Balancing and Settlement Code

BSC PROCEDURE

Metering Protocol Approval and Compliance Testing

BSCP601

Version ~~7~~8.0

Date : xx February 2008~~28 June 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 is BSC Procedure BSCP601, Version 78.0 relating to Metering Protocol Approval and Compliance Testing.

3.　　This BSC Procedure is effective from the xx February 200828 June 2007

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

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For and on behalf of the Panel

AMENDMENT RECORD

BSC Procedure

Version	Date	Description of Changes	CRs Included	Mods Panel Ref
0.1	20/01/01	Re-Badged for NETA	NCR313	
1.0	27/03/01	Approved by Panel 22/02/01	P/13/008	
2.0	05/08/02	Changes to incorporate CP764	CP764	SVG/18/226 ISG/18/187
3.0	01/08/03	Updated for Modification P62	P62	SVG/29/390
4.0	29/06/04	Updated for CP983	CP983	SVG/39/003 ISG/40/002
5.0	23/02/05	SVA February 2005 Release and BETTA 6.3	P159, CP993, CP1091 and BETTA 6.3 and CP1067	SVG/47/004
6.0	03/11/2005	SVA November 2005 Release	CP1099 and CP1139	SVG/56/004
7.0	28/06/07	June 2007 Release Updated terminology in preparation for P197 Release	CP1174 (v2.0) P197	ISG/72/04 SVG/72/04
8.0	XX/02/08	Update of protocol and incorporation of appendices	CP xxxx	

CONTENTS

1. Introduction

1.   Introduction

1.1   Scope and Purpose of the Procedure

This BSC Procedure defines the processes for Meter Manufacturers, Meter Operator Agents, Suppliers, Half Hourly Data Collectors and other Half Hourly Metering Equipment users to apply for Compliance Testing and Protocol Approval. This procedure covers the application process, submission of Metering Equipment, communications with the Compliance and Protocol Testing Agents, the issue and removal of certificates. For the avoidance of doubt, this procedure applies only to Half Hourly Metering Equipment.

Protocol Approval

————This process is defined to:

~~i)~~a) Approve a Protocol for Settlement purposes; and

~~ii)~~b)   ensure that an accredited Half Hour Data Collector is capable of appropriate communications with Metering Equipment.

Metering Equipment Compliance

This process is defined to ensure that Metering Equipment is designed and manufactured to the requirements of the relevant Code/s of Practice. Each Compliance Approval is specific to that Metering Equipment tested including type reference and any firmware and software versions. Metering Equipment firmware and software updates not affecting Compliance need not be re-approved. Notification of any such change is to be provided to BSCCo.

1.2   Main Users of Procedure and their Responsibilities

The main users are Meter Manufacturers, Half Hourly Data Collectors, Meter Operator Agents, Compliance and Protocol Testing Agents and BSCCo.

- ▪   The Applicant is responsible for submitting applications for the testing of Metering Equipment, arranging for testing to be conducted and any costs associated with testing.

- ▪   The Applicant is responsible for submitting notification of any amendment to Metering Equipment or Data Retrieval system for an existing Approval.

- ▪   The Compliance and Protocol Testing Agents are responsible for receiving Metering Equipment, undertaking the testing of that Metering Equipment and providing a written report to BSCCo of the findings of such tests.

- BSCCo is responsible for the selection of suitably accredited Compliance and Protocol Testing Agents, the scheduling of tests and the determination of successful tests together with the issue of certificates.

- Half Hour Data Collector Agents are required to ensure that approval is obtained for each type of Metering Equipment that it collects data for Settlement purposes.

1.3   Use of the Procedure

This procedure should be referred to by manufacturers, operators of Metering Equipment and Data Collectors, to understand the role and responsibilities of BSCCo and the Compliance and Protocol Testing Agents.

Following the completion of testing and the issue of the 'Test Report' and/or 'Compliance Certificate', the BSCCo shall make such test results contained in the 'Test Report' available to Parties, Half Hourly Data Collectors and Meter Operator Agents. Following the Approval of a Compliance Test or Protocol, a circular will be issued to communicate the details of the approval.

Throughout this procedure, timetables reflect the number of Working Days (WD) within which an activity should be completed.

The remaining sections in this document are:

Section 2 - Interface and Timetable Information: this section defines each business process in detail. Where the columns headed "Information Required" are also supported by a "Data Flow Reference", then only some of the key data fields are shown in the tables.

Section 3 - Appendices: this section contains supporting information.

The Compliant and Protocol Approved Metering Equipment list can be found on the BSC Website at http://www.elexon.co.uk/

1.4   Balancing and Settlement Code Provision

This BSC Procedure has been produced in accordance with the provisions of the Code. In the event of an inconsistency between the provisions of this BSC Procedure and the Code, the provisions of the Code shall prevail pursuant to H.5.1 of the Code.

1.5   Associated BSC Procedures

- BSCP502   Half Hourly Data Collection for SVA Metering Systems Registered in SMRS

- BSCP531   Accreditation[1]

- BSCP537   Qualification Process for SVA Parties, SVA Party Agents and CVA MOAs[2]

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[1] On 23 May 2008, this BSCP will be withdrawn.
[2] BSCP537 will be effective from 23 August 2007.

1.6 Acronyms and Definitions

1.6.1 Acronyms

Full definitions of the acronyms are, where appropriate, are included in the Balancing and Settlement Code.

The terms used in this Agreed Procedure are defined as follows.

BSCCo	Balancing and Settlement Code Company
CDCA	Central Data Collection Agent
CoP	Code of Practice
CT	Current Transformer
CTA	Compliance Testing Agent
HHDC	Half Hourly Data Collector (Accredited)
MD	Maximum Demand
ME	Metering Equipment
MOA	Meter Operator Agent
SMRS	Supplier Meter Registration Service
WD	Working Day

1.6.2 Definitions

Applicant	Person applying for Compliance and/or Protocol approval
BSCCo	The Balancing and Settlement Code Company
Compliance Testing	means the testing of Metering Equipment in accordance with this BSCP601 to determine whether it conforms with the relevant Code of Practice to obtain approval from the Panel.
Compliance Testing Agent	The agent responsible for the testing of Metering Equipment, accredited against an appropriate (as determined by BSCCo) body such as the UK Accreditation Service (UKAS).
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.
Code of Practice Six	means Code of Practice Six: Issue 4, version 4.20; dated Code Effective Date.
Instation	means a computer based system which sends data to, or receives data from Outstation Systems on a routine basis.
Interrogation Unit	means a Hand Held Unit "HHU" (also known as Local Interrogation Unit "LIU") or portable computer which can program Metering Equipment parameters and extract information from the Metering Equipment and store this for later retrieval.
Metering Equipment	has, for the purposes of this BSCP601, the meaning ascribed to that term in the Balancing and Settlement Code, but excluding voltage and current measurement transformers
person	includes any individual, company, corporation, firm, partnership, joint venture, association, committee, organisation or trust (in each case, whether or not having separate legal personality).
Settlement	has the meaning ascribed to that term in the Balancing and Settlement Code.
Test Laboratory	means the testing body so agreed with BSCCo to perform Compliance Testing to this BSCP601.

