



Technical Assurance of Metering Working Instructions

TAA Working Instructions

Background

The TAA provides the services described by BSCP27 and it does this in accordance with other BSC documentation, such as the CoPs.

This suite of TAA working instructions, though not exhaustive, aims to provide and formalise a standard approach that can be taken by the TAA consistently at each inspection visit. This becomes particularly useful where documents, practices or protocols can be interpreted in various ways.

The aim is to create a common best practice approach in undertaking the TAA services.

Scope

The purpose of these TAA Working Instructions is to provide a common understanding and approach to instructions and to provide transparency of services performed by the TAA for the benefit of all parties involved (BSCCo, TAA and Industry).

These documents are limited to advising HHMOA, HHDC, Registrants and any other responsible parties of the TAA activities and services. These are not intended to be used as instructions for Metering System design and installation, or form part of any industry change process.

These documents are updated to reflect the direction and governance of the BSCCo and the BSC (and Code Subsidiary Documents) as required.

What the TAA needs to know

The Balancing and Settlement Code (BSC) requires the Registrant of the Metering System to provide the TAA with access to the Metering System so that they can carry out a TAA Inspection.

As the Registrant may not necessarily be the Equipment Owner for all or part of the Metering System, where this is the network operator (Distribution or Transmission company), authorisation is required from them for the TAA to carry out inspections on their asset.

Other useful information you will need to be aware of:

- BSC (Balancing and Settlement Code)
- BSCP06 (CVA Meter Operations for Metering Systems Registered in CMRS)
- BSCP27 (Technical Assurance of Half Hourly Metering Systems for Settlement Purposes)
- BSCP32 (Metering Dispensations)
- BSCP502 (Half Hourly Data Collection for SVA Metering Systems Registered in SMRS)
- BSCP514 (SVA Meter Operations for Metering Systems Registered in SMRS)



Technical Assurance of Metering Working Instructions

- BSCP515 (Licensed Distribution)
- BSCP537 (Qualification Process for SVA Parties, SVA Party Agents and CVA MOA)
- BSCP538 (Error and Failure)
- BSCP550 (Shared SVA Meter Arrangement of Half Hourly Import and Export Active Energy)
- BSCP601 (Metering Protocol Approval and Compliance Testing)
- Technical Pool Circulars
 - CEO00437 – Provision of Neutral Links for Metering Equipment by the Distribution Business
 - CEO00438 – Fusing of Metering Equipment
 - CEO00441 – Metering Equipment – Phase Failure Indication
- ELEXON Circular – Technical Assurance of Low Voltage CoP 5 Metering Systems – Fusing Arrangements
- Change Proposals / Modification Proposals
- Codes of Practice
- Guidance Notes
- Metering Dispensations
- Protocol Approved Meters
- National Measurement Transformer Error Statement (i.e. generic certificates)
- Meter Operation Code Of Practice Agreement - <http://www.mocopa.org.uk/>

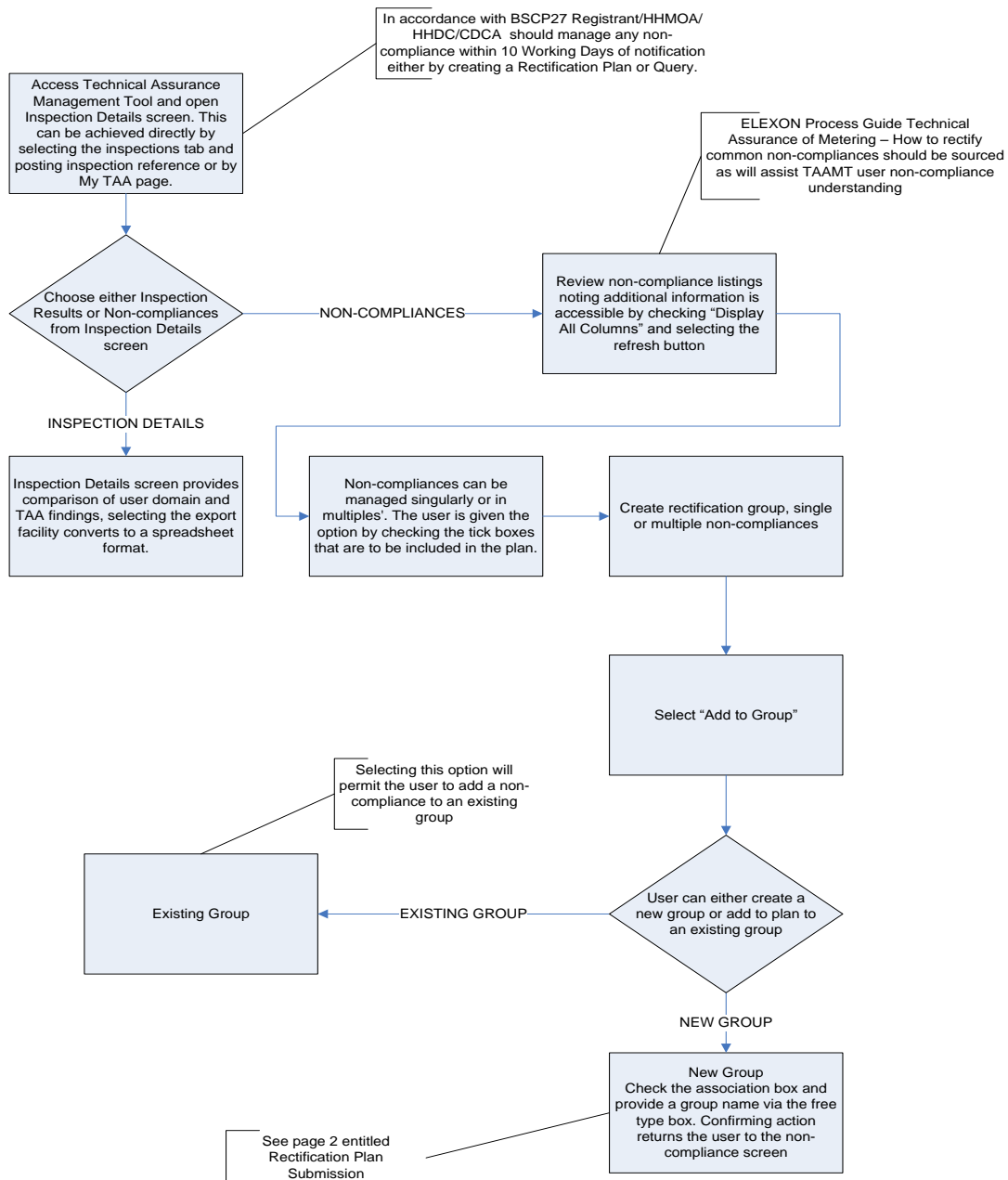


Technical Assurance of Metering Working Instructions

TAA non-compliance resolution process

When the TAA identifies a category 1 non-compliance, the TAA shall (where possible) raise a category 1 non-compliance report form which summarises its findings. The category 1 non-compliance report for shall aim to assist with the rectification of the category 1 non-compliance, and shall also aim to assist ELEXON with its Trading Disputes process.

