 7) during the daily or weekly transmittal of *Metering Data*.
- b) On a monthly basis:
 - v. If prior to transmitting monthly *Metering Data* to the *IMEM Operator* (under SECTION 5 of this *IMEM Manual*), the *IMEM Metering Services Provider* discovers erroneous or missing values; or
 - vi. If the *IMEM Operator* notifies the *IMEM Metering Services Provider* of a *Metering Data* error through a *Meter Trouble Report* (see SECTION 7) during the monthly transmittal of *Metering Data*.

In the remainder of this Section 6.5.1, the procedures for daily or weekly estimation and monthly estimation are presented separately.

6.5.1.1 Procedures Triggered by Daily or Weekly Metering Data Error

IMEM Metering Services Providers shall estimate and substitute erroneous values (as defined in the error categories of Table 9) using the following estimation procedures:

- a) The *IMEM Metering Services Provider* may substitute erroneous values using the following historical data:
 - i. Value during the same hour last week,
 - ii. Value during the same hour the previous day, and
 - iii. Average of the values during the whole previous day;
- b) The *IMEM Metering Services Provider* may substitute erroneous values using values from the backup *Meter* during the same hour; or
- c) The *IMEM Metering Services Provider* may substitute erroneous values using the *Meter* reading from the previous hour.

6.5.1.2 Procedures Triggered by Monthly Metering Data Error

IMEM Metering Services Providers shall estimate and substitute erroneous values using the following estimation procedures.

- a) If *Metering Data* pertaining to one (1) to four (4) consecutive fifteen-minute intervals are missing, the *IMEM Metering Services Provider* shall estimate the missing *Metering Data* by means of interpolation between the available intervals
- b) If *Metering Data* pertaining to more than four (4) consecutive fifteen-minute intervals are missing:
 - i. The *IMEM Metering Services Provider* shall directly substitute the missing values using *Metering Data* from the back-up *Meter* provided that the historical difference of *Metering Data* between the main *Meter* and the backup *Meter* does not exceed 0.2%.
 - ii. If the historical deviation exceeds 0.2% but not more than 0.6%, the *IMEM Metering Services Provider* shall apply a correction factor based on the historical difference between the main *Meter* and the backup *Meter* on the *Metering Data* of the backup *Meter* before substitution of the missing *Metering Data* from the main *Meter*.
 - iii. If the deviation exceeds to 0.6%, the *IMEM Metering Services Provider* shall immediately investigate and correct the cause of deviation.
- c) For *Grid-Connected Meters*, if both the *Main Meter* and backup *Meters* fail, the *Metering Data* from the *Metering Point* may be substituted with data from a *Remote Terminal Unit* (“RTU”) associated with that *Metering Point* applied with a correction factor. The correction factor is based on the historical correlation of the data from the RTU and the *Metering Data* of the *IMEM Trading Participant* from the associated *Metering Point*.
- d) If there is a loss of one of the phase voltages and currents, the *IMEM Metering Services Providers* shall perform estimation through the scientific method of calculation using the average remaining phase voltages or currents of good data from the historical load profile.
- e) If the above methods do not provide reasonable values, the *IMEM Metering Services Provider* may use the following historical data from the main *Meter* to estimate erroneous values:

- i. Values during the same hour of the previous day with the same day type (i.e., weekday or weekend),
 - ii. Values during the same hour of the same day last week recorded by the same meter (i.e. Saturday, Sunday, Holidays), and
 - iii. Average value of the values during the same hour of the same day of the three (3) previous weeks recorded by the same meter.
- f) The *IMEM Operator* may consider other estimation methods proposed and submitted by the *IMEM Metering Services Providers*.

6.5.2 Procedures for the IMEM Operator

The *IMEM Operator* shall estimate *Metering Data* in accordance with the procedures provided in Section 6.5.1.2.

SECTION 7 METER TROUBLE REPORT

7.1 COVERAGE

This Section describes the procedures that the *IMEM Operator* and *IMEM Metering Services Providers* shall follow in issuing and responding to *Meter Trouble Reports*.