Type Approval	means the approval from the Electricity Meter Examination Service of the Office of Gas and Electricity Markets.
UTC	means Co-ordinated Universal Time based on atomic clocks as distinct from Greenwich Mean Time (GMT).

2.Interface and Timetable Information

2. Interface and Timetable Information

2.1 APPLICATION FOR PROTOCOL APPROVAL

REF	WHEN	ACTION	FROM	TO	INFORMATION REQUIRED	METHOD
2.1.1	At any time.	Submit Application for Protocol Approval and any supporting documentation.	Applicant	BSCCo	Notification of Metering Equipment and/or HHDC Agent to be approved. Form F601/ 03	Fax, Post.
2.1.2	Within 2WD of receipt of 2.1.1 above.	Validate application.	BSCCo			Internal Process.
2.1.3	Within 5 WD of 2.1.1 above.	Notify Applicant of acceptance or rejection of Application. If accepted, provide copy of testing schedule and notification of Application reference number.	BSCCo	Applicant	Protocol Approval test schedule and Application reference number.	E-mail, Fax, Post.
2.1.4	Within 10 WD of receipt of 2.1.3 above.	Agree any re-drafting of test schedule.	Applicant	BSCCo	Re-drafted schedule (if required).	E-mail, Fax, Post.
2.1.5	Within 5 WD of 2.1.4 above.	Arrange with nominated HHDC to conduct testing and liaise with BSCCo to witness testing.	Applicant	HHDC BSCCo		As agreed.
2.1.6	Within 10 WD of 2.1.5 above.	Submit 2 Outstations and any software for testing to the nominated HHDC.	Applicant	HHDC		As agreed.

REF	WHEN	ACTION	FROM	TO	INFORMATION REQUIRED	METHOD
2.1.7	Within 10 WD of 2.1.5 above.	Undertake testing of Protocol in accordance with agreed Test Schedule.	HHDC	BSCCo		
		Prepare and submit report including test results.	HHDC	BSCCo	Test Report[3].	E-mail, Fax, Post.
2.1.8	Within 5 WD of 2.1.7 above.	Notify Applicant of test result determination.	BSCCo	Applicant	Form F601/02	E-mail, Fax, Post.
		If testing successful, update Protocol Approval list (see section 3.2), notify Parties and Party Agents and issue certificate to Applicant.		Parties	Approval details.	
				Party Agents	Approval details.	E-mail, Fax, Post, BSC Website.
2.1.9	Next opportune meeting.	Notify Panel of certificates issued and updates to Protocol Approval list (see section 3.2).	BSCCo	Panel	Panel report.	Panel Paper.

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[3] Copies of the Test Report will be made available by BSCCo to Parties, Meter Operator Agents and Half Hourly Data Collectors on request to BSCCo.

2.2 APPLICATION FOR COMPLIANCE APPROVAL

REF	WHEN	ACTION	FROM	TO	INFORMATION REQUIRED	METHOD
2.2.1	At any time	Submit Application for Compliance Testing.	Applicant	BSCCo	Form F601/03	E-mail, Fax, Post.
2.2.2	Within 2WD of receipt of 2.2.1 above.	Validate Application.	BSCCo			Internal Process.
2.2.3	Within 5 WD of 2.2.1 above.	Notify Applicant of acceptance or rejection of Application. If accepted, provide copy of testing schedule and notification of Application reference number.	BSCCo	Applicant	Compliance test schedule and Application reference number.	E-mail, Fax, Post.
2.2.4	Within 10WD of receipt of 2.2.3 above.	Agree any re-drafting to test schedule.	Applicant	BSCCo	Re-drafted schedule (if required).	E-mail, Fax, Post.
2.2.5	Within 10 WD of 2.2.4 above.	Agree Compliance Testing Agent with BSCCo. Liaise with CTA to undertake Compliance testing.	Applicant	BSCCo CTA	Notification of CTA.	E-mail, Fax, Post.
2.2.6	Within 3 Months of 2.2.5 above.	Undertake testing and submit report to BSCCo.	CTA	BSCCo	Compliance test report[4].	E-mail, Fax, Post.

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[4] Copies of the compliance test report will be made available by BSCCo to Parties, Meter Operator Agents and Half Hourly Data Collectors on request to BSCCo.

REF	WHEN	ACTION	FROM	TO	INFORMATION REQUIRED	METHOD
2.2.7	Within 5 WD of 2.2.6 above.	Notify Applicant of test result determination. If testing successful, update Compliance Approval list (see section 3.2). Notify Parties and Party Agents of new approval and issue certificate of Compliance to Applicant.	BSCCo	Applicant Parties Party Agents	Form F601/01. Approval details. Approval details.	E-mail, Fax, Post. E-mail, Fax, Post, BSC Website.
2.2.8	Next opportune meeting.	Notify Panel of certificates issued and updates to Compliance Approval list (see section 3.2).	BSCCo	Panel	Panel report.	Panel Paper.

2.3 AMENDMENT TO METERING EQUIPMENT

REF	WHEN	ACTION	FROM	TO	INFORMATION REQUIRED	METHOD
2.3.1	At any time	Submit notification of amendment to Metering Equipment or Data Retrieval system for an existing Approval and agree impact of change.	Applicant	BSCCo	Details and impact of change.	E-mail, Fax, Post.
2.3.2	Within 30 WD of 2.3.1 above.	Consult with affected Parties (if required) and determine whether Approval for the amendment to Metering Equipment or Data Retrieval system can be given.	BSCCo	Affected Parties	Details and impact of change.	As agreed.
2.3.3	Within 5 WD of 2.3.3 above.	Notify Applicant of determination and if new Approval given, update Approval list (see section 3.2).	BSCCo	Applicant Parties Party Agents	BSCCo determination. Approval details. Approval details	E-mail, Fax, Post, BSC Website.
2.3.4	Next opportune meeting	Notify Panel of any updates to Approval list (see section 3.2).	BSCCo		Panel Report	Internal Process

2.4 NOTIFICATION OF APPROVED PROTOCOL/COMPLIANCE ISSUES

REF	WHEN	ACTION	FROM	TO	INFORMATION REQUIRED	METHOD
2.4.1	At any time	Submit notification of approval issue.	Any party	BSCCo	Details and impact of issue.	E-mail, Fax, Post.
2.4.2	Within 30 WD of 2.4.1 above	Clarify and substantiate issue. Consult with and obtain additional information from affected parties (if necessary).	BSCCo	Affected parties	Additional Information.	As agreed.
2.4.3	Within 10 WD of 2.4.2 above	Agree findings with notifying party.	BSCCo	Notifying party		As agreed.
2.4.4	Next opportune meeting.	If issue substantiated, prepare and submit report with recommendations to the Panel.	BSCCo	Panel	Report to the Panel.	Internal Process.
2.4.5	Within 5 WD of 2.4.4 above	Notify Parties and Party Agents of Panel decision and if necessary update Compliance and/or Protocol Approval list.	BSCCo	Parties Party Agents	Issue and Panel decision.	Circular.

