

**ANNEX 6 TO THE PRIVATE NETWORK CFD
AGREEMENT**

PRIVATE NETWORK METERING OPERATIONAL FRAMEWORK

Version 2

13 March 2017

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1. INTRODUCTION

Metered Volume shall be measured and recorded through Metering Equipment calibrated, installed, commissioned, proved, operated, maintained, tested and otherwise provided for as set out in this MOF.

2. INTERPRETATION

In this MOF:

- (a) in relation to any Metering System, references to requirements under the TSRs shall be construed as requirements in relation to all of the Metering Equipment comprised or required to be comprised in that Metering System;
- (b) references to a Metering System include a Metering System which is to comprise Metering Equipment which a third party is or will be required to calibrate, install, commission, prove, operate, maintain or test;
- (c) references to Metering Equipment in the context of a Metering System or the Generator are to all of the Metering Equipment which is or is to be comprised in such Metering System (except that references to Metering Equipment shall not include references to Metering Equipment which comprises a Boundary Point Metering System, and references to a Metering System shall not include a Boundary Point Metering System);
- (d) where the Facility is a Dual Scheme Facility, references to Metered Volume shall not include Imported Input Electricity; and
- (e) “**BD**” shall mean “**Business Days**”.

3. RESPONSIBILITY OF GENERATOR FOR METERING EQUIPMENT

3.1.1 The Generator must ensure that:

- (a) all Facility Metering Equipment meets or exceeds the specifications set out in the TSRs;
- (b) the Facility Metering Equipment, including each Main Meter, Check Meter and Measurement Transformer, is calibrated, installed, commissioned, proved, operated, maintained and tested in such a way as to enable the CfD Counterparty to measure Metered Volume accurately and calculate the payments due under the Contract for Difference accordingly;
- (c) the Facility Metering Equipment is kept in good working order to the extent necessary to allow the correct registration, recording and submission of the metering data;

- (d) all Facility Metering Equipment is calibrated, installed, commissioned, proved and sealed in accordance with paragraphs 4 to 8 of this MOF and paragraphs 3 and 4 of the TSRs prior to the Start Date;
- (e) for each Main Meter there is a corresponding Check Meter;
- (f) neither the Main Meter nor the Check Meter is calibrated, commissioned or proved without the other Meter being so calibrated, commissioned or proved; and
- (g) each Meter is appropriately labelled, where applicable, as to whether it relates to input electricity, output electricity or both.

3.1.2 The Metering Equipment to be installed:

- (a) must be Half-Hourly Metering Equipment; and
- (b) must comply with Schedule 7 of the EA 1989.

3.1.3 The Generator may with the prior consent of the CfD Counterparty transfer to any person, or enter into an arrangement whereby any person is to perform any or all of its obligations under this MOF, provided that:

- (a) the CfD Counterparty (acting reasonably) must be satisfied that such a person is suitably qualified; and
- (b) the Generator shall not be relieved of any of its obligations under this MOF, the TSRs or Contract for Difference and shall be liable for the acts and omissions of any person to whom it sub-contracts or delegates or with whom it enters into an arrangement to perform any or all of its obligations under this MOF or otherwise.

4. INSTALLATION

4.1.1 The Generator must ensure that a Main Meter and a Check Meter (and any associated Measurement Transformers, and any necessary fuses, test facilities and Communications Equipment) are installed before the initial Metering Commissioning Test in relation to the Facility Metering Equipment is carried out.

4.1.2 The Generator must ensure that the Main Meter and Check Meter are capable of accurately measuring Metered Volume, and for this purpose the point of measurement of the Main Meter and Check Meter must:

- (a) be located as close to the relevant Generating Unit as practicable;
- (b) be located at the point indicated on the electrical schematic diagram notified to the CfD Counterparty in accordance with the terms of the Contract for Difference; and
- (c) be capable of accurately recording:

- (i) all input electricity used by the Facility; and
- (ii) all output electricity generated by the Facility.

4.1.3 The Generator must ensure that parasitic load and site load are taken into account in measuring Metered Volume and that the Measurement Transformers for each Main Meter and Check Meter are appropriately located at a point after any such parasitic load or site load have been netted off from the output electricity generated by the Generator.

4.1.4 Testing facilities must be provided as close as practicable to the Meters, which enables such Meters to be routinely tested and/or changed safely with the circuit energised. A separate test facility is required for each set of current transformers used in the Metering System.