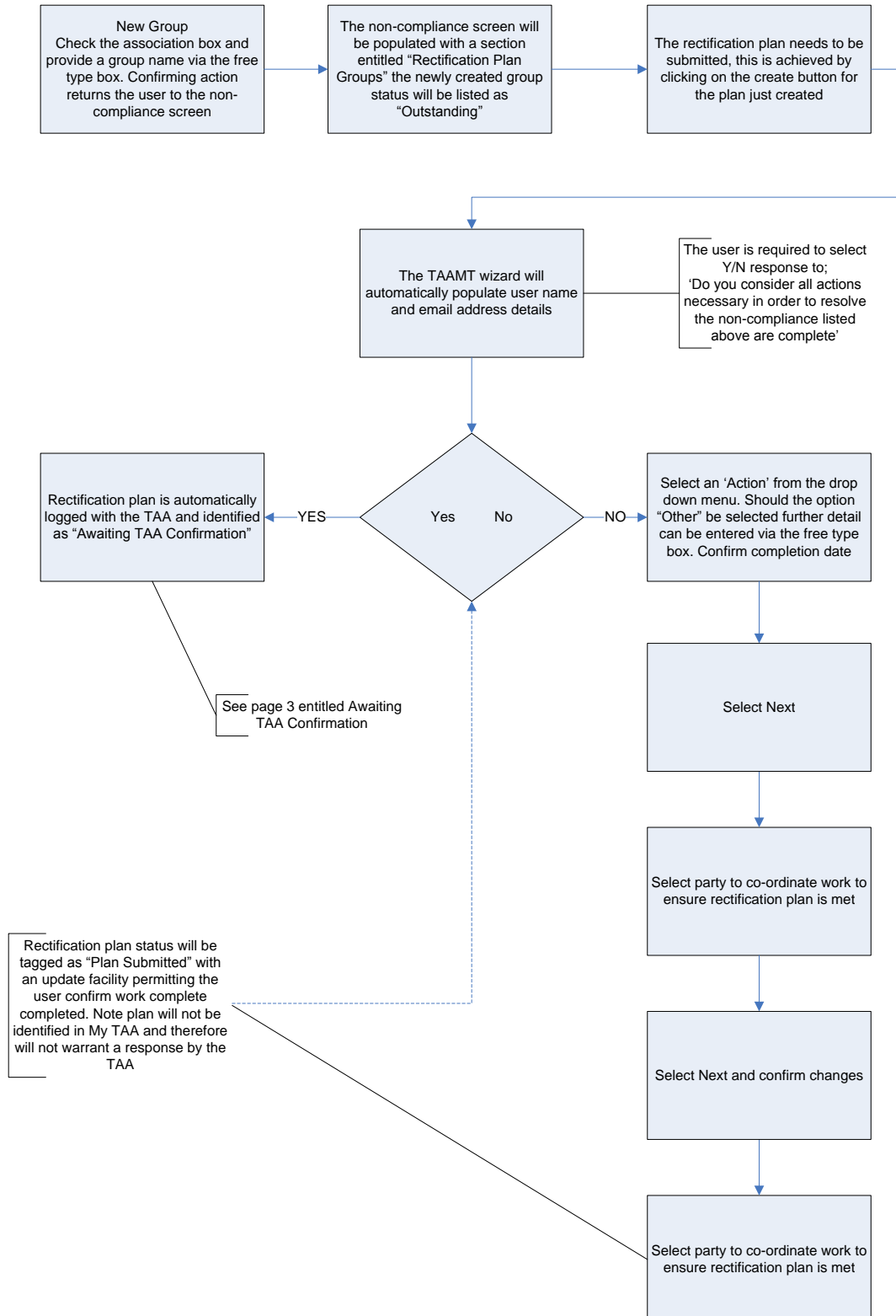
- Non-compliance identification and rectification grouping