3. Appendices

3.1   Forms

3.1.1   Form F601/01 – Certificate of Compliance

F601/01

Certificate of Compliance

Code of Practice [Five]

CODE OF PRACTICE FOR THE METERING OF ENERGY TRANSFERS [WITH A MAXIMUM DEMAND OF UP TO (AND INCLUDING) 1MW FOR SETTLEMENT PURPOSES]

Application Reference No:

Issued To:

Meter Description:	Type:	Firmware Version:
Test Reference No.	Date of Test:	Software Version:

Test Laboratory:

Test Environment:

[ABC Manufacturer's] Metering Equipment has undergone Compliance Testing in accordance with Code of Practice [Five], Issue * (v *.**) dated n^{th} Month Year, and the ~~Specification~~ for Type Testing Version [5.0] dated n^{th} Month Year (and subsequent revisions) and BS EN 61036.

The Metering Equipment was tested in conjunction with the Manufacturer's "XXXX Software, version V*.**".

Certificate of Compliance:

The review of the Compliance Testing results on n^{th} Month Year confirmed that the Metering Equipment was found to comply with the requirements of Code of Practice [Five] in all respects.

Signed: ………………………………………   Date: ………………………………

On Behalf of the Panel, ELEXON Limited (as the Balancing and Settlement Code Company ('BSCCo'))

3.1.2   Form F601/02 – Certificate of Protocol Approval

F601/02

Certificate of Protocol Approval

METERING EQUIPMENT PROTOCOL MEETING THE REQUIREMENTS OF BSCP601 FOR SETTLEMENT PURPOSES

Application Reference No:

Issued To:

Meter Description: Type: Firmware Version:

Test Reference No.   Date of Test: Software Version:

Test Laboratory:

Test Environment:

[ABC Manufacturer's] Metering Equipment listed above, has undergone Protocol Testing in accordance with BSC Procedure BSCP601, Issue * (v *.**), dated n[th] Month Year.

The Metering Equipment was tested in conjunction with the Manufacturer's "XXXX Software, version V*.**" and the following Accredited[5] Data Collector.

Data Collector	System or Process[6]	Instation Version	Outstation Version

Certificate of Protocol Approval:

The review of the Protocol Testing results on n[th] Month Year confirmed that the Metering Equipment was found to be suitable for Settlement use in conjunction with the Accredited Data Collector listed above.

Signed: …………………………………………   Date: ……………………………….

       On Behalf of the Panel, ELEXON Limited (as the Balancing and Settlement Code Company ('BSCCo'))

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[5] From 23 August 2007 the Accreditation Process will be replaced by the Qualification Process.
[6] So approved in accordance with BSCP537.

3.1.3 Form F601/03 – Protocol Approval and Compliance Testing

Part 1 of 3

F601/03

PROTOCOL APPROVAL AND COMPLIANCE TESTING APPLICATION FORM (PART 1)

Ref. No[7]……………..

I wish to apply for Protocol Approval of the Products identified in Section **B** below: ☐   tick as appropriate

I wish to apply for Compliance Testing of the Products identified in Section **C** below ☐   tick as appropriate

Section A: DETAILS OF APPLICANT

Company Name: ………………………………….

Address: …………………………………………………………….…

     …………………………………………….………………….

Participant Role: ………………………………….(e.g. Meter Manufacturer)

Contact Name: ………………………………….

Contact Tel. No: …………………………...………..

Fax. No: ………….………………...

E-mail: …………………….………...

Signature: ………………………………….

Date of Application: ……………………….

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[7] Reference No. obtainable from ELEXON Limited

Part 2 of 3

Section B: REQUEST FOR PROTOCOL APPROVAL

Please enter the details of the Metering Equipment type(s) and Data Collector(s) to be Protocol Approved.

Data Collector	Metering Equipment
………………………………………	……………………………………..
………………………………………	……………………………………..
………………………………………	……………………………………..
………………………………………	……………………………………..
………………………………………	……………………………………..
………………………………………	……………………………………..
………………………………………	……………………………………..

Note:
For Data Collectors seeking Protocol Approval, enter one entry in the left hand column and the Metering Equipment type/s to be tested in the right hand column.

For Manufacturers seeking Protocol Approval, enter the Metering Equipment type in the right hand column and the Data Collector/s to conduct the testing in the left hand column.

Part 3 of 3

Section C: REQUEST FOR COMPLIANCE TESTING

Metering Equipment Description

Manufacturer	Type	Serial No.	OFGEM TYPE APPROVAL STATUS		
			APPROVED	**IN PROGRESS**	**NONE**
1					
2					
3					

Applicable Codes of Practice for Metering Equipment Testing

Code of Practice *	Issue		Code of Practice *	Issue	
ONE TWO THREE			FIVE SIX SEVEN		

* Delete Codes of Practice not applicable.

3.2 Compliant Metering Equipment and Approved Protocols List

Note that the list of Compliant and Protocol Approved Metering Equipment can be found at http://www.elexon.co.uk/, titled 'Codes of Practice (CoP) Compliance and Protocol Approvals'.

3.3   Specification for the Testing of Metering Equipment Protocols

3.3.1 Scope

Protocol Test Specification

The Protocol test schedule referenced in Section 2.1 above will be produced for each Applicant by BSCCo and will be based upon the requirements of the relevant Protocol.

A protocol in the context of an Outstation, is the set of rules governing the communication of data between the Outstation and any other device connected to it. The protocol is usually designed and implemented by the manufacturer of the Outstation.

As described in this BSCP, it is necessary to ensure that Settlement Instations are able to communicate appropriately with the various Outstations. This is achieved by the verification of the Instations function when compared with the protocol. There are a number of ways in which an Instation can be verified compliant with a protocol and this Appendix describes the general requirements and provides an example test procedure.

Unless the context otherwise requires, words importing the singular number shall include the plural, and vice versa.

This BSCP sets out the:-

(a)   technical requirements for testing;

(b)   testing facilities to be provided; and

(c)   Test Procedures to be followed,

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

This BSCP supersedes the previous BSCP(s) and/or documentation in respect of Protocol Testing.

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The Protocol Testing requirements as detailed in this BSCP apply only to the communication parts of a Metering System and therefore satisfactory test results from this Protocol Testing do not constitute a compliant Metering System as required by the Balancing and Settlement Code, BSC Procedures and Codes of Practice.

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3.3.2   Test Procedure

The following functions are required to be tested:

1. Data retrieval;

2. Passwords;

3. Time reset; and

4. Flags.

3.3.3   Test Schedule – Example

The following test schedule example is provided for information only. The actual tests to be used are dependant on the Code of Practice requirements that an Outstation is to be tested against. The proposed test schedule shall be agreed between the applicant and BSCCo prior to the commencement of any testing.