7.2 PROCEDURES

- 7.2.1 The *IMEM Operator* shall issue a *Meter Trouble Report* to the relevant *IMEM Metering Services Provider* if the *IMEM Operator* detects *Metering Data* errors during *Metering Data* validation.
- 7.2.2 The *IMEM Operator* may issue *Meter Trouble Reports* upon receipt of daily, weekly or monthly *Metering Data* (transmitted by the *IMEM Metering Services Provider* in accord with the procedures in SECTION 5 of this *IMEM Manual*).
- 7.2.3 The *IMEM Operator* shall issue a *Meter Trouble Report* to the relevant *IMEM Metering Services Provider* within twenty-four (24) hours after detection of *Metering Data* error.
- 7.2.4 The *IMEM Metering Services Provider* shall submit the corrected or estimated *Metering Data* (using the procedures outlined in SECTION 6 of this *IMEM Manual*) to the *IMEM Operator* within two (2) Business Days of receiving the *Meter Trouble Report* from the *IMEM Operator*¹².
- 7.2.5 The *IMEM Metering Services Provider* shall respond to the *Meter Trouble Report* in accordance with *IMEM Rules* Clause 4.4.5.2, notwithstanding any *Dispute* raised by the affected *IMEM Trading Participant*¹³.
- 7.2.6 If an *IMEM Metering Services Provider* provides corrected *Metering Data* to the *IMEM Operator* within one (1) year after the issuance of the *Final Settlement Statement* for the *Billing Period* where the *IMEM Trading Interval* of the corrected *Metering Data* belongs to, the *IMEM Operator* shall include in the *Settlement Statements* of affected *IMEM Trading Participants* for the *next Billing Period* the adjustments that resulted from the use of the corrected *Metering Data*¹⁴.
- 7.2.7 In case of *Dispute* on the previously submitted meter data, the *IMEM Metering Services Provider* shall estimate and substitute under *IMEM Rules* Clause 4.4.5.2 and shall issue a certification on the corrected or substituted *Metering Data*, which shall be submitted to the *IMEM Operator*

¹²*IMEM Rules* Clause 4.4.5.2(b)

¹³*IMEM Rules* Clause 4.4.5.2(c)

¹⁴*IMEM Rules* Clause 4.4.5.5

and the affected *IMEM Trading Participant*¹⁵. Such certification must be signed by the *IMEM Trading and the IMEM Services Provider*.

¹⁵*IMEM Rules* Clause 4.4.5.6

SECTION 8 DEREGISTRATION OF METERING INSTALLATION

8.1 COVERAGE

This section describes the procedures the *IMEM Operator* and *IMEM Metering Services Providers* shall follow when deregistering a *Metering Installation* in accordance with *IMEM Rules* Clause 4.3.1.2.

8.2 TRIGGERS FOR DEREGISTERING A METERING INSTALLATION

Deregistration of a *Metering Installation* may be triggered as follows:

- a) Upon the request of the *IMEM Trading Participant* and/or the *IMEM Metering Services Provider*;
- b) Upon the cessation and deregistration of the *IMEM Trading Participants* to whom the *Metering Installation* relates;
- c) Upon retirement or decommissioning of the *Metering Installation*; or
- d) If there is a change in the nature or classification of the *Metering Installation*.

8.3 PROCESS OF DEREGISTRATION

- 8.3.1 The *IMEM Trading Participant* or *IMEM Metering Services Provider* (as relevant) shall inform the *IMEM Operator* of the *Metering Installation* they wish to deregister along with the reasons for the request for deregistration.
- 8.3.2 The *IMEM Operator* may request additional information from the *IMEM Trading Participant* or *IMEM Metering Services Provider*.
- 8.3.3 The *IMEM Operator* shall deregister the *Metering Installation* and inform all affected parties within 10 (ten) *Business Days* of receiving the deregistration request or receiving clarifications from affected parties as required.

SECTION 9 GLOSSARY

American National Standards Institute (ANSI): A private non-profit organization that oversees the development of voluntary consensus standards for products, services, processes, systems, and personnel in the United States.

Blondel's Theorem: In a system of N conductors, N-1 meter elements, properly connected, will measure the active power or energy taken. The connection must be such that all voltages coils have a common tie to the conductor in which there is no current coil.

Burden: For a *Voltage Transformer*, the total volt-ampere load, with specified power factor, applied to the secondary terminals. For a *Current Transformer*, the total apparent impedance, expressed in ohms, connected to the secondary terminals.

Current Transformer: An *Instrument Transformer* intended to have its primary winding connected in series with the conductor carrying the current to be measured or controlled.

End-to-End Test: A continuity test of data transfer from the meter to the Metering Data Retrieval System of the *IMEM Metering Services Provider* and then to the Metering Data Collection System of the *IMEM Operator*.

Embedded Metering Installation: A *Metering Installation* whose *Metering Point* is connected to a *Mindanao Distribution System* or *User System* directly connected to the *Mindanao Grid*.

Embedded Meter: A *Meter* contained within an *Embedded Metering Installation*.

Grid-connected Metering Installation: A *Metering Installation* whose *Metering Point* is directly connected to the *Mindanao Grid*.

Grid-connected Meter: A *Meter* contained within a *Grid-connected Metering Installation*.

Grid Off-Take Meter: For *Embedded Meters*, the *Grid-Connected Meter* where the energy measured by the *Embedded Meter* flows from the *Mindanao Grid*.

