

**Balancing and Settlement Code**

**BSC PROCEDURE**

**Metering Protocol Approval and Compliance Testing**

**BSCP601**  
**Specification for Compliance Testing of**  
**Metering Equipment Compliance Testing**  
**for**  
**Codes of Practice**  
**One, Two, Three and Five**

**Version 2.10**

**Date: 18 January 2007**

~~**BSC PROCEDURE BSCP601**~~

~~**relating to**~~

~~**Metering Protocol Approval and Compliance Testing**~~

- ~~1. Reference is made to the Balancing and Settlement Code (the Code) for the Electricity Industry in Great Britain, and in particular, to the definitions of "BSC Procedure".~~
- ~~2. This BSC Procedure BSCP601, Version 6.0 relating to Metering Protocol Approval and Compliance Testing.~~

~~This BSC Procedure is effective from the 03 November 2005.~~

~~This BSC Procedure has been approved by the Panel.~~

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For and on behalf of the Panel

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AMENDMENT RECORD

<u>Version</u>	<u>Date</u>	<u>Description of Changes</u>	<u>CRs Included</u>	<u>Mods Panel Ref</u>
<u>1.0</u>	<u>October 2005</u>			
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## 1. DEFINITIONS AND INTERPRETATIONS

- 1.1. In this specification, words and expressions shall have the meanings attributed to them in the Balancing and Settlement Code (“the Code”) and Codes of Practice (CoPs).
- 1.2. The following definitions, which also apply, supplement or complement those in the Code and CoPs and are included for the purposes of clarification.

“Applicant” means any person who makes an application to the Panel for Compliance Testing in accordance with the Specification.

“Type Approval” means the approval from the Electricity Meter Examination Service of the Office of Gas Electricity Markets.

“Compliance Testing” means the testing of Metering Equipment in accordance with this specification to determine whether it conforms with the relevant Code of Practice to obtain approval from the Panel.

“Compliance Testing Agent” means the agent appointed by BSCCo to perform Compliance Testing.

Code of Practice One means Code of Practice One: Issue 2, version 3.0; dated 23 February 2006 - CODE OF PRACTICE FOR THE METERING OF CIRCUITS WITH A RATED CAPACITY EXCEEDING 100MVA FOR SETTLEMENT.

Code of Practice Two means Code of Practice Two: Issue 4, version 3.0; dated 23 February 2006 - CODE OF PRACTICE FOR THE METERING OF CIRCUITS WITH A RATED CAPACITY NOT EXCEEDING 100MVA FOR SETTLEMENT PURPOSES.

Code of Practice Three means Code of Practice Three: Issue 5, version 5.0; dated 3 November 2005 - CODE OF PRACTICE FOR THE METERING OF CIRCUITS WITH A RATED CAPACITY NOT EXCEEDING 10MVA FOR SETTLEMENT PURPOSES.

Code of Practice Five	means Code of Practice Five: Issue 6, version 4.0; dated 3 November 2005 - CODE OF PRACTICE FOR THE METERING OF ENERGY TRANSFERS WITH A MAXIMUM DEMAND OF UP TO (AND INCLUDING) 1MW FOR SETTLEMENT PURPOSES.
Instation	means a computer based system which sends data to, or receives data from Outstations on a routine basis.
Interrogation Unit	means a Hand Held Unit "HHU" (also known as Local Interrogation Unit "LUI") or portable computer which can program Metering Equipment parameters and extracts information from the Metering Equipment and stores this for later retrieval.
Metering Equipment	has, for the purpose of this specification, the meaning ascribed to that term in the Balancing and Settlement Code, but excluding measurement transformers.
Test Laboratory	means the testing body so agreed with BSCCo to perform Compliance Testing to this specification.
UTC	means Co-ordinated Universal Time based on atomic clocks as distinct from Greenwich Mean Time (GMT).

## 2. SCOPE

This specification sets out:

- 2.1. the technical requirements for the Test Laboratory in order for it to carry out its obligations under the terms of the Compliance Testing agreement;
- 2.2. the testing facilities to be provided by the Test Laboratory; and
- 2.3. the test procedures to be followed by the Test Laboratory

to determine the accuracy and functionality of the items of Metering Equipment as conforming, or otherwise, to the requirements of the Balancing and Settlement Code and the relevant Codes of Practice.

