Philippine Electricity Market Corporation

WHOLESALE ELECTRICITY SPOT MARKET
RULES CHANGE COMMITTEE

RESOLUTION NO. 2020-04

Proposed Amendment to the WESM Manual on Metering Standards and Procedures

WHEREAS, the WESM Manual on Metering Standards and Procedures (WESM Metering Manual) provides the pertinent metering procedures and standards for WESM Participants and WESM Metering Services Providers (WMSP);

WHEREAS, on 29 November 2019, the Manila Electric Company (MERALCO) submitted the proposed amendments to the WESM Metering Manual, for both the current one (1) hour trading interval and enhanced five (5) minute dispatch interval markets, regarding Current Transformer Requirements;

WHEREAS, the proposal aims to align and clarify the rated burden requirement of Current Transformers based on the Philippine Grid Code (PGC) 2016 Rules and the latest revision of IEC 61869-2 which supersedes IEC 60044-1 and to update the term "ANSI C57.13" to "IEEE C57.13";

WHEREAS, during its 159th Meeting on 06 December 2019, the RCC approved the publication of the proposal in the PEMC website to solicit comments from industry stakeholders and interested parties;

WHEREAS, following the 30-working day commenting period from publication date on 12 December 2019, comments were received from Philippine Electricity Market Corporation (PEMC), Technical Committee (TC), Cebu III Electric Cooperative, Inc. (CEBECO III), Tarlac Electric, Inc. (TEI), Cebu Energy Development Corp (CEDC), and National Grid Corporation of the Philippines (NGCP):

WHEREAS, during the 161st RCC Meeting last 21 January 2020, the RCC reviewed the proposal and gave due course to the comments received and corresponding proponent's responses, which are summarized as follows:

a) CEBECO III, TEI, TC and CEDC agreed with the proposal in aligning the rated burden requirement of current transformers with the revised

[redacted]

international standards. They deemed that the proposal maintains the CT accuracy within specified limits;

b) NGCP, on the other hand, opined that with the proposal, Grid Users may use higher burden rated CTs in which the permissible ratio error (accuracy class) may not hold at the lower range of the burden rating. NGCP deemed that the proposed amendment would contradict the objective of Chapter 9 of the PGC which is to ensure accuracy of the measurements/recording of the energy delivered and absorbed by the Grid with the objective of the proposal and suggested to follow what is required in the PGC; and

c) One of the Generator Representatives, Mr. Carlito Claudio, pointed out that the PGC sets the minimum requirement for the technical standards and specifications;

WHEREAS, the RCC agreed to align the rated burden requirement of current transformers with the revised international standards, thereby adopting MERALCO's proposal, as amended, and to update the WESM Metering Manual to reflect the appropriate references to the PGC;

WHEREAS, upon final review of the proposed amendments to the WESM Metering Manual, it was determined that there were missing provisions under RCC Resolution No. 2019-10 dated 19 July 2019 approving NGCP's proposed amendments to the WESM Metering Manual for the enhanced market design, which likewise aimed to align the said manual with the procedures and standards under the PGC, issuances from the DOE and Energy Regulatory Commission (ERC) and other international and national standards;

WHEREAS, during the 162nd RCC Meeting on 13 March 2020, the RCC noted that the said missing provisions were part of the proposed amendments of NGCP submitted on 03 April 2019, and agreed to adopt said proposed amendments to ensure consistent provisions of the WESM Metering Manual;

WHEREAS, in consideration of the aforementioned proposed amendments of MERALCO and NGCP and for consistency with the PGC, the RCC also adopted that the burden of current and voltage transformers shall be compliant to the IEC 61869-3 or ANSI C57.13 Standard (or the latest version/s) under the following sections of the WESM Metering Manual:

a) Section 2.5.7 and Section 2.5.8 for the current one (1) hour trading interval; and

b) Appendix N (Specifications for Current Transformers) and Appendix O (Specifications for Voltage Transformers) for the enhanced five (5) minute dispatch interval;

[redacted]

WHEREAS, to address the NGCP's opposition to MERALCO's proposal, the RCC agreed that clarification should be sought from the ERC regarding the interpretation of GRM 9.2.3.2 of the PGC, specifically on the following requirements:

> *xxx (b) The Accuracy Class for Load metering service shall be in accordance to the* ***Appendix 2*** *or better. For Generation Company metering service, the Accuracy Class of the Current Transformers shall be such that the ratio and phase accuracies are certified by factory test reports over the entire operating current range when the Generation Company is both generating and consuming electricity;*
>
> *(c) The total burden of the metering circuit, consisting of the burdens coming from all the connected devices and the secondary cable shall not exceed fifty percent (50%) of the specified burden of the Current Transformer in* ***Appendix 2****; xxx*

WHEREAS, in view of the foregoing, the RCC approved the proposals, as amended, and its endorsement to the PEM Board;

NOW THEREFORE, we, the undersigned, in behalf of the sectors we represent, hereby resolve as follows:

RESOLVED, that the RCC approves the Proposed Amendments on the WESM Manual on Metering Standards and Procedures (WESM Metering Manual), for both the current one (1) hour trading interval and enhanced five (5) minute dispatch interval markets;

RESOLVED FURTHER, that the said Proposed Amendments on the WESM Manual on Metering Standards and Procedures (attached as Annex A and B) are hereby endorsed to the PEM Board for approval and subsequent transmittal to the DOE for promulgation;

Done this 13 March 2020, Pasig City.

[redacted]

Approved by: **THE RULES CHANGE COMMITTEE**	
Independent Members:	
Maila Lourdes G. de Castro Chairperson	[redacted] **Francisco L.R. Castro, Jr.**
[redacted] **Allan C. Nerves**	[redacted] **Concepcion I. Tanglao**
Generation Sector Members:	
[redacted] **Dixie Anthony R. Banzon** Masinloc Power Partners Co. Ltd. (MPPCL)	[redacted] **Cherry A. Javier** Aboitiz Power Corp. (APC)
[redacted] **Carlito C. Claudio** Millennium Energy, Inc./ Panasia Energy, Inc. (MEI/PEI)	[redacted] **Mark D. Habana** Vivant Corporation - Philippines (Vivant)
Distribution Sector Members:	
[redacted] **Virgilio C. Fortich, Jr.** Cebu III Electric Cooperative, Inc. (CEBECO III)	[redacted] Manila Electric Company (MERALCO)
[redacted] **Ricardo G. Gumalal** Iligan Light and Power, Inc. (ILPI)	[redacted] **Nelson M. Dela Cruz** Nueva Ecija II Area 1 Electric Cooperative, Inc. (NEECO II – Area 1)

[redacted]

Supply Sector Member:
[redacted] **Lorreto H. Rivera** TeaM (Philippines) Energy Corporation (TPEC)
Market Operator Member:
Isidro E. Cacho, Jr. Independent Electricity Market Operator of the Philippines (IEMOP)
System Operator Member:
[redacted] **Ambrocio R. Rosales** National Grid Corporation of the Philippines (NGCP)

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Annex A

Proposed Amendment on the WESM Manual on Metering Standards and Procedures regarding Current Transformer Requirements

WESM Manual on Metering Standards and Procedures Issue 11.0				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
Current Transformer Burden	2.5.7	Shall not exceed the rated burden limit of 12.5 VA for the IEC 44-1 Class 0.2 /ANSI C57.13 Class 0.3 (see Table 1)	**Shall be based on the standard rated burden as specified in the latest revision of IEC 61869-2 or ANSI/IEEE C57.13, or their latest equivalent standards.**	To consider the latest revision of International Standard IEC 61869-2 (2012) which cancels and replaces the first edition of IEC 60044-1 published in 1996 and to update the term "ANSI" to "IEEE". Installation of a higher accuracy and functionality than the standards set by the PGC and WESM and its conformance to IEC and IEEE standards are supported by Sections 2.1.1 and 2.5.4.1 of WESM Metering Standards and Procedures which is also consistent with PEMC-TC's opinion issued last April 2019 to Mactan Electric Corp. in which "the TC is of the opinion that the specifications of MECO's current transformer comply with the metering accuracy class of 0.3 as well as the rated burden of B-1 (25VA), which is higher and therefore better than the burden B-0.2 (5VA) specified in PGC Appendix 2." Refer to the attached letter (Annex "A"). Refer also to the attached Factory Test Reports (FAT) and MERALCO acceptance tests that certifies that the CT maintains its accuracy within specified limits when tested at different primary current and burden. Factory Test Reports

[redacted]

Annex A

WESM Manual on Metering Standards and Procedures Issue 11.0				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
				(FAT) also certifies that it conforms to IEC 61869-1, IEC 61869-2 and IEEE C57.13 Standard requirements. The rules change should also be reflected in the WESM Metering Standards and Procedures Issue 12.0, Appendix "N".
Requirements for Grid Revenue Meters	2.4.1.	[See attached Annex B]	[See attached Annex B]	Document Reference for consistency with the Philippine Grid Code 2016 Edition
Requirements for Distribution Revenue Meter	2.4.2.	[See attached Annex B]	[See attached Annex B]	Document Reference for consistency with the Philippine Distribution Code 2016 Edition
Current Transformer	2.5.7.	[See attached Annex B]	[See attached Annex B]	Document Reference for consistency with the Philippine Grid Code 2016 Edition
Voltage Transformer	2.5.8.	[See attached Annex B]	[See attached Annex B]	Document Reference for consistency with the Philippine Grid Code 2016 Edition

[redacted]

Annex A

WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
Instrument Transformers	2.5	2.5.3.1. Selection of Current Transformer Ratios 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 10% of the primary tap.	2.5.3.1. Selection of Current Transformer Ratios 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 **rated** primary ~~tap~~ **current** multiplied by the ~~primary~~ **current rating** factor of the current transformer; and b. The minimum sustained primary current during normal operation shall not be less than ~~10% of the primary tap~~ **the lowest primary current that the current transformer can measure wherein the measurement accuracy is still guaranteed**	▪ To be consistent with the terms used by ANSI and IEC standards ▪ To consider the improvements in measurement range of new designs of extended range current transformers which can already measure down to 1% of rated current at guaranteed accuracy ▪ In reference to RCC-RESO-19-10 (19 July 2019)
Instrument Transformers	2.5	2.5.5.1. Burden Calculation – All Current Transformers The burden calculation for a current transformer shall include: a. the impedance of the secondary wiring; b. the impedance of all devices connected to the current transformer; c. the apparent impedance associated with the interconnection of current transformer secondaries;	2.5.5.1. Burden ~~Calculation~~ **Measurement** – All Current Transformers The **actual connected** burden ~~calculation for a current transformer~~ shall ~~include~~ **be measured using a CT burden measuring instrument. If manual calculation will be employed, the calculation shall consider the following:**	▪ To recommend an alternative and easier method in determining the connected burden using test equipment ▪ Items c-h are recommended for deletion as most of the conditions are no longer present in existing metering facilities i.e., common return conductor, parallel connected CT etc. Also, for consistency with Section 2.7.3.7. of this WESM Manual

