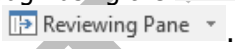
BSC CHANGE – DRAFT REDLINING

This is the redlined changes to BSCP601 for P375. We have redlined these changes against version 20.0. (Please note that the version number, effective date and numbering will be updated ahead of implementation.)

Using 'Tracked Changes'

In Microsoft Word, the tracked changes function is under the 'Review' tab.
Selecting the 'All Markup' view will show the original document with any additions and deletions clearly marked.
To navigate between redlined changes, you can either scroll through using the 

and 

buttons, or to see a full list of off changes you can open out the 

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If you require assistance in assessing this redlining, please contact **Chris Wood** on **020 7380 4142** or email **BSC.change@elexon.co.uk** .

Balancing and Settlement Code

BSC PROCEDURE

Metering Protocol Approval and Compliance Testing

BSCP601

Version 20.0

Date: 27 June 2019

BSC Procedure 601

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 definition of "BSC Procedure".

2. This is BSC Procedure 601, Version 20.0 relating to Metering Protocol Approval and Compliance Testing.

3. This BSC Procedure is effective from 27 June 2019.

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

AMENDMENT RECORD

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	03/11/05	SVA November 2005 Release	CP1099 and CP1139	SVG/56/004
7.0	28/06/07	June 2007 Release	CP1174 P197	ISG/72/04 SVG/72/04
8.0	23/08/07	August 2007 Release	P197	P/115/04
9.0	28/02/08	February 2008 Release Update of protocol and incorporation of appendices	CP1202, CP1203 CP1166 v.3.0	ISG79/02 SVG79/02 SVG80/03
10.0	06/11/08	November 2008 Release	CP1232	ISG88/01 SVG88/02
11.0	26/02/09	February 2009 Release	CP1261	ISG93/02 SVG93/02
12.0	25/06/09	June 2009 Release	CP1264 CP1273	ISG94/01 SVG94/02 ISG97/01 SVG97/01
13.0	05/11/09	November 2009 Release	CP1275 v2.0	ISG100/01 SVG99/02
14.0	25/02/10	February 2010 Release	CP1296 CP1297	ISG102/01 SVG102/01 ISG102/01 SVG102/01
15.0	24/06/10	June 2010 Release	CP1318	ISG107/01 SVG107/01
16.0	04/11/10	November 10 Release	CP1315	SVG109/01

Version	Date	Description of Changes	CRs Included	Mods Panel Ref
17.0	23/02/12	February 2012 Release	P266	ISG130/08 SVG130/01
18.0	25/02/16	February 2016 Release	CP1450	SVG178/04
19.0	23/02/17	February 2017 Release	CP1466 CP1472	P261/09 SVG191/05 ISG190/03
20.0	27/06/19	June 2019 Release	CP1508 CP1513	SVG213/04 SVG216/04 ISG214/01

CONTENTS

1. Introduction

1.1 Scope and Purpose of the Procedure

This BSC Procedure defines the processes for Meter Manufacturers, Meter Operator Agents, Suppliers, Virtual Lead Parties, Half Hourly Data Collectors and other Half Hourly Metering Equipment or Asset Metering Equipment users to apply for Compliance Testing and Protocol Approval. This procedure covers the application process, submission of Metering Equipment and Asset 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 applies to Half Hourly Metering Equipment used in relation to Code of Practice One, Two, Three, Five, Six and Ten; and to Asset Metering Equipment used in relation to Code of Practice Eleven.

This BSC Procedure does not apply to Metering Equipment that is compliant with the Smart Metering Equipment Technical Specification (SMETS) or to communications with such Metering Equipment.

Protocol Approval

This process is defined to:

a) Approve a Protocol for Settlement purposes; and

b) ensure that a qualified Half Hourly Data Collector is capable of appropriate communications with Metering Equipment and Asset Metering Equipment; or

c) ensure that a qualified Virtual Lead Party is capable of appropriate communications with Asset Metering Equipment~~.~~

Metering Equipment and Asset Metering Equipment Compliance

This process is defined to ensure that Metering Equipment and Asset 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 or Asset Metering Equipment, tested including type reference and any firmware and software versions. Metering Equipment and Asset 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. On successful completion of the Compliance Testing process for Metering Equipment, BSCCo shall select an appropriate code which is to be used in conjunction with the SVA Data Transfer Network data item J0471 'Outstation Type'. This code shall be available on the CoP Compliant~~t~~ce and ~~p~~Protocol Approvals ~~approved~~list for Metering Equipment ~~list~~, which can be found on the BSC Website ~~www.elexon.co.uk~~. The list will include all approved Asset Metering Equipment.

When applying for Compliance Approval in respect of Metering Equipment and Asset Metering Equipment, the Meter Manufacturer or Virtual Lead Party, as applicable, should acknowledge, on its application form included at section 3.1.3, its intention to provide relevant Settlement O~~o~~utstation Protocols or Asset Meter Protocols to BSC Parties (via their Party Agents) upon request. The Meter Manufacturer or Virtual Lead Party, as applicable, should also acknowledge, on its application form included at section 3.1.3 its

intention to make available to Meter Operator Agents, upon request, the Meter Manufacturer's software or Virtual Lead Party's software that will enable the Meter Operator Agent to re-configure the relevant Asset Meters, Meters and/or Outstations (the "Configuration Software"). The Meter Manufacturer may require the disclosure of Settlement Outstation Protocols, Asset Meter Protocols and Configuration Software to be subject to a confidentiality agreement[1].

The Panel (and its Committees) and ELEXON and its employees, agents and contractors do not and shall not be deemed to make or give any representation, warranty or guarantee, nor shall each or any of them have any liability or responsibility whatsoever or howsoever arising (whether directly or indirectly), in relation to:

- each or any Metering Equipment and Asset Metering Equipment (including in relation to any safety matters) in respect of any item of Metering Equipment and Asset Metering Equipment which is not tested whether or not such item is of the same type, model or version as an item which is tested;
- the processing of any application for certification or for Compliance Approval, Protocol Approval or any other approval ("approval") in relation to Metering Equipment and Asset Metering Equipment;
- the grant, failure or refusal to grant any such certification or approval; and/or
- any testing, method of testing or analysis of the results of testing of Metering Equipment and Asset Metering Equipment, or any act, error, failure or omission in relation to such testing, method of testing or analysis.

All Parties and applicants for certification and approval acknowledge and accept the foregoing and that the processes, requirements and tests relating to Metering Equipment and Asset Metering Equipment referred to in Code Subsidiary Documents relate to matters concerning Ssettlement and not matters relating to health and safety, which matters are the sole responsibility of the Parties and/or the applicant.

All Parties and applicants for certification and/or approval agree that they accept the foregoing and accept that all applications for certification and/or approval are processed by ~~ELEXON~~ BSCCo subject to and on the basis of the foregoing.

1.2 Main Users of Procedure and their Responsibilities

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

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

[1] Confidentiality agreements shall not prohibit Party Agents from fulfilling their BSC obligations.

- The Applicant is responsible for submitting notification of any amendment to Metering Equipment, Asset Metering Equipment or ~~D~~data collection~~Retrieval~~ system for an existing Approval.

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

- The Meter, or Outstation, manufacturer is responsible for confirming its intention to ensure that BSC Parties have access to the relevant Settlement Outstation Protocols and Asset Meter Protocols.

- The Meter, or Outstation, manufacturer is responsible for confirming its intention to ensure that Meter Operator Agents and Virtual Lead Parties have access to the Meter or Outstation manufacturer's Configuration Software.

- 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 and Asset Metering Equipment that it collects data for Settlement purposes.

- The Virtual Lead Party is responsible for confirming its intention to ensure that BSC Parties have access to the relevant Asset Meter Protocols.

- Virtual Lead Party Agents are required to ensure that approval is obtained for each type of Asset Metering Equipment that it collects data from for Settlement purposes.

1.3 Use of the Procedure

This procedure should be referred to by manufacturers, operators of Metering Equipment and Asset 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' and/or 'Protocol Approval Certificate', the BSCCo shall make such test results contained in the 'Test Report' available to Parties, Half Hourly Data Collectors, Virtual Lead Parties and their Agents, 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 and Asset Metering Equipment list can be found on the BSC Website.

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.15.15 of the Code.

1.5 Associated BSC Procedures

BSCP502	Half Hourly Data Collection for SVA Metering Systems Registered in SMRS
BSCP537	Qualification Process for SVA Parties, SVA Party Agents and CVA MOAs

1.6 Acronyms and Definitions

1.6.1 Acronyms

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

The terms used in this BSC 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 (Qualified)
MD	Maximum Demand
ME	Metering Equipment
MOA	Meter Operator Agent
SMETS	Smart Metering Equipment Technical Specifications
SMRS	Supplier Meter Registration Service
SVA	Supplier Volume Allocation
VLP	Virtual Lead Party
WD	Working Day

1.6.2 Definitions

Applicant	Person applying for Compliance and/or Protocol approval
Asset Meter	means a device for measuring Active Power and/or Active Energy
Asset 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
BSCCo	The Balancing and Settlement Code Company
Compliance Testing	means the testing of Metering Equipment and Asset 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 and Asset Metering Equipment, accredited against an appropriate (as determined by BSCCo) body such as the UK Accreditation Service (UKAS).
Code of Practice One	means the latest version[§] of Code of Practice One - CODE OF PRACTICE FOR THE METERING OF CIRCUITS WITH A RATED CAPACITY EXCEEDING 100MVA FOR SETTLEMENT.