The Compliance Testing requirements as detailed in this specification apply only to parts of the Metering System and therefore satisfactory test results from this Compliance Testing do not constitute a compliant Metering System as required by the Code, Balancing and Settlement Code Procedures (“BSCPs”) and the Codes of Practice.

- 2.4. This test specification applies to Codes of Practice One, Two, Three and Five and should be used by the Compliance Testing Agent to confirm compliance with the relevant Code of Practice the Metering Equipment is intended to be approved.
- 2.5. Unless agreement has been received in writing from BSCCo prior to the commencement of any testing to this specification, this specification is applicable only to one CoP at any one time and Metering Equipment requiring compliance with multiple CoPs shall be subject to a full and complete testing schedule for each CoP.

### 3. REFERENCES

The following documents are referenced in the text:-

BS 7856: <del>1996</del>	_____ ‘Code of Practice for Design of Alternating Current Watt-Hour Meters for Active Energy (Classes 1 and 2)’
<del>BS EN 60687</del>	<del>‘Alternating current static watt-hour meters for active energy (classes 0,2 S and 0,5 S)’</del>
BS EN 62053-22	Electricity metering equipment (a.c.) - Particular requirements – Part 22: Static meters for active energy (classes 0.2S and 0.5S)
BS EN 62053-11	Electricity metering equipment (a.c.) - Particular requirements – Part 11: Electromechanical meters for active energy (classes 0.5, 1 and 2)
BS EN 62053-23	Electricity metering equipment (a.c.) - Particular requirements – Part 23: Static meters for reactive energy (classes 2 and 3)
BS EN 62056-21	Electricity metering – Data exchange for meter reading, tariff and load control – Part 21: Direct local data exchange
BS EN 61107	Data exchange for meter reading, tariff and load control – Direct local data exchange
BS EN 61036: <del>1993</del>	‘Alternating current static watt-hour meters for active energy (classes 1 and 2)’
BS EN 60521	Class 0.5, 1 and 2 alternating-current watt-hour meters
BS EN 61268	Alternating current static var-hour meters for reactive energy (classes 2 and 3)
<u>IEC 61000-4-3</u>	<u>Electromagnetic Compatibility (EMC) – Part 4-3: Testing and Measurement</u>

techniques – Radiated, radio-frequency,  
electromagnetic field immunity test.

BS 5685: Part 4

Electricity meters. Part 4. Specification for  
Class 3 var-hour meters

Balancing and Settlement Code

‘Section X; Annex X-1 and Sections L and  
S’

BSC Procedures List

‘See BSC Section H 1.3.2 (a) – Code  
Subsidiary Documents’

Electricity Act 1989

‘Schedule 7, as amended by Schedule 1, to  
the Competition and Services (Utilities)  
Act 1992.’

Statutory Instrument 1998 No. 1565

‘The Meters (Approval of Pattern or  
Construction and Manner of Installation)  
Regulations 1998.’

Statutory Instrument 1998 No.1566

‘Electricity – The Meters (Certification)  
Regulations 1998.’

## **4. TEST CONSTRAINTS**

### **4.1. Applicable Codes of Practice**

Subject to 2.5 above, the following clauses refer to the Test Procedure solely for Compliance Testing to the requirements of a relevant Code of Practice at any one time and not to any other Code of Practice reference in the Code.

### **4.2. Timetable**

For each Compliance Testing Application the Test Laboratory shall complete all Compliance Testing within 40 business days of receipt of approval from BSCCo.

Where Compliance Testing can not be completed within the timetable the Test Laboratory shall inform BSCCo prior to the end of the initial 40 business day testing period and obtain agreement to a revised schedule.

### **4.3. Test Conditions**

To test the metering accuracy requirements in Clause 4.4 below, the test conditions shall be maintained in accordance with BS EN 61036, BS EN 60521, BS EN 62053-11 or BS EN 62053-22 for indoor meters. The appropriate accuracy Class of the Meter Equipment under test will be employed.

### **4.4. Samples for Testing**

The Applicant shall provide a minimum of two samples of the Metering Equipment for test and any supporting software and hardware necessary to fulfil testing.

## 5. TESTING

Note: (1) References contained within {} are to clauses in the relevant Code of Practice and are generic to CoPs 1, 2, 3 and 5 unless otherwise stated.

(2) Reference numbers in the right hand margin are to be used for test cross reference purposes and are to be prefixed with the relevant CoP number.

(3) Tests referenced to CoPs in italics indicate CoP specific tests.