[redacted]

WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
		d. the apparent impedance associated with the sharing of a common current path through a measuring device with another current transformer; 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 instrument transformer; g. burden under balanced power system conditions; and h. worst-case unbalance, including single-phase power	a. the impedance of the secondary wiring; b. the impedance of all devices connected to the current transformer; ~~c. the apparent impedance associated with the interconnection of current transformer secondaries;~~ ~~d. the apparent impedance associated with the sharing of a common current path through a measuring device with another current transformer;~~ ~~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 instrument transformer;~~ ~~g. burden under balanced power system conditions; and~~ ~~h. worst-case unbalance, including single phase power~~	prescribing separate conductors for each secondary terminal of each instrument transformer ▪ In reference to RCC-RESO-19-10 (19 July 2019)
Instrument Transformers	2.5	2.5.5.3. Burden Calculations – All Voltage Transformers The burden calculation for a voltage transformer shall include the apparent power and power factor at the secondary terminals of the instrument transformer.	2.5.5.3. Burden ~~Calculations~~ **Measurement** – All Voltage Transformers The **actual connected** burden ~~calculation for a voltage transformer~~ shall ~~include the~~ **be measured using a VT burden measuring instrument. If manual calculation will be employed,**	▪ To have an alternative and easier option in determining the connected burden using test equipment ▪ In reference to RCC-RESO-19-10 (19 July 2019)

[redacted]

WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
			the calculation shall consider the following: **a)** the apparent power and power factor at the secondary terminals of the instrument transformers.	
Instrument Transformers	2.5	2.5.6. General Requirements for Grounding System 2.5.6.1. The installation shall be in accordance but not limited to the following provisions of the Philippine Electrical Code: a. … b. … c. … d. … e. … f. The minimum size of copper conductor to be used for metering grounding shall be 8 mm^2. g. Connections to all bonded parts shall be made in accordance to Article 2.50.1.8 of the Philippine Electrical Code 2009 Part 1.	2.5.6. General Requirements for Grounding System 2.5.6.1. The installation shall be in accordance but not limited to the following provisions of the Philippine Electrical Code: a. … b. … c. … d. … e. … f. **For voltage level 69kV and higher,** the minimum size of copper conductor to be used for metering **instrument transformer** grounding shall be ~~8~~ **125** mm^2. **g. For voltage lower than 69kV the minimum size of copper conductor to be used for metering instrument transformer grounding shall be 70 mm2.**	▪ To provide clarity on the application of the requirements for minimum size of equipment grounding. (The selected values were based on the prescribed minimum size in the Philippine Electrical Code. PEC in no case requires the equipment grounding conductor to be larger than the circuit conductors supplying the equipment) ▪ In reference to RCC-RESO-19-10 (19 July 2019)

[redacted]

Annex A

WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
			h. The minimum size of copper conductor to be used for the secondary circuits of instrument transformers shall be 3.5mm2. ~~g~~**i.** Connections to all bonded parts shall be made in accordance to Article 2.50.1.8 of the Philippine Electrical Code 2009 Part 1.	
Instrument Transformers	2.5	2.5.7. Current Transformer Requirements Current Transformers installed as the main metering shall adhere to the prevailing requirements of the Philippine Grid Code. The current specifications are provided as Appendix N of this Manual.	~~2.5.7. Current Transformer Requirements~~ ~~Current Transformers installed as the main metering shall adhere to the prevailing requirements of the Philippine Grid Code.~~ ~~The current specifications are provided as Appendix N of this Manual.~~	The revision is being proposed since it will be replaced by additional provision under Section 2.5.1.1 as approved by the RCC-RESO-19-10 (19 July 2019)
Instrument Transformers	2.5	2.5.8. Voltage Transformer Requirements Voltage Transformers installed as the main metering shall adhere to the prevailing requirements of the Philippine Grid Code. The current specifications are provided as Appendix O of this Manual.	~~2.5.8. Voltage Transformer Requirements~~ ~~Voltage Transformers installed as the main metering shall adhere to the prevailing requirements of the Philippine Grid Code.~~ ~~The current specifications are provided as Appendix O of this Manual.~~	The revision is being proposed since it will be replaced by additional provision under Section 2.5.1.1 as approved by the RCC-RESO-19-10 (19 July 2019)

[redacted]

Annex A

WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
Secondary Connections for Instrument Transformers	2.7	2.7.1.1. Size of Secondary Cabling The secondary cabling between the current transformers and the meter test switch/block shall be of a sufficient size that the rated burden for the IEC 0.2 or ANSI 0.3 accuracy class is not exceeded when current, equivalent to the rated current, flows in the secondary winding.	2.7.1.1. Size of Secondary Cabling The secondary cabling between the current transformers and the meter test switch/block shall be of a sufficient size that the rated burden ~~for the IEC 0.2 or ANSI 0.3~~ **specified in Sec. 2.5.4.1** accuracy class is not exceeded when current, equivalent to the rated current, flows in the secondary winding.	▪ The revision is being proposed to refer appropriate section of the WESM manual for amendment ▪ In reference to RCC-RESO-19-10 (19 July 2019)
Site Equipment Identification	Section 3	Section 3 Site Equipment Identification (SEIN)	Section 3. Site Equipment Identification **Label** (SEIL~~N~~)	▪ To change SEIN to SEIL, in all affected clause, as standard term for labelling Metering equipment, where L stands for Label. N stands for Number ▪ In reference to RCC-RESO-19-10 (19 July 2019)
Site Equipment Identification	3.2	General Procedures The assignment of the Site Equipment Identification Number (SEIN) shall be done by the Metering Service Provider. For embedded generators and load customers to be registered in the WESM, the responsibility to assign the SEIN is with the Market Operator.	General Procedures The assignment of the Site Equipment Identification **Label** ~~Number~~ (SEI**L**~~N~~)**, in general,** shall be done by the Metering Service Provider. **However,** for embedded generators ~~and load customers to be registered in the WESM~~, **with the concerned DU as their MSP,** the responsibility to assign the SEI**L**~~N~~ is with the Market Operator.	▪ To clarify responsibility in the assignment of SEIL. ▪ To recommend the use of SEIL instead of SEIN ▪ In reference to RCC-RESO-19-10 (19 July 2019)
Requirements for Registration	4.3		**4.3.5. All requests of the Trading Participant for clarifications and/or reconsideration concerning the**	▪ To provide additional provision to clarify the roles of the MSP and MO in

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Annex A

WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
of Metering Installations			**approval of registration of metering facility shall be addressed to the Market Operator for resolution.**	the registration of a metering facility to the WESM While the Metering Service Provider is responsible for the assessment and certification of readiness of a WESM Metering Facility, the approval of registration is within the jurisdiction and function of the Market Operator. ▪ In reference to RCC-RESO-19-10 (19 July 2019)
Performance Standards	9.5	Performance Standards	Performance Standards	▪ The revision is being proposed to provide a more reflective measure of the important deliverables of the MSP as far as monthly billing and settlement in the WESM is concerned. The re-allocation in the percent weight would provide more emphasis on the parameters which are relatively significant in the billing and settlement process which is the end goal of an effective metering services. ▪ In reference to RCC-RESO-19-10 (19 July 2019)

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Annex A

WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**

Provision

Performance Indicator	Category	Performance Measures	Percent Weight	Percent Passing
Service Delivery	Daily Meter Data Delivery	Number of metering installations successfully retrieved	25	95
	Integrity of Meter Data	Meter Data that passed the validation processes	25	95
	Timeliness and Percentage Resolution to the Daily Meter Trouble Report	Resolution to the Meter Trouble Report within 10 calendar days	15	90
	Timeliness and Percentage Resolution to the Monthly Meter Trouble Report	Resolution to the Meter Trouble Report within 2 business days	10	90
	Timeliness of Monthly Meter Data Delivery	Complete delivery of all meter data within 3 calendar days after the billing period.	15	100

Proposed Amendment

Performance Indicator	Category	Performance Measures	Percent Weight	Percent Passing
Service Delivery	Daily Meter Data Delivery	Number of metering installations successfully retrieved	~~25~~**15**	95
	Integrity of Meter Data	Meter Data that passed the validation processes	~~25~~**15**	95
	Timeliness and Percentage Resolution to the Daily Meter Trouble Report	Resolution to the Meter Trouble Report within 10 calendar days	15	90
	Timeliness and Percentage Resolution to the Monthly Meter Trouble Report	Resolution to the Meter Trouble Report within 2 business days	~~10~~**20**	90
	Timeliness of Monthly Meter Data Delivery	Complete delivery of all meter data within 3 calendar days after the billing period.	~~15~~**25**	100

[redacted]

Annex A

WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
Metering De-registration	10.0	10.3 Timeline for De-Registration The Metering Service Provider shall issue a notification to the Market Operator when de-registering a metering installation within the 15-day period before its actual disconnection. The Market Operator shall facilitate the processing of the deregistered metering installation and shall also inform the responsible groups of the de-registration of the same.	10.3 Timeline for De-Registration The Metering Service Provider shall issue a notification to the Market Operator when de-registering a metering installation within the 15-day period before its **<u>scheduled de-registration and/or</u>** actual disconnection. The Market Operator shall facilitate the processing of the deregistered metering installation and shall also inform the responsible groups of the de-registration of the same.	▪ The revision is being proposed for the inclusion of de-registration in the provision since not all de-registration requires actual disconnection In the case of totalization of metering facilities, the metered trading participants have the option to retain the downstream metering facilities, subject to MSP charge, to serve as check metering facilities. ▪ In reference to RCC-RESO-19-10 (19 July 2019)
Metering De-registration	10.0	10.5 Workflow for De-Registration of Metering Installation	10.5 Workflow for De-Registration of Metering Installation **<u>(See attached Workflow)</u>**	▪ To recommend deletion of steps involving the WESM Member initiating request for de-registration of MI. The MSP shall represent the WESM Member in the de-registration process (same as in the registration process in Section 4) Transactions between the WESM Member and the MSP is covered by Metering Service Agreements (MSA). ▪ In reference to RCC-RESO-19-10 (19 July 2019)