[§] The latest versions of the Codes of Practice can be found on the BSC Website.

Code of Practice Two	means the latest version§ of Code of Practice Two - CODE OF PRACTICE FOR THE METERING OF CIRCUITS WITH A RATED CAPACITY NOT EXCEEDING 100MVA FOR SETTLEMENT PURPOSES.
Code of Practice Three	means the latest version§ of Code of Practice Three - CODE OF PRACTICE FOR THE METERING OF CIRCUITS WITH A RATED CAPACITY NOT EXCEEDING 10MVA FOR SETTLEMENT PURPOSES.
Code of Practice Five	means the latest version§ of 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.
Code of Practice Six	means the latest version§ of Code of Practice Six - CODE OF PRACTICE FOR THE METERING OF ENERGY IMPORTS VIA LOW VOLTAGE CIRCUITS FUSED AT 100 AMPS OR LESS PER PHASE FOR SETTLEMENT PURPOSES.
Code of Practice Ten	means the latest version§ of Code of Practice Ten - CODE OF PRACTICE FOR METERING OF ENERGY VIA LOW VOLTAGE CIRCUITS FOR SETTLEMENT PURPOSES.
Code of Practice Eleven	means the latest version§ of Code of Practice Eleven - Code of Practice for the Metering of Balancing Services Assets for Settlement Purposes
Embedded Metering Device	Embedded Metering Device means an Asset Meter, measuring Active Power and/or Active Energy that is embedded within equipment used for other purposes (e.g. an EV charging unit or a small-scale domestic battery storage unit) and is not a dedicated meter, i.e. one whose primary purpose is to measure Active Power and/or Active Energy.
Instation	means a computer based system which sends data to, or receives data from Outstation Systems or Asset Metering 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 or Asset Metering Equipment parameters and extract information from the Metering Equipment or Asset 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).

Protocol	means a set of rules or procedures for transmitting data between a Meter, Asset Meter or Outstation and a data collection system used for collecting data from Settlement Metering Systems to exchange information.
Protocol Approval	means a process by which the Protocol implemented in a Qualified HHDC's or VLP's data collection system is tested against a known version of the Protocol (e.g. the Meter, Asset Meter or Outstation manufacturer's software) to confirm it has been correctly implemented in order to collect metered data from a Meter, Asset Meter or Outstation for Settlement purposes. The BSC Panel approves the protocol for use in Settlement in accordance with this BSCP601.
Settlement	has the meaning ascribed to that term in the Balancing and Settlement Code.
Smart Metering Equipment Technical Specifications	As defined in Section X Annex X-1 of the Balancing and Settlement Code.
Test Laboratory	means the testing body so agreed with BSCCo to perform Compliance Testing to this BSCP601.
Type Approval	refers to the approval of a given meter types' pattern or construction under Schedule 7 of the Electricity Act 1989 and supporting regulations, where used for billing. Meters are approved under the EU Measuring Instruments Directive (MID). Meters outside the scope of the MID must be approved by the Office for Product Safety & Standards under national legislation.~~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

2.1 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 supporti~~1~~ng documentation.	Applicant	BSCCo	Notification of Metering Equipment or Asset Metering Equipment and~~/or~~ HHDC Agent or VLP to be approved. Form F601/ 03	Fax, Post.
2.1.2	Within 2 WD 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 or VLP to conduct testing and liaise with BSCCo to witness testing.	Applicant	HHDC or VLP 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 or VLP.	Applicant	HHDC or VLP		As agreed.
2.1.7	Within 10 WD of 2.1.5 above.	Undertake testing of Protocol in accordance with agreed Test Schedule. Prepare and submit report including test results.	HHDC or VLP HHDC or VLP	BSCCo BSCCo	Test Report[2].	E-mail, Fax, Post.

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

REF	WHEN	ACTION	FROM	TO	INFORMATION REQUIRED	METHOD
2.1.8	Within 5 WD of 2.1.7 above.	Notify Applicant of test result determination. If testing successful, update Protocol Approval list (see section 3.2), notify Parties and Party Agents and issue certificate to Applicant.	BSCCo	Applicant Parties Party Agents	Form F601/02 Approval details. Approval details.	E-mail, Fax, Post. 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.

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 2 WD 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 10 WD 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[3].	E-mail, Fax, Post.
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.

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

2.3 Amendment to Metering Equipment or Asset Metering Equipment

REF	WHEN	ACTION	FROM	TO	INFORMATION REQUIRED	METHOD
2.3.1	At any time	Submit notification of amendment to Metering Equipment, Asset 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, Asset 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	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 [XXXX~~Five~~]

CODE OF PRACTICE FOR THE METERING OF [XXXXXXXX~~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/Asset Metering Equipment* has undergone Compliance Testing in accordance with Code of Practice [~~Five~~XXXX], Issue * (v *.**) dated n^th^ Month Year, and Type Testing Version [5.0] dated n^th^ Month Year (and subsequent revisions) [and BS EN/IEC 62052-11 and BS EN/IEC 62053-~~##21~~ or BS EN 50470-3 / insert relevant BS EN/IEC standard for Asset Metering Equipment*].

The Metering Equipment/Asset 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/Asset Metering Equipment* was found to comply with the requirements of Code of Practice [~~Five~~XXXX] in all respects.

* Delete as applicable

Signed: …… Date: ……

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

The Panel (and its Committees) and ELEXON and its employees, agents and contractors do not and shall not be deemed to make or give any representation, warranty or guarantee, nor shall each or any of them have any liability or responsibility whatsoever or howsoever arising (whether directly or indirectly), in relation to:

- each or any Metering Equipment and Asset Metering Equipment (including in relation to any safety matters) in respect of any item of Metering Equipment which is not tested whether or not such item is of the same type, model or version as an item which is tested;
- the processing of any application for certification or for Compliance Approval, Protocol Approval or any other approval ("approval") in relation to Metering Equipment and Asset Metering Equipment;
- the grant, failure or refusal to grant any such certification or approval; and/or
- any testing, method of testing or analysis of the results of testing of Metering Equipment and Asset Metering Equipment, or any act, error, failure or omission in relation to such testing, method of testing or analysis.

All Parties and applicants for certification and approval acknowledge and accept the foregoing and that the processes, requirements and tests relating to Metering Equipment and Asset Metering Equipment referred to in Code Subsidiary Documents relate to matters concerning settlement and not matters relating to health and safety, which matters are the sole responsibility of the Parties and/or the applicant.

All Parties and applicants for certification and/or approval agree that they accept the foregoing and accept that all applications for certification and/or approval are processed by ELEXON subject to and on the basis of the foregoing.

3.1.2 Form F601/02 – Certificate of Protocol Approval

F601/02

Certificate of Protocol Approval

METERING EQUIPMENT/ASSET 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/Asset Metering Equipment*] listed above, has undergone Protocol Testing in accordance with BSC Procedure BSCP601, Issue * (v *.**), dated nth Month Year.

The Metering Equipment/Asset Metering Equipment* was tested in conjunction with the Manufacturer's "XXXX Software, version V*.**" and the following Qualified Half Hourly Data Collector/Virtual Lead Party*.

Half Hourly Data Collector / Virtual Lead Party*	System or Process[4]	Instation Version	Outstation Version

Certificate of Protocol Approval:

The review of the Protocol Testing results on nth Month Year confirmed that the Metering Equipment/Asset Metering Equipment* was found to be suitable for Settlement use in conjunction with the Qualified Half Hourly Data Collector/Virtual Lead Party* listed above.

* Delete as applicable

Signed: …… Date: ……

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

The Panel (and its Committees) and ELEXON and its employees, agents and contractors do not and shall not be deemed to make or give any representation, warranty or guarantee, nor shall each or any of them have any liability or responsibility whatsoever or howsoever arising (whether directly or indirectly), in relation to:

- each or any Metering Equipment and Asset Metering Equipment (including in relation to any safety matters) in respect of any item of Metering Equipment and Asset Metering Equipment which is not tested whether or not such item is of the same type, model or version as an item which is tested;
- the processing of any application for certification or for Compliance Approval, Protocol Approval or any other approval ("approval") in relation to Metering Equipment and Asset Metering Equipment;
- the grant, failure or refusal to grant any such certification or approval; and/or,

[4] So approved in accordance with BSCP537.

- any testing, method of testing or analysis of the results of testing of Metering Equipment and Asset Metering Equipment, or any act, error, failure or omission in relation to such testing, method of testing or analysis.

All Parties and applicants for certification and approval acknowledge and accept the foregoing and that the processes, requirements and tests relating to Metering Equipment and Asset Metering Equipment referred to in Code Subsidiary Documents relate to matters concerning settlement and not matters relating to health and safety, which matters are the sole responsibility of the Parties and/or the applicant.

All Parties and applicants for certification and/or approval agree that they accept the foregoing and accept that all applications for certification and/or approval are processed by ELEXON subject to and on the basis of the foregoing.

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[5]……..

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; or HHDC, VLP for Protocol Approval)

Contact Name: …….

Contact Tel. No: ……...……..

Fax. No: ……...

E-mail: ……...

Signature: …….

Date of Application: …….