Record all relevant details:

a. Test Environment
     i. Date and time
     ii. Location
     iii. Parties present

b. Outstation details
     i. Serial number
     ii. Type reference
     iii. Make and model
     iv. Record whether Outstation has integral Meter
     v. Number and type of measured quantities available in the Outstation
     vi. Record energy flow direction capability (import and export)
     vii. Record any software and firmware versions.

c. Outstation Set up details
     i. Number of input channels configured
     ii. Record Outstation constant and scale factor (e.g. MWh x 10)
     iii. Confirm Outstation time is set to GMT
     iv. Set (using the manufacturer's software) and record each unique password for the level of access required.

d.   Instation details
  i.   Type, version and operating platform
  ii.   Record the software version of any relevant module details
  iii.   Configure the Instation with the passwords chosen in c. iv. above and ensure they are consistent with the level of access required.

3.3.3.1 Data retrieval

Energise the Outstation and ensure that the Outstation contains at least 20 days of non-uniform[8] half hour period data.

Test 1.

Ensure the Outstation clock is set to GMT.
Using manufacturer's software, collect at least 48 consecutive half hour periods of data.
Using the Instation, collect the same periods of data.
Compare the two sets of data and identify any inconsistencies.
Record results

Test 2.

Repeat Test 1.
Compare the Instation results from both tests for any inconsistencies.
Record results.

Note: This test is designed to ensure that repeated data collection does not corrupt any data.

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[8] Period data may be populated by any means providing it enables data retrieval to be differentiated.

3.3.3.2 Passwords

Test 3.

Configure the Instation with an incorrect access level password (i.e. Level 1 for read only access).
Repeat Test 1.
Confirm that access was prohibited.
Record results.

Test 4.

Configure the Instation with the correct access password.
Repeat Test 1.
Confirm that access was granted
Record results.

Test 5.

Using incorrect and correct Level 2 access passwords (i.e. read and write access)
Repeat Tests 3 and 4
Confirm whether access was gained
Record Results

3.3.3.3 Time re-set

Test 6.
Set the Outstation clock to GMT minus 10 minutes (using manufacturer's software)
Perform an Instation data retrieval
Record the Outstation time
Record results

Test 6a
Set the Outstation clock to GMT plus 10 minutes (using manufacturer's software)
Perform an Instation data retrieval
Record the Outstation time
Record results

Note: The Instation is expected to correct the Outstation time.

3.3.3.4 Flags

Test 8.

Ensure that the Outstation is set to GMT
During a single half hour period, disconnect the supply from the Outstation for approximately 10 minutes then re-connect the supply.
During the following half hour period, collect data from the Outstation.
Ensure that the Instation reports that, the half hour period where supply was disconnected is flagged and that the following half hour period is not flagged.
Record results.

Note: Test 8 should be repeated, where possible, for all flag conditions.

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

The documentation for the Compliance test schedule referenced in Section 2.2 above can be found at http://www.elexon.co.uk, titled 'Specification for Metering Equipment Compliance Testing for Codes of Practice One, Two, Three and Five' and 'Specification for Metering Equipment Compliance Testing for Code of Practice Six'.

3.4.1   Scope

a)   This Appendix sets out:

   ▪   the technical requirements for the Test Laboratory in order for it to carry out its obligations under the terms of the Compliance Testing agreement;

   ▪   the testing facilities to be provided by the Test Laboratory; and

   ▪   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.

b)   The Compliance Testing requirements as detailed in this Appendix applies only to parts of the Metering System (i.e. Meters and Outstations) 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.

c)   This test 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.

d)   Unless agreement has been received in writing from BSCCo prior to the commencement of any testing to this , this 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.

3.4.2   References

The following documents are referenced in this Appendix 3.4

BS 7856	'Code of Practice for Design of Alternating Current Watt-Hour Meters for Active Energy (Classes 1 and 2)'
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	'Alternating current static watt-hour meters for active energy (classes 1 and 2)'
BS EN 60521	Class 0.5, 1 and 2 alternating-current watthour meters
BS EN 61268	Alternating current static var-hour meters for reactive energy (classes 2 and 3)
IFC 61000-4-3	Electromagnetic Compatibility (EMC) – Part 4-3: Testing and Measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test.
BS 5685: Part 4	Electricity meters. Part 4. for Class 3 var-hour meters

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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.'

3.4.3   Test Constraints

3.4.3.1 Applicable Codes of Practice

Subject to 3.4.1 d) 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.

3.4.3.2 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.

3.4.3.3 Test Conditions

To test the metering accuracy requirements in Clause 5.4 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.

3.4.3.4 Samples for Testing

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

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3.4.4   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.

3.4.5   General Test Conditions

Before testing the metering accuracy requirements in clause 3.4.8 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 part 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)   Not withstanding 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[9] (Red phase in) to the adjacent load terminal on the same phase (Red phase out).

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[9] Viewed from the front of the Meter, as though reading the display.

3.4.6   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;	**001**
(b)	if more than one Measured Quantity configuration is available, list all configurations;	**002**
(c)	confirm that a cumulative register display is available for each Measured Quantity (see also 3.4.12);	**003**
(d)	Import Active Energy is measured in kWh;	**004**
(e)	Export Active Energy is measured in kWh; and	**005**
(f)	confirm that Measured Quantities are available in both kilo and Mega values. *(CoPs 1 and 2 only)*	**006**

3.4.7   Demand Values {4.1.2}

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

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

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3.4.8   Accuracy Requirements {4.2}

(a)   Active Energy

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: CoP 1 ±0.01%; CoP 2 ±0.05%; CoP 3 ±0.1%; or CoP 5 ±0.2%.	**010**

Table 1 Active Energy

Condition		Limits of Error			
Current expressed as a percentage of Rated Measuring Circuit[10]	**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%

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[10] 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 ±0.4%.	**011**

Table 2 Reactive Energy

Condition		Limits of Error			
Current expressed as a percentage of Rated Measuring Circuit[11]	**System Power Factor**	**CoP 1**	**CoP 2**	**CoP 3**	**CoP 5**
120% to 10% inclusive	Zero	±4.0%	±4.0%	±4.0%	●
120% to 20% inclusive	0.866 lag and 0.866 lead	±5.0%	±5.0%	±5.0%	●
100% to 20% inclusive	Zero	●	●	●	±4.0%
100% to 20% inclusive	0.866 lag and 0.866 lead	●	●	●	±5.0%

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

3.4.9 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.	**012**

3.4.10 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 3.4.9 above then record	**013**

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[11] for whole current metering percentage relates to I_{max}.

that no additional adjustment is available)

3.4.11 Meter {5.3}

Establish the following parameters for the Meter under test:

(a)	record whether the Meter is of a Static or induction disc type;	**014**
(b)	record whether the Meter has an integral Outstation;	**015**
(c)	establish that the Active Energy Meter meets the requirements of: i. CoP 1 BS EN 62053-22 Class 0.2S; ii. CoP 2 BS EN 62053-22 Class 0.5S or BS EN 62053-11 Class 0.5; iii. CoP 3 BS EN 61036 Class 1 or BS EN 60521 Class 1; or iv. CoP 5 BS EN 61036 Class 2 or BS EN 7856 Class 2	**016**
(d)	establish whether the Import Active Energy Meter meets the requirements of Schedule 7 of the Electricity Act 1989;	**017**
(e)	establish that the Reactive Energy Meter meets the requirements of; i. CoP 1 BS EN 62053-23 Class 2.0; ii. CoP 2 BS EN 62053-23 Class 3 or BS 5685 Part 4; iii. CoP 3 BS EN 61268 Class 3 or BS 5685 Part 4; or iv. CoP 5 BS EN 61268 Class 3 or BS 5685 Part 4.	**018**
(f)	establish whether the number of measuring elements is one less or equal to the number of primary system conductors;	**019**
(g)	record whether provision has been made for the recording of measurement transformer ratios on the Meters name plate;	**020**
(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;	**021**
(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;	**022**
(j)	confirm that the Meter includes a non-volatile Meter register of cumulative energy for each Measured Quantity;	**023**
(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	**024**
(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	**025**

| | Quantity (two output pulse facilities are required in the case of CoP1). | |

3.4.12 Displays {5.4}

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

(a)	the total cumulative energy values for each Measured Quantity in actual scaled values can be displayed and stored in non–volatile memory;	**026**
(b)	the current time and date can be displayed;	**027**
(c)	the CT and/or VT ratios that have been programmed into the Meter can be displayed;	**028**
(d)	any compensation factor applied for measurement transformer errors and/or system losses can be displayed; and	**029**
(e)	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.	**030**

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

(a)	the Maximum Demand ("MD") for kW (or MW as appropriate) per month can be displayed;	**031**
(b)	the Maximum Demand ("MD") for kW (or MW as appropriate) for other programmable charging periods can be displayed;	**032**
(c)	the Maximum Demand ("MD") for kVA (or MVA as appropriate) per month can be displayed;	**033**
(d)	the Maximum Demand ("MD") for kVA (or MVA as appropriate) for other programmable charging periods can be displayed;	**034**
(e)	twice the kWh (or MWh as appropriate) advance from the commencement of the current Demand period can be displayed;	**035**
(f)	twice the kVAh (or MVAh as appropriate) advance from the commencement of the current Demand period can be displayed;	**036**
(g)	the cumulative Maximum Demand can be displayed;	**037**
(h)	the number of Maximum Demand resets can be displayed;	**038**
(i)	the multi rate display sequence, for at least 8 rates selectable over the calendar year, can be displayed;	**039**
(j)	a reverse running indication for Active Energy is provided (where appropriate).	**040**

	(Required for CoPs 3 and 5 only);	
(k)	the indicated Maximum Demand is re-settable at midnight of the last day of the selected charging period;	**041**

(l)	the indicated Maximum Demand is re-settable for a part of a charging period; and	**042**
(m)	any manual reset button is sealable.	**043**

3.4.13 Facilities {5.4.2}

Establish whether the Meter is capable of providing different voltage free pulsed outputs for local use.	**044**
If test 043 is confirmed then confirm that the facilities meet the following requirements as shown in Table 3.	**045**

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}. *(Applies to CoPs 3 and 5 only);* and	**046**
(b)	confirm that one output can be allocated to the Demand Period reset (usually 30 minutes) within a tolerance of ±0.1% and a duration of between 0.5 and 10 seconds.	**047**

3.4.14 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;	048
(b)	For Meters with integral Outstations that an auxiliary terminal provides for the Outstations energisation for remote interrogation purposes (*CoP1 and CoP2 only*);	049
(c)	The Outstation is capable of communicating with more than one Instation (not simultaneously and of similar type or otherwise);	050
(d)	It is possible to repeatedly retrieve data throughout the Outstation data storage period;	051
(e)	Any "read" operation does not alter or delete any stored metered data; and	052
(f)	The Outstation can provide all metered data stored from the time of commencement of any specified date upon request by the Instation during the data storage period of the outstation.	053

3.4.15 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	054
(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.	055

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	**056**
(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);	**057**

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;	**058**
(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;	**059**
(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	**060**
(d)	for separate Meter/Outstation combinations, that the Outstation registers can be set to match and increment with the Meter registers.	**061**

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 Energisation, confirm that;

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

3.4.16 **Time Keeping {5.5.2}**

(a)	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[12] in the de-energised state verify on reconnection of the supply that:	**064**
(b)	all stored data has been correctly stored and is not corrupt;	**065**
(c)	the Metering Equipment internal clock is accurate to within ±10 seconds[12]; and	**066**
(d)	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.	**067**

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 ±10 seconds[13]; and	**068**
(b)	the duration of each demand period is within ±0.1% of 30 minutes, this being achieved by the comparison of stored energy values or pulse counts in each Demand Period.	**069**

Set the Metering Equipments 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 period has been marked with an alarm indication.	**070**
Repeat the synchronisation test using the Local Interrogation Unit and check that the Demand Period has been marked with an alarm indication	**071**

3.4.17 **Monitoring Facilities {5.5.3}**

3.4.17.1   Phase Failure Indication Tests

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[12] For tests to Code of Practice 3 and 5, period of disconnection is 20 days and the acceptable tolerance is ±20 Seconds.
[13] For tests to Code of Practice 3 and 5, the acceptable tolerance is ±20 Seconds.

Ensure that the Metering equipment 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;	**072**
(b)	repeat the disconnection process for each of the remaining phases in separate Demand Periods;	**073**
(c)	repeat the disconnection process for combinations of multiple phase failure; and	**074**
(d)	verify phase failure alarm resets on restoration of normal supply after each test.	**075**

3.4.17.2   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.	**076**

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.