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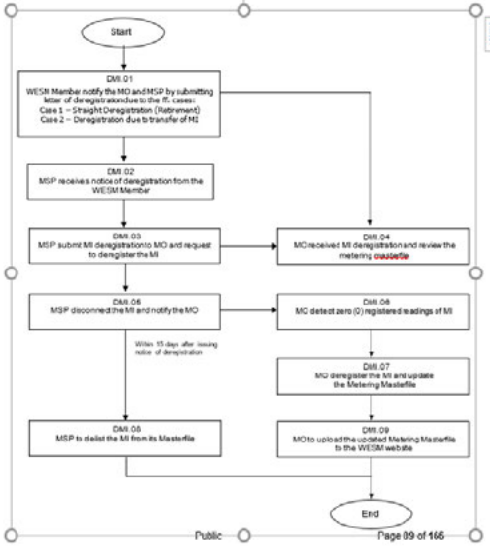
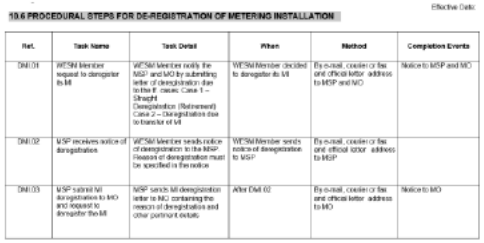
Annex A

WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
				
Metering De-registration	10.0	10.6 Procedural Steps for De-Registration of Metering Installation  Effective Date: 10.6 PROCEDURAL STEPS FOR DE-REGISTRATION OF METERING INSTALLATION Ref. | Task Name | Task Detail | When | Method | Completion Events DMI.01 | WESM Member request to deregister its MI | WESM Member notify the MSP and MO by submitting letter of deregistration due to the ff. cases: Case 1 – Straight Deregistration (Retirement) Case 2 – Deregistration due to transfer of MI | WESM Member decided to deregister its MI | By e-mail, courier or fax and official letter address to MSP and MO | Notice to MSP and MO DMI.02 | MSP receives notice of deregistration | WESM Member sends notice of deregistration to the MSP. Reason of deregistration must be specified in the notice | WESM Member sends notice of deregistration to MSP | By e-mail, courier or fax and official letter address to MSP | DMI.03 | MSP submit MI deregistration to MO and request to deregister the MI | MSP sends MI deregistration letter to MO containing the reason of deregistration and other pertinent details | After DMI.02 | By e-mail, courier or fax and official letter address to MO | Notice to MO	10.6 Procedural Steps for De-Registration of Metering Installation **(See attached Procedural Steps)**	▪ To provide detailed steps consistent with the proposed revisions on the workflow for de-registration ▪ In reference to RCC-RESO-19-10 (19 July 2019)

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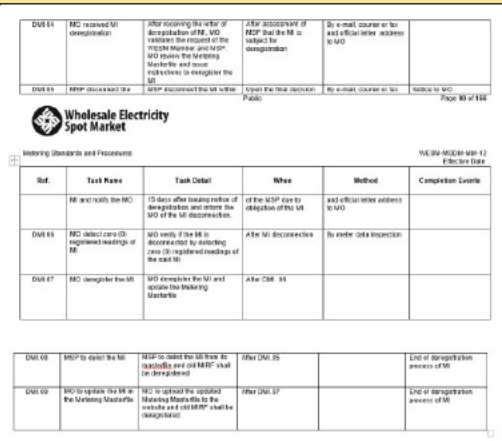
Annex A

WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
				
Appendices	Appendix C	Clause 4.4.3 If a Trading Participant is a Customer and also a Network Service Provider, the Trading Participant may register as a Metering Services Provider only for connection points that it does not own.	Clause 4.4.3 If a Trading Participant is a Customer and also a Network Service Provider, the Trading Participant may register as a Metering Services Provider only for connection points that it does not own. **<u>If there are no other party interested, capable and legally authorized to assume the role of the Metering Services Provider, the Network Service Provider may be permitted to act as the MSP provided that it has a valid Certificate of Authority as WESM MSP granted by the ERC</u>**	▪ To provide an option in case there are no willing, capable and ERC Certified MSP which can assume the role ▪ In reference to RCC-RESO-19-10 (19 July 2019)
Appendices	Appendix F	Meter Trouble Report Form	**(see attached Appendix F)**	▪ To update the old Meter Trouble Report Form

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WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
		APPENDIX F **METER TROUBLE REPORT FORM** Meter Trouble Report Form Completion Date (mm/dd/yyyy): GEIN: MDEF File Number: Substation: Initial Findings (Gap/Overlap/Uncertain): Actual Start Date (mm/dd/yyyy): Actual Start Time (hh:mm): Actual End Date (mm/dd/yyyy): Actual End Time (hh:mm): Initial Action Taken(Edit/Estimation): MSP Verification Remarks (Findings and Action Taken): Proposed Adjustment (Estimated Value): Report Close Date (mm/dd/yyyy): Note: Detailed Completion Report for submission within 48 Hours to MO. Market Operator (Signature over Printed Name) Meter Service Provider (Signature over Printed Name)		▪ In reference to RCC-RESO-19-10 (19 July 2019)
Instrument Transformers	2.5	2.5.3.2. Selection of Current Transformer Ratios Current transformer ratios shall be selected according to the following factors: c. 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 d. The minimum sustained primary current during normal operation shall not be less than 10% of the primary tap.	2.5.3.2. Selection of Current Transformer Ratios Current transformer ratios shall be selected according to the following factors: c. The maximum sustained primary current in a current transformer shall not exceed the **rated** primary ~~tap~~ **current** multiplied by the ~~primary~~ **current rating** factor of the current transformer; and	▪ To be consistent with the terms used by ANSI and IEC standards To consider the improvements in measurement range of new designs of extended range current transformers which can already measure down to 1% of rated current at guaranteed accuracy ▪ In reference to RCC-RESO-19-10 (19 July 2019)

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WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
			d. The minimum sustained primary current during normal operation shall not be less than ~~10% of the primary tap~~ **the lowest primary current that the current transformer can measure wherein the measurement accuracy is still guaranteed**	
SPECIFICATIONS FOR CURRENT TRANSFORMERS Burden	Appendix N	Shall not exceed the rated burden limit of 12.5 VA for the IEC 44-1 Class 0.2 /ANSI C57.13 Class 0.3 (see Table 1)	**Shall be based on the standard rated burden as specified in the latest revision of IEC 61869-2 or ANSI/IEEE C57.13, or their latest equivalent standards.**	To consider the latest revision of International Standard IEC 61869-2 (2012) which cancels and replaces the first edition of IEC 60044-1 published in 1996 and to update the term "ANSI" to "IEEE". Installation of a higher accuracy and functionality than the standards set by the PGC and WESM and its conformance to IEC and IEEE standards are supported by Sections 2.1.1 and 2.5.4.1 of WESM Metering Standards and Procedures which is also consistent with PEMC-TC's opinion issued last April 2019 to Mactan Electric Corp. in which "the TC is of the opinion that the specifications of MECO's current transformer comply with the metering accuracy class of 0.3 as well as the rated burden of B-1 (25VA), which is higher and therefore better than the burden B-0.2 (5VA) specified in PGC Appendix 2." Refer to the attached letter (Annex "A").

Annex A

WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
				Refer also to the attached Factory Test Reports (FAT) and MERALCO acceptance tests that certifies that the CT maintains its accuracy within specified limits when tested at different primary current and burden. Factory Test Reports (FAT) also certifies that it conforms to IEC 61869-1, IEC 61869-2 and IEEE C57.13 Standard requirements. The rules change should also be reflected in the WESM Metering Standards and Procedures Issue 12.0, Appendix "N".
SPECIFICATIONS FOR TRANSMISSION REVENUE METERS	APPENDIX L	[See attached Annex B]	[See attached Annex B]	Document Reference for consistency with the Philippine Grid Code 2016 Edition
SPECIFICATIONS FOR REVENUE METERS FOR EMBEDDED GENERATORS REGISTERED AS WESM PARTICIPANTS	APPENDIX M	[See attached Annex B]	[See attached Annex B]	Document Reference for consistency with the Philippine Distribution Code 2016 Edition

[redacted]

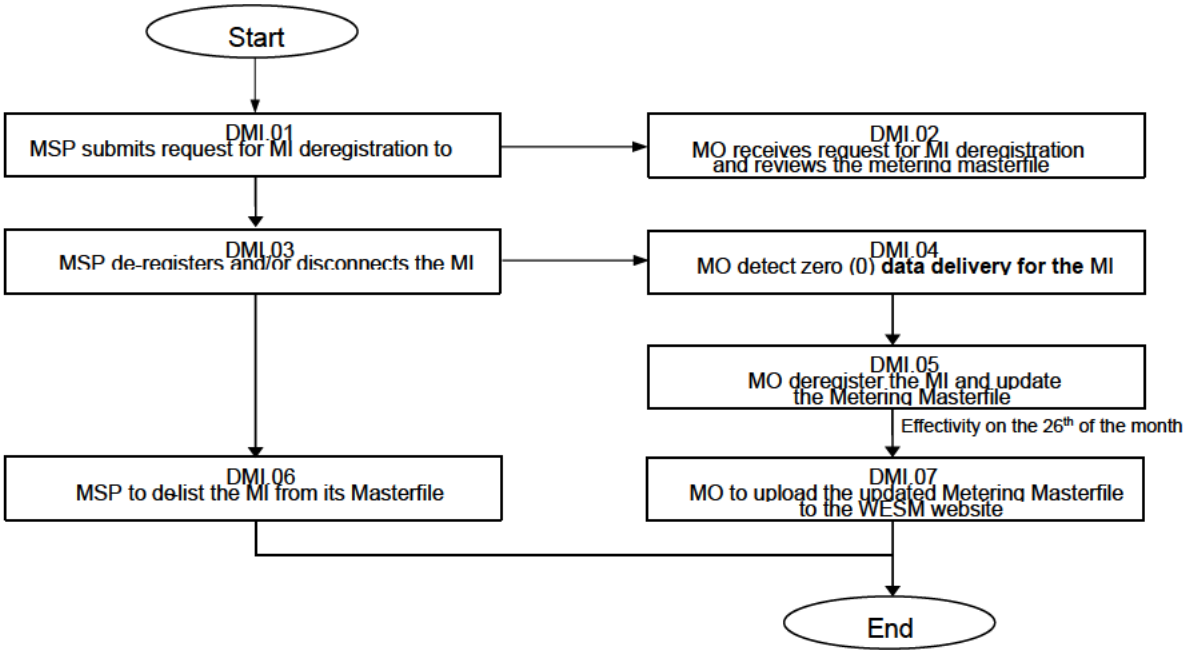
Annex A

WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)				
Title	**Clause**	**Provision**	**Proposed Amendment**	**Rationale**
SPECIFICATIONS FOR CURRENT TRANSFORMERS	APPENDIX N	[See attached Annex B]	[See attached Annex B]	Document Reference for consistency with the Philippine Grid Code 2016 Edition
SPECIFICATIONS FOR VOLTAGE TRANSFORMERS	APPENDIX O	[See attached Annex B]	[See attached Annex B]	Document Reference for consistency with the Philippine Grid Code 2016 Edition