5. CALIBRATION

5.1 Meter calibration

5.1.1 Each Meter must be calibrated by the manufacturer prior to installation.

5.1.2 Each calibration must demonstrate that each Meter meets the relevant product standards for the class index of the Meter as specified in the TSRs.

5.2 Measurement Transformer calibration

5.2.1 All Measurement Transformers must be calibrated by the manufacturer so as to comply with the accuracy requirements set out in the TSRs prior to installation.

5.2.2 Each calibration must demonstrate that each Measurement Transformer meets the accuracy and measurement range requirements for the class index of the Measurement Transformer as set out in the TSRs.

5.2.3 For multi-ratio current transformers and voltage transformers, the transformer shall be calibrated for all possible ratios.

5.3 Calibration certificates

5.3.1 A certificate from the manufacturer must be obtained for each Meter and Measurement Transformer for every calibration conducted (a "**Calibration Certificate**") and retained by the Generator for the Term. A Calibration Certificate must:

(a) be in the form of a manufacturer's certificate that:

- (i) states that the Meter or Measurement Transformer conforms to the relevant product standards in accordance with the TSRs; and
- (ii) shows actual errors determined through calibration for the relevant Meter or Measurement Transformer across its operating range and which demonstrates conformance with the relevant product standards under the TSRs; and

- (b) identify the serial number and type of Meter calibrated, the name of the testing body, the location of the calibrations, the date on which the calibrations were concluded and (where appropriate) the measurement uncertainties.

5.3.2 Calibration Certificates must be produced using verifiable standards in accordance with Good Industry Practice.

5.4 Subsequent Calibrations

5.4.1 If the Generator undertakes a subsequent calibration of a Main Meter or a Check Meter (each such calibration being a “**Subsequent Metering Calibration Test**”), the Generator must give the CfD Counterparty a minimum of ten (10) Business Days’ notice prior to undertaking that Subsequent Metering Calibration Test.

5.4.2 For each Subsequent Metering Calibration Test, a relevant Subsequent Metering Calibration Test Record in the form set out at **Appendix 1** must be completed.

5.5 Meter Subsequent Calibration Timetable

	When	Action	From	To	Information Required	Method
1	10BD before Subsequent Metering Calibration Test is required	Notify the CfD Counterparty of an impending test and proposed date and time Generator submits the Key Meter Technical Details form	Generator	CfD Counterparty	Notification that a Metering Calibration Test is required and Key Meter Technical Details Form	Email
2	No later than 5BD after receipt of Subsequent Metering Calibration Test notification (set out in 1 above)	CfD Counterparty notifies the Generator whether or not it will attend	CfD Counterparty	Generator	General notification	Email
		Where the CfD Counterparty is attending: Both parties to agree date and time of test	Both parties	Both parties	Availability of each party	
		Where the CfD Counterparty is not attending: Generator to advise date and time of the test	Generator	CfD Counterparty	CfD Counterparty acknowledges test date and time	

	When	Action	From	To	Information Required	Method
3	On the agreed date of the Subsequent Metering Calibration Test date (in accordance with 2 above)	Perform test and provide test results to the CfD Counterparty	Generator	CfD Counterparty	Test results, including Meter reads Certificate for calibration equipment prepared in accordance with paragraph 5.8	If the CfD Counterparty did attend: Hard-copy of, and email with, test results
						If the CfD Counterparty did not attend: Email with test results
4	No later than 2BD after the Subsequent Metering Calibration Test date (set out in 3 above)	CfD Counterparty to approve test results and confirm whether test has been passed or failed	CfD Counterparty	Generator	Copy of the test results (electronic and hard-copy, as applicable) Certificate for calibration equipment prepared in accordance with paragraph 5.8	If the CfD Counterparty did attend: Notification in person and via email
						If the CfD Counterparty did not attend: Notification via email
5	Where the calibration equipment is deemed by the CfD Counterparty to be inaccurate and the CfD Counterparty notifies the Generator within 10 BD of a Subsequent Metering Calibration Test, the Generator must re-test pursuant to paragraph 5.6 of this MOF		N/A		N/A	

5.6 Re-Tests

Where, in relation to a Subsequent Metering Calibration Test, the calibration equipment is deemed to be inaccurate by the CfD Counterparty and the CfD Counterparty gives notice to the Generator within ten (10) Business Days of that Subsequent Metering Calibration Test, the Generator must undertake a re-test no later than five (5) Business Days after that notice in accordance with the timetable set out at paragraph 5.5 of this MOF (each such re-test being a “**Subsequent Metering Calibration Re-Test**”).