Technical Assurance of Metering Working Instructions

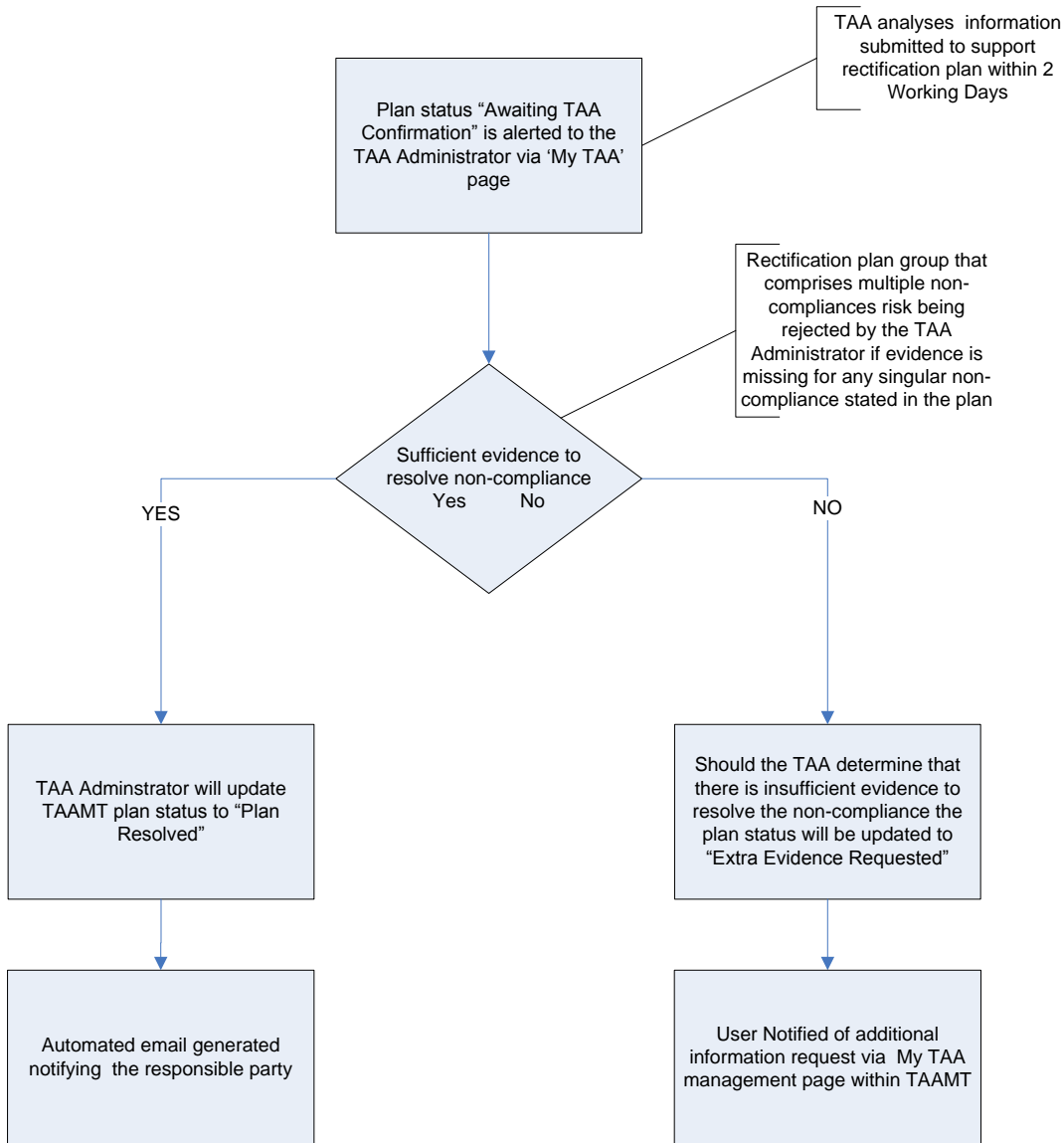
- Rectification Plan Submission





Technical Assurance of Metering Working Instructions

- Awaiting TAA Confirmation





Technical Assurance of Metering Working Instructions

Reference 001 – CoP Determination

Reference	001
Version	1 Issue 2
Title	CoP Determination
Issue Date	16 th September 2009
Status	Final
Related NCs	Category 1, 2 and Observation.

Purpose

This TAA Working Instruction provides the guidelines employed by the TAA, as directed by the BSCCo, when determining the relevant Metering System CoP.

Requirement Summary

There may be uncertainty about what determines the applicable CoP of a Metering System.

The BSC places responsibility on the Registrant of a Metering System to install, commission, operate and maintain Metering Equipment in accordance with the Section L and relevant CoP.

The suite of documents that make up the Metering CoPs provide for a range of different maximum rates of electrical energy flow through a Metering System. The CoPs comprise Alpha and Numeric references. Each CoP describes the minimum requirements that must be adhered to. Where a requirement in a CoP cannot be met for practical or financial reasons then a Registrant can apply for a Metering Dispensation from that requirement (see Working Instruction 004 for how the TAA approaches a Metering System where a site specific or generic Metering Dispensation has been approved).

Under Section L, the relevant (numeric) CoP is the version of the CoP which is applicable to that Metering Equipment at the time the Metering System is first registered for Settlement under the BSC.

For a Metering System that was registered for Settlement purposes under the Pooling & Settlements Agreement (P&SA) before the Go-Live Date, the applicable CoP is the version that was applicable under the P&SA immediately before the Go-Live Date.

For a Metering System that was registered for Settlement purposes under the Settlement Agreement for Scotland (SAS) before the BETTA Effective Date, the applicable CoP is that version that was applicable under the SAS immediately before the BETTA Effective Date.



Technical Assurance of Metering Working Instructions

For calibration, testing and commissioning of any Metering Equipment at any time, the relevant CoP is the latest version of the applicable CoP prevailing at that time. (See Working Instruction References 014, 015 and 016).

Approach to be applied

To determine the relevant CoP the TAA is required to consider a number of aspects. The TAA liaises with the HHMOA attendee identifying evidence (described below) and agreeing the applicable CoP before continuing with the audit, as the outcome of this may determine if a site is CoP compliant or not. Areas of evidence include:

- Meter Technical Details
- Site Evidence
 - Age of the installation
 - Material change since installation
 - Metering Equipment arrangement

Meter Technical Details

The TAA checks the CoP and Issue across all MTD submissions (MOA, HHDC and Supplier). Satisfied that all parties have MTDs prescribing the same CoP and Issue, the TAA will review the EFD and Feeder Status EFD detailed in the MTDs ensuring a comparison can be made to the declared CoP (accounting for any changes that do not affect the CoP). Any anomalies are investigated to determine if the mismatch can be explained.

Where there is a disparity that cannot be justified the TAA will record an Observation.

In line with a BSCCo directive the HHMOA is permitted to request the TAA to conduct the Metering System audit to a more recent version of a declared registered CoP. The application of a retrospective CoP by the same BSCCo directive is not permitted in order to achieve a compliant status. E.g. CoP3 Issue 1 places a requirement on the responsible party to provide separate testing facilities for main and check Meters of each circuit. This requirement in later versions of CoP3 has been changed to "testing facilities shall be provided". The BSCCo directive permits the site to be inspected to a later version of CoP3, but in this case the CoP3 Issue 1 compliant Meters themselves may not comply with the password requirements of the later version.

Site Evidence

Age of Installation

The EFD of the applicable CoP may give an indication of the age of the Metering System before a site visit.

Does the date of the declared CoP match that of the metering installation? Or is it the case that the Meter alone is registered to a later CoP due to a Meter change? The TAA may wish to take this into account in its assessment.

An aid to establishing the date of first registration under the BSC is to use the Calibration date of site Measurement Transformers.

Where the relevant CoP was applicable prior to the P&SA Go-Live date, or under the SAS prior to the BETTA Effective Date, then a similar approach will be made as above. These decisions are on the judgement and experience of the TAA as evidence may not be conclusive.



Technical Assurance of Metering Working Instructions

Material Change

Material change falls into two categories, which impact the CoP determination differently:

- Where the HHMOA has replaced a faulty Meter the BSC considers this a material change and requires that the replacement must comply with the latest version of the relevant CoP.
- Where a component part of an item of Metering Equipment is repaired or modified and is not considered by the HHMOA to be a substantial part of the Metering Equipment, then this is *not* deemed a material change and neither action impacts the registered CoP.

CoP1 and 2 consider a change to the following as a material change to a Metering System which requires the entire Metering System to be compliant with the current version of the CoP:

- Switchgear containing Measurement Transformers: and/or
- The primary plant associated with the Metering System, i.e. Measurement Transformers.

Corrective Action

The Registrant (through the MOA) must make the Metering System comply with the relevant version of the applicable CoP, or seek a Metering Dispensation.