International Electrotechnical Commission (IEC): A non-profit, non-governmental international standards organization that prepares and publishes International Standards for all electrical, electronic and related technologies – collectively known as "electrotechnology".

Institute of Electrical and Electronics Engineers (IEEE): A professional association that is dedicated to advancing technological innovation and excellence.

Instrument Transformers: A general term for *Current Transformers* and *Voltage Transformers*.

Meter Trouble Report: A report issued by the *IMEM Operator* to an *IMEM Metering Services Provider* for the correction of detected *Metering Data* errors.

Philippine Electrical Code: The basis in the Philippines for practically safeguarding persons and properties from hazards arising from the use of electricity.

Remote Terminal Unit: A telemetry equipment for monitoring real-time information and controlling equipment in the *Mindanao Power System*.

Site Equipment Identification Number: The unique naming convention given to a *Metering Installation* and its components upon registration with the *IMEM Operator*. *Grid-connected Metering Installation* has thirteen alphanumeric characters while *Embedded Metering Installation* have seventeen alphanumeric characters.

Voltage Transformer: A device that scales down primary voltage supplied to a *Meter* while providing electrical isolation.

Appendix A Appendices to Section 2

Table A-1. Standard Burdens for Current Transformers with 5 A Secondary Windings.

Designation	Resistance (ohms)	Inductance (mH)	Impedance (ohms)	Volt-Amperes (at 5 A)	Power Factor
B-0.1	0.09	0.116	0.1	2.5	0.9
B-0.2	0.18	0.232	0.2	5.0	0.9
B-0.5	0.45	0.580	0.5	12.5	0.9
B-0.9	0.81	1.040	0.9	22.5	0.9
B-1.8	1.62	2.080	1.8	45.0	0.9

Table A-2. Basic Impulse Insulation Levels (BIL)

Nominal System Voltage (kV)	BIL and full-wave crest (kV)
15	110
25	150
34.5	200
69	350
115	550
138	650
230	1050
500	1675

Table A-3. Creepage Distance

Pollution Level	Minimum Nominal Specific Creepage Distance Between Phase and Earth (mm/kV)
Light	16
Medium	20
Heavy	25
Very Heavy	31

Table A-4. Standard Burdens for Voltage Transformers

Characteristics on Standard Burdens			Characteristics on 120 V Basis			Characteristics on 69.3 V Basis		
Designation	VA	Power Factor	Resistance	Inductance	Impedance	Resistance	Inductance	Impedance
W	12.5	0.10	115.2	3.0400	1152	38.4	1.0100	384
X	25.0	0.70	403.2	1.0900	576	134.4	0.3640	192
M	35.0	0.20	82.3	1.0700	411	27.4	0.3560	137
Y	75.0	0.85	163.2	0.2680	192	54.4	0.0894	64
Z	200.0	0.85	61.2	0.1010	72	20.4	0.0335	24
ZZ	400.0	0.85	30.6	0.0503	36	10.2	0.0168	12

Table A-5. Ratios and Ratings of Voltage Transformers

Rated Voltage (V)	Marked Ratio	Secondary Voltage
14,400 Grd Y/8,400	70/120:1	120V/69V
24,940 Grd Y/14,400	120/200:1	120V/69V
34,500 Grd Y/20,125	175/300:1	120V/69V
69,000 Grd Y/40,250	350/600:1	115V/67V
115,000 Grd Y/69,000	600/1000:1	115V/67V
138,000 Grd Y/80,500	700/1200:1	115V/67V
230,000 Grd Y/138,000	1200/2000:1	115V/67V
500,000 Grd Y/287,500	2500/4500:1	115V/67V

Table A-6. Minimum Clearances and Distances of Energized Metal Parts

Nominal System Voltage	d1 (mm)	d2 (mm)	D (mm)	H (mm)
13.8	300	350	900	3500
34.5	500	610	1500	3600
69	800	900	2000	3750
115	1100	1360	2500	4000
138	1300	1800	3000	4000
230	1850	3200	4000	5000
500	3250	5200	8000	9000

Where:

d1 = minimum clearance between live metal parts and ground

d2 = minimum clearance between live metal parts of two phases

D = practical distance phase center lines

H = minimum height of live conductors above ground. However, the upper edge of an earthed insulator support must be at a height of at least 2300mm above the ground level for all voltage series.