5.7 Replacement

Where a Main Meter or Check Meter has failed either a Subsequent Metering Calibration Test or a Subsequent Metering Calibration Re-Test, the Generator must promptly replace that Main Meter or Check Meter in accordance with paragraph 9 of this MOF.

5.8 Calibration Equipment

All certificates for calibration equipment used for a Subsequent Metering Calibration Test or a Subsequent Metering Calibration Re-Test must:

- 5.8.1 be prepared in accordance with the then in force UKAS Directive M3003;
- 5.8.2 be produced using standards verified by the National Physical Laboratory (NPL), or a calibration laboratory that has been accredited by the United Kingdom Accreditation Service (UKAS), or a similarly accredited international body;
- 5.8.3 include an overall accuracy and uncertainty of measurement statement for the relevant calibration equipment, where uncertainty is determined in accordance with the current UKAS Directive M3003 or any other method as agreed with the CfD Counterparty in writing beforehand; and
- 5.8.4 include the technical specification from the manufacturer of the relevant calibration equipment, which will be the error tolerances of the calibration equipment over a range of currents, voltages and power factors (or phase angles) as determined by the manufacturer.

6. COMMISSIONING

6.1 General

- 6.1.1 Prior to the Start Date, the Generator must perform an initial Metering Commissioning Test in relation to the Facility Metering Equipment. The Generator must give the CfD Counterparty a minimum of ten (10) Business Days' notice before undertaking the initial Metering Commissioning Test.
- 6.1.2 Any Metering Commissioning Test (other than the initial Meter Commissioning Test) must be undertaken in accordance with the timetables set out in paragraph 6.4 below.

6.2 Metering Commissioning Tests

- 6.2.1 Metering Commissioning Tests must be performed on site.
- 6.2.2 For each Metering Commissioning Test, a Metering Equipment Commissioning Record in the form set out at **Appendix 1** must be completed.
- 6.2.3 The results of such tests shall be used to confirm and record, so far as appropriate, that:
 - (a) the current transformers are of the ratio specified in the Key Meter Technical Details, have the correct polarity and are correctly located to record the required power flow;
 - (b) the voltage transformers are of the ratio specified in the Key Meter Technical Details, have the correct polarity and are correctly located to record the required power flow;
 - (c) the relationships between voltages and currents are of the correct phase sequence and that phase rotation is standard at the Meter terminals;
 - (d) the burdens on the Measurement Transformers are within the normal operating range of the Measurement Transformers;

- (e) the Meters are set to the same current transformer and voltage transformer ratios as the installed Measurement Transformers;
- (f) the output of the Metering System correctly records the electricity in the primary system; and
- (g) the Metering Equipment detects phase failure and operates the necessary alarms.

6.3 Reasons for carrying out a Metering Commissioning Test

6.3.1 In addition to the initial Metering Commissioning Test, a Metering Commissioning Test must be carried out:

- (a) in relation to the Metering System when there is a change to the Key Meter Technical Details; and
- (b) in relation to any item of Facility Metering Equipment when such item is repaired or replaced.

6.3.2 The “**Key Meter Technical Details**” are the Meter Serial Numbers, the Outstation Number of Channels, the Measurement Quantity ID, the Meter Multiplier, the Pulse Multiplier, the CT and/or VT serial numbers and the CT and/or VT ratios (as described in the TSRs).

6.4 Meter Commissioning Timetable

	When	Action	From	To	Information Required	Method
1	10BD before Metering Commissioning Test is required	Notify the CfD Counterparty of an impending test and proposed date and time Generator submits the Key Meter Technical Details form	Generator	CfD Counterparty	Notification that a Metering Commissioning Test is required and Key Meter Technical Details Form	Email
2	No later than 5BD after receipt of Metering Commissioning Test notification (set out in 1 above)	CfD Counterparty notifies the Generator whether or not it will attend	CfD Counterparty	Generator	General notification	Email
		Where the CfD Counterparty is attending: Both parties to agree date and time of test	Both parties	Both parties	Availability of each party	