### 5.1. General Test Conditions

Before testing the metering accuracy requirements in Clause 5.4 below, the following conditions shall be maintained:

- (a) The Meter shall be tested in its case with the cover in position and all its intended parts earthed;
- (b) Seals need not be applied to any sealing point during testing;
- (c) Before any test is conducted, the circuits and instrumentation shall have been energised for sufficient time to reach thermal stability;
- (d) For polyphase Meters, the phase sequence shall be marked on the diagram of connections and voltages and currents shall be substantially balanced (see Table 18 of BS EN 61036 for details);
- (e) Reference conditions shall be in accordance with table 19 of BS EN 61036;
- (f) In all cases taking into account the additional percentage error due to change of influence quantities in accordance with Table 14 of BS EN 61036; and
- (g) Notwithstanding rack mountable Meters, where a Meter has both Import and Export functionality, then the Active Import Energy flow is deemed to be from the extreme left hand terminal<sup>1</sup> (Red phase in) to the adjacent load terminal on the same phase (Red phase out).

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<sup>1</sup> Viewed from the front of the Meter, as though reading the display.

### 5.2. Measured Quantities {4.1.1}

The following tests shall be performed to establish the measured quantities:

(a)	establish the number and type of Measured Quantities available on the Meter;	<b>001</b>
(b)	if more than one Measured Quantity configuration is available, list all configurations;	<b>002</b>
(c)	confirm that a cumulative register display is available for each Measured Quantity (see also 5.8);	<b>003</b>
(d)	Import Active Energy is measured in kWh;	<b>004</b>
(e)	Export Active Energy is measured in kWh; and	<b>005</b>
(f)	confirm that Measured Quantities are available in both kilo and Mega values. <i>(CoPs 1 and 2 only)</i>	<b>006</b>

### 5.3. Demand Values {4.1.2}

The following test shall be performed to confirm that Demand Vvalues are provided:

(a)	confirm that a kW value is provided for each Demand Period for each Active Energy Measured Quantity;	<b>007</b>
(b)	where Import and Export values are provided confirm that each value is gross and recorded separately. <i>(Applies to CoP 5 and 3 only);and</i>	<b>008</b>
(c)	confirm that Demand <u>V</u> values are available in both kilo and Mega values. <i>(CoPs 1 and 2 only)</i>	<b>009</b>

#### 5.4. Accuracy Requirements {4.2}

(a) Active Energy

<p>Tests shall be carried out at fundamental frequency (50Hz) to verify that the Active Energy measurements are within the limits show in Table 1 below. The measurement uncertainty at fundamental frequency of the measurement system used shall not be greater than:</p> <p style="text-align: center; margin-left: 150px;">                     CoP 1    ±0.01%;                      CoP 2    ±0.05%;                      CoP 3    ±0.1%; or                      CoP 5    ±0.2%.                 </p>	<b>010</b>
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Table 1 Active Energy

Condition		Limits of Error			
Current expressed as a percentage of Rated Measuring Circuit*	System Power Factor	CoP 1	CoP 2	CoP 3	CoP 5
100% to 10% inclusive	1	±0.5%	±1.0%	●	●
Below 10% to 5%	1	±0.7%	±1.5%	±2.0%	●
Below 5% to 1%	1	±1.5%	±2.5%	●	●
120% to 10% inclusive	0.5 lag and 0.8 lead	±1.0%	±2.0%	±2.5%	●
120% to 10% inclusive	1	●	●	±1.5%	●
100% to 20% inclusive	1	●	●	●	±1.5%
Below 20% to 5%	1	●	●	●	±2.5%
100% to 20% inclusive	0.5 lag and 0.8 lead	●	●	●	±2.5%

\* for whole current metering percentage relates to  $I_{max}$ .

(b) Reactive Energy

Tests shall be carried out at fundamental frequency (50Hz) to verify that the Reactive Energy measurements are within the limits show in Table 2 below. The measurement uncertainty at fundamental frequency of the measurement system used shall not be greater than $\pm 0.4\%$ .	<b>011</b>
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Table 2 Reactive Energy

Condition		Limits of Error			
Current expressed as a percentage of Rated Measuring Circuit*	System Power Factor	CoP 1	CoP 2	CoP 3	CoP 5
120% to 10% inclusive	Zero	$\pm 4.0\%$	$\pm 4.0\%$	$\pm 4.0\%$	●
120% to 20% inclusive	0.866 lag and 0.866 lead	$\pm 5.0\%$	$\pm 5.0\%$	$\pm 5.0\%$	●
100% to 20% inclusive	Zero	●	●	●	$\pm 4.0\%$
100% to 20% inclusive	0.866 lag and 0.866 lead	●	●	●	$\pm 5.0\%$

\* for whole current metering percentage relates to  $I_{max}$ .