Technical Assurance of Metering Working Instructions

Reference 002 – Approved Protocols

Reference	002
Version	1 Issue 1
Title	Approved Protocols
Issue Date	16 th September 2009
Status	Final
Related NCs	To be determined by ELEXON, potentially Category 1

Purpose

This TAA working Instruction describes the process that the TAA uses to assess whether a Meter/Outstation protocol (an established set of rules utilised for the communication of data between devices) has been approved for Settlement use.

Requirement Summary

Each CoP includes a requirement for Outstation data to be in an approved format and retrieved via an approved protocol, in accordance with BSCP601 'Metering Protocol Approval and Compliance Testing'.

Approach to be applied

Having established the Meter/Outstation type being inspected, the TAA will compare the Meter/Outstation with the latest version of the CoP Compliance and Protocols Approvals spreadsheet located on the BSCCo website. In the event that the TAA finds any mismatch or anomaly the TAA contacts the BSCCo to seek clarity and guidance.

Corrective Action

Any corrective action will be directed via the BSCCo.



Technical Assurance of Metering Working Instructions

Reference 003 – Current Transformers and Open Bars (Appropriate Seals)

Reference	003
Version	1 Issue 1
Title	Current Transformers on open bars (appropriate seals)
Issue Date	16 th September 2009
Status	Final
Related NCs	Category 2.11

Purpose

This TAA Working Instruction describes the process for checking Metering Systems where appropriate seals are not being used for current transformers because of practical/safety reasons.

Section L3.8 of the BSC requires that all Metering Equipment is sealed¹ in accordance with the relevant CoP or, if applicable, the Electricity Act.

The CoPs require all Metering Equipment to be sealed in accordance with BSCP06 (for CVA Metering Equipment) or Appendix 8 and 9 of the Meter Operation Code of Practice Agreement (for SVA Metering Equipment) and these documents stipulate the controls surrounding the breaking and remaking of appropriate Metering Equipment seals.

Additionally, CoPs 1, 2, 3 and 5, as defined in Section 5 'Metering Criteria', require all Metering Equipment, other than outdoor Measurement Transformers, to be accommodated in a clean and dry environment.

Requirement Summary

TAA inspections include where safety permits, collating relevant Measurement Transformer ratios, class accuracy, burden and metering protection fuse ratings. Measurement Transformers, by design, are either located in a chamber (Figure 1) with appropriate seals preventing access to them or are located in a controlled, authorised access substation.

¹ Section I6.7.1 states that any Metering System which has been sealed by a SAS Meter Operator and which seal is in place on the day before the BETTA Effective Date is deemed to comply with BSCP06 in relation to sealing.



Technical Assurance of Metering Working Instructions

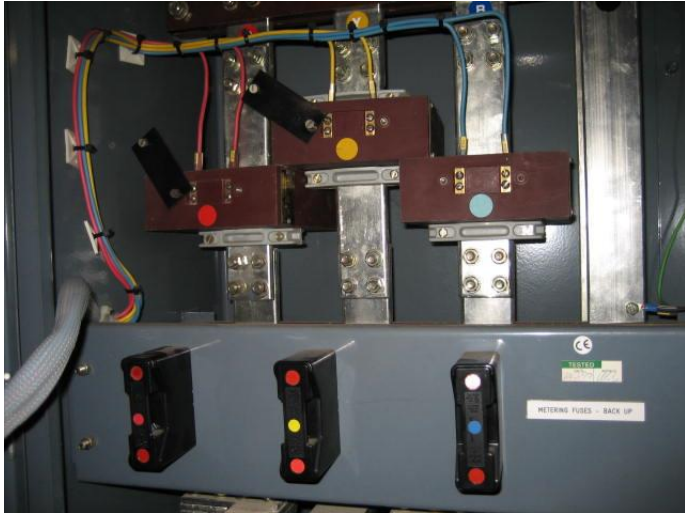


Figure 1 - Typical LV Measurement Transformer Housing

This TAA Working Instruction specifically covers those sites where the Measurement Transformers themselves are located in an adjacent substation and are mounted on exposed busbars. In these circumstances a BSCCo directive makes an allowance for current transformers not to have appropriate seals fitted. The substation padlocking is deemed as an appropriate seal as the risk of tampering is considered by the BSCCo directive to be minimal.

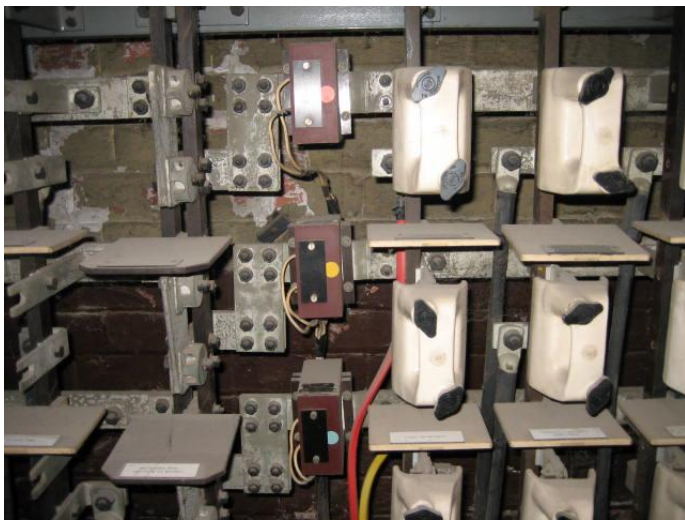


Figure 2 - Exposed Busbar Measurement Transformer Installation

Approach to be applied

Where it has been established that the associated Measurement Transformers are housed in an adjacent LDSO substation then, in cooperation with the HHMOA or where prior arrangements have been made with a representative from the LDSO, the substation is accessed noting due risk assessment and appropriate safety rules.



Technical Assurance of Metering Working Instructions

Upon accessing the substation the TAA will ascertain the manner of the Measurement Transformer installation (installations that comprise open busbars are treated with the utmost care and LDSO safety procedures/rules followed).

Working within the LDSO safety rules the TAA collates data from Measurement Transformer rating plates and associated backup fuses (where risk assessment permits; in the event this action cannot be completed reference should be made to TAA Working Instruction 014 - Commissioning).

The LDSO substation security padlocking is inspected to ensure compliance with BSCCo instruction:

1. Is there a dual lock padlock arrangement present?
2. What parties have authorised access?
3. What controls are in place?

Sites failing to observe the BSCCo instruction will be determined non-compliant. A note entry accompanying the category 2.11 non-compliance will be made by the TAA explaining reasons for uncertainty.