	When	Action	From	To	Information Required	Method
		<p>Where the CfD Counterparty is not attending:</p> <p>Generator to advise date and time of the test</p>	Generator	CfD Counterparty	CfD Counterparty acknowledges test date and time	
3	On the agreed date of the Metering Commissioning Test date (in accordance with 2 above)	Perform test and provide test results to the CfD Counterparty	Generator	CfD Counterparty	Test results, including Meter reads	<p>If the CfD Counterparty did attend:</p> <p>Hard-copy of, and email with, test results</p> <p>If the CfD Counterparty did not attend:</p> <p>Email with test results</p>
4	No later than 2BD after the Metering Commissioning Test date (set out in 3 above)	CfD Counterparty to approve test results and confirm whether test has been passed or failed	CfD Counterparty	Generator	Copy of the test results (electronic and hard-copy, as applicable)	<p>If the CfD Counterparty did attend:</p> <p>Notification in person and via email</p> <p>If the CfD Counterparty did not attend:</p> <p>Notification via email</p>
5	No later than 5BD after a failed Metering Commissioning Test		Generator must re-test pursuant to paragraph 6.5 of this MOF		N/A	

6.5 Re-Tests

Where any item of the Facility Metering Equipment has failed a Metering Commissioning Test, the Generator must undertake a re-test no later than five (5) Business Days after the failed Metering Commissioning Test in accordance with the timetable set out at paragraph 6.4 of this MOF.

7. PROVING

7.1.1 Prior to the Start Date, the Generator must perform an initial Proving Test in relation to the Metering System.

7.1.2 The Generator must give the CfD Counterparty a minimum of ten (10) Business Days' notice before undertaking the initial Proving Test.

7.1.3 Any Proving Test (other than an initial Proving Test) must be carried out in accordance with the timetables set out in paragraph 7.4 below.

7.2 Reasons for a Proving Test

The Generator must carry out a Proving Test on both the Main Meter and the Check Meter following a change to any of the Key Meter Technical Details (set out in paragraph 6.3.2 above).

7.3 Methods of Proving

7.3.1 Except with the prior written agreement of the CfD Counterparty, for the purposes of undertaking a Proving Test, the Generator shall:

- (a) install or reconfigure the Metering System, commission the Metering System and record the reading for the Metered Volume in relation to a Settlement Unit while on site from the Meter Register;
- (b) use a hand-held unit (“**HHU**”) to interrogate all Meters in the Metering System and obtain the readings for the same Settlement Unit electronically; and
- (c) notify the CfD Counterparty of the Meter reads obtained.

7.3.2 For the Metering System to be deemed proven the Meter readings taken using a HHU must be the same as the physical Meter reading of the Meter Register (subject to any differences considered by the CfD Counterparty to be reasonable in the circumstances).

7.3.3 If the CfD Counterparty is not present for the Proving Test, the Generator must demonstrate that the physical Meter readings and those obtained using the Meter manufacturer’s software are not from the same source.

7.4 Proving Test Timetable

	When	Action	From	To	Information Required	Method
1	10BD before Proving Test is required	Notify the CfD Counterparty of an impending test and proposed date and time Generator submits the Key Meter Technical Details form	Generator	CfD Counterparty	Notification that a Proving Test is required and Key Meter Technical Details Form	Email
2	No later than 5BD after receipt of Proving Test notification (set out in 1 above)	CfD Counterparty notifies the Generator whether or not it will attend	CfD Counterparty	Generator	General notification	Email
		Where the CfD Counterparty is attending: Both parties to agree date and time of test	Both parties	Both parties	Availability of each party	
		Where the CfD Counterparty is not attending: Generator to advise date and time of the test	Generator	CfD Counterparty	CfD Counterparty acknowledges test date and time	
3	On the agreed date of the Proving Test date (in accordance with 2 above)	Perform test and provide test results to the CfD Counterparty	Generator	CfD Counterparty	Proving Test results, including Meter reads	If the CfD Counterparty did attend: Hard-copy of, and email with, test results
						If the CfD Counterparty did not attend: Email with test results
4	No later than 2BD after the Proving Test date (set out in 3 above)	CfD Counterparty to approve test results and confirm whether test has been passed or failed	CfD Counterparty	Generator	Copy of the test results (electronic and hard-copy, as applicable)	If the CfD Counterparty did attend: Notification in person and via email

						If the CfD Counterparty did not attend: Notification via email
5	No later than 5BD after a failed Proving Test	Generator must re-test pursuant to paragraph 7.5 of this MOF		N/A		

It is not necessary for all the processes required to complete a Proving Test to be carried out on the same day, other than where the CfD Counterparty attends the Proving Test, provided that the deadlines set out in the timetable above are met.