These limits of error for both Active and Reactive Energy shall apply at the reference conditions defined in the appropriate Meter specification.

**5.5. Measurement Compensation for Measurement Transformer Error(s) {4.2.2}**

Record the available range of measurement transformer compensation adjustment provided for both current and voltage measurements.	<b>012</b>
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**5.6. Compensation for Power Transformer and Line Losses {4.2.3}**

Record the available range of power transformer compensation adjustment provided. (If this adjustment is recorded as part of test 5.5 above then record that no additional adjustment is available).	<b>013</b>
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### 5.7. Meter Specification {5.3}

Establish the following parameters for the Meter under test:

(a)	record whether the Meter is of a Static or induction disc type;	<b>014</b>
(b)	record whether the Meter has an integral Outstation;	<b>015</b>
(c)	establish that the Active Energy Meter meets the requirements of:	<b>016</b>
	<ul style="list-style-type: none"> <li>i. CoP 1 BS EN 62053-22 Class 0.2S;</li> <li>ii. CoP 2 BS EN 62053-22 Class 0.5S or BS EN 62053-11 Class 0.5;</li> <li>iii. CoP 3 BS EN 61036 Class 1 or BS EN 60521 Class 1; or</li> <li>iv. CoP 5 BS EN 61036 Class 2 or BS EN 7856 Class 2</li> </ul>	
(d)	establish whether the Import Active Energy Meter meets the requirements of Schedule 7 of the Electricity Act 1989;	<b>017</b>
(e)	establish that the Reactive Energy Meter meets the requirements of:	<b>018</b>
	<ul style="list-style-type: none"> <li>i) CoP 1 BS EN 62053-23 Class 2.0;</li> <li>ii) CoP 2 BS EN 62053-23 Class 3 or BS 5685 Part 4;</li> <li>iii) CoP 3 BS EN 61268 Class 3 or BS 5685 Part 4; or</li> <li>iv) CoP 5 BS EN 61268 Class 3 or BS 5685 Part 4.</li> </ul>	
(f)	establish whether the number of measuring elements is one less or equal to the number of primary system conductors;	<b>019</b>
(g)	record whether provision has been made for the recording of measurement transformer ratios on the Meters name plate;	<b>020</b>
(h)	if the Meter is a static Meter with combined display and/or Outstation, then confirm that the ratios can be displayed and downloaded during the interrogation process;	<b>021</b>
(i)	Also confirm that any compensation factors that have been applied for measurement transformer errors and/or system losses, and where this is a constant factor applied at security level 3, can be similarly displayed and downloaded;	<b>022</b>
(j)	confirm that the Meter includes a non-volatile Meter register of cumulative energy for each Measured Quantity;	<b>023</b>
(k)	confirm that the Meter Register(s) do not roll-over more than once within the normal reading cycle [90 days at full load]; and	<b>024</b>
(l)	where the Meter is to be used with an external Outstation, confirm that the Meter is fitted with at least one output pulse facility for each Measured Quantity ( <i>two output pulse facilities are required in the case of CoP1</i> ).	<b>025</b>

### 5.8. Displays {5.4}

(a) Confirm that the Metering Equipment is capable of displaying the following primary information (not necessarily simultaneously):

i.	the total cumulative energy values for each Measured Quantity in actual scaled values can be displayed and stored in non-volatile memory;	<b>026</b>
ii.	the current time and date can be displayed;	<b>027</b>
iii.	the CT and/or VT ratios that have been programmed into the Meter can be displayed;	<b>028</b>
iv.	any compensation factor applied for measurement transformer errors and/or system losses can be displayed; and	<b>029</b>
v.	that, where the Meter is combined with the display and/or Outstation and a constant factor is applied, such factor is applied at security level 3.	<b>030</b>