Corrective Action

Provide adequate padlocking and controls in accordance with BSCCo directive.



Technical Assurance of Metering Working Instructions

Reference 004 – Metering Dispensations

Reference	004
Version	1 Issue 1
Title	Metering Dispensations
Issue Date	16 th September 2009
Status	Final
Related NCs	Potentially either Category 1 or 2

Purpose

The TAA assesses the Metering System for compliance with the relevant CoP and Code Subsidiary Documents taking into account any Metering Equipment Dispensations. This Working Instruction outlines how the TAA uses the details of a Metering Dispensation when performing the inspection.

Requirement Summary

The BSC makes provision for Metering Equipment to be used which does not meet the requirements of a CoP. BSCP32 'Metering Dispensations' describes the process.

BSCP32 defines the Registrant as the Responsible Party who may apply for a Metering Dispensation. However, it is the HHMOA's responsibility to be aware of any applicable Metering Dispensations. In accordance with BSCP27 the HHMOA is the party accountable for providing relevant information supplementing the MTDs for review by the TAA.

Approach to be applied

The BSCCo provides the TAA with all current valid applicable Metering Dispensations annually. The TAA uses this database as a reference to confirm the validity of any Metering Dispensation presented by the HHMOA.

The TAA is required to validate any relevant Metering Dispensation by:

- Reviewing the Metering Dispensation, checking specific details (site reference, metering circuit, etc.) to ensure the document presented is applicable to the site being inspected; noting whether the Metering Dispensation is Temporary or Lifetime and, if relevant, is Site Specific or Generic. Generic Metering Dispensations may need references to the order date of the Metering Equipment in question; and
- Making reference to the BSCCo Metering Dispensation database to check a Metering Dispensation has not expired or been withdrawn.

After taking into account any Metering Dispensation, the Metering System will be deemed non-compliant if the requirements of the BSC, Code Subsidiary Documents and registered Meter parameters are not adhered to.



Technical Assurance of Metering Working Instructions

Where circumstances have arisen to create doubt in a Metering Dispensation the TAA will seek clarification from the BSCCo. Any related non-compliances which are recorded and found inappropriate due to a Metering Dispensation will be removed.

The TAA believes this approach fulfils all reasonable efforts to identify a valid, applicable Metering Dispensation and to apply non-compliances in an informed way.

Corrective Action

Apply for, or amend a valid Metering Dispensation or alternatively, install Metering Equipment compliant with the requirements of the relevant CoP.



Technical Assurance of Metering Working Instructions

Reference 005 – Complex and Non-Complex Sites

Reference	005
Version	1 Issue 1
Title	Complex and Non-Complex Sites
Issue Date	16 th September 2009
Status	Final
Related NCs	Category 1

Purpose

This TAA Working Instruction describes the review process that the TAA uses to verify the MSID registered for multi-feeder arrangements, as detailed in data flow D0268 – Half Hourly Meter Technical Details.

Requirement Summary

The TAA will ensure that the Complex Site identifier within the MTDs is correctly set for all site visits.

Approach to be applied

Prior to the inspection of the Metering System the TAA should have received MTDs from the HHDC and HHMOA and the Registrant. The MTDs should convey the number of Settlement Meters registered up to MSID level.

The TAA validates the Metering System on site against the submitted MTDs to ensure that the energy associated with the MSID is correct. The TAA will also give consideration to any Metering Dispensations that apply or should apply.

The significant marker for the TAA to note is that which indicates whether the Metering System is complex. This is depicted in the MTDs by a field whose value is either T (True) or F (False). This marker provides instruction for the HHDC (as detailed in BSCP502) how the data must be aggregated up to MSID level using the HHMOA's instructions (as detailed in BSCP514).

Changes to the industry and law now permit customers on private networks to be able to purchase electricity from a third party Supplier, with this change the TAA must be mindful of the need to consider Generic Metering Dispensation D/380 which will cover such installations (the HHDC will need to be in possession of an appropriate aggregation rule which may/or may not have to detail any compensation factors).

The HHMOA will receive a non-compliance if a Metering System is incorrectly identified as complex/non-complex and if the aggregation rules are incorrect at an MSID shown as complex. In either case the TAA will notify ELEXON of such non-compliance.



Technical Assurance of Metering Working Instructions

Corrective Action

Provide correct information to rectify non-compliance which may be as simple as revising the MTDs or providing Complex Site Supplementary Documentation in accordance with BSCP514. The TAA will validate any corrective action provided before a non-compliance is resolved.



Technical Assurance of Metering Working Instructions

Reference 006 – Measurement Uncertainty

Reference	006
Version	1 Issue 1
Title	Measurement Uncertainty
Issue Date	16 th September 2009
Status	Final
Related NCs	Category 2.13

Purpose

This TAA Working Instruction details the process employed by the TAA when reviewing Calibration Certificates for a statement of measurement uncertainty. Section L2.5 of the BSC requires that the Registrant prepares and maintains complete and accurate records as required by the relevant CoP, or the Act, for the life of the relevant item of Metering Equipment. CoP4 requires that Metering Equipment Calibration Certificates are kept for the life of the Metering Equipment. These Certificates are required to ensure that the Overall Accuracy of the Metering System is maintained. As with any measurement there is a margin of uncertainty associated with it and in the case for Calibration of Metering Equipment this must be considered by the TAA. For example, if a measurement of 100kW is recorded by a whole current Meter which has a stated accuracy at that load of $\pm 1\%$, then, excluding other factors which contribute to Measurement Uncertainty, the true measurement may be between 99 and 101kW. In this case the Measurement Uncertainty is $\pm 1\%$. In practice many other factors account for Measurement Uncertainty that must be taken into account by the Metering Equipment Calibration centre.

Requirement Summary

The BSC requires that Metering Equipment must comply with all of the relevant Codes of Practice, including CoP4. The Calibration criteria set out in CoP4 define limits of class accuracy and places an onus on the testing body to account for and, where required, include Measurement Uncertainty on the Calibration Certificate.

Approach to be applied

Certificates may comprise a suite of documents or a single conformance statement. When reviewing Calibration Certificates the TAA must be mindful of the declared Calibration date.

Any Certificates issued after the CoP4 Issue 6 Version 5 effective date (6th November 2008) must account for Measurement Uncertainty. The BSCCo instruction requires the TAA to examine Calibration Certificates for evidence of Measurement Uncertainty.

The TAA will report on any instances where Calibration Certificates fail to declare Measurement Uncertainty and record a category 2.13 non-compliance.