7.5 Re-Tests

Where the Metering System has failed the Proving Test, the Generator must undertake a re-test no later than five (5) Business Days after the failed Proving Test in accordance with the timetable set out at paragraph 7.4 of this MOF.

8. SEALING

- 8.1.1 Meters must be sealed, and the seals maintained at all times, in accordance with Good Industry Practice.
- 8.1.2 The Generator must update the Re-Sealing Form, set out in **Appendix 1**, promptly each time the Meter is re-sealed. The Re-Sealing Form must be maintained for the Term.
- 8.1.3 The Generator shall notify the CfD Counterparty immediately if the seal on any Facility Metering Equipment is broken or damaged or the security of the Facility Metering Equipment is otherwise compromised.

9. REPLACEMENT

In the event that the Generator installs or replaces the Facility Metering Equipment, it must ensure that it does so in compliance with the TSRs applicable to the Facility and the Generator's Private Network CfD Agreement.

10. THIRD PARTY METER OPERATOR

The Generator may appoint a third party meter operator to operate the Facility Metering Equipment provided any such third party meter operator is suitably qualified (in the opinion of the CfD Counterparty, acting reasonably). If the Generator does appoint such a third party meter operator, it shall promptly notify the CfD Counterparty of the identity of that third party meter operator and of any change to the identity of the person operating the Facility Metering Equipment from time to time.

11. METERING DATA

Metering data used for the purposes of calculating Metered Volume must be provided to the CfD Counterparty by the Generator in the file format stipulated by the CfD Counterparty, and as modified from time to time.

12. METERING CHECKS

12.1.1 The CfD Counterparty may undertake or require the Generator to undertake the tests and checks described in paragraphs 12.2 to 12.7 below in relation to a Metering System. The CfD Counterparty may require other tests or checks to be undertaken as it considers reasonably necessary from time to time.

12.1.2 Tests may be carried out either on-site at the Facility or off-site, as the CfD Counterparty or its appointed representative considers appropriate.

12.2 Metering System Checks

The following checks may be performed to verify the overall accuracy requirements of the Metering System:

- (a) that the test certificates provided relate to the Measurement Transformers;
- (b) that the test certificate calibration details in relation to the Metering Equipment meet the relevant requirements set out in the TSRs; and
- (c) that the Metering Equipment installed meets the specifications set out in the TSRs and, where required, that the Main Meters and Check Meters are correctly identified.

12.3 Measurement Transformer specification

12.3.1 The Measurement Transformer specification may be checked to ensure it complies with the standards set out in the TSRs and is consistent with the information provided by the Generator.

12.3.2 The following may be checked as part of the Measurement Transformer specification:

- (a) ratio, class, rated burden and polarity from the labels physically attached to the Measurement Transformers and/or the identification plates attached to switchgear or other enclosures containing Measurement Transformers (although this may not always be practical for safety reasons); and
- (b) test records/certificates (including the Calibration Certificates) detailing specific measured errors associated with the Measurement Transformers on site.

12.4 Key Meter Technical Details

The Key Meter Technical Details (set out in paragraph 6.3.2 above) may be checked to ensure that they match the records of the CfD Counterparty using information provided by the Generator, including any Measurement Transformer error offsets and commissioning details.

12.5 Accuracy

12.5.1 The following checks may be performed to verify the overall accuracy requirements of the Metering System:

- (a) that the Measurement Transformers relate to Calibration Certificates provided;
- (b) that the Calibration Certificates in respect of the Meters and the Measurement Transformers meet the requirements set out in the TSRs; and
- (c) that the Facility Metering Equipment meets the requirements set out in the TSRs and the Main Meters and Check Meters are correctly identified.

12.5.2 The overall accuracy shall be determined by the CfD Counterparty and must be within the accuracy limits set out in the TSRs.