Table A-7. Minimum Height in Outdoor Installation

Rated Voltage	Max Voltage for Equipment	Minimum Clearances		Minimum Height	
				H	
				Minimum Clearances	
Un (kV)	Um (kV)	N (mm)	S (mm)	N (mm)	S (mm)
3	3.6	150	150	2600	2600
6	7.2	150	150	2600	2600
10	12	150	150	2600	2600
20	24	215	160	2600	2600
30	36	325	270	2625	2600
45	52	520		2820	
60	72.5	700		3000	
110	123	1100	950	3400	3250
150	170	1550	1350	3850	3650
220	245	2200	1850	4500	4150
330	362		2400	4700	
380	420		2900	5200	
500	525		4100	6400	

Table A-8. Minimum Protective Clearance between Barriers and Live Parts

Rated Voltage	Protective Clearance between Barriers and Live Parts Inside the Installation					
	A		B		C	
	Minimum Clearances		Minimum Clearances		Minimum Clearances	
Un (kV)	N(mm)	S(mm)	N(mm)	S(mm)	N(mm)	S(mm)
3	150	150	250	250	600	600
6	150	150	250	250	600	600
10	150	150	250	250	600	600
20	215	160	315		600	600
30	325	270	425		625	600
45	520		620		820	
60	700		800		1000	
110	1100	950	1200		1450	1250
150	1550	1350	1650		1850	1650
220	2200	1850	2300		2500	2150
330	2400		2500		2700	
380	2900		3000		3200	
500	4100		4200		4400	

Table A-9. Minimum Clearances at the Perimeter Fence

Rated Voltage	At the Perimeter Fence			
	A		B	
	Minimum Clearances		Minimum Clearances	
Un (kV)	N(mm)	S(mm)	N(mm)	S(mm)
3	1150	1150	1650	1650
6	1150	1150	1650	1650
10	1150	1150	1650	1650
20	1215	1160	1720	1660
30	1325	1270	1825	1770
45	1520		2020	
60	1700		2200	
110	2100	1950	2600	2450
150	2550	2350	3050	2850
220	3200	2850	3700	3350
330	3400		3900	
380	3900		4400	
500	5100		5600	

Appendix B Appendices to Section 3

Table B-1. Meter Purpose Designations.

Designation	Meter Purpose
M	Main Meter (Grid connected)
I	Main Meter (Embedded)
A	Alternate Meter(Partial Redundant Metering)
B	Alternate Meter(Full Redundant Metering)
C	Backup Meter

Table B-2. Metering Equipment, Devices and Auxiliaries Designations

Designation	Description
CT	Current Transformer
LA	Lightning Arrester
MB	Meter Box
MD	Modem
MF	Multi-function Electronic Meter(Smart Meter)
PT	Potential Transformer
ST	Metering Structure
TS	Meter Test Switch