The Panel (and its Committees) and ELEXON and its employees, agents and contractors do not and shall not be deemed to make or give any representation, warranty or guarantee, nor shall each or any of them have any liability or responsibility whatsoever or howsoever arising (whether directly or indirectly), in relation to:

- each or any Metering Equipment and Asset Metering Equipment, (including in relation to; any safety matters), in respect of any item of Metering Equipment and Asset Metering Equipment which is not tested whether or not such item is of the same type, model or version as an item which is tested;
- the processing of any application for certification or for Compliance Approval, Protocol Approval or any other approval ("approval") in relation to Metering Equipment and Asset Metering Equipment;
- the grant, failure or refusal to grant any such certification or approval; and/or,
- any testing, method of testing or analysis of test results of Metering Equipment and Asset Metering Equipment, or any act, error, failure or omission in relation to such testing, method of testing or analysis.

All Parties and applicants for certification and approval acknowledge and accept the foregoing and that the processes, requirements and tests relating to Metering Equipment and Asset Metering Equipment referred to in Code Subsidiary Documents relate to matters concerning settlement and not matters relating to health and safety, which matters are the sole responsibility of the Parties and/or the applicant.

All Parties and applicants for certification and/or approval agree that they accept the foregoing and accept that all applications for certification and/or approval are processed by ELEXON subject to and on the basis of the foregoing.

[5] Reference No. obtainable from ELEXON Limited

Section B: REQUEST FOR PROTOCOL APPROVAL

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

Data Collector	Metering Equipment/Asset Metering Equipment
……	……
……	……
……	……
……	……
……	……
……	……
……	……

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

For Manufacturers seeking Protocol Approval, enter the Metering Equipment type or Asset 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/Asset Metering Equipment Description

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

Note:
For Manufacturers or VLPs seeking Compliance Approval for Asset Metering Equipment the Asset Meter Type number (i.e. 1 to 5) must be included in the Applicable Codes of Practice for Metering Equipment and Asset Metering Equipment table.

I intend to provide Settlement Outstation Protocols, Asset Meter Protocols and Configuration Software to relevant Party Agents on request: ☐ tick as appropriate

Applicable Codes of Practice for Metering Equipment and Asset Metering Equipment Testing

Code of Practice *	Issue		Code of Practice *	Issue	
ONE TWO THREE FIVE			~~FIVE~~ SIX SEVEN TEN ELEVEN Asset Meter Type 1, 2, 3 ,4, 5		

* Delete Codes of Practice not applicable and in the case of Code of Practice Eleven delete the Asset Meter Type(s) not applicable.

3.2 Compliant Metering Equipment and Approved Protocols List

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

3.3 Specification for the Testing of Metering Equipment and Asset Metering Equipment Protocols

3.3.1 Scope

The specification for Protocol Testing is subdivided into two groups. All Meters that are Half Hourly Integral Outstations and separate Outstations designed to store data half hourly shall be tested as per (i) (i.e. 3.3.2) below. Any Meter or Outstation approved under 3.3.2 shall be automatically approved for the equivalent Asset Metering Type in Code of Practice Eleven. All other metering products to be used as Asset Metering Equipment (this includes Half Hourly Integral Outstation Meters that are not approved through BSCP601 for Code of Practice 1, 2, 3, 5 and 10 (as applicable)) shall be tested as per (ii) (i.e. 3.3.3) below.

(i) Testing of Metering Equipment for Codes of Practice One, Two, Three, Five, Six and Ten (3.3.2); or

(ii) Testing of Asset Metering Equipment for Code of Practice Eleven (3.3.3)[6].

3.3.2~~1~~ Scope for Protocol Testing of Metering Equipment for Codes of Practice One, Two, Three, Five, Six and Ten

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.

[6] Any Half Hourly Integral Outstation Meter approved under 3.3.3 cannot be used for Code of Practice 1, 2, 3, 5 and 10 unless it has been tested as per 3.3.2

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.

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 the relevant Codes of Practice.

3.3.2.~~2~~1 Test Procedure

The following functions are required to be tested:

1. Data retrieval;
2. Passwords;
3. Time reset; and
4. Flags.

3.3.2.~~3~~2 Test Schedule – Example

The following test schedule example is provided for information only. The actual tests to be used are dependent 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~~UTC

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.

3.3.2.32.1 Data retrieval

Energise the Outstation and ensure that the Outstation contains at least 20 days of non-uniform[7] half hour period data.

Test 1.

Ensure the Outstation clock is set to ~~GMT~~UTC.

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.

3.3.2.32.2 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.

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

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

3.3.2.~~3~~2.3 Time re-set

Test 6.

Set the Outstation clock to ~~GMT~~ UTC 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~~ UTC 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.

3.3.2.~~3~~2.4 Flags

Test 8.

Ensure that the Outstation is set to ~~GMT~~UTC

During a single half hour period, disconnect the supply from the Outstation for approximately 10 minutes then re-connect the supply.

~~During the following~~Allowing for a further half hour period so as to confirm the flags in the period of supply disconnection and the following 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.

3.3.3 Scope for Protocol Testing of Asset Metering Equipment for Code of Practice Eleven

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

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

The Protocol Testing in Code of Practice Eleven can be for a HHDC communicating directly with an Asset Meter, or a VLP data retrieval Instation communicating directly with an Asset Meter and then passing the data to a HHDC.

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

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

3.3.3.1 Test Procedure

The following functions are required to be tested:

1. Data retrieval;
2. Data security;
3. Time reset; and
4. Data file creation.

3.3.3.2 Test Schedule – Example

The following test schedule example is provided for information only. The actual tests to be used are dependent on the Code of Practice Eleven Asset Metering Type requirements (i.e. Asset Metering Type 1, 2, 3, 4 or 5) that an Asset Meter 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; and
iii. Parties present

b. **Asset Meter details**

i. Serial number;
ii. Type reference;
iii. Make and model;
iv. Record whether the Asset Meter has half hourly data storage capability;
v. Record whether the Asset Meter is using an instantaneous power output and if so the method used;
vi. Record whether the Asset Meter has an internal clock;
vii. Number and type of measured quantities available in the Asset Meter;
viii. Record energy flow direction capability (i.e. active import and/or active export); and
ix. Record any software and firmware versions.

c. **Asset Meter set up details**

i. Record number of measured quantities configured (i.e. Import and/or Export);
ii. Record Asset Meter cumulative register data constant and scale factor (e.g. MWh x 10), if applicable;

iii. Record Asset Meter instantaneous outputs configured (e.g. Import Power and/or Export Power) and any scaling factors for instantaneous outputs (e.g. 4mA = 10MW), if applicable;
iv. Confirm if applicable, that Asset Meter time is set to UTC; and
v. Confirm the security access required.

d. **Instation details**

i. Confirm if VLP data retrieval Instation or HHDC Instation;
ii. Record Type, version and operating platform;
iii. Record the software version of any relevant module details; and
iv. Configure the Instation for the Asset Meter set up in c. above.

3.3.3.2.1 Data retrieval

Energise the Asset Meter and using a stable power source inject a known load through the Asset Meter for a period of 24 hours (e.g. 48 Demand Periods in 30 minute Settlement Periods). Ensure that the known load injected is varied (i.e. non-uniform) in at least six Demand Periods. Where the Asset Meter is capable of measuring Import and Export at least six Demand Periods should be in each direction.

Test 1.

Ensure the Asset Meter clock, if fitted, is set to UTC.

Monitor the known load injected and allocate it into Demand Period format accounting for direction of flow (i.e. allocate to Import and/or Export).

Using manufacturer's software, collect at least 24 hours of data.

Using the Instation, where not the manufacturer's software, collect the same period of data.

Where the Asset Meter does not store data in Demand Period format, using the Instation convert the data collected into Demand Period format. The value of any energy measured in a Demand Period, but not stored in that Demand Period should be carried forward to the next Demand Period.

Compare the sets of data, i.e. from manufacturer's software, Instation and known load injected, and identify any inconsistencies.

Record results

Test 2.

Where the Asset Meter stores data in Demand Period format repeat the collection of data steps from Test 1.

Compare the 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.

3.3.3.2.2 Data Security

Test 3.

Configure the Instation with an incorrect access protocol for the Asset Meter (e.g. Incorrect password or identifiers used).

Attempt to read the Asset Meter.

Confirm that access was prohibited.

Record results.

Test 4.

Configure the Instation with the correct access protocols for the Asset Meter.

Attempt to read the Asset Meter.

Confirm that access was granted

Record results.

3.3.3.2.3 Time reset

Test 5.

Where the Asset Meter is fitted with a clock set the clock to UTC minus 10 minutes (using manufacturer's software)

Perform an Instation data retrieval

Record the Asset Meter time

Record results

Note: The Instation is expected to correct the Asset Meter time.

Test 5a

Where the Asset Meter is fitted with a clock set the clock to UTC plus 10 minutes (using manufacturer's software)

Perform an Instation data retrieval

Record the Asset Meter time

Record results

Note: The Instation is expected to correct the Asset Meter time.

3.3.3.2.4 Data File Creation

Test 6.

Where the Asset Meter is downloaded by a VLP data retrieval Instation, from the data collected in Test 1 ensure that the VLP data retrieval Instation has converted the data into Demand Period format, is in energy values and is in UTC

Confirm that the data file is in the correct format

Compare with the raw data recorded in Test 1.

Confirm that the energy values are correct and stored in the correct Settlement Period.

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

3.4.1 Scope

a) This Appendix sets out:

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

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.

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 relevant Codes of Practice.

c) This test applies to Codes of Practice One, Two, Three, Five, and Ten 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 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.