3.4.17.3   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.	**077**

3.4.17.4   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.	**078**
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.	**079**

3.4.17.5 *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.	**080**
Test that upon return to normal power flow, the reverse running flag is no longer present in the unaffected Demand Period.	**081**

3.4.18 Communications {5.6}

Verify that two communications ports are available for interrogating the Outstation	**082**

3.4.19 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 *(CoP 3 and 5)* or BS EN 62056-21 *(CoP1 and 2);* or	**083**
(b)	The local port provides data to a Local Interrogation Unit via another type of port; and	**084**
(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.	**085**

3.4.20 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	**086**
(b)	Repeat collections of stored data are available throughout the storage period and verify that any "read" operation does not delete of modify any stored metering data	**087**

3.4.21 Password Protection

(a)	For separate Outstations establish that a password is required to read or change any data.	**088**

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 six characters and no more than twelve 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 (_).	**089**
(c)	For hexadecimal character passwords, ensure that passwords are no less than eight characters and no more than twelve characters long. Ensure that passwords are formed from case insensitive hexadecimal characters (0 to F).	**090**

3.4.22 Level 1 Passwords

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

(a)	Outstation ID;	**091**
(b)	all programmable Demand Values;	**092**

(c)	all programmable cumulative Measured Quantities;	**093**
(d)	the Maximum Demand for kW and/or kVA per programmable charging period;	**094**
(e)	the multi-rate cumulative Active Energy values;	**095**
(f)	the VT and CT transformer ratios, where appropriate;	**096**
(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;	**097**
(h)	all alarm indications; and	**098**
(i)	Outstation time and date	**099**

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

3.4.23 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:		**100**
(a)	changes to time and date; and	**101**
(b)	resetting of all Maximum Demands.	**102**

3.4.24 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:		**103**
(a)	Displays and Facilities as defined in Clause 5.4;	**104**
(b)	measurement transformer ratios as defined in Clause 5.3;	**105**
(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	**106**
(d)	passwords for Levels 1, 2 and 3.	**107**

Establish that it is possible to read additional information within the Metering Equipment to enable the programmed information to be confirmed.	**108**

3.4.25 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 alterations can be performed:		**109**
(a)	calibration of the Meter (only where the Meter is integral with the Outstation);	**110**
(b)	setting the measurement transformer ratios, where appropriate;	**111**
(c)	setting the measurement transformer error correction and/or system loss factors applied as a complex factor; and	**112**
(d)	programming the Level 3 & 4 Passwords.	**113**

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);	**114**
(b)	setting the measurement transformer ratios, where appropriate; and	**115**
(c)	setting the measurement transformer error correction and/or system loss factors applied as a complex factor.	**116**

3.4.26 Password Monitoring {Appendix D}

Using the Approved Protocol[4], verify that the password offered determines the Level of access to the data within the Metering Equipment.	**117**

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	**118**
(b)	after the seventh illegal password attempt entered between counter resets, that access is prohibited at all levels until the counter resets.	**119**

3.4.27 Additional Tests

3.4.27.1   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	**120**
(b)	the metering accuracy remains within the requirements of Clause 5.4 of this Compliance Testing .	**121**

3.4.27.2   Immunity to Electromagnetic HF Fields

Verify, by testing in accordance with IEC 1000-4-3, 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	**122**
(b)	that with basic current Ib, and power factor equal to 1.0, at sensitive frequencies or frequencies of dominant interest, the variation of error does not exceed 3%.	**123**

On completion of each EMC test verify that:

(a)	any stored data is not corrupted or has been destroyed; and	**124**
(b)	the metering accuracy remains within the requirements of Clause 5.4 of this .	**125**

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.

3.4.27.3   Sealing {5.7}

Ensure that adequate sealing facilities are provided for Settlement requirements.	**126**

3.5   Specification for Compliance Testing of Metering Equipment for Code of Practice Six

3.5.1   Scope

This sets out:-

       (a)   the testing facilities to be provided by the Test Laboratory; and

       (b)   the Test Procedures to be followed by the Test Laboratory,

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

This Appendix supersedes the for "Type Testing to Code of Practice Six, Issue 4 (Issue 1 v1.00)".

The Type Testing requirements as detailed in this Appendix applies only to parts of a Metering System and therefore satisfactory test results from this Type Testing do not constitute a compliant Metering System as required by the Balancing and Settlement Code, BSC Procedures and Codes of Practice.

This Appendix does not include approvals of protocols, but merely requires a check that transferred data meets the general requirements for Data Structure and Format specified in Code of Practice Six.

3.5.2   References

The following documents are referred to in the text:-

IEC 1334-4-41   Application Protocols: Distribution Line Message .

BS EN 61036   AC Static Watthour Meters for Active Energy (Class 1 and 2)

BS EN 60521   of Class 0.5, 1 and 2 Single-Phase and Polyphase Single Rate
                                            and Multi Rate Watt hour meters.

BS EN 61107   Data Exchange for Meter Reading, Tariff and Load Control.
                                            Direct Local Exchange.

Code of Practice for   Sealing Requirements.
Electricity Meter
Operators

3.5.3   Test Procedure

3.5.3.1 Applicable Codes

The following clauses refer to the Test Procedure solely for testing to the requirements of
Code of Practice Six and not to any other Code of Practice referenced in the Balancing and
Settlement Code.

3.5.3.2 Test Conditions

To test the metering accuracy requirements in Clause 4.3 below the test conditions shall be
maintained in accordance with BS EN 61036 Class 2 or BS EN 60521 Class 2 for indoor
meters as appropriate.

3.5.4   Samples for Testing

The Applicant shall provide a minimum of three (3) samples of Metering Equipment for
test. For each of the storage categories for which the Applicant provides Metering
Equipment for test, at least one sample shall have the Outstation memory pre-loaded with
data to within 20 days (960 half hour periods) to enable test 3.5.7.1 d) to be undertaken as
specified.   The pre-loaded Metering Equipment shall be clearly identified as having
dummy data inserted.

If accelerated loading techniques have been employed (i.e. reduced Time Period duration), then the Metering Equipment should be reset to its normal operating mode (i.e. 30 minute Time Period) by the Applicant prior to testing.

3.5.5 Meters

3.5.5.1 Active Energy Accuracy

Tests shall be carried out on the Metering Equipment at fundamental frequency to verify that the overall accuracy of the measurements are in accordance with current UK legal and metrological requirements for meter 'Approvals' and 'Initial Verification' (Certification).

3.5.5.2 Ratings

Verify that new Metering Equipment complies with the ratings specified in Code of Practice Six, Section 6.1.

3.5.6 Displays and Facility Checks

The Metering Equipment shall be checked for the following functionality in accordance with Code of Practice Six, Section 6.3.

Verify the following information can be displayed, not necessarily simultaneously:

3.5.6.1 For Polyphase Metering Equipment only:

(i) the total Import cumulative kWh, with 6 digit integer kWh value padded with leading zeroes, and stored in a non-volatile memory register;

(ii) the Maximum Demand ("MD") in 6 digit (4 integer and 2 decimal places) kW value padded with leading zeroes where appropriate for the current and historic programmable charging period;

(iii) twice the kWh advance since the commencement of the current Demand Period, to 6 digits (4 integer and 2 decimal places) kW value padded with leading zeroes where appropriate for the current and historic programmable charging period;

(iv) the cumulative Maximum Demand, 6 digit (4 integer and 2 decimal places) kW value padded with leading zeroes where appropriate;

(v) the number of Maximum Demand resets up to a maximum of 99;

(vi) a minimum of 8 selectable rates;

(vii) the Maximum Demand can be automatically reset at midnight at the end of the month or at the end of a statistical review period; and

(viii) assuming level 2 access has been granted, a Maximum Demand can be reset during a chargeable period, and where this is by means of a button that the button is sealable.