Appendix C Drawing, Figures and Pertinent Sketches

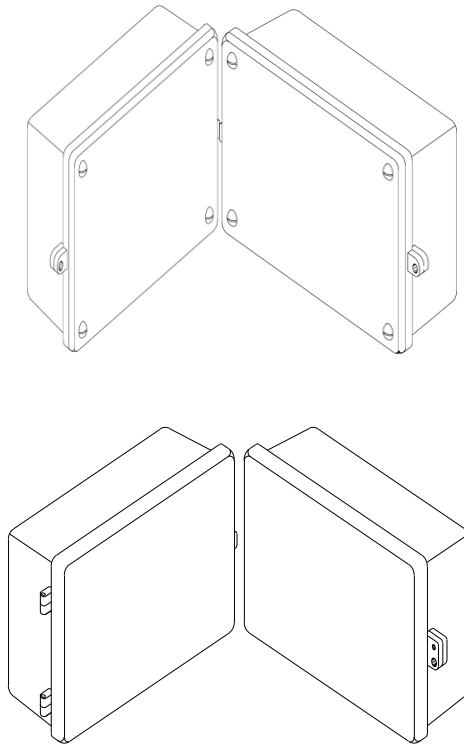


Figure C-1. CT/VT Terminal Box

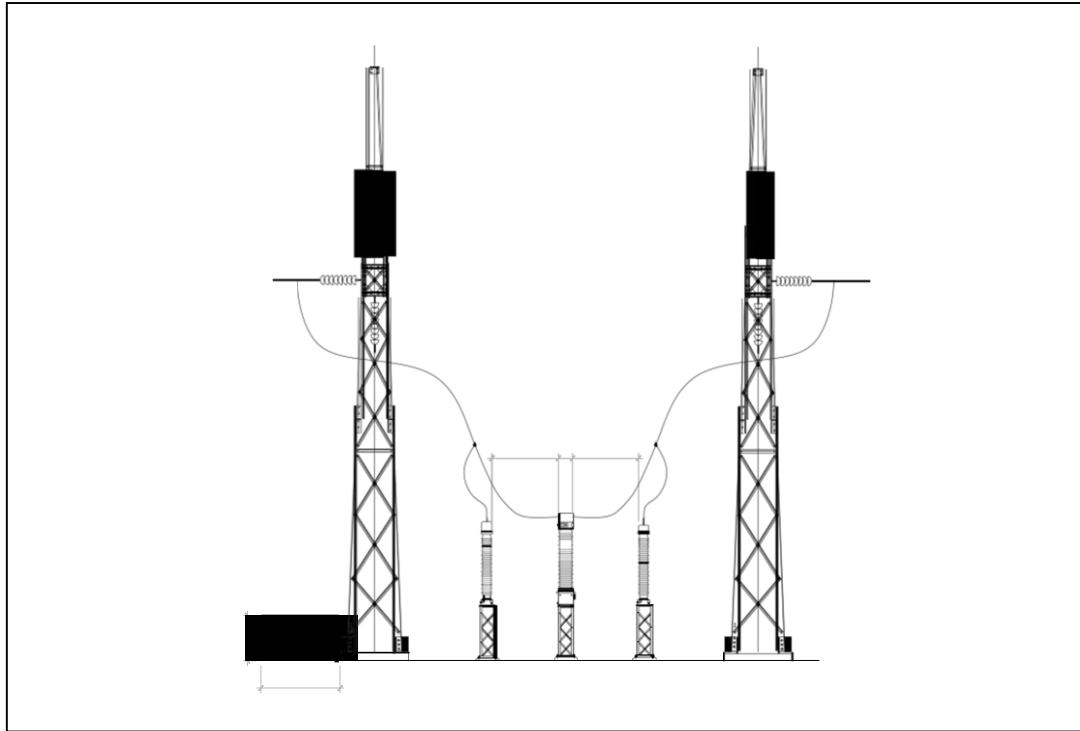


Figure C-2. Location or Arrangement of Instrument Transformers

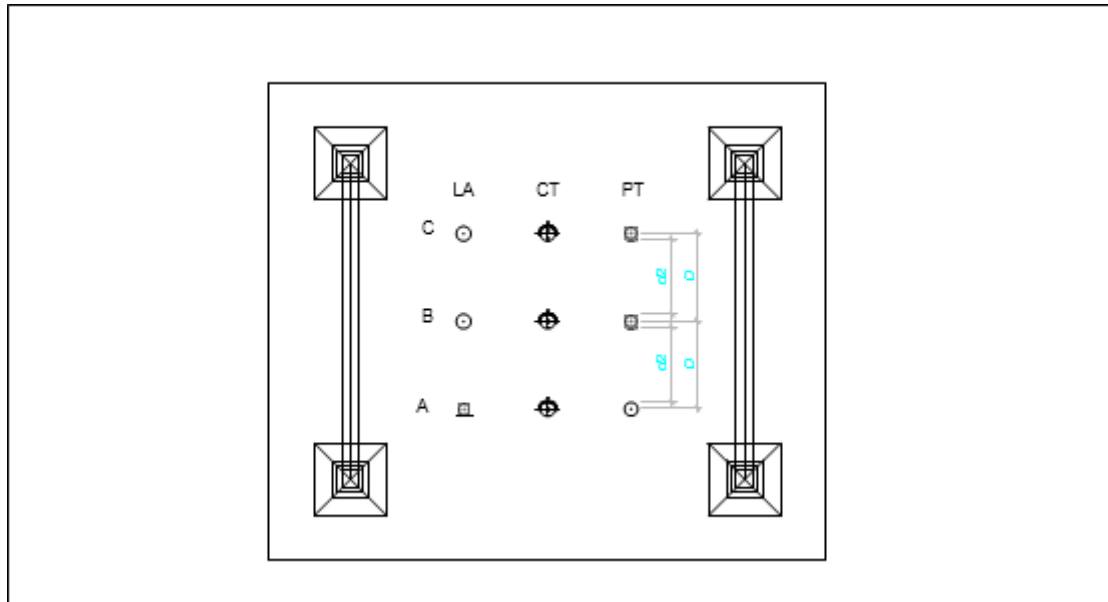


Figure C-3. Tower Plan (Top View)