3.4.2 References[8]

The following documents are referenced in this Appendix:

BS 7856	'Code of Practice for Design of Alternating Current Watt-Hour Meters for Active Energy (Classes 1 and 2)'
BS EN/IEC 62053-22	Electricity metering equipment (a.c.) - Particular requirements – Part 22: Static meters for active energy (classes 0.2S and 0.5S)
BS EN/IEC 62053-11	Electricity metering equipment (a.c.) - Particular requirements – Part 11: Electromechanical meters for active energy (classes 0.5, 1 and 2)
BS EN/IEC 62053-23	Electricity metering equipment (a.c.) - Particular requirements – Part 23: Static meters for reactive energy (classes 2 and 3)
BS EN/IEC 62056-21	Electricity metering – Data exchange for meter reading, tariff and load control – Part 21: Direct local data exchange
BS EN/IEC 62053-21	'Alternating current static watt-hour meters for active energy (classes 1 and 2)'
BS EN/IEC 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~~
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.'

[8] Metering Equipment should be tested and stamped to the latest iteration of the applicable standard named in this document at the time of initial registration.

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~~Working Days of receipt of approval from BSCCo.

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

3.4.3.3 Test Conditions

To test the metering accuracy requirements in clause 3.4.8 below, the test conditions shall be maintained in accordance with BS EN/IEC 62053-21, BS EN/IEC 62053-11 or BS EN/IEC 62053-22 for indoor ~~m~~Meters. The appropriate accuracy Class of the Meter Equipment under test will be employed.

For CoP10 Meters, tests for accuracy need not be repeated providing the Meter is approved for use under the Electricity Act 1989.

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.

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 ‘Accuracy Requirements {5.3}’, 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/IEC 62053-21 for details);

(e) Reference conditions shall be in accordance with table 19 of BS EN/IEC 62053-21;

(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/IEC 62053-21; 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[9] (~~Red~~ L1 phase in) to the adjacent load terminal on the same phase (~~Red~~ L1 phase out).

3.4.6 Measured Quantities {4.1.1}

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

(a)	i) Establish if the Pulse Multiplier can be of a value other than 1 (under any circumstance); and ii) Where the value can be other than 1 record the values and circumstances.	**001**
(b)	establish the number and type of Measured Quantities available on the Meter;	**002**
(c)	if more than one Measured Quantity configuration is available, list all configurations;	**003**
(d)	confirm that a cumulative register display is available for each Measured Quantity (see also 3.4.12);	**004**
(e)	Import Active Energy is measured in kWh; Import Reactive Energy is measured in kvarh;	**005**
(f)	Export Active Energy is measured in kWh; Export Reactive Energy is measured in kvarh; and	**006**
(g)	confirm that Measured Quantities are available in both kilo and Mega values. *(CoPs 1, 2, 3 and 5)*	**007**

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

3.4.7 Demand Values {4.1.2}

The following tests 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; and kvar value is provided for each Demand Period for each Reactive Energy Measured Quantity.	**008**
(b)	Confirm that reactive Import and Export quantities (kvar and kvarh) can be provided separately for both Import and Export Active Power conditions. *(CoP1, 2, 3 and 5)*	**009**
(c)	Confirm that reactive quantities (kvar and kvarh) can,, be provided cumulatively as both Import and Export regardless of Active Power conditions.	**010**
(d)	where Active Import and Active Export values are provided confirm that each value is gross and recorded separately. (*CoP3, 5, and 10);* and	**011**
(e)	confirm that Demand Values are available in both kilo and Mega values. *(CoPs 1, 2, 3 and 5)*	**012**

3.4.8 Accuracy Requirements {5.3}

(a) Active Energy

Meters subject to *CoP10* compliance testing shall meet all of the accuracy requirements for Active Energy if the Meter is approved under SI 1998 No 1566 or SI 201~~0~~6 No 1153.

Tests shall be carried out at fundamental frequency (50Hz) to verify that the Active Energy measurements are within the limits shown in Table 1 below. The measurement uncertainty at fundamental frequency of the measurement system used shall not be greater than: ±0.01% (*CoP1*); ±0.05% (*CoP2*); ±0.1% (*CoP3*); or ±0.2% (*CoP5*).	**013**

Table 1 Active Energy

Value of Current (I)		**Power factor (Cos φ)**	**Percentage error limits[10] for Meters of Class**				
For whole current Meters	**For transformer operated Meters[11]**		**0.2S** ***(CoP1)***	**0.5S** ***(CoP2)***	**0.5** ***(CoP2)***	**1** ***(CoP3)***	**2** ***(CoP5)***
-	$0.01\ I_n \leq I < 0.05 I_n$	1	±0.4	±1.0	-	-	-
-	$0.05\ I_n \leq I \leq I_{max}$	1	±0.2	±0.5	-	-	-
-	$0.02\ I_n \leq I < 0.1 I_n$	0.5 ind 0.8 cap	±0.5 ±0.5	±1.0 ±1.0	-	-	-
-	$0.1\ I_n \leq I \leq I_{max}$	0.5 ind 0.8 cap	±0.3 ±0.3	±0.6 ±0.6	-	-	-
$0.05\ I_b \leq I < 0.1\ I_b$[12]	$0.02\ I_n \leq I < 0.05\ I_n$	1	-	-	±1.0	±1.5	±2.5
$0.1\ I_b \leq I \leq I_{max}$	$0.05\ I_n \leq I \leq I_{max}$	1	-	-	±0.5	±1.0	±2.0
$0.1\ I_b \leq I < 0.2\ I_b$[13]	$0.05\ I_n \leq I < 0.1\ I_n$	0.5 ind 0.8 cap	-	-	±1.3 ±1.3	±1.5 ±1.5	±2.5 -
$0.2\ I_b \leq I \leq I_{max}$	$0.1\ I_n \leq I \leq I_{max}$	0.5 ind 0.8 cap	-	-	±0.8 ±0.8	±1.0 ±1.0	±2.0 -

Source †: BS EN 62053 - 22 for *CoPs 1 and 2* (Clasess 0.2S and 0.5S), or BS EN 62053 - 11 for *CoP2* (Class 0.5), and BS EN/IEC 62053-21 for CoPs 3 and 5 (Classes 1 and 2).

(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%. *(CoPs 1, 2, 3 and 5)*	**014**

[10] Single-phase Meters and polyphase Meters with balanced loads.
[11] BS EN/IEC 62053-11 specifies values of current as 'basic' (i.e. see figures in whole current Meters column)
[12] BS EN/IEC 62053-11 specifies one test point (0.05 I_b)
[13] BS EN/IEC 62053-11 specifies one test point (0.1 I_b)

Table 2 Reactive Energy

Value of Current (I)		Sin φ	Percentage error limits[10] for Meters of Class		Applicable BS EN Standard for Test Criteria
For whole current Meters	For transformer operated Meters		2 *(CoP1)*	3 *(CoPs 2, 3 and 5)*	
$0.05\ I_b \leq I < 0.1\ I_b$	$0.02\ I_n \leq I < 0.05\ I_n$	1	±2.5	±4.0	BS EN/IEC 62053 - 23
$0.1\ I_b \leq I \leq I_{max}$	$0.05\ I_n \leq I \leq I_{max}$	1	±2.0	±3.0	
$0.1\ I_b \leq I < 0.2\ I_b$	$0.05\ I_n \leq I < 0.1\ I_n$	0.5 ind or cap	±2.5	±4.0	
$0.2\ I_b \leq I \leq I_{max}$	$0.1\ I_n \leq I \leq I_{max}$	0.5 ind or cap	±2.0	±3.0	
$0.2\ I_b \leq I \leq I_{max}$	$0.1\ I_n \leq I \leq I_{max}$	0.25 ind or cap	±2.5	±4.0	BS EN/IEC 62053 - 23
$0.2\ I_b \leq I \leq I_b$	$0.1\ I_n \leq I \leq I_n$	0.25 ind or cap	-	±10.0	BS EN/IEC 62053 - 23
$0.1\ I_b \leq I \leq 0.2\ I_b$	-	1	-	±4.0	BS 5685 Part 4
$0.2\ I_b < I \leq I_{max}$	-	1	-	±3.0	
$0.2\ I_b \leq I \leq I_{max}$	-	0.5 ind and 0.8 cap	-	±3.0	

Source †: BS EN 62053 - 23 for *CoPs1 and 2* (Classes 2 and 3), for *CoPs 3 and 5* or BS 5685: Part 4 (Class 3) for *CoPs 2, 3 and 5*. * 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.

† Permission to reproduce extracts from BS EN 62053 – 22, BS EN 62053 – 11, BS EN/IEC 62053-21, BS EN 62053 – 23 and BS 5685: Part 4 is granted by BSI. British Standards can be obtained in PDF or hard copy formats from the BSI online shop: www.bsigroup.com/Shop or by contacting BSI Customer Services https://shop.bsigroup.com/Contact-Us/~~for hardcopies only: Tel: +44 (0)20 8996 9001, Email: cservices@bsigroup.com~~.