(b) Confirm that the Metering Equipment is capable of enabling the display of the following information:

i.	the Maximum Demand ("MD") for kW (or MW as appropriate) per month can be displayed;	<b>031</b>
ii.	the Maximum Demand ("MD") for kW (or MW as appropriate) for other programmable charging periods can be displayed;	<b>032</b>
iii.	the Maximum Demand ("MD") for kVA (or MVA as appropriate) per month can be displayed;	<b>033</b>
iv.	the Maximum Demand ("MD") for kVA (or MVA as appropriate) for other programmable charging periods can be displayed;	<b>034</b>
v.	twice the kWh (or MWh as appropriate) advance from the commencement of the current Demand period can be displayed;	<b>035</b>
vi.	twice the kVAh (or MVAh as appropriate) advance from the commencement of the current Demand period can be displayed;	<b>036</b>
vii.	the cumulative Maximum Demand can be displayed;	<b>037</b>
viii.	the number of Maximum Demand resets can be displayed;	<b>038</b>
ix.	the multi rate display sequence, for at least 8 rates selectable over the calendar year, can be displayed;	<b>039</b>
x.	a reverse running indication for Active Energy is provided (where appropriate). <i>(Required for CoPs 3 and 5 only);</i>	<b>040</b>
xi.	the indicated Maximum Demand is re-settable at midnight of the last day of the selected charging period;	<b>041</b>
xii.	the indicated Maximum Demand is re-settable for a part of a charging period; and	<b>042</b>
xiii.	any manual reset button is sealable.	<b>043</b>

### 5.9. Facilities {5.4.2}

Establish whether the Meter is capable of providing different voltage free pulsed outputs for local use.	<b>042044</b>
If test 043 is confirmed then confirm that the facilities meet the following requirements as shown in Table 3.	<b>045</b>

Table 3 Pulse Output Requirements.

Requirement	Code of Practice			
	1	2	3	5
Number of Outputs	1 per Measured Quantity	1 per Measured Quantity	3 min (See 5.9 (a))	3 min (See 5.9 (a))
Pulse Rate	Min at full load 1000 per Demand Period	Min at full load 1000 per Demand Period	Between 0.1 and 2/ second	Between 0.1 and 2/ second
Nominal Pulse Duration (mS)	80	80	80	80

(a)	confirm that at least two of the outputs can be allocated to the Measured Quantities identified in {5.4.2}. <i>(Applies to CoPs 3 and 5 only)</i> ; and	<b>046</b>
(b)	confirm that one output can be allocated to the Demand Period reset (usually 30 minutes) within a tolerance of $\pm 0.1\%$ and a duration of between 0.5 and 10 seconds.	<b>047</b>

### 5.10. Outstation {5.5}

Where an Outstation has been provided as part of the Metering Equipment for test, the protocol shall be Approved in accordance with BSCP601 Section 3.

Establishing that:

(a)	The Outstation has a unique Outstation identification code;	<b>048</b>
(b)	For Meters with integral Outstations that an auxiliary terminal provides for the Outstations energisation for remote interrogation purposes <i>(CoP1 and CoP2 only)</i> ;	<b>049</b>
(c)	The Outstation is capable of communicating with more than one Instation (not simultaneously and of similar type or otherwise);	<b>050</b>

(d)	It is possible to repeatedly retrieve data throughout the Outstation data storage period;	<b>051</b>
(e)	Any "read" operation does not alter or delete any stored metered data; and	<b>052</b>
(f)	The Outstation can provide all metered data stored from the time of commencement of any specified date upon request by the Instation.	<b>053</b>

### 5.11. Data Storage {5.5.1}

The Metering Equipment shall be continuously energised at full load for a period of five days and afterwards at a cyclical variable load for a further fifteen days, determine to total number of kWh supplied to the Meter over the whole twenty day period.

During the test cycle establish that:

(a)	from the beginning of the current Demand Period, twice the kWh (or MWh as appropriate) is being registered in the kW (or MW) Maximum Demand register; and	<b>054</b>
(b)	from the beginning of the current Maximum Demand period, twice the kVAh (or MVAh as appropriate) is being registered in the kVA (or MVA) Maximum Demand register.	<b>055</b>

on completion of the twenty day cycle above, the following tests shall be performed and confirm that:

(a)	each Demand Value is identifiable to its respective date and time; and	<b>056</b>
(b)	a storage capacity of 48 periods per day in accordance with Table 4 below is available for all Demand Values as integer multiples of kW (or MW as appropriate);	<b>057</b>