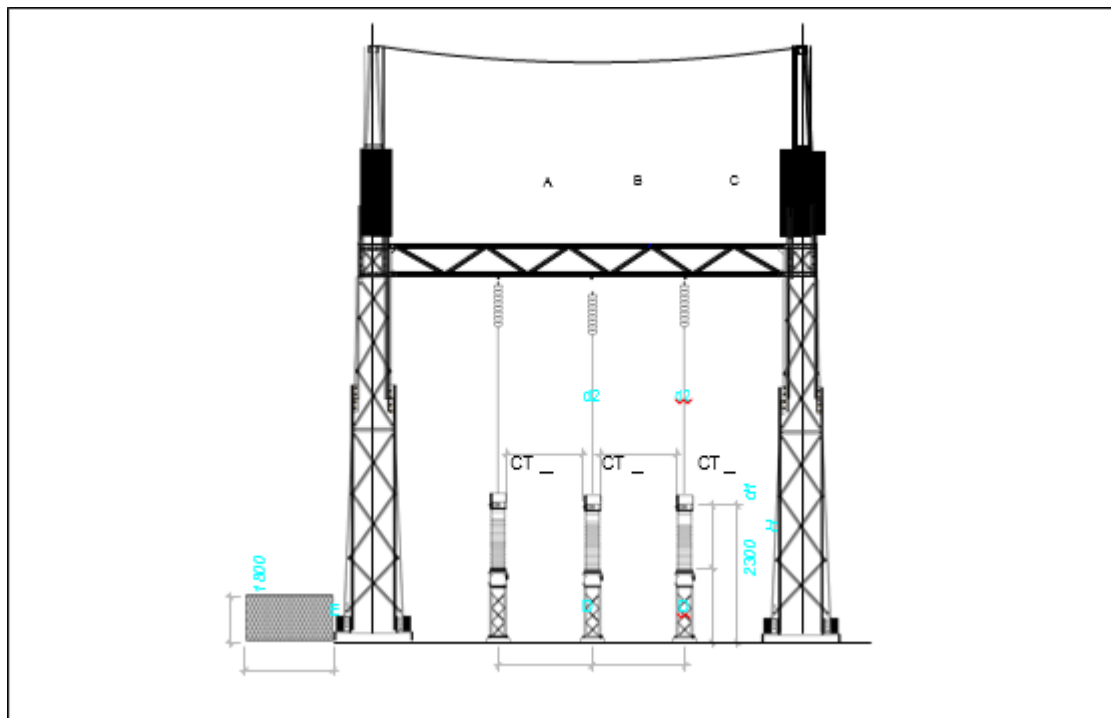


Figure C-4. Tower Plan (Distance between Phases)

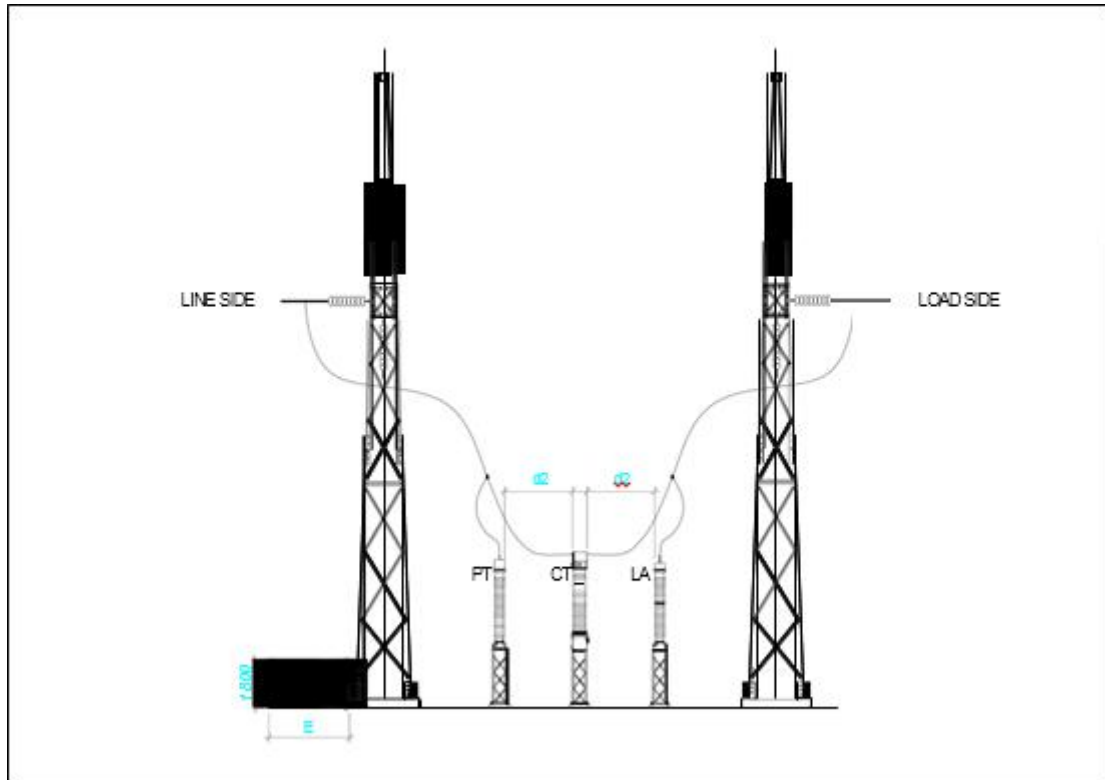


Figure C-5. Tower Plan (Distance between Instrument Transformers)