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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. *(CoPs 1, 2, 3 and 5)*	**015**

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 that no additional adjustment is available) *(CoPs 1, 2, 3 and 5)*	**016**

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;	**017**
(b)	record whether the Meter has an integral Outstation;	**018**
(c)	establish that the Active Energy Meter meets the requirements of: i. *CoP1* BS EN/IEC 62053-22 Class 0.2S; ii. *CoP2* BS EN/IEC 62053-22 Class 0.5S or BS EN/IEC 62053-11 Class 0.5; iii. *CoP3* BS EN/IEC 62053-21 Class 1; iv. *CoP5* BS EN/IEC 62053-21 Class 2 or BS EN 7856 Class 2; or v. *CoP10* SI 1998 No 1566 or SI 20106 No 1153.	**019**
(d)	establish whether the Import Active Energy Meter meets the requirements of Schedule 7 of the Electricity Act 1989;	**020**
(e)	establish that the Reactive Energy Meter meets the requirements of; i. *CoP1* BS EN/IEC 62053-23 Class 2.0; ii. *CoP2* BS EN/IEC 62053-23 Class 3 ~~or BS 5685 Part 4~~; iii. *CoP3* BS EN/IEC 62053-23 Class 3~~BS 5685 Part 4~~; or iv. *CoP5* BS EN/IEC 62053-23 Class 3~~BS 5685 Part 4~~.	**021**
(f)	establish whether the number of measuring elements is one less or equal to the number of primary system conductors;	**022**
(g)	record whether provision has been made for the recording of measurement transformer ratios on the Meter's name plate; *(CoPs 1, 2, 3 and 5)*	**023**
(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;	**024**

(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; *(CoPs 1, 2, 3 and 5)*	**025**
(j)	confirm that the Meter includes a non-volatile Meter register of cumulative energy for each Measured Quantity;	**026**
(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 *(CoPs 1, 2, 3 and 5)*	**027**
(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 (two output pulse facilities are required in the case of CoP1). *(CoPs 1, 2, 3 and 5)*	**028**

3.4.12 Displays {5.4.1}

(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 and that such values are stored in non–volatile memory;	**029**
(b)	the current time and date;	**030**
(c)	the CT and/or VT ratios that have been programmed into the Meter;	**031**
(d)	any compensation factor applied for measurement transformer errors and/or system losses; and *(CoPs 1, 2, 3 and 5)*	**032**
(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. *(CoPs 1, 2, 3 and 5)*	**033**

(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 *(CoPs 1, 2, 3 and 5)* per month;	**034**
(b)	the Maximum Demand ("MD") for kW or MW *(CoPs 1, 2, 3 and 5)* for other programmable charging periods;	**035**
(c)	the Maximum Demand ("MD") for kVA or MVA *(CoPs 1, 2, 3 and 5)* per month can;	**036**
(d)	the Maximum Demand ("MD") for kVA or MVA *(CoPs 1, 2, 3 and 5)* for other programmable charging periods;	**037**

(e)	twice the kWh or MWh advance from the commencement of the current Demand Pperiod; *(CoPs 1, 2, 3 and 5)*	**038**
(f)	twice the kVAh or MVAh advance from the commencement of the current Demand Pperiod; *(CoPs 1, 2, 3 and 5)*	**039**
(g)	the cumulative Maximum Demand;	**040**
(h)	the number of Maximum Demand resets;	**041**
(i)	the multi rate display sequence, for at least 8 rates selectable over the calendar year;	**042**
(j)	whether a reverse running indication for Active Energy is provided. *(CoPs 3 and 5)*;	**043**
(k)	the indicated Maximum Demand is re-settable at midnight of the last day of the selected charging period;	**044**
(l)	the indicated Maximum Demand is re-settable for a part of a charging period; and	**045**
(m)	any Maximum Demand manual reset button is sealable.	**046**

3.4.13 Facilities {5.4.2}

(CoPs 1, 2, 3 and 5)

Establish whether the Meter is capable of providing different voltage free pulsed outputs for local use.	**047**
If test 047 is confirmed then confirm that the facilities meet the following requirements as shown in Table 3.	**048**

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 3.4.13 (a))	3 min (See 3.4.13 (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}. *(CoPs 3 and 5);* and	**049**

(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.	**050**

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 this BSCP.

Establish that:

(a)	The Outstation has a unique Outstation identification code;	**051**
(b)	For Meters with integral Outstations an auxiliary terminal provides for the Outstation's energisation for remote interrogation purposes (*CoP1*). For Meters with integral Outstations record whether an auxiliary terminal provides for the Outstation's energisation for remote interrogation purposes (*CoP2*);	**052**
(c)	The Outstation is capable of communicating with more than one Instation (not simultaneously and of similar type or otherwise);	**053**
(d)	It is possible to repeatedly retrieve data throughout the Outstation data storage period;	**054**
(e)	Any "read" operation does not alter or delete any stored metered data; and	**055**
(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.	**056**
(g)	In addition, establish whether the Outstation is capable of sending metering data automatically *(CoPs 5 and 10).* If this test is satisfied then:	**057**
(h)	Verify that the metering data sent complies with section 3.4.22 'Level 1 Passwords' of this test specification *(CoPs 5 and 10)*; and	**058**
(i)	Establish whether the Outstation is capable of sending metering data on a daily basis as a minimum *(CoPs 5 and 10).*	**059**

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, to determine the total number of kWh or MWh *(CoPs 1, 2, 3 and 5)* 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 *(CoPs 1, 2, 3 and 5)* is being registered in the kW or MW *(CoPs 1, 2, 3 and 5)* Maximum Demand register; and	**060**
(b)	from the beginning of the current Maximum Demand period, twice the kVAh or MVAh *(CoPs 1, 2, 3 and 5)* is being registered in the kVA or MVA *(CoPs 1, 2, 3 and 5)* Maximum Demand register.	**061**

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	**062**
(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 *(CoPs 1, 2, 3 and 5)*;	**063**

Table 4 Data Storage Periods

Code of Practice	Minimum Storage Period(days)
1	10
2	10
3	20
5	20
10	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;	**064**
(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;	**065**
(c)	for each of the twenty days under test that the contents of the kW or MW *(CoPs 1, 2, 3 and 5)* data stored facility have been stored correctly; and	**066**
(d)	for separate Meter/Outstation combinations, that the Outstation registers can be set to match and increment with the Meter registers. *(CoPs 1, 2, 3 and 5)*	**067**

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).

With prior agreement from BSCCo integration periods other than 30mins may be used to facilitate the following two tests.

Upon further Energisation, confirm that;

(a)	on reaching maximum memory storage capacity, that any new data overwrites the oldest stored data; and	**068**
(b)	no other data has been altered or removed.	**069**

3.4.16 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[14] in the de-energised state verify on reconnection of the supply that:

(a)	all stored data has been correctly stored and is not corrupt;	**070**
(b)	the Metering Equipment internal clock is accurate to within ±10 seconds[14]; and	**071**
(c)	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.	**072**

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 10~~ten~~[15] 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[16]; and	**073**
(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.	**074**

Set the Metering Equipment 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.	**075**
Repeat the synchronisation test using the Local Interrogation Unit and check that the Demand Period has been marked with an alarm indication.	**076**

[14] For tests to Code of Practice 3, 5 and 10, period of disconnection is 20 days and the acceptable tolerance is ±20 Seconds.
[15] For tests to Codes of Practice 3, 5 and 10, this period is 20 days
[16] For tests to Code of Practice 3, 5 and 10, the acceptable tolerance is ±20 Seconds.

3.4.17 Monitoring Facilities {5.5.3}

3.4.17.1 Phase Failure Indication Tests

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;	**077**
(b)	repeat the disconnection process for each of the remaining phases in separate Demand Periods;	**078**
(c)	repeat the disconnection process for combinations of multiple phase failure; and	**079**
(d)	verify phase failure alarm resets on restoration of normal supply after each test.	**080**

3.4.17.2 Battery Monitoring Tests

If battery fitted, establish the method of battery monitoring and test for alarms and indications tagged to the relevant Demand Periods, if necessary by disconnecting the battery.	**081**

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.	**082**

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.	**083**
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.	**084**

3.4.17.5 Reverse Running

Where an Active Energy reverse running display is provided, determine that the requirements of BS EN/IEC 62053-21 or BS EN/IEC 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 *(CoPs 3 and 5, and if fitted).*	**085**
Test that upon return to normal power flow, the reverse running flag is no longer present in the unaffected Demand Period *(CoPs 3 and 5, and if fitted).*	**086**

3.4.18 Communications {5.6}

Verify that two communications ports are available for interrogating the Outstation	**087**

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 *(CoPs 3 and 5)* or~~ BS EN/IEC 62056-21 ~~*(CoPs 1, 2 and 10)*~~; or	**088**
(b)	The local port provides data to a Local Interrogation Unit via another type of port; and	**089**
(c)	Repeat collections of stored data are available throughout the storage period and verify that any~~d~~ "read" operation does not delete or modify any stored metering data.	**090**

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	**091**
(b)	Repeat collections of stored data are available throughout the storage period and verify that any "read" operation does not delete o~~f~~r modify any stored metering data	**092**

3.4.21 Password Protection

(a)	For separate Outstations establish that a password is required to read or change any data. *(CoPs 1, 2, 3 and 5)*	**093**
(b)	For integral Outstations establish that **four**[17] discrete password controlled access levels are provided for both local and remote interrogation.	**094**
(c)	For alpha numeric 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 or sensitive alpha characters (A to Z) and/or digits (0 to 9) and/or the underscore character (_); or *(CoPs 1, 2, 3 and 5)*	**095**
(d)	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 upper case hexadecimal characters (0 to F). *(CoPs 1, 2, 3 and 5)*	**096**

3.4.22 Level 1 Passwords

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

(a)	Outstation ID;	**097**
(b)	all programmable Demand Values;	**098**
(c)	all programmable cumulative Measured Quantities;	**099**
(d)	the Maximum Demand for kW and/or kVA per programmable charging period;	**100**
(e)	the multi-rate cumulative Active Energy values;	**101**
(f)	the VT and CT transformer ratios, where appropriate;	**102**
(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; *(CoPs 1, 2, 3 and 5)*	**103**
(h)	all alarm indications; and	**104**
(i)	Outstation time and date	**105**