Technical Assurance of Metering Working Instructions

It should be noted that when applying either CT and/or VT errors listed in the NMTES, or implementing the BSCCo instruction regarding low voltage sites installed with class 0.5 or better CTs, the BSCCo has already accounted for Measurement Uncertainty and therefore this scenario should not be determined as non-compliant.

Corrective Action

The HHMOA should present Calibration Certificates compliant with CoP4.



Technical Assurance of Metering Working Instructions

Reference 007 – Onshore and Offshore CVA Inspections/Audits (including Aggregation Rules)

Reference	007
Version	2 Issue 1
Title	Central Volume Allocation Inspections/Audits
Issue Date	1 st April 2018
Status	Final
Related NCs	Category 1.01 and 2.01

Purpose

This TAA Working Instruction describes the processes employed by the TAA when conducting CVA audits which may differ from those employed for SVA inspections i.e.

- Circuit selection
- Accessibility
- CDCC
- Aggregation Rule check

Requirement Summary

The TAA conducts inspections of CVA Metering Systems in accordance with BSCP27.

Approach to be applied

Circuit Selection

It is common for CVA MSIDs to have multiple circuits. The TAA will inspect all circuits on site using the following process;

1. The HHMOA provides the TAA with the total number of circuits which are associated with the MSID to be audited. Where relevant, HHMOAs are requested to provide the names of the circuits rather than just circuit 1, circuit 2, etc. E.g. Name of feeder from Substation.
2. The TAA will request technical information relating to all circuits associated with the MSID.
Once on site, the TAA will audit all circuits associated with the MSID.
3. The results of the audit will be conveyed by the TAAMT in accordance with standard practice.



Technical Assurance of Metering Working Instructions

Accessibility to Metering System

It is recognised that some windfarm Metering Equipment which is required for inspection will be Offshore. Specialist training may be required to complete the audit fully. The TAA should check requirements of the audit prior to attending the site for inspection.

It is recognised that on occasion not all Metering Equipment will be accessible for the inspection. Typically, Current and Voltage Transformer rating plates may not be readily visible or accessible without infringing safety distances. This puts a greater emphasis on the responsible parties to ensure all relevant and traceable documentation is provided including single line drawings to evidence metering arrangement. It's important to note that upon notification of the inspection it is the responsibility of the Registrant to ensure access is available to all Metering Equipment (including Current and Voltage Transformer plates requiring inspection).

Consumption Data Comparison Check (CDCC)

As part of the inspection the TAA conducts a CDCC whilst still on site by contacting the CDCA directly and obtaining metering data for the site. The data is compared with the Meter advance observed on site. The CDCC is classed as compliant or non-compliant and reported to the responsible party via the TAA Administrator and TAAMT.

Aggregation Rule Check

A CVA Aggregation Rule is a mathematical expression used by Settlement Central Systems to calculate the Metered Volume associated with a Volume Allocation Unit (VAU). VAU's include BM Units (other than Interconnector BM Units and Supplier BM Units), Interconnectors, Grid Supply Points and GSP Groups. The Metered Volume (MV) of a VAU is the net aggregate volume of Active Energy, determined at the Transmission System Boundary, which flowed to or from that VAU in a Settlement Period (e.g. $MV = AE - AI$, where AE is the Active Export Measurement Quantity and AI is the Active Import Measurement Quantity for a Settlement Period). The TAA needs to confirm that the Metered Volumes associated with a VAU are correctly accounted for in Settlements by the relevant Aggregation Rule(s).

To do this the TAA will:

- Request a copy from the CDCA of the VAU Aggregation Rule(s) associated with the MSID to be audited;
- Request a Single Line Diagram (in accordance with TAA Working Instruction Reference 023– Defined Metering Point) from the Registrant covering the total number of circuits that are associated with the MSID;
- Request the Meter Technical Details from the CDCA for the sample of circuits selected for audit;
- Confirm that the VAU Aggregation Rule(s) comply with the requirements of BSCP75, e.g.:
 - The identifier for a specific flow consists of the MSID, the metering subsystem ID and the measurement quantity;
 - A net flow measured by a metering subsystem is calculated as $[AE - AI]$ (Note: For Metering Systems connected to a Distribution System relevant LLFs should be applied to metered data before any combination of metered data to which different LLF apply and before any combination



Technical Assurance of Metering Working Instructions

of import and export active energy metered data, as per BSC Section R 3.3. For Aggregation Rules more generally, constants should be applied with similar consideration. Where different LLFs need to be applied, separate MSIDs will be required due to CDCA system constraints).

- All net flows measured by a metering subsystem which are to be accounted for in a given VAU are summed.
- All net flows measured by a metering subsystem which are to be accounted for in any other VAUs that are associated with the given VAU are subtracted from the above summated net flow.
- If the VAU Aggregation Rule does not include Active Import or Active Export Measurement Quantities, confirm with the MOA/Registrant that the VAU cannot Import or Export and that the missing Measurement Quantity is substituted by a zero in the Aggregation Rule (e.g. a Demand only BM Unit would have an Aggregation Rule of: $BM\ Unit\ Volume = (0 - AI)$). It should be noted that if the Metering System associated with the VAU has to comply with Code of Practice One, then the Aggregation Rule must contain both Import and Export Measurement Quantities (unless a Metering Dispensation has been approved not to do so for either Measurement Quantity).
- If the Metering Equipment associated with the Aggregation Rule is not installed at the Defined Metering Point, check that either the Aggregation Rule takes account of any electrical losses to the Defined Metering Point or the Meters have been compensated for the losses and, where required (numeric CoPs), a valid Metering Dispensation exists.
- Where the MSID is associated with more than one VAU (e.g. 1 main Generating Unit and an Auxiliary Generating Unit), request copies of and confirm that the Aggregation Rules associated with these VAUs, taken together, are consistent with each other² and, specifically, there is no double counting of metered data derived from such Metering System or no metering data is omitted from being allocated;
- Where the Aggregation Rule relates to a VAU associated with a Grid Supply Point (GSP) (including an Offshore Transmission Connection Point (a form of GSP)), request a copy of the GSP Group Metered Volume Aggregation Rule from the CDCA and confirm that the GSP ID is included within it as a positive (net) Metered Volume (e.g. $GSPG_X = \dots + GSP_ABC_1$);
- Where the Aggregation Rule relates to a VAU associated with a Distribution System Connection Point (DSCP), request a copy of and confirm that for the GSP Group Metered Volume Aggregation Rules that have been submitted for the two relevant GSP Groups that the DSCP ID has an equal and opposite effect in the determination of the GSP Group Metered Volume for the two GSP Groups (i.e. that where the nominated

² Each Aggregation Rule determines the net flow associated with its BM Unit only.