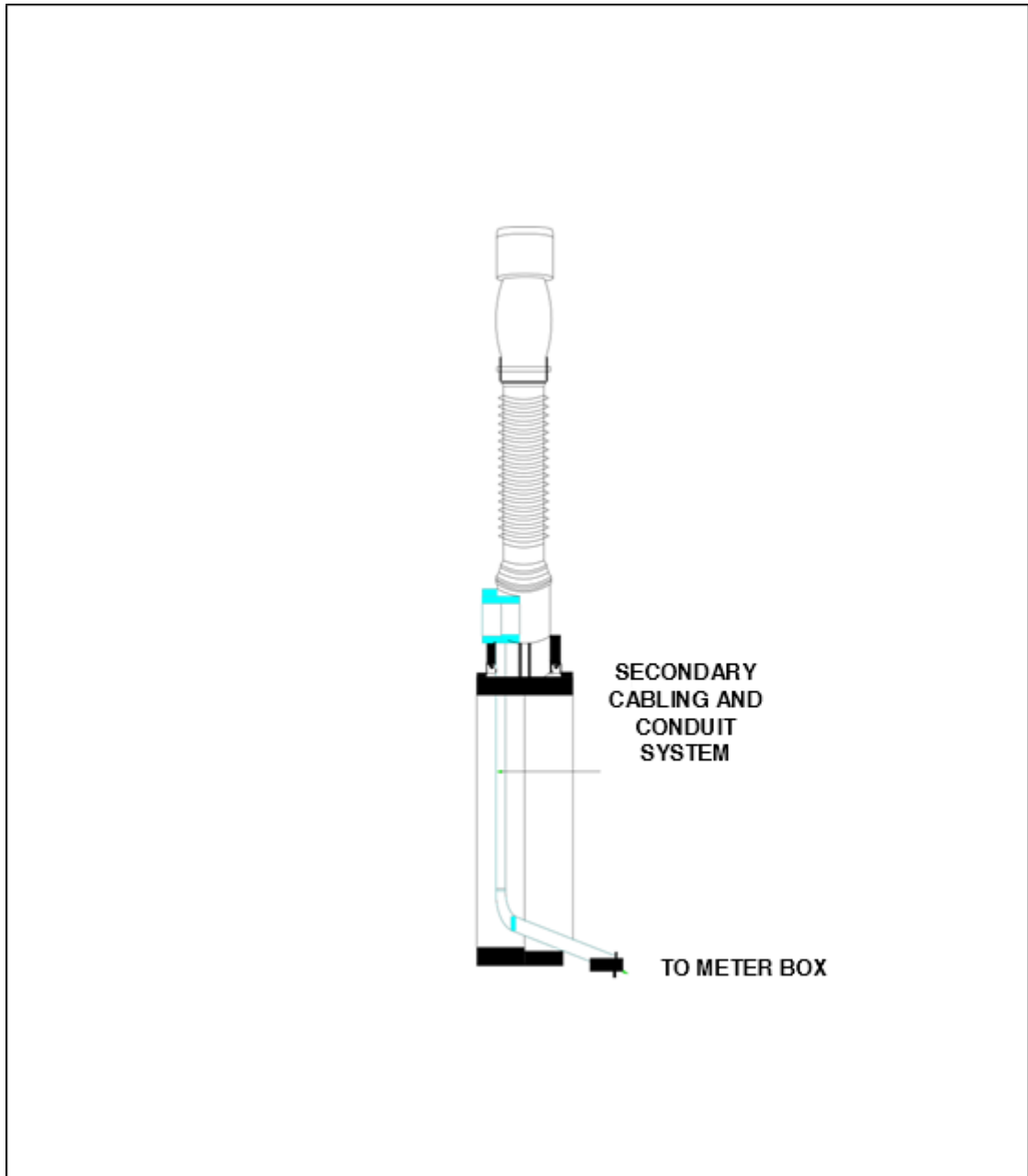


Figure C-6. Conduit System

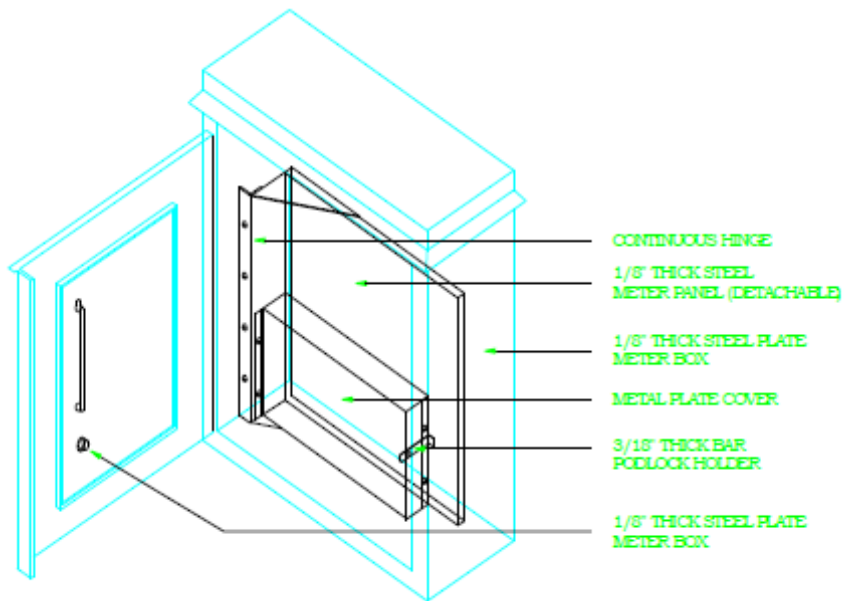


Figure C-7. Isometric View of a Meter Box.