Table 4 Data Storage Periods

Code of Practice	Minimum Storage Period(days)
1	10
2	10
3	20
5	20

(a)	for each of the initial five days, the sum of the Demand Values for each block of 48 half-hour periods are within 0.1% of the advance of the total cumulative register of the associated Meter for the same interval;	<b>058</b>
(b)	the value of any energy measured in a Demand Period, but not stored in that Demand Period are carried forward to the next Demand Period;	<b>059</b>

(c)	for each of the twenty days under test that the contents of the kW (or MW as appropriate) data stored facility have been stored correctly; and	<b>060</b>
(d)	for separate Meter/Outstation combinations, that the Outstation registers can be set to match and increment with the Meter registers.	<b>061</b>

One test sample of the Outstation shall be provided by the Applicant with its memory occupied with data to within twenty days of capacity (appropriate for the number of channels configured).

Upon further eEnergisation, confirm that;

(a)	on reaching maximum memory storage capacity, that any new data overwrites the oldest stored data; and	<b>062</b>
(b)	no other data has been altered or removed.	<b>063</b>

### 5.12. Time Keeping {5.5.2}

With the Metering Equipment connected to a supply, note the contents of all energy registers. Ensure that the time and date are correctly set to UTC. Disconnect the Metering Equipment from the supply and after 10 days<sup>2</sup> in the de-energised state verify on reconnection of the supply that:

<del>(a)</del>	<del>With the Metering Equipment connected to a supply, note the contents of all energy registers. Ensure that the time and date are correctly set to UTC. Disconnect the Metering Equipment from the supply and after 10 days<sup>22</sup> in the de-energised state verify on reconnection of the supply that:</del>	<del><b>0610</b></del> <del><b>64</b></del>
<del>(ab)</del>	all stored data has be correctly stored and is not corrupt;	<del><b>064</b></del>
<del>(be)</del>	the Metering Equipment internal clock is accurate to within $\pm 10$ seconds <sup>2</sup> ; and	<del><b>065</b></del>
<del>(cd)</del>	partial Demand Values in which an Outstation supply failure and/or restoration occurs and any zero values associated with the Outstation supply failure are marked so that they can be identified by the Instation.	<del><b>0666</b></del>

With the Metering Equipment energised, set the date and time correctly to UTC. Apply a load equivalent to full load (alternatively a high pulse rate of 2,000 pulses per half hour) using a stable power supply. Avoid any communication or time synchronisation with the Outstation for twenty days. At the end of the test and before any time synchronisation occurs, verify that:

(a)	the Metering Equipment internal time clock is accurate to within $\pm 10$ seconds <sup>3</sup> ; and	<del><b>06778</b></del>
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<sup>2,2</sup> For tests to Code of Practice 3 and 5, period of disconnection is 20 days and the acceptable tolerance is  $\pm 20$  Seconds.

(b)	the duration of each <del>e</del> Demand <del>p</del> Period is within $\pm 0.1\%$ of 30 minutes, this being achieved by the comparison of stored energy values or pulse counts in each Demand Period.	<del>06889</del>
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Set the Metering Equipment's internal time clock to five minutes slow with respect to UTC. Then synchronise the internal time clock using the remote Instation and check that the Demand <del>P</del> period has been marked with an alarm indication.	<del>069970</del>
Repeat the synchronisation test using the Local Interrogation Unit and check that the Demand Period has been marked with an alarm indication	<del>070704</del>

<sup>2</sup> For tests to Code of Practice 3 and 5, period of disconnection is 20 days and the acceptable tolerance is  $\pm 20$  Seconds.

<sup>3</sup> For tests to Code of Practice 3 and 5, the acceptable tolerance is  $\pm 20$  Seconds.

### 5.13. Monitoring Facilities {5.5.3}

#### 5.13.1. Phase Failure Indication Tests

*This test 5.13.1 applies to CoP 3 and 5 only.*

Ensure that the Metering ~~E~~quipment is connected to a supply and has no alarms or flags set. Undertake the following phase failure tests:

(a)	disconnect one phase from the Metering Equipment and ensure that a phase failure has occurred and is assigned to the relevant Demand Period;	<del>071</del>
(b)	repeat the disconnection process for each of the remaining phases in separate Demand Periods;	<del>072</del> <del>3</del>
(c)	repeat the disconnection process for combinations of multiple phase failure <del>s</del> and	<del>073</del> <del>4</del>
(d)	verify phase failure alarm resets on restoration of normal supply after each test.	<del>074</del> <del>5</del>

#### 5.13.2. Battery Monitoring Tests

Establish the method of battery monitoring and test for alarms and indications tagged to the relevant Demand Periods, if necessary by disconnecting the battery.	<del>0755</del>
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Note 1: It may not be possible to test some battery monitoring such as extended shelf life or out of service monitoring or total battery life.