Establish that it is not possible to change any of the above values at Level 1 Password.	**106**

[17] For CoP 10 only three are required

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:		**107**
(a)	changes to time and date; and	**108**
(b)	resetting of all Maximum Demands.	**109**

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:		**110**
(a)	Displays and Facilities as defined in clauses 3.4.12 'Displays {5.4.1}' and 3.4.13 'Facilities {5.4.2}' of this test specification;	**111**
(b)	measurement transformer ratios as defined in clause 3.4.11 'Meter {5.3}' of this test specification;	**112**
(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 *(CoPs 1, 2, 3 and 5)*	**113**
(d)	passwords for Levels 1, 2 and 3.	**114**
(e)	where applicable, confirm it is possible to programme the schedule for automated transfer of Level 1 metering data via Level 3 access *(CoPs 5 and 10)*.	**115**

Establish that it is possible to read additional information within the Metering Equipment to enable the programmed information to be confirmed.	**116**

3.4.25 Level 4 Passwords

(CoPs 1, 2, 3 and 5)

If the Level 4 Password is implemented electronically then:

(a)	establish that all the functionality listed at Level 3 can be performed and in addition that the following alterations can be performed:	**117**
(b)	calibration of the Meter (only where the Meter is integral with the Outstation);	**118**
(b)	setting the measurement transformer ratios, where appropriate;	**119**
(d)	setting the measurement transformer error correction and/or system loss factors applied as a complex factor; and	**120**
(e)	programming the Level 3 & 4 Passwords.	**121**

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);	**122**
(b)	setting the measurement transformer ratios, where appropriate; and	**123**
(c)	setting the measurement transformer error correction and/or system loss factors applied as a complex factor.	**124**

3.4.26 Password Monitoring {Appendix D}

Using the Approved Protocol [18], verify that the password offered determines the Level of access to the data within the Metering Equipment.	**125**

Verify, by accessing the Metering Equipment at least eight times with an "illegal" password(s), that:

(CoPs 1, 2, 3 and 5)

(a)	the illegal password counter resets to zero every hour on the hour change; and	**126**
(b)	after the seventh illegal password attempt entered between counter resets, that access is prohibited at all levels until the counter resets.	**127**

[18] If the protocol has not yet received Approval, record the status and description of the protocol used for testing purposes.

3.4.27 Additional Tests

3.4.27.1 Electromagnetic Compatibility Tests

(CoPs 1, 2, 3 and 5)

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/IEC 62053-21, verify, by testing under all the conditions detailed in BS EN/IEC 62053-21, that:

(a)	any stored data and time/date is not corrupted or has been destroyed; and	**128**
(b)	the metering accuracy remains within the requirements of clause 3.4.8 'Accuracy Requirements {5.3}' of this test specification.	**129**

3.4.27.2 Immunity to Electromagnetic HF Fields

(CoPs 1, 2, 3 and 5)

Verify, by testing in accordance with BS EN/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	**130**
(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%.	**131**

On completion of each EMC test verify that:

(a)	any stored data is not corrupted or has been destroyed; and	**132**
(b)	the metering accuracy remains within the requirements of clause 3.4.8 'Accuracy Requirements {5. 3}'of this test specification.	**133**

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.	**134**

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

3.5.1 Scope

This specification 3.5 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 specification 3.5 supersedes the specification for "Type Testing to Code of Practice Six, Issue 4 (Issue 1 v1.00)".

The type testing requirements as detailed in this specification 3.5 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 relevant Codes of Practice.

This specification 3.5 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/IEC 62053-21	AC Static Watthour Meters for Active Energy (Class 1 and 2)
BS EN/IEC 62056-21	Data Exchange for Meter Reading, Tariff and Load Control. Direct Local Exchange.
Code of Practice for Electricity Meter Operators	Sealing Requirements.

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 3.5.4 below the test conditions shall be maintained in accordance with BS EN/IEC 62053-21 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 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.

a) 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.)

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

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/IEC 62056-21 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 cannot 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/IEC 62053-21, verify, by testing under all the conditions detailed in BS EN/IEC 62053-21, 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 this specification 3.5.

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 BS EN/IEC 61000-4-3, 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 1~~K~~kHz 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 this specification 3.5.

3.5.13 Sealing

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

3.6 Specification for Compliance Testing of Asset Metering Equipment for Code of Practice Eleven

3.6.1 Scope

a) This specification 3.6 sets out:-

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

3) the test procedures to be followed by the Test Laboratory to determine the accuracy and functionality of items of Asset Metering Equipment as conforming, or otherwise, to the requirements of the Balancing and Settlement Code and Code of Practice Eleven.

Asset Meters in Code of Practice Eleven are subdivided into three categories;

(i) An Asset Meter approved for use in Code of Practice 1, 2, 3, 5 and 10 that is a Half Hourly Integral Outstation Meter. These Meters and Outstations shall be approved under 3.4 of this BSCP (Specification for Compliance Testing of Metering Equipment for Codes of Practice One, Two, Three, Five and Ten);

(ii) An Asset Meter whose primary purpose is the measurement of Active Power and/or Active Energy that is **not** a Half Hourly Integral Outstation Meter approved for use under Code of Practice 1, 2, 3, 5 and 10; and

(iii) An Asset Meter whose primary purpose is **not** the measurement of Active Power and/or Active Energy and is **not** a Half Hourly Integral Outstation Meter approved for use under Code of Practice 1, 2, 3, 5 and 10. These Embedded Metering Devices are embedded within equipment used for purposes other than the measurement of Active Power and/or Active Energy, such as an EV charging unit or a small-scale domestic battery storage unit.

Only categories (ii) and (iii) are considered in this section (3.6 - Specification for Compliance Testing of Asset Metering Equipment for Code of Practice Eleven).

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 Codes of Practice Eleven.

b) The Compliance Testing requirements as detailed in this Appendix apply only to parts of the Asset Metering System (i.e. Asset Meters) and therefore satisfactory test results from this Compliance Testing do not constitute a compliant Asset Metering System as required by the Code, Balancing and Settlement Code Procedures ("BSCPs") and Code of Practice Eleven.

c) This test applies to Code of Practice Eleven for the Asset Metering Types described in category ii) and iii) above and should be used by the Compliance Testing Agent to confirm compliance with the relevant Asset Metering Type the Asset Metering Equipment is intended to be approved against.

d) 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 Asset Metering Type at any one time and Asset Metering Equipment requiring compliance with multiple Asset Metering Types shall be subject to a full and complete testing schedule for each Asset Metering Type.

Asset Metering Type means the category of Asset Metering Equipment required to be compliant with Code of Practice Eleven. The categories are subdivided by the rated capacity of the circuit being measured or by the Maximum Demand of the energy transfers of the circuit being measured. There are five categories:

(i) Asset Metering Type 1 - Metering of circuits with a rated capacity greater than 100MVA;
(ii) Asset Metering Type 2 - Metering of circuits with a rated capacity not exceeding 100MVA;
(iii) Asset Metering Type 3 - Metering of circuits with a rated capacity not exceeding 10MVA;
(iv) Asset Metering Type 4 - Metering of energy transfers with a Maximum Demand of up to (and including) 1MW; and
(v) Asset Metering Type 5 - Metering (embedded within another device) for energy transfers with a Maximum Demand of up to (and including) 100kW.

3.6.2 References[19]

The following documents are referenced in this Appendix:

BS EN/IEC 62053-21	Electricity metering equipment - Particular requirements – Part 21: Static meters for AC active energy (classes 0,5, 1 and 2)
BS EN/IEC 62053-22	Electricity metering equipment - Particular requirements - Part 22: Static meters for AC active energy (classes 0,1S, 0,2S and 0,5S)
BS EN 50470-3	Electricity metering equipment (a.c.). Particular requirements. Static meters for active energy (class indexes A, B and C)
BS EN/IEC 61000-4-3	Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test
BS EN/IEC 62052-11	Electricity Metering Equipment – General Requirements, Tests and Test Conditions – Part 11: Metering equipment
BS EN/IEC 61557-12	Electrical safety in low voltage distribution systems up to 1000 V a.c. and 1500 V d.c. Equipment for testing, measuring or monitoring of protective measures. Performance measuring and monitoring devices (PMD)
BS EN/IEC 60688	Electrical measuring transducers for converting a.c. electrical quantities to analogue or digital signals
BS EN/IEC 62056-21	Electricity metering. Data exchange for meter reading, tariff and load control. Direct local data exchange

[19] Asset Metering Equipment should be tested and stamped to the latest iteration of the applicable standard named in this document at the time of initial registration.

3.6.3 Test Constraints

3.6.3.1 Applicable Codes of Practice

Subject to 3.6.1 d) above, the following clauses refer to the Test Procedure solely for Compliance Testing to the requirements of a relevant Asset Metering Type in Code of Practice Eleven at any one time and not to any other Asset Metering Type or other Code of Practice reference in the Code.

3.6.3.2 Timetable

For each Compliance Testing application, the Test Laboratory shall complete all Compliance Testing within 40 Working Days of receipt of approval from BSCCo.

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

3.6.3.3 Test Conditions

For Asset Meters compliant with a relevant standard[20] that specifies accuracy classes, tests for accuracy need not be repeated providing a test certificate from an independent Test House confirming compliance with the relevant accuracy class is provided.