12.6 Correct Energy Measurement Test

The Metering Equipment may be checked to confirm that the Metered Volume is consistent with the electricity flowing in the circuit using the following methods:

- (a) comparing the Metered Volume derived from independently measured primary values to the Meter's instantaneous reading for the same period;
- (b) comparing the reading of Metered Volume derived from independently measured secondary values where the primary/secondary ratios can be established to the Meter reading for the same period;
- (c) using an alternative measurement device for comparison with the Meter;
- (d) using appropriate commissioning records; or
- (e) comparing the read from the Meter with the metering data provided for the purposes of the CfD Settlement Activities.

12.7 Quality of installation

All points may be checked, including (but not limited to):

- (a) labelling of equipment; and
- (b) whether installation has been undertaken in accordance with Good Industry Practice.

13. VALIDATION OF METERING DATA

The CfD Counterparty may undertake or require the Generator to undertake the following checks to validate the metering data. The CfD Counterparty may require other checks to be undertaken as it considers reasonably necessary from time to time.

13.1 Interrogation

The Outstation may be interrogated, or data automatically received from the Outstation may be reviewed, to check:

- (a) that the Outstation ID is the same as expected;
- (b) that the Outstation Number of Channels is the same as expected;
- (c) that the time of the Outstation does not differ by more than fifteen (15) minutes from UTC; or
- (d) that the individual alarms described in the TSRs are not flagged.

13.2 Main Meter / Check Meter comparison

13.2.1 Metering data recorded by the Main Meter and Check Meter must be compared on a half-hourly basis. Allowance shall be made for low load discrepancies.

13.2.2 Any discrepancy between the two values in excess of 1.5 times the accuracy requirements prescribed for the individual Meters at full load in accordance with the TSRs must be investigated further by the Generator.

14. INFORMATION AND RECORDS

14.1 Key Meter Technical Details

14.1.1 The Generator must ensure that a complete, up-to-date and accurate record of the Key Meter Technical Details is maintained at all times.

14.1.2 If any of the Key Meter Technical Details are changed, the Generator must notify the CfD Counterparty of the changes no later than 10 (ten) Business Days after the change has taken place using the Key Meter Details Form set out in **Appendix 1**.

14.2 Commissioning records

The Generator shall maintain records to show the instruments used for Metering Commissioning Tests by the Generator and shall retain such records for the Term.

14.3 Other records

14.3.1 The Generator must prepare and maintain, for the life of each relevant item of Facility Metering Equipment, including each Meter and Measurement Transformer, complete, up-to-date and accurate records as required by the CfD Counterparty from time to time.

14.3.2 Such records must include details of the following (including relevant dates and time periods, where applicable):

- (a) Facility name;
- (b) Facility address;

- (c) Generator Unique Reference Number;
- (d) Meter Serial Number;
- (e) name of commissioning body (even if the Generator is the commissioning body);
- (f) date of commissioning;
- (g) name of persons responsible for organising and undertaking commissioning;
- (h) reason for commissioning;
- (i) Key Meter Technical Details (including any certificate identity);
- (j) current transformers details (including any certificate identity);
- (k) voltage transformers details (including any certificate identity);
- (l) circuit name (where more than one);
- (m) calibration results (including individual test errors for each Meter); and
- (n) results of inspections, tests and observations.

**Appendix 1
Metering Records and Forms**

**Metering Equipment Commissioning Record Part 1
(Measurement Transformers)**

1. DETAILS

Current Transformer	L1	L2	L3
Location of CTs			
Serial Number			
Burden			
Accuracy Class			
Make			
Type			
Available Ratios (in Amps)			
Ratio Selected (in Amps)			
CT pole face P2 facing Generating Unit?	Yes/No*	Yes/No*	Yes/No*

Voltage Transformer	L1	L2	L3
Location of VT			
Serial Number			
Burden			
Accuracy Class			
Make			
Type			
Available Ratios (in Volts)			
Ratio Selected (in Volts)			

L1 CT associated with L1 voltage? **Yes/No***

L2 CT associated with L2 voltage? **Yes/No***

L3 CT associated with L3 voltage? **Yes/No***

Standard Phase sequence at Testing Facility (L1, L2, L3)? **Yes/No***

CT shorting links left open? **Yes/No***

CTs and VTs Calibration Records attached? **Yes/No***

*Delete as appropriate

2. RATIO VERIFICATION

Test performed: **Primary Injection/Prevailing load tests***

Test Results: **Pass/Fail***

2.1 Primary Injection Tests

Instruments Used:

Include description and serial Nos:

Calibration expiry dates:

Description of test performed:

Test results:

Correct polarity verified? **Yes/No***

Current Transformer	L1	L2	L3
Primary Current Injected			
Secondary Current measured Hi Ratio			
Secondary Current measured Mid Ratio			
Secondary Current measured Low Ratio			
Ratio Calculation High Ratio			
Ratio Calculation Middle Ratio			
Ratio Calculation Low Ratio			

Voltage Transformers	L1 – L2	L2 – L3
Primary Volts Injected		
Secondary Volts measured High Ratio		
Secondary Volts measured Low Ratio		
Ratio Calculation High Ratio		
Ratio Calculation Low Ratio		

2.2 Prevailing Load Tests

Instruments Used:
 Include description and serial Nos:
 Calibration expiry dates:

Current Transformer	L1	L2	L3
Primary Measurement			
Secondary measurement			
Ratio Calculation			

3. CT POLARITY VERIFICATION

Description of Tests performed

For example, verification with known standard CT (buck & boost tests) or DC flick test.

Instruments Used:
 Include description and serial Nos:
 Calibration expiry dates:

All tests performed and are correct? **Yes/No***

Tests performed by:
 Date of Tests:.....

*Delete as appropriate

**Metering Equipment Commissioning Record Part 2
(Meters)**

1. DETAILS

Meters			
Serial Number			
Manufacturer			
Type			
Meter CT ratio			
Meter VT ratio			
Register Readings			
Date & Time			
KW demand			

Correct phase sequence at Meter terminals? **Yes/No***

Current and Voltages have correct relationship? **Yes/No***

CT Burdens

CT secondary cable runVA

MetersVA

Other ...*description*VA

Total CT BurdenVA

Overall Burden on CTs is within limits? **Yes/No***

VT Burdens

VT secondary cable runVA

MetersVA

Other ...*description*VA

Total VT BurdenVA

Overall Burden on VTs is within limits? **Yes/No***

Confirm that the Meter is set to the actual ratios of the CTs and VTs **Yes/No***

CTs and VTs located where indicated on electrical schematic diagram? **Yes/No***

If No state location and reason:

.....

Phase fail alarms operating correctly? **Yes/No***

AI register advances when electricity flows toward the Generating Unit? **Yes/No***

CT shorting links left open? **Yes/No***

Meter potential fuse ratings..... Amps

Local fuse rating Amps

Commissioning form Part 1 verified and correct **Yes/No***

All connections tight? **Yes/No***

Tests performed by:

Date of Tests:.....

*Delete as appropriate

Subsequent Metering Calibration Test Record – Class 1 Meters

CfD ID:.....

Meter Type:.....

Serial Number:.....

Meter CT ratio:.....

Meter VT ratio:.....

Class:.....

Circuit Configuration:.....

Test instrument:.....

Serial Number:.....

Type:.....

Accuracy Class:.....

Date last tested:.....

Export / Import¹ Direction

P/Q	% Rated Voltage	% Rated Current	Phase Angle Applied	Phase	Instrument Error ²	Plant Error ³	Meter Error ⁴	Measurement Uncertainty ⁵
P	100	1.0 I _n ⁶	0°	L1/L2/L3				
				L1				
				L2 ⁷				
		1.0 I _n ⁶	60°	L1				
				L2 ⁷				
				L3				
		0.05 I _n ⁶	0°	L1/L2/L3				
Q		1.0 I _n ⁶	90°	L1/L2/L3				

Import/Export¹ Direction

P/Q	% Rated Voltage	% Rated Current	Phase Angle Applied	Phase	Instrument Error ²	Plant Error ³	Meter Error ⁴	Measurement Uncertainty ⁵
P	100	1.0 I _n ⁶	0°	L1/L2/L3				

Temperature:

Date of Test:/...../.....

Location of Test:

Test Sheet Reference No.:

Tested by:
(print name)

Signed:

Explanatory notes:

¹ The Meter will be tested in the direction it predominantly operates in, i.e. for a Generator this will be in the export direction. If the same measuring element is used to measure both import and export then one additional test point is required in the reverse direction. Delete as appropriate.

² The displayed error on the test instrument used to test the Meter; this will include the effect of any applied meter compensations for transformer errors/losses, if applicable.