3.5.6.2 For Single Phase Metering Equipment only:

(i) the total Import cumulative kWh, with 5 digit integer kWh value padded with leading zeroes, and stored in a non-volatile memory register; and

(ii) a minimum of 4 selectable rates.

3.5.6.3 For all Metering Equipment:

(i) the current time and date, in UTC and clock time or clock time and date as defined by the applicant;

(ii) if fitted, a reverse running indicator;

(iii) that where a multi-rate display sequence is enabled on a Meter, the default display shall be the cumulative kWh register of the active rate and rate identifier. The initial operation of the display selector shall display the test display and the next operation shall display the total Import cumulative kWh. Subsequent operation of the display selector shall display registers in any selectable sequence; and

(iv) the multi-rate facility and any switching shall be confirmed in writing by the Applicant as conforming to the requirements of Appendix 5 of Code of Practice Six and a copy submitted with the report.

3.5.7 Pulse Output Checks

a) Tests 3.5.7 b) and 3.5.7 c) are only required where the manufacturer has provided for a pulsed output.

b) Verify that the Metering Equipment impulse output for kWh from voltage-free contacts is at a pulse rate of between 0.1 and 2 pulses per second at full load and that the duration of each pulse is a nominal 80ms.

c) Verify that the Metering Equipment 30 minute reset pulse is within a tolerance of ±0.2% (absolute) of the 30 minute Demand Period, from voltage-free contacts with a duration of between 0.5s and 10s.

3.5.7.1 Stored Data

a) Establish that the nameplate description "Six (a), (b), (c) & (d)" corresponds with the actual data storage capacity of the Outstation as specified in Code of Practice Six, Section 6.2.1.

b) The Metering Equipment shall be continuously energised at 50Hz ±0.1%, at full load (steady state conditions) for a period of 5 days and afterwards at a cyclic variable load for a further 15 days, determining the total number of kWh supplied to the Meter over the whole 20 day period.

c) On completion of energising the Meter under the above conditions, the following tests shall be carried out.

Verify that -

(i) at the end of each Demand Period over the 20 days the reading of the truncated absolute cumulative register in the range of 10's of kWh, kWh, 1/10 th's of kWh and 1/100 th's of kWh is correctly stored;

(ii) that for each Demand Period in the first 5 days, the reading of the truncated kWh cumulative register has advanced by a constant amount. Any variation should be noted together with any observation as to whether there is any pattern regarding such variation; and

(iii) any discrepancy between the measured value of Active Energy at each individual metering point and equivalent data presented by the Outstation for the same metering point shall not exceed ± 0.5% at full load at the metering point.

d) The Metering Equipment will then be run continuously for at least one additional day (or however many required to commence overwriting previously stored data) to ensure that Day n+1 values recorded at the end of the Demand Period only overwrite Day 1 values recorded at the end of the Demand Period and that no other data has been destroyed or corrupted.
(Note: In the case of Storage Categories (b), (c) & (d) it will be necessary to utilise the Metering Equipment with data pre-loaded by the Applicant. "Day n+1" is one day greater than the total number of days data storage capacity of the meter.)

e) Carry out a recorded number of Maximum Demand resets (one per Business Day for a period of 5 Business Days) and verify that this corresponds to the number of Maximum Demand resets recorded by the Meter.

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3.5.7.2   Functional Tests

Whilst carrying out the tests specified in Clauses 3.5.7.1 b) to 3.5.7.1 e) inclusive, verify, from the beginning of a current Demand Period, that twice kWh are being registered in the Maximum Demand register.

Verify that any energy that is measured during part of a Demand Period, and is not stored, is carried forward to the next Demand Period.

With the Metering Equipment connected to a supply, note the contents of all energy registers, and ensure that the time and date are set correctly to UTC. Disconnect the Metering Equipment from supply and, after 7 days in a de-energised state, verify that, on reconnecting the supply:-

(i)   all data has been retained and is not corrupted;

(ii)   all the data is correct;

(iii)   the Metering Equipment internal clock is accurate within ±7 seconds of UTC or if fitted with a Broadcast clock that re-synchronisation occurs within 5 minutes of supply restoration;

(iv)   the data for Demand Periods in which a Metering Equipment supply failure and / or restoration occurs and the data for Demand Periods where the supply is disconnected for the whole period are flagged such that it can be identified by the appropriate Instation; and.

(v)   for the complete days that the supply is disconnected, the appropriate Days data is flagged as set out in Code of Practice Six, Section 6.2.1 (ii).

Verify that the Metering Equipment internal clock can be corrected within the limits specified in Code of Practice Six, Section 6.2.2 by communication with the relevant Instation, but once only during any Demand Period.

Verify that no switching between UTC and British Summer Time (BST) or any other Time Zone is possible for Settlement data stored in the Outstation.

Time the Demand Period set by the Metering Equipment when connected to a 50Hz ±0.1% supply and the clock is set (as appropriate) to:

(i)   'Mains' operation;

(ii)   'Crystal' operation; and

(iii)   'Broadcast' operation, with the Metering Equipment shielded from incoming broadcasts;

and verify that:-

(a)   the duration is within ±2.0% of the specified Demand Period of 30 minutes (other than where the time has been corrected or synchronised to UTC in that Demand Period); and

(b)   the completion of each Demand Period is within ±20 seconds in 20 days.

For broadcast clocks also verify that the Metering Equipment complies with Code of Practice Six, Section 6.2.3.

3.5.8   Local Interrogation

Ensure that a local interrogation facility is provided which is an optical port conforming to BS EN 61107 and with a Data Protocol as defined in the Appendices of Code of Practice Six, and verify that data can be read using an Interrogation Unit.

Ensure that repeat collections of stored data are possible throughout the storage period and verify that any "read" operation shall not delete or modify any stored metering data.

Verify that the data transfer rate from the Outstation to the Interrogation Unit or PC achieves no less than 100 days worth of data in 90 seconds, using the Protocol Tester. (Note: ensure that the Protocol Tester is not the limiting factor).

Determine if the Metering Equipment will

a)   provide any portion of data stored in complete days, i.e. all metering data between any specified date and the current date; or

b)   provide metering data from the start of a daily block, for any date or day number, up to, and including, the Demand Period preceding the time of interrogation; or

c)   provide metering data only in daily blocks of 48 Demand Periods from any date(s) or day number(s),

upon request from an Interrogation Unit or PC.

Ensure that the data format and protocol submitted by the Applicant conforms to the requirements of Code of Practice Six, Section 6.4.1 and Appendices.

Ensure that for the purposes of transferring data to the relevant Instation a unique Outstation identification code is required.

3.5.9   Remote Interrogation

Where a Remote Interrogation facility is provided, then:-

Ensure that connection to the Outstation remote interrogation facility cannot be disconnected without the breaking of a seal conforming with the Meter Operators Code of Practice Agreement.