Technical Assurance of Metering Working Instructions

LDSO has registered the Metering System and associated DSCP Aggregation Rule, and an Import is defined as a flow into that nominated LDSO's Distribution System, that the DSCP ID (e.g. II_ABC_2) is added to the GSP Group Metered Volume Aggregation Rule for that GSP Group and also subtracted from GSP Group Metered Volume Aggregation Rule for the other interconnected GSP Group (e.g. GSPG_Y (nominated LDSO GSP Group) = ... + II_ABC_2 and GSPG_Z (interconnected LDSO GSP Group) = ... - II_ABC_2)

- Where the Aggregation Rule relates to a VAU which is embedded in a Distribution System, request a copy from the CDCA of, and confirm that, the relevant GSP Group Take Aggregation Rule contains that VAU ID (e.g. BMU_ABC_4) and is accounted for correctly (i.e. is subtracted from the sum of the GSP IDs associated with that GSP Group, e.g. GSPG Take = ... + GSP_ABC_3 - BMU_ABC_4).

in accordance with BSC Section R and BSCP75, and subject to any valid Metering Dispensation.

Where a Measurement Quantity for a circuit(s) is (are) not measured and recorded (where required) or is, but is not accounted for in the relevant VAU Aggregation Rule, or the Aggregation Rule is not accounted for in an associated VAU Aggregation Rule (if required to be), a non-compliance shall be issued to the relevant party responsible for their submission to the CDCA as part of the relevant registration process (i.e. under BSCP20 or BSCP75).

Corrective Action

The Registrant is responsible for ensuring that the reasons for a non-compliant check are investigated by the CDCA/relevant party and rectified, providing evidence to the TAA when it has been resolved so that the non-compliance can be closed.



Technical Assurance of Metering Working Instructions

Reference 008 – No Access, Supplier, MOA and LDSO

Reference	008
Version	1 Issue 2
Title	No Access
Issue Date	17 th January 2013
Status	BSCP27 Review
Related NCs	Not Applicable

Purpose

This working Instruction describes the process that the TAA uses to secure access to a Metering System. The TAA typically inspects a sample (1% of SVA MS and 5% CVA MS³) of the HHMS population. If this sample is not met, the required level of assurance of the accuracy of HH Metering Systems may not be provided. The historical level of no access 10% and over has not gone un-noticed by the PAB and Panel. Both parties have expressed concern about the cost as well as the potential reduction in assurance.

Requirement Summary

In order to undertake inspections of Metering Systems, the TAA requires physical access to the Metering Equipment. Where this is not possible a visit status of 'No Access' is recorded.

BSCP27 identifies that it is the responsibility of the Registrant to make all reasonable endeavours to ensure the TAA gains access to all Metering Equipment selected for audit. This includes contacting the customer, MOA and where applicable the LDSO (Transmission Company) and providing correct and up to date access information⁴.

Causes have been identified as mostly premises closed/unoccupied, customers being unable or unavailable (lack of Supplier notice) to provide access, but also customers unwilling to provide access, or the HHMOA unable to secure access without the attendance of a SAP or representative from the LDSO.

The TAAMT has mandatory fields for the Registrant to provide confirmation of attendance and notes fields for specific access information.

Approach to be applied

The TAA utilises the information provided by Registrant, in conjunction with the HHMOA and where applicable the LDSO (Transmission Company), to access the site in compliance with any general or site specific safety rules in force.

No Access Due to Safety Reasons

³ The scope of the actual Technical Assurance checks is set by the Performance Assurance Board annually.

⁴ BSCCo has issued guidance on [Securing Access for Technical Assurance Agent \(TAA\) Inspections](#). This can be found on the ELEXON website under Reference/Technical Operations then the Metering section.



Technical Assurance of Metering Working Instructions

It is understood that the Registrant is not in direct control of the Metering System environment. Those sites that are considered too unsafe in the risk assessment to permit a Technical Assurance audit to proceed are photographically recorded (see Figure 1 for example).



Figure 1 - Water Ingress to the Metering Installation rendering it unsafe to access the Metering Equipment

In such cases, the visit is aborted and the TAA updates the TAAMT providing a description of the metering environment. In addition, the TAA will make a TAAMT entry recording the HHMOA/LDSO (Transmission Company) safety reporting procedure.

It is not the responsibility of the TAA to ensure that any remedial activity is performed in order to make the Metering System and its associated environment safe. This remains the responsibility of the Registrant.

No Access for non-safety reasons

Where access cannot be afforded, having utilised the information contained in the TAAMT and any additional efforts by the HHMOA, the TAA will contact the Registrant directly before aborting the visit to confirm that there is no missing access information. The TAA will also provide the Registrant with an opportunity to continue to try and arrange access. The TAA will remain on site for a maximum of 30 minutes, affording the Registrant more time to arrange access. Where time constraints permit, the TAA will attempt to revisit the site in order to complete the inspection should the Registrant confirm access has been arranged.

If the TAA cannot access the site, he will, where possible, advise the Registrant and the HHMOA that the visit will be aborted. This will be recorded as a No Access in the TAAMT.

No Access to LDSO equipment (Transmission Company)

Where the LDSO (Transmission Company) fail to assist the Registrant in meeting its obligation as described in BSCP27 (fail to attend site inspection) and associated Metering Equipment cannot be accessed, the TAA will record a "Note for ELEXON" advising "Inspection incomplete".

Corrective Action

Not Applicable.



Technical Assurance of Metering Working Instructions

Reference 009 – Passwords

Reference	009
Version	1 Issue 1
Title	Passwords
Issue Date	16 th September 2009
Status	Final
Related NCs	Potentially Cat 1.01 or 2.01

Purpose

This TAA Working Instruction is intended to explain why Metering Systems may be deemed non-compliant by the TAA in relation to the application of passwords. Depending on the determined CoP, Metering Systems may be required to have password functionality but not necessarily have it enabled.

Requirement Summary

CoPs 1, 2, 3 and 5 contain requirements for a security scheme for accessing Settlement metered data via a password. These requirements have been included over a number of years. Some earlier CoPs make a simple reference to the reading of data via suitable security levels whereas the Alpha Metering Codes list no criteria in relation to data access and allied security.