Note 2: Depending on the manufacturer and the type of Metering Equipment under test, it may be necessary to temporarily disconnect the power supply to the Metering Equipment for safety reasons whilst the battery is disconnected.

5.13.3. Time Setting Alarms

For Outstations using other methods of time synchronisation, such as a Radio Teleswitch, confirm that any truncated or extended Demand Period is tagged with a separate alarm indication.	<b>076</b>
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5.13.4. Other Alarms

Using the Local Interrogation Unit access the local port and change data other than time and/or date. Confirm that the relevant Demand Period is tagged with a separate alarm indication.	<b>077</b>
Using the Instation to access the remote port, change data other than time and/or date. Confirm that the relevant Demand Period is tagged with a separate alarm indication.	<b>078</b>

5.13.5. Reverse Running

Where an Active Energy reverse running display is provided, determine that the requirements of BS EN 61036 or BS EN 62053-22 as appropriate are met. Establish under what conditions the reverse running flag is activated and record those conditions. Tests should include single and polyphase power reversals and set the appropriate flag for the Demand Period affected.	<b>08079</b>
Test that upon return to normal power flow, the reverse running flag is no longer present in the unaffected Demand Period.	<b>0810</b>

**5.14. Communications {5.6}**

Verify that two communications ports are available for interrogating the Outstation	<b>081</b>
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5.14.1. Local Port

Using the Local Interrogation Unit provided by the Applicant, confirm that:

(a)	The local port provides data to a Local Interrogation Unit via an opto port to BS EN 61107 ( <i>CoP 3 and 5</i> ) or BS EN 62056-21 ( <i>CoP1 and 2</i> ); or	<b>082</b>
(b)	The local port provides data to a Local Interrogation Unit via another type of port; and	<b>083</b>
(c)	Repeat collections of stored data are available throughout the storage period and verify that and "read" operation does not delete or modify any stored metering data.	<b>084</b>

#### 5.14.2. Remote Port

Using a modem or similar device provided by the Applicant, via one of the prescribed media {5.6.2} confirm that:

(a)	The remote port is sealable; and	<b>085</b>
(b)	Repeat collections of stored data are available throughout the storage period and verify that any "read" operation does not delete or modify any stored metering data	<b>086</b>

#### 5.15. Password Protection

(a)	For separate Outstations establish that a password is required to read or change any data.	<b>087</b>
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For integral Outstations establish that **four** discrete password controlled access levels are provided for both local and remote interrogation.

(b)	For alpha character passwords, ensure that passwords are no less than <b>six</b> characters and no more than <b>twelve</b> characters long.  Ensure that passwords are formed from case insensitive alpha characters (A to Z) and/or digits (0 to 9) and/or the underscore character (_).	<b>0898</b>
(c)	For hexadecimal character passwords, ensure that passwords are no less than <b>eight</b> characters and no more than <b>twelve</b> characters long.  Ensure that passwords are formed from case insensitive hexadecimal characters (0 to F).	<b>0899</b>

5.15.1. Level 1 Passwords

Using the Level 1 password, establish that the following data can be retrieved:

(a)	Outstation ID;	<del>09100</del>
(b)	all programmable Demand Values;	<del>091</del>
(c)	all programmable cumulative Measured Quantities;	<del>0922</del>
(d)	the Maximum Demand for kW and/or kVA per programmable charging period;	<del>093</del>
(e)	the multi-rate cumulative Active Energy values;	<del>094</del>
(f)	the VT and CT transformer ratios, where appropriate;	<del>095</del>
(g)	(for combined Meter and Outstation only), the VT and CT transformer error correction factor and/or system loss factor applied as a constant factor to the entire dynamic range;	<del>096</del>
(h)	all alarm indications; and	<del>097</del>
(i)	Outstation time and date	<del>098</del>

Establish that it is **not** possible to change any of the above values at Level 1 Password.