To test the metering accuracy requirements in clause 3.6.8 below, the test conditions shall be maintained in accordance with a relevant standard[20] for indoor Meters. The appropriate accuracy class of the Asset Meter Equipment under test will be employed.

3.6.3.4 Samples for Testing

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

3.6.4 Testing

Note:

(1) References contained within {} are to clauses in Code of Practice Eleven.

(2) Reference numbers in the right hand margin are to be used for test cross reference purposes and are to be prefixed with Code of Practice Eleven and the relevant and Asset Metering Type number.

3.6.5 General Test Conditions

Before testing the metering accuracy requirements in clause 3.6.8 ‘Accuracy Requirements {6.1.2; 6.1.3}’, the following conditions shall be maintained:

[20] a recognised national or international standard such as International Electrotechnical Commission (IEC); European Committee for Electrotechnical Standardization (CENELEC); International Organization for Standardization (ISO); British Standards Institution (BSI), etc

(a) The Asset Meter shall be tested in its case, and where the Asset Meter is embedded within a device, 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 the relevant table within clause 7.1 'General test conditions' of the BS EN/IEC 62052-11 standard for details);

(e) Reference conditions shall be in accordance with the relevant table within clause 7.1 'General Test Conditions' of BS EN/IEC 62052-11;

(f) In all cases taking into account the additional percentage error due to change of influence quantities in accordance with the relevant standard (e.g. see clause 7.10 'Limits of error due to influence quantities' table 4 of BS EN/IEC 62053-21 for details); and

(g) Where an Asset Meter has both Import and Export functionality, then the Active Import Energy flow is deemed to be from the extreme left hand terminal[21] (L1 phase in) to the adjacent load terminal on the same phase (L1 phase out) for category (ii)) Asset Meters. For category (iii) Asset Meters Active Energy Import Energy flow is deemed to be coming into the equipment (e.g. in the case of a small scale battery storage unit to charge it up or supply it) and Active Energy Export Energy flow is deemed to be coming from the equipment (e.g. in the case of a small scale battery storage unit to discharge stored energy).

3.6.6 Measured Quantities {4.1}

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

(a)	i) Establish if the Pulse Multiplier can be of a value other than 1 (under any circumstance); and ii) Where the value can be other than 1 record the values and circumstances.	**001**
(b)	establish the number and type of Measured Quantities available on the Meter;	**002**
(c)	if more than one Measured Quantity configuration is available, list all configurations;	**003**
(d)	confirm if a display is fitted	**004**

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

(e)	confirm if a cumulative register display is available for each Measured Quantity (see also 3.6.12);	**005**
(f)	confirm if Import Active Energy is measured in either kWh or MWh;	**006**
(g)	confirm if Export Active Energy is measured in either kWh or MWh; and	**007**
(h)	confirm if Measured Quantities are available in kilo values for Asset Metering Type 3, 4 or 5 and Mega values for Asset Metering Type 1 or 2.	**008**

3.6.7 Demand Values {4.2}

The following tests shall be performed to confirm that Demand Values are provided:

(a)	Confirm that a kW or MW value is provided for each Demand Period for each Active Energy Measured Quantity;	**009**
(b)	where Active Import and Active Export values are provided confirm that each value is gross and recorded separately; and	**010**
(c)	confirm if Demand Values are available in kilo values for Asset Metering Type 3, 4 or 5 and Mega values for Asset Metering Type 1 or 2.	**011**

3.6.8 Accuracy Requirements {6.1.2; 6.1.3}

(a) Active Energy

If the Asset Meter is designed for the measurement of Active Energy or Active Power in both directions, the values specified in the relevant standard[20] or Table 5 and Table 6 shall apply for each direction.

For Asset Meters compliant with a relevant standard[20] that quotes accuracy classes and limits of error a Test Certificate proving compliance with the relevant standard and accuracy class shall be provided for Active Energy or Active Power measurements, as applicable. Confirm the following: (i) relevant standard[20] (ii) whether the Test Certificate is for Active Energy or Active Power or both (as applicable) (iii) relevant accuracy class (all applicable if different for Active Energy and Active Power); and (iv) errors are within the allowed limits	**012**
For a.c. Asset Meters not compliant with a relevant standard[20] that quotes accuracy classes and limits of error a Test Certificate for Active Energy or Active Power proving measurements are within the limits shown in Table 5 below. Confirm the following: (i) whether the Test Certificate is for Active Energy or Active Power or both (as applicable); and (ii) errors are within the allowed limits	**013**
For d.c. Asset Meters not compliant with a relevant standard[20] that quotes accuracy classes and limits of error a Test Certificate for Active Energy or Active Power	**014**

proving measurements are within the limits shown in Table 6 below. Confirm the following: (i) whether the Test Certificate is for Active Energy or Active Power or both (as applicable); and (ii) errors are within the allowed limits	

Table 5: Asset Meters embedded within equipment and are an a.c. measuring device should meet the following criteria for Active Energy and/or Active Power (a.c)

CONDITION	**LIMITS OF ERROR AT STATED SYSTEM POWER FACTOR**	
Current expressed as the operational range of the device	Power Factor	Limits of Error
50% I_{max} to I_{max} inclusive	1	± 2.0%
I_n to 50% I_{max}	1	± 2.5%
I_n to I_{max} to inclusive	0.5 lag and 0.8 lead	± 2.5%

Table 6: Asset Meters embedded within equipment and are a d.c. measuring device should meet the following criteria Active Energy and/or Active Power (d.c.)

CONDITION	**LIMITS OF ERROR AT STATED SYSTEM POWER FACTOR**	
Current expressed as the operational range of the device	Power Factor	Limits of Error
50% I_{max} to I_{max} inclusive	N/A	± 2.0%
I_n to 50% I_{max}	N/A	± 2.5%

Where I_n is the nominal current the device is designed to operate at and I_{max} is the maximum current the device is designed to operate at. For example, if a device was designed to only operate in the 6A-32A range I_n would be 6A and I_{max} 32A.

3.6.9 Measurement Compensation for Measurement Transformer Error(s) {6.2}

(i) Confirm if Asset Meter can be compensated for Measurement Transformer errors; (ii) If answer to (i) is yes record the available range of Measurement Transformer compensation adjustment provided for both current and voltage measurements.	015

3.6.10 Compensation for Power Transformer and Line Losses {5.2}

(i) Confirm if Asset Meter can be compensated for Power Transformer and Line Losses; (ii) If answer to (i) is yes record the available range of power transformer and line loss compensation adjustment provided. (If this adjustment is recorded as part of test 3.6.9 above then record that no additional adjustment is available).	016

3.6.11 Inverter or Rectifier Losses {6.1.3}

Where the Asset Meter is a d.c. meter and does not account for the losses associated with an inverter or rectifier.

Confirm the losses in Watts associated with the inverter and/or rectifier. (i) The test should be repeated to demonstrate repeatability of the losses; (ii) The test evidence provided by the applicant should be conducted over a number of unit of the same type to demonstrate repeatability of the inverter and/or rectifier type. (iii)Confirm if Asset Meter can be compensated for inverter and/or rectifier losses; (iv)If answer to (iii) is yes record the available range of inverter and/or rectifier loss compensation adjustment provided.	017

3.6.12 Asset Meter {6.1.2; 6.1.3}

Establish the following parameters for the Asset Meter under test:

(a)	confirm that the Asset Meter has a unique identification code;	**018**
(b)	confirm that the Asset Meter is capable of communicating with more than one Instation (not simultaneously and of similar type or otherwise);	**019**
(c)	Where the Asset Meter has data storage functionality, confirm that it is possible to repeatedly retrieve data throughout the Asset Meter data storage period;	**020**
(d)	Any "read" operation does not alter or delete any stored metered data; and	**021**
(e)	Where the Asset Meter has data storage functionality, confirm the Asset Meter 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 Asset Meter.	**022**
(f)	establish whether the number of measuring elements is one less or equal to the number of primary system conductors;	**023**
(g)	record whether provision has been made for the recording of measurement transformer ratios on the Asset Meter's name plate;	**024**
(h)	Where the Asset Meter is combined with a display, then confirm that the measurement transformer ratios can be displayed and downloaded during the interrogation process;	**025**
(i)	confirm that any compensation factors that have been applied for measurement transformer errors can be downloaded, and where this is a constant factor applied whether it can be similarly displayed (should a display be fitted);	**026**
(j)	confirm that the Asset Meter includes a non-volatile register of cumulative energy for each Measured Quantity;	**027**
(k)	confirm that the cumulative energy register(s) (both displayed registers should a display be fitted and internal registers) do not roll-over more than once within the normal reading cycle [90 days at full load]; and	**028**
(l)	where the Asset Meter is using an analogue or digital output connected to a separate Outstation/Instation, confirm that the Asset Meter is fitted with at least one output facility capable of transmitting data for each Measured Quantity	**029**

3.6.13 Displays {6.1.2; 6.1.3}

(a) Where the Asset Meter is fitted with a display, confirm whether the Asset Meter 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 and that such values are stored in non–volatile memory;	**030**
(b)	the instantaneous parameters (e.g. power, voltage current);	**031**
(c)	the measurement transformer (i.e. current transformer and/or voltage transformer) ratios that have been programmed into the Asset Meter;	**032**
(d)	any compensation factor applied, where this is a constant factor, for measurement transformer errors and/or system losses (i.e. power transformer and/or cable/line losses) or inverter losses or rectifier losses; and	**033**
(e)	any scaling factor applied to an analogue or digital output used to transmit data to a Settlement Instation to convert to energy values for any Measured Quantity (e.g. 50kWh/imp).	**034**