[redacted]

Annex A

Workflow for De-Registration of Metering Installation



Annex A

Procedural Steps for De-Registration of Metering Installation

Ref.	Task Name	Task Detail	When	Method	Completion Events
~~DMI.01~~	~~WESM Member request to deregister its MI~~	~~WESM Member notify the MSP and MO by submitting letter of deregistration due to the ff. cases:~~ ~~Case 1 – Straight Deregistration (Retirement)~~ ~~Case 2 – Deregistration due to transfer of MI~~	~~WESM Member decided to deregister its MI~~	~~By e-mail, courier or fax and official letter address to MSP and MO~~	~~Notice to MSP and MO~~
~~DMI.02~~	~~MSP receives notice of deregistration~~	~~WESM Member sends notice of deregistration to the MSP. Reason of deregistration must be specified in the notice~~	~~WESM Member sends notice of deregistration to MSP~~	~~By e-mail, courier or fax and official letter address to MSP~~	
DMI.01 ~~DMI.03~~	MSP submit**s request for** MI deregistration to MO and request to deregister the MI	MSP sends MI deregistration letter to MO containing the reason of deregistration and other pertinent details **including the schedule of deregistration.**	**After reaching an agreement with the WESM member to de-register the MI** ~~After DMI.02~~	By e-mail, courier or fax and official letter address to MO	Notice to MO
DMI.02 ~~DMI.04~~	MO receive~~d~~**s** MI deregistration	After receiving the letter of deregistration of MI, MO ~~validates~~ reviews the request of the ~~WESM Member through the~~ MSP. MO review the Metering Masterfile and issue instructions to deregister the MI	~~After assessment of MSP that the MI is subject for deregistration~~ **After DMI. 01**	By e-mail, courier or fax and official letter address to MO	

Annex A

Ref.	Task Name	Task Detail	When	Method	Completion Events
DMI.03 ~~DMI.05~~	MSP **de-registers and/or** disconnect**s** the MI and notify the MO	MSP **de-registers and/or** disconnect**s** the MI **on the agreed schedule.** ~~within 15 days after issuing notice of deregistration and inform the MO of the MI disconnection.~~ **MSP to cease sending of data of de-registered MI to the MO**	**At the agreed de-registration or disconnection schedule**	~~**By e-mail, courier or fax and official letter address to MO**~~	~~**Notice to MO**~~
DMI.04 ~~DMI.06~~	MO detect zero (0) ~~registered readings of~~ **data delivery for the MI**	MO verify if the MI **is de-registered and/or disconnected** by detecting zero (0) ~~registered readings of~~ **data delivery for** the said MI	After MI **de-registration and/or** disconnection	By meter data inspection	
DMI.05 ~~DMI.07~~	MO deregister**s** the MI	MO deregister the MI and update the Metering Masterfile **Effectivity of de-registration to the market shall be on the 26th of the month following the actual de-registration or disconnection of the WESM Member by the MSP under DMI.03**	After **DMI.04** ~~DMI.06~~		
DMI.06 ~~DMI.08~~	MSP to delist the MI	MSP to delist the MI from its masterfile and old MIRF shall be deregistered	After **DMI.05** ~~DMI.07~~		End of deregistration process of MI
DMI.07 ~~DMI.09~~	MO to update the MI in the Metering Masterfile	MO to upload the updated Metering Masterfile to the website and old MIRF shall be deregistered	After **DMI.06** ~~DMI.08~~		End of deregistration process of MI

Appendix F

METER TROUBLE REPORT FORM

Day, Month Date, Year	MTR SUMMARY				TOTAL MTR:	63	TOTAL REMAINING MTR:		REMARKS
					INC DATA	3	INC DATA		
MTR_2019-02-13_(1ST ISSUE)	TD	TOTAL DATA	TM	TOTAL MISSING	INC DATA & UNCERTAIN	1	INC DATA & UNCERTAIN		
					NO DATA	45	NO DATA		
					UNCERTAIN	14	UNCERTAIN		

			KWH DEL			KVARH DEL			KWH REC			KVARH REC			REMARKS		REMARKS	
No.	TP NAME	SEIN	TD	TM	TU	TD	TM	TU	TD	TM	TU	TD	TM	TU	WESM		MSG	CLOSED/C
1					■			■			■			■				
2				■			■			■			■					
3					■			■			■			■				
4				■			■			■			■					
5					■			■			■			■				
6				■			■			■			■					
7				■			■			■			■					
8				■			■			■			■					
9				■			■			■			■					
10				■			■			■			■					
11				■			■			■			■					
12				■			■			■			■					
13				■			■			■			■					
14				■			■			■			■					
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63				■			■											

[redacted]

Annex B: Amendments to the Reference Documents

Proposed Amendment on the WESM Manual on Metering Standards and Procedures regarding Current Transformer Requirements

WESM Manual on Metering Standards and Procedures Issue 11.0

Provision

2.4.1. Requirements for Grid Revenue Meters

Meters installed as the main revenue meter, shall meet the minimum requirements listed below:

ITEMS	SPECIFICATIONS	REFERENCE DOCUMENTS
Accuracy Class	IEC 687 Class 0.2 / ANSI 12.20 Class 0.3 or better	Grid Code 9.3.3.1
No. of Stator	Blondel's Theorem compliant / 3-element	
Rating	115V 1 A or 5 A 60 Hz	The rating should be suitable to the secondary rating of the instrument transformers.
No. of Quadrants (Measurement)	Active Energy/Power Measurement: Bi-directional Reactive Power Measurement: 4 Quadrant	Grid Code 9.3.3.2
Interval Data	Programmable to 1, 5, 15, 30, and 60 minute interval	Grid Code 9.3.4.1
No. of Channels	At least eight (8)	Grid Code 9.2.4.1 Grid Code 9.2.4.2
Mass Memory	Minimum 60 day recording of a 5-minute time-stamped demand interval for 8 recording channels	WESM 4.5.1 (g) Grid Code 9.3.4.3 Grid Code 9.2.5.3
Billing Function	The meter shall be capable of measuring and recording the following electrical parameters per billing interval: • Kwh (Delivered) • Kwh (Received)	Grid Code 9.2.4.1 Grid Code 9.2.4.2 Grid Code 9.3.3.1 Grid Code 9.3.3.2 Grid Code 9.5.4

Proposed Amendment

2.4.1. Requirements for Grid Revenue Meters

Meters installed as the main revenue meter, shall meet the minimum requirements listed below:

ITEMS	SPECIFICATIONS	REFERENCE DOCUMENTS
Accuracy Class	IEC 687 Class 0.2 / ANSI 12.20 Class 0.3 or better	~~Grid Code 9.3.3.1~~ **PGC 2016 GRM 9.2.3.3**
No. of Stator	Blondel's Theorem compliant / 3-element	**PGC 2016 GRM 9.2.2.1**
Rating	115V 1 A or 5 A 60 Hz	The rating should be suitable to the secondary rating of the instrument transformers.
No. of Quadrants (Measurement)	Active Energy/Power Measurement: Bi-directional Reactive Power Measurement: 4 Quadrant	~~Grid Code 9.3.3.2~~ **PGC 2016 GRM 9.2.2.2** **PGC 2016 GRM 9.2.3.3**
Interval Data	Programmable to 1, 5, 15, 30, and 60 minute interval	~~Grid Code 9.3.4.1~~ **PGC 2016 GRM 9.2.3.3**
No. of Channels	At least eight (8)	~~Grid Code 9.2.4.1~~ ~~Grid Code 9.2.4.2~~ **PGC 2016 GRM 9.2.2.2** **PGC 2016 GRM 9.2.3.3**
Mass Memory	Minimum 60 day recording of a 5-minute time-stamped demand interval for 8 recording channels	WESM 4.5.1 (g) ~~Grid Code 9.3.4.3~~ ~~Grid Code 9.2.5.3~~ **PGC 2016 GRM 9.2.3.3**

Annex B: Amendments to the Reference Documents

WESM Manual on Metering Standards and Procedures Issue 11.0					
Provision			**Proposed Amendment**		
	• Kvarh (Quadrant 1) • Kvarh (Quadrant 2) • Kvarh (Quadrant 3) • Kvarh (Quadrant 4) • Kvah (Delivered) • Kvah (Received) • Max Kw (Delivered) • Max Kw (Received) • Kvar (Quadrant 1) • Kvar (Quadrant 2) • Kvar (Quadrant 3) • Kvar (Quadrant 4) • Kva (Delivered) • Kva (Received) A. Power Factor • Frequency • Per Phase Current • Per Phase Voltage	Grid Code 9.5.5	Billing Function	The meter shall be capable of measuring and recording the following electrical parameters per billing interval: • Kwh (Delivered) • Kwh (Received) • Kvarh (Quadrant 1) • Kvarh (Quadrant 2) • Kvarh (Quadrant 3) • Kvarh (Quadrant 4) • Kvah (Delivered) • Kvah (Received) • Max Kw (Delivered) • Max Kw (Received) • Kvar (Quadrant 1) • Kvar (Quadrant 2) • Kvar (Quadrant 3) • Kvar (Quadrant 4) • Kva (Delivered) • Kva (Received) A. Power Factor • Frequency • Per Phase Current • Per Phase Voltage	~~Grid Code 9.2.4.1~~ ~~Grid Code 9.2.4.2~~ ~~Grid Code 9.3.3.1~~ ~~Grid Code 9.3.3.2~~ ~~Grid Code 9.5.4~~ ~~Grid Code 9.5.5~~ **PGC 2016 GRM 9.2.2.2** **PGC 2016 GRM 9.2.3.3**
Loss Compensation	A flexible transformer loss compensation for both copper and iron losses and transmission/ distribution line loss compensation with a simple user set-up for Site Specific adjustments. Losses can be measured and segregated separately from other billing parameters.	Grid Code 9.2.3.1 WESM 4.5.2.2	Loss Compensation	A flexible transformer loss compensation for both copper and iron losses and transmission/ distribution line loss compensation with a simple user set-up for Site Specific adjustments. Losses can be measured and segregated separately from other billing parameters.	~~Grid Code 9.2.3.1~~ **WESM 4.5.2.2**
Security	The meter shall have provisions for securing the meter data, meter configurations and programs by electronic means and/or passwords. It shall also be secured physically by way of security seals.	WESM 4.5.6 Grid Code 9.4.5	Security	The meter shall have provisions for securing the meter data, meter configurations and programs by	WESM 4.5.6 ~~Grid Code 9.4.5~~ **PGC 2016 GRM 9.3.8.1**