5.15.2. Level 2 Passwords

Using the Level 2 Password, establish that all the data listed at Level 1 can be retrieved and in addition that the following actions can be performed:		<del>09699</del>
(a)	changes to time and date; and	<del>100</del>
(b)	resetting of all Maximum Demands.	<del>101</del>

5.15.3. Level 3 Passwords

Using the Level 3 Password, establish that all the functionality listed at Level 2 can be performed and in addition that the following programming can be performed:		<del>102</del>
(a)	Displays and Facilities as defined in Clause 5.4;	<del>103</del>
(b)	measurement transformer ratios as defined in Clause 5.3;	<del>104</del>
(c)	(for combined Meter and Outstation only), the VT and CT transformer error correction factor and/or system loss factor applied as a constant factor to the entire dynamic range; and	<del>105</del>
(d)	passwords for Levels 1, 2 and 3.	<del>106</del>

Establish that it is possible to read additional information within the Metering Equipment to enable the programmed information to be confirmed.		<del>107</del>
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5.15.4. Level 4 Passwords

If the Level 4 Password is implemented electronically then establish that all the functionality listed at Level 3 can be performed and in addition that the following <u>alterations</u> can be performed:		<b>108</b>
(a)	calibration of the Meter (only where the Meter is integral with the Outstation);	<b>1099</b>
(b)	setting the measurement transformer ratios, where appropriate;	<b>1140</b>
(c)	setting the measurement transformer error correction and/or system loss factors applied as a complex factor; and	<b>111</b>
(d)	programming the Level 3 & 4 Passwords.	<b>112</b>

If the Level 4 Password is implemented by removing the seals and cover, then establish that the following alterations can be performed:

(a)	calibration of the Meter (only where the Meter is integral with the Outstation);	<b>113</b>
(b)	setting the measurement transformer ratios, where appropriate; and	<b>114</b>
(c)	setting the measurement transformer error correction and/or system loss factors applied as a complex factor.	<b>1155</b>

5.15.5. Password Monitoring {Appendix D}

Using the Approved Protocol <sup>4</sup> , verify that the password offered determines the Level of access to the data within the Metering Equipment.	<b>116</b>
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Verify, by accessing the Metering Equipment at least eight times with an "illegal" password(s), that:

(a)	the illegal password counter resets to zero every hour on the hour change; and	<b>117</b>
(b)	after the seventh illegal password attempt entered between counter resets, that access is prohibited at all levels until the counter resets.	<b>1188</b>

5.16. Additional Tests

5.16.1. Electromagnetic Compatibility Tests

In addition to the EMC tests carried out by the Electricity Meter Examination Service of the Director of Electricity Supply as part of the process of Type Approval for the Meter in accordance with BS EN 61036, verify, by testing under all the conditions detailed in BS EN 61036, that:

(a)	any stored data and time/date is not corrupted or has been destroyed; and	<b>12019</b>
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(b)	the metering accuracy remains within the requirements of Clause 5.4 of this Compliance Testing Specification.	<b>12<del>1</del>0</b>
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5.16.2. Immunity to Electromagnetic HF Fields

Verify, by testing in accordance with IEC 61000-4-3, and under the following conditions:

- the voltage and auxiliary circuits energised with reference voltage;
- a frequency band of 26MHz to 1GHz;
- a test field strength of 12.5V/m; and
- a carrier of 80% amplitude modulated with a 1kHz sine wave.

(a)	that without any current in the current circuits and the current terminals open circuit the application of the HF fields shall not produce a change in the Meter Register reading of more than 0.01kWh and the test output shall not produce a signal equivalent to more than 0.01kWh. (Where VT and CT connected Meter(s) is under test, equivalent scaled values should be used taking into account the transformer ratios); and	<b>12<del>1</del>1</b>
(b)	that with basic current $I_b$ , and power factor equal to 1.0, at sensitive frequencies or frequencies of dominant interest, the variation of error does not exceed 3%.	<b>12<del>2</del>2</b>

On completion of each EMC test verify that:

(a)	any stored data is not corrupted or has been destroyed; and	<b>12<del>3</del>3</b>
(b)	the metering accuracy remains within the requirements of Clause 4.3 of this Specification.	<b>12<del>4</del>4</b>

NOTE: Where VT and CT connected Meter(s) are under test the equivalent scaled values, taking into account the transformer ratios, should be used when considering any differences in Meter Register reading and output signals.

5.17. Sealing {5.7}

Ensure that adequate sealing facilities are provided for Settlement requirements.	<b>12<del>5</del>5</b>
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