³ The plant error applied to the Meter at that % rated current and power factor based on the transformer errors/losses calculation.

⁴ The actual error of the Meter once the effect of the Plant Error is removed from the raw instrument error.

⁵ Measurement uncertainty calculated to a confidence level of 95 %, $k=2$.

⁶ Test point used is the nominal value of current the Meter is rated for, i.e. if the nominal current of the meter is 5A the test would be done at 5A.

⁷ L2 test point is only applicable if the meter has three measuring elements, i.e. in a 3 Phase 4 wire Meter.

Subsequent Metering Calibration Test Record - Class 2 and Class 3 Meters

CfD ID:.....

Meter Type:.....

Serial Number:.....

Meter CT ratio:.....

Meter VT ratio:.....

Class:.....

Circuit Configuration:.....

Test instrument:.....

Serial Number:.....

Type:.....

Accuracy Class:.....

Date last tested:.....

Export/Import¹ Direction

P/Q	% Rated Voltage	% Rated Current	Phase Angle Applied	Phase	Instrument Error ²	Plant Error ³	Meter Error ⁴	Measurement Uncertainty ⁵	
P	100	1.0 I _{max} or 1.2 I _n / 1.5 I _n or 2.0 I _n ⁶	0°	L1/L2/L3					
			60°	L1/L2/L3					
			-36.9°	L1/L2/L3					
		0.1 I _n	60°	L1/L2/L3					
			-36.9°	L1/L2/L3					
		0.05 I _n	0°	L1/L2/L3					
				L1					
				L2					
		0.02 I _n	60°	L1/L2/L3					
			-36.9°	L1/L2/L3					
		0.01 I _n	0°	L1/L2/L3					
		Q		1.0 I _{max} or 1.2 I _n / 1.5 I _n or 2.0 I _n ⁶	90°	L1/L2/L3			
	L1/L2/L3								
0.1 I _n	30°			L1/L2/L3					
	-30°			L1/L2/L3					
0.05 I _n	90°			L1/L2/L3					
				L1					
				L2					
		L3							

Import/Export¹ Direction

P/Q	% Rated Voltage	% Rated Current	Phase Angle Applied	Phase	Instrument Error ²	Plant Error ³	Meter Error ⁴	Measurement Uncertainty ⁵
P	100	1.0 I _{max} or 1.2 I _n / 1.5 I _n or 2.0 I _n ⁶	0°	L1/L2/L3				

Temperature:

Date of Test:/...../.....

Location of Test:

Test Sheet Reference No.:

Tested by:
(print name)

Signed:

Explanatory Notes:

¹ The Meter will be tested in the direction it predominantly operates in, i.e. for a Generator this will be in the export direction. If the same measuring element is used to measure both import and export then one additional test point is required in the reverse direction. Delete as appropriate.

² The displayed error on the test instrument used to test the Meter; this will include the effect of any applied meter compensations for transformer errors/losses, if applicable.

³ The plant error applied to the Meter at that % rated current and power factor based on the transformer errors/losses calculation.

⁴ The actual error of the Meter once the effect of the plant error is removed from the raw instrument error.

⁵ Measurement uncertainty calculated to a confidence level of 95 %, k=2.

⁶ Test point used is dependent on the current rating of the Meter and will be the highest value of current the Meter is rated for, i.e. if the nominal current of the meter is 5A the test would be done at 6A (1.2 x 5A). 1.5 I_n or 2.0 I_n is only used if the Meter is designed for it and is determined by the overload capacity of the circuit, if unspecified test at 1.0 I_{max}. Delete as appropriate.

⁷ L2 test point is only applicable if the meter has three measuring elements, i.e. in a 3 Phase 4 wire Meter.

Key Meter Technical Details Form

To: [●] (the "CfD Counterparty")
[Address]

From: [●] (the "Generator")
[Unique reference number: [●]]

Dated: [●]

KEY METER TECHNICAL DETAILS

1. The following Key Meter Technical Detail was changed on **[date]:**

.....

2. The Key Meter Technical Details are now as follows:

Outstation ID.....

Meter Serial Number.....

Outstation Number of Channels.....

Measurement Quantity ID.....

Meter Multiplier.....

Pulse Multiplier.....

CT Serial Number.....

VT Serial Number.....

CT Ratios.....

VT Ratios.....

Print Name

Signed.....

Date.....