Annex B: Amendments to the Reference Documents

WESM Manual on Metering Standards and Procedures Issue 11.0					
Provision			**Proposed Amendment**		
Communication Capability	The meter shall have at least minimum of three (3) independent communication ports that could operate independently. Each port can communicate simultaneously, with each one using a different protocol. It should be capable of a two-way communication.	WESM 4.5.7.1 WESM 4.5.1(c) Grid Code 9.3.4.2 Grid Code 9.5.1.1 Grid Code 9.5.1.4		electronic means and/or passwords. It shall also be secured physically by way of security seals.	**PGC 2016 GRM 9.3.8.2** **PGC 2016 GRM 9.3.8.3**
Internal Clock	The meter shall have an internal clock with an allowable error of +/-1 second per demand interval.	WESM 4.5.8.1 Grid Code 9.3.4.4	Communication Capability	The meter shall have at least minimum of three (3) independent communication ports that could operate independently. Each port can communicate simultaneously, with each one using a different protocol. It should be capable of a two-way communication.	WESM 4.5.7.1 WESM 4.5.1(c) ~~Grid Code 9.3.4.2~~ ~~Grid Code 9.5.1.1~~ ~~Grid Code 9.5.1.4~~ **PGC 2016 GRM 9.2.3.3**
Time Synchronization	Line frequency or crystal synchronization. The internal clock shall be capable of being reset set by the data collection software during normal collection operations.	WESM 4.5.8.1 Grid Code 9.3.4.4	Internal Clock	The meter shall have an internal clock with an allowable error of +/-1 second per demand interval.	WESM 4.5.8.1 ~~Grid Code 9.3.4.4~~ **PGC 2016 GRM 9.2.3.3**
Digital Display	The meter shall have a digital display with a minimum of 5 digits.	WESM 4.5.1 (c) Grid Code 9.3.3.1	Time Synchronization	Line frequency or crystal synchronization. The internal clock shall be capable of being reset set by the data collection software during normal collection operations.	WESM 4.5.8.1 ~~Grid Code 9.3.4.4~~ **PGC 2016 GRM 9.2.3.3**
Codes and Standards Compliance	The meter shall adhere to established International Standards (IEC, etc.).	Grid Code 9.3.3.1	Digital Display	The meter shall have a digital display with a minimum of 5 digits.	WESM 4.5.1 (c) **PGC 2016 GRM 9.2.3.3**
Applicable and Compliance Tests	These tests shall include material tests and established practice and/or other approved standards. Routine tests prescribed by the applicable standards shall be performed. In particular, the following tests shall be performed for the revenue meters: a. Power frequency tests (insulation) b. Impulse voltage test (insulation). c. HF interference test d. Surge withstand and fast transient tests	Grid Code 9.3.3.3. IEC 255-1 IEC 255-A (Class III) IEC 245-4	Codes and Standards Compliance	The meter shall adhere to established International Standards (IEC, etc.).	~~Grid Code 9.3.3.1~~ **PGC 2016 GCR 4.2.10**
			Applicable and Compliance Tests	These tests shall include material tests and established practice and/or other approved standards. Routine tests prescribed by the applicable standards shall be performed. In particular, the following tests shall be performed for the revenue meters: a. Power frequency tests (insulation) b. Impulse voltage test (insulation). c. HF interference test	**PGC 2016 GRM 9.2.5.2** **PGC 2016 GRM 9.2.5.3** **PGC 2016 GRM 9.2.8.1** ~~Grid Code 9.3.3.3.~~ IEC 255-1 IEC 255-A (Class III) IEC 245-4

WESM Manual on Metering Standards and Procedures Issue 11.0

Provision

Battery	Capable of retaining readings and time of day for at least two days without external power source	Grid Code 9.2.5.3 Grid Code 9.3.3.2 WESM 4.5.1 (g)
Enclosure	The meter shall be provided with the necessary cover to protect the internal component against the harmful elements of environment that may affect its measuring circuit and operation.	ANSI 12.1 4.3.4

2.4.2. Requirements for Distribution Revenue Meter

Meters installed as the main revenue meter, shall meet the minimum requirements listed below:

ITEMS	SPECIFICATIONS	REFERENCE DOCUMENTS
Accuracy Class	IEC 687 Class 0.2 / ANSI 12.20 Class 0.3 or better	IEC 687 4.6
No. of Stator	Corresponds to the service type and complying with Blondell's Theorem	Dist. Code 8.4.3.1 ANSI C12.1
Voltage Rating	Corresponds to the secondary voltage rating of voltage transformers used	Dist. Code 5.5.1.1
Current Rating	Corresponds to the secondary current rating of current transformers used (typically 1A or 5A)	ANSI or IEC Standard
Frequency	60 Hz	Dist. Codes 3.2.2.1 -
Measurement	Bi-directional active metering (delivered & received) and 4-quadrant reactive metering	Dist Codes 8.3.3.1 Dist. Codes 8.3.4.2 Dist. Code 8.4.3.2
Interval Data	Programmable to 5, 15, 30 minute interval	Dist. Code 8.4.4.1

Proposed Amendment

	d. Surge withstand and fast transient tests	
Battery	Capable of retaining readings and time of day for at least two days without external power source	**PGC 2016 GRM 9.2.3.3** ~~Grid Code 9.2.5.3~~ ~~Grid Code 9.3.3.2~~ WESM 4.5.1 (g)
Enclosure	The meter shall be provided with the necessary cover to protect the internal component against the harmful elements of environment that may affect its measuring circuit and operation.	ANSI 12.1 4.3.4 **PGC 2016 GRM 9.2.2.3** **PGC 2016 GRM 9.2.2.4** **PGC 2016 GRM 9.3.8**

2.4.2 Requirements for Distribution Revenue Meter

Meters installed as the main revenue meter, shall meet the minimum requirements listed below:

ITEMS	SPECIFICATIONS	REFERENCE DOCUMENTS
Accuracy Class	IEC 687 Class 0.2 / ANSI 12.20 Class 0.3 or better	IEC 687 4.6 **PDC 2016 7.2.7**
No. of Stator	Corresponds to the service type and complying with Blondell's Theorem	**PDC 2016 7.2.7** ~~Dist. Code 8.4.3.1~~ ANSI C12.1
Voltage Rating	Corresponds to the secondary voltage rating of voltage transformers used	~~Dist. Code 5.5.1.1~~ **PDC 2016 7.2.7**
Current Rating	Corresponds to the secondary current rating of current transformers used (typically 1A or 5A)	ANSI or IEC Standard **PDC 2016 7.2.7**
Frequency	60 Hz	~~Dist. Codes 3.2.2.1 -~~ **PDC 2016 7.2.7**

Annex B: Amendments to the Reference Documents

WESM Manual on Metering Standards and Procedures Issue 11.0					
Provision			**Proposed Amendment**		
No. of Channels	At least Six (6) Channels	This satisfies the minimum requirements as stated under: Dist. Codes 8.3.3.2 Dist. Codes 8.3.4.3	Measurement	Bi-directional active metering (delivered & received) and 4-quadrant reactive metering	~~Dist Codes 8.3.3.1~~ ~~Dist. Codes 8.3.4.2~~ ~~Dist. Code 8.4.3.2~~ **PDC 2016 7.2.7**
Mass Memory	At least 60 days	Dist Code 8.3.5.3	Interval Data	Programmable to 5, 15, 30 minute interval	~~Dist. Code 8.4.4.1~~ **PDC 2016 7.2.7**
Recording Billing Quantities	Display and record TOU energy and power parameters (kWh, kVarh, max. kW & cum. kW) for all rates	Dist. Code 8.4.3.1	No. of Channels	At least Six (6) Channels	This satisfies the minimum requirements as stated under: ~~Dist. Codes 8.3.3.2~~ ~~Dist. Codes 8.3.4.3~~ **PDC 2016 7.2.7**
Loss Compensation (if applicable)	A flexible transformer loss compensation for both copper and iron losses and transmission/ distribution line loss compensation with a simple user set-up for Site Specific adjustments. Losses can be measured and segregated separately from other billing parameters.	WESM 4.5.2.2	Mass Memory	At least 60 days	~~Dist Code 8.3.5.3~~ **PDC 2016 7.2.7**
Security	The meter shall have provisions for securing the meter data, meter configurations and programs by electronic means and/or passwords. It shall also be secured physically by way of security seals.	WESM 4.5.6	Recording Billing Quantities	Display and record TOU energy and power parameters (kWh, kVarh, max. kW & cum. kW) for all rates	~~Dist. Code 8.4.3.1~~ **PDC 2016 7.2.7**
Communication Capability	The meter shall be equipped with a means of communication channel capable of electronic data transfer. Either an integrated telephone modem, and/or RS-232 communication port for interface to an external communication medium are considered acceptable.	WESM 4.5.7.1 WESM 4.5.1(c) Dist. Code 8.4.4.2	Loss Compensation (if applicable)	A flexible transformer loss compensation for both copper and iron losses and transmission/ distribution line loss compensation with a simple user set-up for Site Specific adjustments. Losses can be measured and segregated separately from other billing parameters.	WESM 4.5.2.2
Internal Clock/Battery	With long life lithium battery for clock/ calendar maintenance	WESM 4.5.8.1 Dist Code 8.4.4.6	Security	The meter shall have provisions for securing the meter data, meter configurations and programs by electronic means and/or passwords. It shall also be secured physically by way of security seals.	WESM 4.5.6 **PDC 2016 7.4.7**
Time Synchronization	The meter can be programmed to synchronize time without change in measured billing parameters.		Communication Capability	The meter shall be equipped with a means of communication channel capable of electronic data transfer.	WESM 4.5.7.1 WESM 4.5.1(c) ~~Dist. Code 8.4.4.2~~

WESM Manual on Metering Standards and Procedures Issue 11.0

Provision

Digital Display	The meter shall have a digital display with a minimum of 5 digits.	WESM 4.5.1 (c) Dist Code 8.4.3.1
Codes and Standards Compliance	The meter shall adhere to the IEC Standards or their equivalent national standards for metering	
Enclosure	The meter shall be provided with the necessary cover to protect the internal component against the harmful elements of environment that may affect its measuring circuit and operation.	ANSI 12.1 4.3.4

xxx

2.5.7. Current Transformer

Current Transformer installed as the main metering, shall meet the minimum requirements listed below:

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	IEC 44-1 Class 0.2 /ANSI C57.13 Class 0.3 or better	Grid Code 9.3.2.1
Burden	Shall not exceed the rated burden limit of 12.5 VA for the IEC 44-1 Class 0.2 /ANSI C57.13 Class 0.3 (see Table 1)	Grid Code 9.3.2.2 Grid Code 9.4.1.2
Rated Primary Current	The thermal rating factor shall not be less than 1.0.	