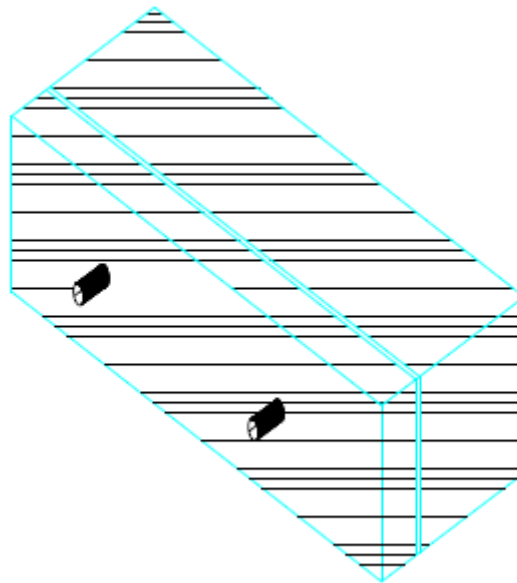


Figure C-8. Isometric View of a Test Switch / Box

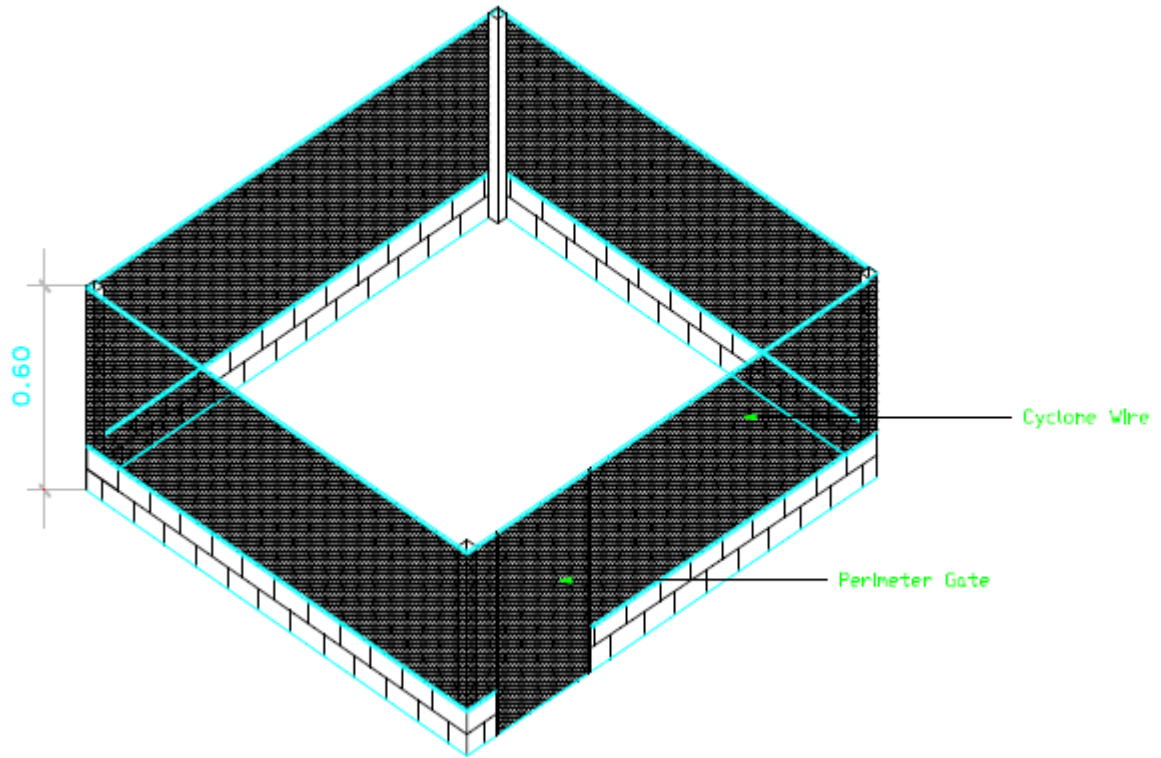


Figure C-9. Perimeter Fence.