Ensure that the data format and protocol submitted by the Applicant conforms to the requirements of Code of Practice Six, Section 6.4.2 and Appendices.

Ensure that repeat collections of stored data are possible throughout the storage period and verify that any "read" operation shall not delete or modify any stored metering data.

Ensure that for the purposes of transferring data to the relevant Instation a unique Outstation identification code is required.

Determine if the Metering Equipment will

a)   provide any portion of data stored in complete days, i.e. all metering data between any specified date and the current date; or

b)   provide metering data from the start of a daily block, for any date or day number, up to, and including, the Demand Period preceding the time of interrogation; or

c)   provide metering data only in daily blocks of 48 Demand Periods from any date(s) or day number(s).

upon request from the relevant Instation.

Ensure that multiple Outstations (where requested on Application) can be cascaded on to one communication link and interrogated correctly.

Ascertain from the manufacturer any interaction when communicating with either interrogation port, and confirm, as appropriate, that:-

a) where both ports can not be accessed simultaneously, verify that priority is given to the remote port.

b) where both ports can be accessed simultaneously, verify that there is no interaction, loss of security or corruption of stored data.

3.5.10 Data Transfers

3.5.10.1 Level 1 Password

Level 1 - No Password required to access data on a read only basis.

Verify that the data specified in Code of Practice Six, Section 6.2.1 can be downloaded from the Metering Equipment via the optical port using an Interrogation Unit.

Where a remote interrogation facility is provided, then the Metering Equipment shall be checked for the above using a remote Instation.

3.5.10.2 Level 2 Password

Level 2 - Six character alpha-numeric string

In addition to the Level 1 requirements verify that the following changes can be made via the optical port using an Interrogation Unit:-

(i) programming the Displays and Facilities, including the tariff structures;

(ii) changes to time and date;

(iii) changing password for level 2

(iv) changing the meter Authentication key;

(v) reading any additional information; and

(vi) resetting of Maximum Demand (for Polyphase meters only).

and ensure the appropriate flag is set for each event.

3.5.10.3   Level 3 Password

Level 3 - Only achievable by the removal of Metering Equipment cover(s) necessitating the breaking of a seal:-

(i)   calibration of the Metering Equipment; and

(ii)   programming the Level 2 password.

3.5.11 Monitoring Facilities

3.5.11.1   Power Supply Failure.

3.5.11.1.1   Polyphase Metering Equipment.

With the Metering Equipment connected to the supply, ensure the half hourly and daily data is not flagged.

Verify that:-

(i)   in the event of loss of all but one phase the Outstation continues to operate normally and no data is flagged.

(ii)   in the event of all phases being lost, the appropriate half hour data is flagged.

(iii)   the half hour data is not flagged for the complete periods after the supply is restored.

3.5.11.1.2   Single Phase Metering Equipment.

With the Metering Equipment connected to the supply, ensure the half hourly and daily data is not flagged.

Verify that:

(i)   in the event of loss of supply to the Outstation, the appropriate half hour data is flagged.

(ii)   the half hour data is not flagged for the complete periods after the supply is restored.

3.5.11.2   System Clock Failure.

Verify that the daily data is flagged only for those days that a clock failure has occurred.

3.5.11.3   M.D. Reset.

Verify that the daily data is flagged only for those days that an MD reset has occurred.

3.5.11.4   Level 2 Access.

Verify that:

(i)   the half hour data is flagged only for those periods that a level 2 access has occurred.

(ii)   the daily data is flagged with the number of level 2 accesses that have occurred on that day, up to 7. If more than 7 occur, the counter stops at 7.

3.5.11.5   Battery Maintenance.

Where a battery is fitted in an item of Metering Equipment verify that disconnecting the battery causes the appropriate flag within the Metering Equipment to be set.

NOTE: To verify this requirement may, depending on the manufacturer / type of Metering Equipment under test, **require the Metering Equipment to be temporarily de-energised for safety reasons**, and the flag may only be detected after a power-down / power-up cycle.

Where an 'Elapsed Time Counter' is installed for monitoring purposes verify that the counter increments with respect to:-

either   a)   total time, in hours, that the battery is connected in the Meter; or

b)   total time, in hours, that the power supply to the Meter has been disconnected.

3.5.11.6   Reverse Energy Flow

3.5.11.6.1   Polyphase Metering Equipment.

Ascertain from the manufacturer the methodology of setting the reverse running flag and, logging which of the following conditions apply, verify, with a meter current of $0.05I_b$ on all phases (i.e. balanced load conditions), that:-

(i)   with the connections to any one phase reversed (i.e. supply and load connections to the Metering Equipment reversed), the appropriate half hour data is flagged.

(ii)   where the reverse running flag is not set in (i) above repeat the tests, under similar load conditions, with any two phases reversed (i.e. supply and load connections reversed).

(iii)   where the reverse running flag is not set in either (i) or (ii) above repeat the tests, under similar load conditions, with all three phases reversed (i.e. supply and load connections reversed).

(iv)   the half hour data is not flagged for the complete periods after the direction of the energy flow is restored to normal.

3.5.11.6.2   Single phase Metering Equipment.

Ascertain from the manufacturer the methodology of setting the reverse running flag and, logging which of the following conditions apply, verify, with a meter current of $0.05I_b$, that:-

(i)   with the supply and load connections to the Metering Equipment reversed, the appropriate half hour data is flagged; and

(ii)   the half hour data is not flagged for the complete periods after the direction of energy flow is restored to normal.

3.5.12   Electromagnetic Compatibility Tests

3.5.12.1   *EMC Tests for Data Integrity*

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:-

     (i)   any stored data and time/date is not corrupted or has been destroyed; and

     (ii)   the metering accuracy remains within the requirements of Clause 4.3 of this .

3.5.12.2   *Immunity to Electromagnetic HF Fields*

The Panel accepts that this additional test in terms of severity of test condition, is in excess of those currently required in accordance with IEC 1036 / Code of Practice Six, but is specified to meet possible site conditions where certain types of digital telephones may be used, and failure during this test alone would not mean non-compliance in accordance with Code of Practice Six.

In addition to the test above:-

3.5.12.2.1   *Verify, by testing in accordance with IEC 1000-4-3, and under the following conditions:-*

     - voltage and auxiliary circuits energised with
     - reference voltage;
     - frequency band: 26MHz to 1GHz;
     - test field strength: 12.5V/m;
     - carrier 80% amplitude modulated with a 1KHz sinewave,

     (i)   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.; and

(ii)   that with basic current Ib, and power factor equal to 1.0, at sensitive frequencies or frequencies of dominant interest, the variation of error does not exceed 3%,

and on completion of each EMC test verify that:-

(i)   any stored data is not corrupted or has been destroyed; and

(ii)   the metering accuracy remains within the requirements of Clause 3.5.5.1 of this .

3.5.13 Sealing

Ensure that all Metering Equipment sealing facilities are in accordance with the Code of Practice Six, Section 6.6.