Proposed Amendment

	Either an integrated telephone modem, and/or RS-232 communication port for interface to an external communication medium are considered acceptable.	**PDC 2016 7.2.7**
Internal Clock/Battery	With long life lithium battery for clock/ calendar maintenance	WESM 4.5.8.1 ~~Dist Code 8.4.4.6~~ PDC 2016 7.2.1
Time Synchronization	The meter can be programmed to synchronize time without change in measured billing parameters.	
Digital Display	The meter shall have a digital display with a minimum of 5 digits.	WESM 4.5.1 (c) ~~Dist Code 8.4.3.1~~ **PDC 2016 7.2.7**
Codes and Standards Compliance	The meter shall adhere to the IEC Standards or their equivalent national standards for metering	IEC, ANSI/IEEE **PDC 2016 7.2.7**
Enclosure	The meter shall be provided with the necessary cover to protect the internal component against the harmful elements of environment that may affect its measuring circuit and operation.	ANSI 12.1 4.3.4

xxx

2.5.7. Current Transformer

Current Transformer installed as the main metering, shall meet the minimum requirements listed below:

ITEMS	SPECIFICATIONS	REFERENCE DOCUMENTS
Type	Outdoor Type; Minimum oil filled, Dry Type or Gas-filled	

WESM Manual on Metering Standards and Procedures Issue 11.0

Provision

Secondary Current	1A or 5A	Grid Code 9.3.2.2 IEC 4.2 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	IEC 3.2.1 1996
BIL	Refer to Table 2 for applicable BIL	
Creepage Distance	Refer to Table 3 for applicable creepage distance	
Number of Core	Preferably Two (2) metering core	Grid Code 9321 Grid Code 9.3.2.2
Mounting	Depend on the applications	
Grounding		Grid Code 9.3.2.2
Security	Seal holder shall be provided to the CT secondary terminal box (see Figure 1)	Grid Code 9.4.5 Meter Equipment Security .

2.5.8. Voltage Transformer

Voltage Transformer installed as the main metering, shall meet the minimum requirements listed below:

ITEMS	SPECIFICATIONS	REFERENCE DOCUMENTS
Type	Outdoor Type; Minimum oil filled, Dry Type or Gas-filled	
Cooling	Oil immersed, Self-cooled; Butyl, Cast resin	

Proposed Amendment

Cooling	Oil immersed, Self-cooled; Butyl, Cast resin	
Construction	Single phase, wound type, free standing	
Accuracy Class	IEC 44-1 Class 0.2 /ANSI C57.13 Class 0.3 or better	~~Grid Code 9.3.2.1~~ **PGC 2016 GRM 9.2.3.2**
Burden	~~Shall not exceed the rated burden limit of 12.5 VA for the IEC 44-1 Class 0.2 /ANSI C57.13 Class 0.3 (see Table 1)~~ **Shall be based on the standard rated burden as specified in the latest revision of IEC 61869-2 or ANSI/IEEE C57.13, or their latest equivalent standards.**	~~Grid Code 9.3.2.2~~ ~~Grid Code 9.4.1.2~~ **PGC 2016 GRM 9.2.3.2**
Rated Primary Current	The thermal rating factor shall not be less than 1.0.	
Secondary Current	1A or 5A	~~Grid Code 9.3.2.2~~ **PGC 2016 GRM 9.2.3.2** IEC 4.2 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	IEC 3.2.1 1996
BIL	Refer to Table 2 for applicable BIL	
Creepage Distance	Refer to Table 3 for applicable creepage distance	
Number of Core	Preferably Two (2) metering core	~~Grid Code 9321~~ ~~Grid Code 9.3.2.2~~ **PGC 2016 GRM 9.2.3.2**
Mounting	Depend on the applications	

WESM Manual on Metering Standards and Procedures Issue 11.0

Provision

Construction	Single phase, Inductive type, single bushing	
Termination	Line-to-ground	Grid Code 9.3.1.
Accuracy Class	IEC 6044-2 Class 0.2 /ANSI C57.13 Class 0.3 or better	Grid Code 9.3.1.1 .
Burden	Shall not exceed the rated burden limit for the IEC 6044-2 Class 0.2 /ANSI C57.13 Class 0.3 or better. (see Table 4)	Grid Code 9.4.1.2
Ratio	See Table 5	
Secondary Voltage	See Table 5	
Frequency	60 Hz	
Operating Temperature	55°C average ambient temperature, with max ambient temperature not exceeding 65°C	
BIL	Refer to Table 2 for applicable BIL	
Creepage distance	Refer to Table 3 for applicable creepage distance	
Number of Core	Preferably Two (2)	
Mounting	Depend on the applications	
Grounding		Grid Code 9.3.1.1
Security	Seal holder shall be provided to the CT secondary terminal box (see Figure 1)	Grid Code 9.4.5 Meter Equipment Security

Proposed Amendment

Grounding		~~Grid Code 9.3.2.2~~ **PGC 2016 GCR 4.4.1.3.2** **PGC GRM 9.2.2.1 (g)**
Security	Seal holder shall be provided to the CT secondary terminal box (see Figure 1)	~~Grid Code 9.4.5 Meter Equipment Security~~ **PGC 2016 GRM 9.3.8.2** **PGC 2016 GRM 9.2.4.1**

2.5.8. Voltage Transformer

Voltage Transformer installed as the main metering, shall meet the minimum requirements listed below:

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, Inductive type, single bushing	
Termination	Line-to-ground	~~Grid Code 9.3.1.~~ **PGC 2016 GRM 9.2.3.1** **PGC 2016 GCR 4.4.1.3**
Accuracy Class	IEC 6044-2 Class 0.2 /ANSI C57.13 Class 0.3 or better	~~Grid Code 9.3.1.1 .~~ **PGC 2016 GRM 9.2.3.1**
Burden	~~Shall not exceed the rated burden limit for the IEC 6044-2 Class 0.2 /ANSI C57.13 Class 0.3 or better. (see Table 4)~~ **Shall be compliant to the IEC 61869-3 or ANSI C57.13 Standard (or the latest version/s)**	~~Grid Code 9.4.1.2~~ **PGC 2016 GRM 9.2.3.1**
Ratio	See Table 5	

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Secondary Voltage	See Table 5	
Frequency	60 Hz	
Operating Temperature	55°C average ambient temperature, with max ambient temperature not exceeding 65°C	
BIL	Refer to Table 2 for applicable BIL	
Creepage distance	Refer to Table 3 for applicable creepage distance	
Number of Core	Preferably Two (2)	
Mounting	Depend on the applications	
Grounding		~~Grid Code 9.3.1.1~~ **PGC 2016 GCR 4.4.1.3.2** **PGC GRM 9.2.2.1 (g)**
Security	Seal holder shall be provided to the CT secondary terminal box (see Figure 1)	~~Grid Code 9.4.5 Meter Equipment Security~~ **PGC 2016 GRM 9.3.8.2** **PGC 2016 GRM 9.2.4.1**

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Provision

APPENDIX L

SPECIFICATIONS FOR TRANSMISSION REVENUE METERS

ITEMS	SPECIFICATIONS		REFERENCE DOCUMENTS
	MAIN METER	BACK- UP METER	
Accuracy Class	IEC 687 Class 0.2 / ANSI 12.20 Class 0.3 or better	Same as the main meter	Grid Code 9.2.3.3
No. of Stators	Blondel's Theorem compliant /3-element	Same as the main meter	Grid Code 9.2.2.1
Rating	115V 1 A or 5 A 60 Hz	Same as the main meter	The rating should be suitable to the secondary rating of the instrument transformers.
No. of Quadrants (Measurement)	Active Energy/Power Measurement: Bi-directional Reactive Power Measurement: 4 Quadrant	Bi-directional or as required by its application	Grid Code 9.2.2.2 Grid Code 9.2.3.3
Interval Data	Programmable to 1, 5, 15, 30, and 60 minute interval	Same as the main meter	Grid Code 9.2.3.3
No. of Channels	The 8-channels are as follows: 1. KWH (Delivered) 2. KWH (Received) 3. KVARH (Quadrant 1) 4. KVARH (Quadrant 2) 5. KVARH (Quadrant 3) 6. KVARH (Quadrant 4) 7. KVAH (Delivered) 8. KVAH (Received)	Minimum requirements of 4 channels as follows: 1. KWH (Delivered) 2. KWH (Received) 3. KVARH (Quadrant 1) 4. KVARH (Quadrant 2)	Grid Code 9.2.2.2 Grid Code 9.2.3.2
Mass Memory	Minimum 60 day recording of a 5-minute time-	Same as main meter	WESM 4.5.1 (g) Grid Code 9.2.3.3

Proposed Amendment

APPENDIX L

SPECIFICATIONS FOR TRANSMISSION REVENUE METERS

ITEMS	SPECIFICATIONS		REFERENCE DOCUMENTS
	MAIN METER	BACK- UP METER	
Accuracy Class	IEC 687 Class 0.2 / ANSI 12.20 Class 0.3 or better	Same as the main meter	**PGC 2016 GRM 9.2.3** ~~Grid Code 9.2.3.3~~
No. of Stators	Blondel's Theorem compliant /3-element	Same as the main meter	**PGC 2016 GRM 9.2.2.1** ~~Grid Code 9.2.2.1~~
Rating	115V 1 A or 5 A 60 Hz	Same as the main meter	The rating should be suitable to the secondary rating of the instrument transformers.
No. of Quadrants (Measurement)	Active Energy/Power Measurement: Bi-directional Reactive Power Measurement: 4 Quadrant	Bi-directional or as required by its application	~~Grid Code 9.2.2.2~~ ~~Grid Code 9.2.3.3~~ **PGC 2016 GRM 9.2.2.2** **PGC 2016 GRM 9.2.3.3**
Interval Data	Programmable to 1, 5, 15, 30, and 60 minute interval	Same as the main meter	~~Grid Code 9.2.3.3~~ **PGC 2016 GRM 9.2.3.3**
No. of Channels	The 8-channels are as follows: 9. KWH (Delivered) 10. KWH (Received) 11. KVARH (Quadrant 1) 12. KVARH (Quadrant 2) 13. KVARH (Quadrant 3) 14. KVARH (Quadrant 4) 15. KVAH (Delivered)	Minimum requirements of 4 channels as follows: 1. KWH (Delivered) 2. KWH (Received) 3. KVARH (Quadrant 1) 4. KVARH (Quadrant 2)	~~Grid Code 9.2.2.2~~ ~~Grid Code 9.2.3.2~~ **PGC 2016 GRM 9.2.2.2** **PGC 2016 GRM 9.2.3.3**