3.6.14 Facilities {6.1.4}

(a)	Establish whether the Asset Meter is capable of providing an analogue or a digital output	**035**
(b)	If an analogue output establish whether the Asset Meter is capable of providing different voltage free pulsed outputs.	**036**
(c)	If test 036 is confirmed then confirm that the facilities have the option of having a suitable value at full load e.g. the between 0.1 and 2 pulses per second with a nominal duration of 80mS per pulse.	**037**
(d)	If an analogue output is converting a.c. electrical quantities to analogue signals confirm the conversion value options (e.g. Wh/imp).	**038**
(e)	If a digital output converting a.c. electrical quantities to digital signals confirm the method and any scaling value required.	**039**
(f)	For all output methods confirm that the output meets the required accuracy class limits for the relevant Asset Metering Type and where the Asset Meter has a cumulative Active Energy register the output cumulative total should be within ±0.1% of the cumulative Active Energy register over the period of test.	**040**

3.6.15 Local Port {6.1.2; 6.1.3}

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

(a)	the type of port used to provide data to a Local Interrogation Unit	**041**
(b)	that the following parameters can be downloaded locally: (i) cumulative energy registers; (ii) programmed measurement transformer ratios; (iii) Demand Period data; (iv) instantaneous parameters – Active Power (W); and (v) any scaling factor programmed into the Asset Meter weighting the Active Energy output (e.g. a pulse output of 50kWh/imp).	**042**
(c)	Repeat collections of stored data are available throughout the storage period and that any "read" operation does not delete or modify any stored metering data.	**043**

3.6.16 Remote Port {6.1.2; 6.1.3}

Using a modem or similar device provided by the Applicant to remotely download the Asset Meter, confirm that:

(a)	the method used to provide data to an Instation remotely (e.g. modem)	**044**
(b)	that the following parameters can be downloaded remotely: (i) cumulative energy registers; (ii) programmed measurement transformer ratios; (iii) Demand Period data; (iv) instantaneous parameters – Active Power (W); and (v) any scaling factor programmed into the Asset Meter weighting the Active Energy output (e.g. a pulse output of 50kWh/imp).	**045**
(c)	Repeat collections of stored data are available throughout the storage period and that any "read" operation does not delete or modify any stored metering data.	**046**

3.6.17 Data Security Protection {6.1.5}

(a)	Confirm the method of data security used for local interrogation;	**047**
(b)	Confirm the method of data security used for remote interrogation;	**048**
(c)	Where passwords are used by the Asset Meter, confirm the number of access levels and what they are limited to (e.g. read only), format and maximum length;	**049**
(d)	Confirm that a password is required to read or change any parameters programmed into the Asset Meter; and	**050**
(e)	Confirm that an incorrect password will not read or change any parameters programmed into the Asset Meter.	**051**

3.6.18 Time Keeping {6.1.2; 6.1.3}

Where the Asset Meter has an internal clock and this clock is the basis for assigning energy consumed or produced to a Demand Period format submitted into Settlement.

With the Asset Meter connected to a supply, note the contents of all cumulative energy registers, by either reading a display, downloading locally or downloading remotely. Ensure that the time and date are set to UTC. Disconnect the Asset Meter from the supply and after 10 days for Asset Metering Type 1 and 2 or after 20 days for Asset Metering Type 3, 4 and 5 in the de-energised state verify on reconnection of the supply that:

(a)	all stored data has been correctly stored and is not corrupt;	**052**
(b)	the Asset Meter internal clock is accurate to within ±10 seconds of UTC for Asset Metering Type 1 and 2 or ±20 seconds of UTC for Asset Metering Type 3, 4 and 5; and	**053**
(c)	partial Demand Values in which an Asset Meter supply failure and/or restoration occurs and any zero values associated with the Asset Meter supply failure are marked so that they can be identified by the Instation.	**054**

With the Asset Meter energised, set the date and time to UTC. Apply a load equivalent to full load using a stable power supply. Avoid any communication or time synchronisation with the Asset Meter for 10 days for Asset Metering Type 1 and 2 or after 20 days for Asset Metering Type 3, 4 and 5. At the end of the test and before any time synchronisation occurs, verify that:

(a)	the Asset Meter internal time clock is accurate to within ±10 of UTC for Asset Metering Type 1 and 2 or ±20 seconds of UTC for Asset Metering Type 3, 4 and 5; and	**055**
(b)	the duration of each Demand Period is within ±0.1% of the Demand Period length (e.g. 30 minutes), this being achieved by the comparison of stored	**056**

	energy values in each Demand Period (i.e. the stored energy values in the Asset Meter should be constant and the energy value in each Demand Period should be within ±0.1% of the load injected from the stable power supply).	

Confirm that the Asset Meter internal time clock can be adjusted locally and remotely.

Set the Asset Meter internal time clock to five minutes slow with respect to UTC for tests 057 and 058.

(a)	Using the remote Instation synchronise the internal time clock of the Asset Meter and confirm it can be synchronised back to UTC.	**057**
(b)	Repeat test 057 synchronisation test using the Local Interrogation Unit.	**058**

Set the Asset Meter internal time clock to five minutes fast with respect to UTC for test 059 and 060.

(a)	Using the remote Instation synchronise the internal time clock of the Asset Meter and confirm it can be synchronised back to UTC.	**059**
(b)	Repeat test 059 synchronisation test using the Local Interrogation Unit.	**060**

3.6.19 Data Storage {6.1.2; 6.1.3}

Where the Asset Meter has the capability to store data; i.e. cumulative energy registers and/or Demand Period data.

The Asset 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, to determine the total number of kWh or MWh, as applicable, supplied to the Asset Meter over the whole twenty day period.

(a)	Where the Asset Meter can store Demand Period data, confirm how many days of Demand Period (30 minute length) data can be stored per Measured Quantity (i.e. accounting for all required Measured Quantities[22] being programmed into the Asset Meter);	**061**

[22] Code of Practice Eleven only requires a maximum number of two Measured Quantities (i.e. Active Import and Active Export)

(b)	Where the Asset Meter can store Demand Period data, confirm how many Measured Quantities can be stored and what they are (e.g. Active Import, Active Export);	**062**
(c)	Where the Asset Meter can store Demand Period data, confirm the units of measurement (Asset Metering Type 1 and 2 should be Mega; Asset Metering Type 3, 4 and 5 should be kilo);	**063**
(d)	Where the Asset Meter can store Demand Period data, confirm each Demand Value is identifiable to its respective date and time;	**064**
(e)	Where the Asset Meter can store Demand Period data, confirm for each of the twenty days under test that the metered volumes have been stored correctly;	**065**
(f)	Where the Asset Meter can store Demand Period data, confirm for each of the first 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 Asset Meter for the same interval;	**066**
(g)	Where the Asset Meter can store cumulative energy register data, confirm how many Measured Quantities can be stored and what they are (e.g. Active Import, Active Export);	**067**
(h)	Where the Asset Meter can store cumulative energy register data, confirm the units of measurement (Asset Metering Type 1 and 2 should be MWh; Asset Metering Type 3, 4 and 5 should be kWh);	**068**

Where the Asset Meter can store Demand Period data, one test sample of the Asset Meter 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). With prior agreement from BSCCo integration periods other than 30 minutes may be used to facilitate the following two tests.

Upon further Energisation, confirm that;

(a)	on reaching maximum memory storage capacity, that any new data overwrites the oldest stored data; and	**069**
(b)	no other data has been altered or removed.	**070**

3.6.20 Additional Tests

3.6.20.1 Electromagnetic Compatibility Tests

BS EN/IEC 62052-11[23] clause 9.3 Electromagnetic compatibility (EMC) requires that Meters shall be designed in a way that prevents external electromagnetic phenomena from damaging the meter, corrupting the meter's energy registers or substantially influencing the result of measurements

In addition to the tests carried out in accordance with BS EN/IEC 62052-11, confirm, by testing under all the conditions detailed in BS EN/IEC 62052-11, that:

(a)	that the Asset Meter is compliant with BE EN/IEC 62052-11 EMC requirements;	**071**
(b)	any stored data and time/date is not corrupted or has been destroyed; and	**072**
(c)	the metering accuracy remains within the requirements of clause 3.6.8 'Accuracy Requirements {6.1.2; 6.1.3}' of this test specification.	**073**

3.6.20.2 Immunity to Electromagnetic HF Fields

Confirm, by testing in accordance with BS EN/IEC 61000-4-3[24], 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 Asset 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 Asset Meter(s) is under test, equivalent scaled values should be used taking into account the measurement transformer ratios); and	**074**
(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%.	**075**

On completion of each EMC test confirm that:

(a)	any stored data is not corrupted or has been destroyed; and	**076**
(b)	the metering accuracy remains within the requirements of clause 3.6.8 'Accuracy Requirements {6.1.2; 6.1.3}'of this test specification.	**077**

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

[23] Electricity Metering Equipment – General Requirements, Tests and Test Conditions – Part 11: Metering equipment
[24] Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test

3.6.20.3 Sealing {8}

(a)	Ensure that adequate facilities are provided for securing the Asset Meter to prevent unauthorised access going undetected. This may include the use of a tamper evident seal or where an Asset Meter is an Embedded Metering Device embedded within equipment used for other purposes that equipment shall be manufactured in such a way so as to prevent unauthorised access.	**078**