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WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)							
Provision				**Proposed Amendment**			
	stamped demand interval for 8 recording channels				16. KVAH (Received)		
Meter Registers	The meter shall be capable of measuring, registering and recording the following electrical parameters per dispatch interval: • KWH (Delivered) • KWH (Received) • KVARH (Quadrant 1) • KVARH (Quadrant 2) • KVARH (Quadrant 3) • KVARH (Quadrant 4) • KVAH (Delivered) • KVAH (Received) • Max KW (Delivered) • Max KW (Received) • Power Factor • Frequency • Per Phase Current • Per Phase Voltage	Minimum requirements • KWH (Delivered) • KWH (Received) • KVARH (Quadrant 1) • KVARH (Quadrant 2) • KVARH (Quadrant 3) • KVARH (Quadrant 4) • KVAH (Delivered) • KVAH (Received) • Max KW (Delivered) • Max KW (Received)	Grid Code 9.2.2.2 Grid Code 9.2.3.3	Mass Memory	Minimum 60 day recording of a 5-minute time-stamped demand interval for 8 recording channels	Same as main meter	WESM 4.5.1 (g) ~~Grid Code 9.2.3.3~~ **PGC 2016 GRM 9.2.3.3**
Loss Compensation	Optional	Optional	WESM 4.5.2.2	Meter Registers	The meter shall be capable of measuring, registering and recording the following electrical parameters per dispatch interval: • KWH (Delivered) • KWH (Received) • KVARH (Quadrant 1) • KVARH (Quadrant 2) • KVARH (Quadrant 3) • KVARH (Quadrant 4) • KVAH (Delivered) • KVAH (Received) • Max KW (Delivered) • Max KW (Received) • Power Factor • Frequency • Per Phase Current • Per Phase Voltage	Minimum requirements • KWH (Delivered) • KWH (Received) • KVARH (Quadrant 1) • KVARH (Quadrant 2) • KVARH (Quadrant 3) • KVARH (Quadrant 4) • KVAH (Delivered) • KVAH (Received) • Max KW (Delivered) • Max KW (Received)	~~Grid Code 9.2.2.2~~ ~~Grid Code 9.2.3.3~~ **PGC 2016 GRM 9.2.2.2** **PGC 2016 GRM 9.2.3.3**
Security	The meter shall have provisions for securing the meter data, meter configurations and programs by electronic means and/or passwords. It shall also be secured physically by way of security seals.	Same as the main meter	WESM 4.5.6 Grid Code 9.3.8.1 Grid Code 9.3.8.2 Grid Code 9.3.8.3	Loss Compensation	Optional	Optional	WESM 4.5.2.2
				Security	The meter shall have provisions for securing the meter data, meter configurations and programs by electronic means and/or passwords. It shall also be secured	Same as the main meter	WESM 4.5.6 ~~Grid Code 9.3.8.1~~ ~~Grid Code 9.3.8.2~~ ~~Grid Code 9.3.8.3~~ **PGC 2016 GRM 9.3.8.1** **PGC 2016 GRM 9.3.8.2**

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WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)							
Provision				**Proposed Amendment**			
Communication Capability	The meter shall have at least a minimum of two (2) independent communication ports that could operate independently. Each port can communicate simultaneously, with each one using a different protocol. It should be capable of a two-way communication.	Same as the main meter	WESM 4.5.7.1 WESM 4.5.1 (c) Grid Code 9.2.3.3		physically by way of security seals.		**PGC 2016 GRM 9.3.8.3**
Internal Clock	The meter shall have an internal clock with an allowable error of +/-1 second	Same as the main meter	WESM 4.5.8.1 Grid Code 9.2.3.3	Communication Capability	The meter shall have at least a minimum of two (2) independent communication ports that could operate independently. Each port can communicate simultaneously, with each one using a different protocol. It should be capable of a two-way communication.	Same as the main meter	WESM 4.5.7.1 WESM 4.5.1 (c) ~~Grid Code 9.2.3.3~~ **PGC 2016 GRM 9.2.3.3**
Time Synchronization	Crystal synchronization. The internal clock shall be capable of being reset set by the data collection software during normal collection operations.	Same as the main meter	WESM 4.5.8.1 Grid Code 9.2.3.3	Internal Clock	The meter shall have an internal clock with an allowable error of +/-1 second	Same as the main meter	WESM 4.5.8.1 ~~Grid Code 9.2.3.3~~ **PGC 2016 GRM 9.2.3.3**
Digital Display	The meter shall have a digital display with a minimum of 5 digits.	Same as the main meter	WESM 4.5.1 (c) Grid Code 9.2.3.3	Time Synchronization	Crystal synchronization. The internal clock shall be capable of being reset set by the data collection software during normal collection operations.	Same as the main meter	WESM 4.5.8.1 ~~Grid Code 9.2.3.3~~ **PGC 2016 GRM 9.2.3.3**
Codes and Standards Compliance	The meter shall adhere to established International Standards	Same as the main meter	Grid Code 4.2.10.1 IEC, ANSI/IEEE	Digital Display	The meter shall have a digital display with a minimum of 5 digits.	Same as the main meter	WESM 4.5.1 (c) ~~Grid Code 9.2.3.3~~ **PGC 2016 GRM 9.2.3.3**
Applicable Compliance Tests	These tests shall include material tests and established practice and/or other approved standards. Routine tests prescribed by the applicable standards shall be performed. In particular,	Same as the main meter	Grid Code 9.2.5.2 Grid Code 9.2.5.3 Grid Code 9.2.8.1 IEC 255-1 IEC 255-A (Class III) IEC 245-4	Codes and Standards Compliance	The meter shall adhere to established International Standards	Same as the main meter	~~Grid Code 4.2.10.1~~ **PGC 2016 GCR 4.2.10** IEC, ANSI/IEEE

Annex B: Amendments to the Reference Documents

WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)							
Provision				**Proposed Amendment**			
	the following tests shall be performed for the revenue meters: a. Power frequency tests (insulation) b. Impulse voltage test (insulation). c. HF interference test d. Surge withstand and fast transient tests			Applicable Compliance Tests	These tests shall include material tests and established practice and/or other approved standards. Routine tests prescribed by the applicable standards shall be performed. In particular, the following tests shall be performed for the revenue meters: e. Power frequency tests (insulation) f. Impulse voltage test (insulation). g. HF interference test h. Surge withstand and fast transient tests	Same as the main meter	~~Grid Code 9.2.5.2~~ ~~Grid Code 9.2.5.3~~ ~~Grid Code 9.2.8.1~~ **PGC 2016 GRM 9.2.5.2** **PGC 2016 GRM 9.2.5.3** **PGC 2016 GRM 9.2.8.1** IEC 255-1 IEC 255-A (Class III) IEC 245-4
Battery	Capable of retaining readings and time of day for at least two days without external power source	Same as the main meter	WESM 4.5.1 (g) Grid Code 9.2.3.3	Battery	Capable of retaining readings and time of day for at least two days without external power source	Same as the main meter	WESM 4.5.1 (g) ~~Grid Code 9.2.3.3~~ **PGC 2016 GRM 9.2.3.3**
Enclosure	Minimum requirements **Indoor**: Protected against dust limited ingress (no harmful deposit) and Protection against vertically falling drops of water e.g. condensation **Outdoor**: Totally protected against dust and Protection against vertically falling drops of water e.g. condensation	Same as the main meter	ANSI 12.1 4.3.4 Grid Code 9.2.2.3 Grid Code 9.2.2.4 Grid Code 9.3.8	Enclosure	Minimum requirements **Indoor**: Protected against dust limited ingress (no harmful deposit) and Protection against vertically falling drops of water e.g. condensation **Outdoor**: Totally protected against dust and Protection against	Same as the main meter	ANSI 12.1 4.3.4 ~~Grid Code 9.2.2.3~~ ~~Grid Code 9.2.2.4~~ ~~Grid Code 9.3.8~~ **PGC 2016 GRM 9.2.2.3** **PGC 2016 GRM 9.2.2.4** **PGC 2016 GRM 9.3.8**

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APPENDIX M

SPECIFICATIONS FOR REVENUE METERS FOR EMBEDDED GENERATORS REGISTERED AS WESM PARTICIPANTS

ITEMS	SPECIFICATIONS		REFERENCE DOCUMENTS
	MAIN METER	BACK-UP METER	
Accuracy Class	IEC 687 Class 0.2 / ANSI 12.20 Class 0.3 or better	Same as the main meter	IEC 687 4.6
No. of Stators	Corresponds to the service type and complying with Blondel's Theorem	Same as the main meter	Dist. Code 8.4.3.1 ANSI C12.1
Voltage Rating	Corresponds to the secondary voltage rating of voltage transformers used	Same as the main meter	Dist. Code 5.5.1.1
Current Rating	Corresponds to the secondary current rating of current transformers used (typically 1A or 5A)	Same as the main meter	ANSI or IEC Standard
Frequency	60 Hz	Same as the main meter	Dist. Codes 3.2.2.1
Measurement	Uni-directional active metering (delivered) and 2-quadrant reactive metering) Or Bi-directional depending on the purpose	Same as the main meter	Dist Codes 8.3.3.1 Dist. Codes 8.3.4.2 Dist. Code 8.4.3.2
Interval Data	Programmable to 5, 15, 30 minute interval	Same as the main meter	Dist. Code 8.4.4.1

Proposed Amendment

	vertically falling drops of water e.g. condensation		

APPENDIX M

SPECIFICATIONS FOR REVENUE METERS FOR EMBEDDED GENERATORS REGISTERED AS WESM PARTICIPANTS

ITEMS	SPECIFICATIONS		REFERENCE DOCUMENTS
	MAIN METER	BACK-UP METER	
Accuracy Class	IEC 687 Class 0.2 / ANSI 12.20 Class 0.3 or better	Same as the main meter	IEC 687 4.6 **PDC 2016 7.2.7**
No. of Stators	Corresponds to the service type and complying with Blondel's Theorem	Same as the main meter	~~Dist. Code 8.4.3.1~~ ANSI C12.1 **PDC 2016 7.2.7**
Voltage Rating	Corresponds to the secondary voltage rating of voltage transformers used	Same as the main meter	~~Dist. Code 5.5.1.1~~ **PDC 2016 7.2.7**
Current Rating	Corresponds to the secondary current rating of current transformers used (typically 1A or 5A)	Same as the main meter	ANSI or IEC Standard **PDC 2016 7.2.7**
Frequency	60 Hz	Same as the main meter	~~Dist. Codes 3.2.2.1~~ **PDC 2016 7.2.7**
Measurement	Uni-directional active metering (delivered) and 2-quadrant reactive metering) Or Bi-directional depending on the purpose	Same as the main meter	~~Dist Codes 8.3.3.1~~ ~~Dist. Codes 8.3.4.2~~ ~~Dist. Code 8.4.3.2~~ **PDC 2016 7.2.7**

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Provision			
No. of Channels	At least four (4) channels for bi-directional meters: a. kWh (Delivered) b. kVARh (Delivered) c. kWh (Received) d. kVARh (Received) At least two (2) channels for unidirectional meters: a. kWh (Received) b. kVARh (Received)	Same as the main meter	This satisfies the minimum requirements as stated under: Dist. Code 8.3.3.2 Dist. Code 8.3.4.3
Mass Memory	Minimum of 60-day recording of a 5-minute time-stamped demand interval for 4 recording channels for bi-directional meters or 2 recording channels for uni-directional meters	Same as the main meter	Dist. Code 8.3.5.3
Recording Billing Quantities	Display and record TOU energy and power parameters (kWh, kVarh, max. kW & cum. kW) for all rates	Same as the main meter	Dist. Code 8.4.3.1
Loss Compensation	Optional	Optional	WESM 4.5.2.2
Security	The meter shall have provisions for securing the meter data, meter configurations and programs by electronic means and/or passwords. It shall also be secured	Same as the main meter	WESM 4.5.6

Proposed Amendment			
Interval Data	Programmable to 5, 15, 30 minute interval	Same as the main meter	~~Dist. Code 8.4.4.1~~ **PDC 2016 7.2.7**
No. of Channels	At least four (4) channels for bi-directional meters: e. kWh (Delivered) f. kVARh (Delivered) g. kWh (Received) h. kVARh (Received) At least two (2) channels for unidirectional meters: c. kWh (Received) d. kVARh (Received)	Same as the main meter	This satisfies the minimum requirements as stated under: ~~Dist. Code 8.3.3.2~~ ~~Dist. Code 8.3.4.3~~ **PDC 2016 7.2.7**
Mass Memory	Minimum of 60-day recording of a 5-minute time-stamped demand interval for 4 recording channels for bi-directional meters or 2 recording channels for uni-directional meters	Same as the main meter	~~Dist. Code 8.3.5.3~~ **PDC 2016 7.2.7**
Recording Billing Quantities	Display and record TOU energy and power parameters (kWh, kVarh, max. kW & cum. kW) for all rates	Same as the main meter	~~Dist. Code 8.4.3.1~~ **PDC 2016 7.2.7**
Loss Compensation	Optional	Optional	WESM 4.5.2.2
Security	The meter shall have provisions for securing the meter data, meter configurations and programs by electronic	Same as the main meter	WESM 4.5.6 **PDC 2016 7.4.7**

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Provision				**Proposed Amendment**			
	physically by way of security seals.				means and/or passwords. It shall also be secured physically by way of security seals.		
Communication Capability	The meter shall have one (1) independent communication port in addition to the optical port.	Minimum requirements: Optical port	WESM 4.5.7.1 WESM 4.5.1(c) Dist. Code 8.4.4.2	Communication Capability	The meter shall have one (1) independent communication port in addition to the optical port.	Minimum requirements: Optical port	WESM 4.5.7.1 WESM 4.5.1(c) ~~Dist. Code 8.4.4.2~~ **PDC 2016 7.2.7**
Internal Clock/Battery	With long life lithium battery for clock/ calendar maintenance	Same as the main meter	WESM 4.5.8.1 Dist. Code 8.4.4.6	Internal Clock/Battery	With long life lithium battery for clock/ calendar maintenance	Same as the main meter	WESM 4.5.8.1 ~~Dist. Code 8.4.4.6~~ **PDC 2016 7.2.1**
Time Synchronization	Shall be 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 meter		Time Synchronization	Shall be 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 meter	
Digital Display	The meter shall have a digital display with a minimum of 5 digits.	Same as the main meter	WESM 4.5.1 (c) Dist. Code 8.4.3.1	Digital Display	The meter shall have a digital display with a minimum of 5 digits.	Same as the main meter	WESM 4.5.1 (c) ~~Dist. Code 8.4.3.1~~ **PDC 2016 7.2.7**
Codes and Standards Compliance	The meter shall adhere to established International Standards	Same as the main meter	IEC, ANSI/IEEE	Codes and Standards Compliance	The meter shall adhere to established International Standards	Same as the main meter	IEC, ANSI/IEEE **PDC 2016 7.2.7**
Enclosure	The meter shall be provided 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 meter	ANSI 12.1 4.3.4	Enclosure	The meter shall be provided with the necessary cover to protect the internal component against the harmful elements of environment that may affect its	Same as the main meter	ANSI 12.1 4.3.4

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APPENDIX N

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	IEC 44-1 Class 0.2 /ANSI C57.13 Class 0.3 or better	Grid Code 9.2.3.2 Grid Code Appendix 2
Burden	Shall not exceed the rated burden limit of 12.5 VA for the IEC 44-1 Class 0.2 /ANSI C57.13 Class 0.3 (see Table 1)	Grid Code 9.2.3.2 Grid Code Appendix 2
Rated Primary Current	The thermal rating factor shall not be less than 1.0.	
Secondary Current	1A or 5A	Grid Code 9.2.3.2 IEC 4.2 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	IEC 3.2.1 1996

Proposed Amendment

	measuring circuit and operation.		

APPENDIX N

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	IEC 44-1 Class 0.2 /ANSI C57.13 Class 0.3 or better	~~Grid Code 9.2.3.2~~ ~~Grid Code Appendix 2~~ **PGC 2016 GRM 9.2.3.2**
Burden	~~Shall not exceed the rated burden limit of 12.5 VA for the IEC 44-1 Class 0.2 /ANSI C57.13 Class 0.3 (see Table 1)~~ **Shall be based on the standard rated burden as specified in the latest revision of IEC 61869-2 or ANSI/IEEE C57.13, or their latest equivalent standards.**	~~Grid Code 9.2.3.2~~ ~~Grid Code Appendix 2~~ **PGC 2016 GRM 9.2.3.2**
Rated Primary Current	The thermal rating factor shall not be less than 1.0.	
Secondary Current	1A or 5A	~~Grid Code 9.2.3.2~~ **PGC 2016 GRM 9.2.3.2**

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BIL	Refer to Table 2 for applicable BIL	
Creepage Distance	Refer to Table 3 for applicable creepage distance	
Number of Core	Preferably Two (2) metering cores	Grid Code 9.2.3.2
Mounting	Depend on the applications	
Grounding		Grid Code 9.2.2.1 (g)
Security	Seal holder shall be provided to the CT secondary terminal box (see Figure 1)	Grid Code 9.2.4.1

APPENDIX O

SPECIFICATIONS FOR VOLTAGE 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, Inductive type, single bushing	
Termination	Line-to-ground	Grid Code 9.3.1.
Accuracy Class	IEC 6044-2 Class 0.2 /ANSI C57.13 Class 0.3 or better	Grid Code 9.2.3.2 Grid Code Appendix 2
Burden	Shall not exceed the rated burden limit for the IEC 6044-2 Class 0.2 /ANSI C57.13 Class 0.3 or better. (see Table 4)	Grid Code 9.2.3.2 Grid Code Appendix 2

Proposed Amendment

		IEC 4.2 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	IEC 3.2.1 1996
BIL	Refer to Table 2 for applicable BIL	
Creepage Distance	Refer to Table 3 for applicable creepage distance	
Number of Core	Preferably Two (2) metering cores	~~Grid Code 9.2.3.2~~ **PGC 2016 GRM 9.2.3.2**
Mounting	Depend on the applications	
Grounding		~~Grid Code 9.2.2.1 (g)~~ **PGC 2016 GCR 4.4.1.3.2** **PGC GRM 9.2.2.1 (g)**
Security	Seal holder shall be provided to the CT secondary terminal box (see Figure 1)	~~Grid Code 9.2.4.1~~ **PGC 2016 GRM 9.3.8.2** **PGC 2016 GRM 9.2.4.1**

APPENDIX O

SPECIFICATIONS FOR VOLTAGE TRANSFORMERS

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Provision

Ratio	See Table 5	
Secondary Voltage	See Table 5	
Frequency	60 Hz	
Operating Temperature	55ºC average ambient temperature, with max ambient temperature not exceeding 65ºC	
BIL	Refer to Table 2 for applicable BIL	
Creepage distance	Refer to Table 3 for applicable creepage distance	
Number of Core	Preferably Two (2)	
Mounting	Depend on the applications	
Grounding		Grid Code 9.2.2.1 (g)
Security	Seal holder shall be provided to the CT secondary terminal box (see Figure 1)	Grid Code 9.2.4.1

Proposed Amendment

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, Inductive type, single bushing	
Termination	Line-to-ground	~~Grid Code 9.3.1.~~ **PGC 2016 GRM 9.2.3.1**
Accuracy Class	IEC 6044-2 Class 0.2 /ANSI C57.13 Class 0.3 or better	~~Grid Code 9.2.3.2~~ ~~Grid Code Appendix 2~~ **PGC 2016 GRM 9.2.3.1**
Burden	~~Shall not exceed the rated burden limit for the IEC 6044-2 Class 0.2 /ANSI C57.13 Class 0.3 or better. (see Table 4)~~ **Shall be compliant to the IEC 61869-3 or ANSI C57.13 Standard (or the latest version/s)**	~~Grid Code 9.2.3.2~~ ~~Grid Code Appendix 2~~ **PGC 2016 GRM 9.2.3.1**
Ratio	See Table 5	
Secondary Voltage	See Table 5	
Frequency	60 Hz	
Operating Temperature	55ºC average ambient temperature, with max ambient temperature not exceeding 65ºC	
BIL	Refer to Table 2 for applicable BIL	
Creepage distance	Refer to Table 3 for applicable creepage distance	
Number of Core	Preferably Two (2)	
Mounting	Depend on the applications	

Annex B: Amendments to the Reference Documents

WESM Manual on Metering Standards and Procedures Issue 12.0 (for enhanced market design)	
Provision	**Proposed Amendment**
	<table><tr><td>Grounding</td><td></td><td>~~Grid Code 9.2.2.1 (g)~~ **PGC 2016 GCR 4.4.1.3.2** **PGC GRM 9.2.2.1 (g)**</td></tr><tr><td>Security</td><td>Seal holder shall be provided to the CT secondary terminal box (see Figure 1)</td><td>~~Grid Code 9.2.4.1~~ **PGC 2016 GRM 9.3.8.2** **PGC 2016 GRM 9.2.4.1**</td></tr></table>