There is no mandatory requirement covered by the BSC and/or CoPs for a Settlement Meter to have password protection enabled. However where a Metering System has a password enabled it is expected to comply with the following CoP extract;

CoP Password Definition (common to the applicable CoP)

"3.22 Password

Password means a string of characters of length no less than six characters and no more than twelve characters, where each character is a case insensitive alpha character (A to Z) or a digit (0 to 9) or the underscore character (_). Passwords must have a minimum of 2,000,000,000 combinations, for example six characters if composed of any alphanumeric characters or eight characters if composed only of hexadecimal characters (0 to F).*

** This figure is reduced to 2,000,000 for CoP1 and 2."*

Approach to be applied

Having established the Metering System CoP the TAA reviews the MTDs of the HHMOA and HHDC, including communications address, method and, where appropriate, applicable password. The TAA records the inspection non-compliant where the password information conveyed via the MTDs fails to meet the minimum requirements of the CoP.



Technical Assurance of Metering Working Instructions

This non-compliance is commonly raised where the site is registered to a CoP where password functionality is required but where the Meter installed on site is a prior specification/design, e.g. Meters that have been recycled.

Technical Pool Circulars and subsequent Lifetime Generic Metering Dispensations recognise that there was a period where Metering Equipment could meet the requirements of early versions of CoP depending on the date of purchase/installation.

Those Metering Systems where the Registrant and/or HHMOA believe the Meter falls into this category should submit the appropriate Metering Dispensation in accordance with BSCP27. See Working Instruction 004 – 'Dispensations' for information on the TAA's approach to Metering Dispensations.

The TAA (via the BSCCo) instruction is to monitor those sites where a password has been implemented; this is recorded via an engineering field note. The TAA is not required to question why a registered Meter with password capability has not had the facility enabled.

The TAA conducts a local Meter interrogation enabling a check to be conducted on the MTDs' listed password. Unsuccessful Meter interrogations are further investigated in co-operation with the HHMOA in order to confirm the failure to communicate with the Meter is not related to the interrogation port or other faulty equipment prior to recording the password as non-compliant. This may include determining if a Metering System investigation request has been raised (Data Transfer Catalogue data flow – D0001).

Metering Systems may be either found Cat 1.01 or 2.01 non-compliant dependent upon the severity of that non-compliance; is the Standing Data inaccurate in the HHDC or HHMOA MTD fields.

Corrective Action

These non-compliances must be rectified by the HHMOA correcting either the Meter, or its MTDs and resending these to the HHDC. The HHDC may be the party to instigate the correction – dependant on whether the non-compliance is a Category 1 or 2.



Technical Assurance of Metering Working Instructions

Reference 010 – Phase Rotation

Reference	010
Version	1 Issue 1
Title	Phase Rotation
Issue Date	16 th September 2009
Status	Final
Related NCs	Cat 2

Purpose

This TAA Working Instruction describes the process for evaluating the Phase Rotation for a Metering System. Historically there has been ambiguity about the point at which Phase Rotation is to be checked by the TAA to confirm that it is standard in relation to the Metering System.

Requirement Summary

As part of the verification process for assessing if a Metering System is recording the correct amount of energy, the TAA checks that Standard Phase Rotation is maintained.

Phase Rotation, or Phase Sequence, is the order in which the voltage waveforms of a polyphase AC source reach their respective peaks.

Approach to be applied

The TAA identifies the LDSO phase sequence by a combination of observing system phase markers and identifiers, warning phase rotation maybe non-standard.

CoP4 [Section 5.5.2 'Commissioning'] requires the Phase Sequence to be standard at the Meter terminals only, regardless of system arrangements.

Phase Rotation is established at the Meter Test facility and Meter Terminals using a propriety Phase Rotation Tester and observing that the Measurement Transformer secondary's are correctly paired (for polarity check see TAA Working Instruction Prevailing Load Test – 013). However limited access to the Meter Terminals may restrict the check to a visual inspection.

Development in Metering technology has led to some Meters being used for Settlement purposes showing what the Phase Rotation is at the Meter Terminals (see Figure 1) on the Meter's visual display. This facility, where available, is used by the TAA as additional confirmation that the requirements of CoP4 are complied with. Those sites that are determined to have Non-Standard Phase Rotation at the Meter Terminals will result in a category 2 non-compliance being raised. Where possible, supportive photographic evidence will be collated and included in the TAAMT.

Technical Assurance of Metering Working Instructions



Figure 1 – Non-Standard Phase Rotation via Settlement Meter display.

Corrective Action

As part of the metering Commissioning process the HHMOA should ensure Standard Phase Rotation is maintained at the Meter terminals.



Technical Assurance of Metering Working Instructions

Reference 011 – Resolution of Metering

Reference	011
Version	1 Issue 2
Title	Resolution of Metering
Issue Date	17 th January 2013
Status	BSCP27 Review
Related NCs	Cat 2.06

Purpose

This TAA Working Instruction sets out to assist all responsible parties on how Resolution of Metering is determined for TAA purposes.

Requirement Summary

The resolution of the Active Energy transferred into the demand registers is detailed within the CoPs1, 2, 3 and 5. The dedicated section is 5.5 'Outstation', subsection 5.5.1 (iii).

Data Storage

"(iii) the resolution of the Active Energy transferred into the demand registers shall be within $\pm 0.1\%$ (at full load) of the amount of Active Energy measured by the associated Meter,"

There are no criteria for Resolution of Metering within the Alpha Metering Codes.

Approach to be applied

To determine Resolution of Metering (expressed as a percentage) the following expression is used;

Resolution of Metering % = (Pulse Multiplier/Demand kW)*100

(To determine Demand in kW for a 3 phase supply = $3*V*I*pf$ (based on 240v phase to neutral) or $\sqrt{3}*V*I*pf$ (based on 415v phase to phase) for LV and $\sqrt{3}*V*I*pf$ for HV)

Where;

kW = Power, measured in Watts

V = Voltage, measured in volts

I = Current, measured in Amps

pf = power factor [assumed to be at unity for the purposes of these calculations]



Technical Assurance of Metering Working Instructions

Examples:

1. LV CT operated site

CT ratio	400/5
Pulse multiplier	10
Demand in kW	288
Resolution of Metering	$(10/288)*100$
Resolution of Metering	3.5%

Outcome: Non-Compliant with Code of Practice

Using a Pulse Multiplier of 1 will be non-compliant as the resolution % will be 3.5%, for this site to be compliant a Pulse Multiplier of 0.25 or better would have to be implemented.

2. HV CT/VT operated site

CT ratio	400/5
VT ratio	11000/110
Pulse multiplier	10
Demand in kW	7621
Resolution of Metering	0.13%

Outcome: Non-Compliant with Code of Practice

Using a Pulse Multiplier of 1 would resolve resolution %.

Typically the Elster/Vision Meter records data in engineering units (kW) and therefore is not subject to a pulse multiplier to calculate demand.

Those sites where the Resolution of Metering is outside the limit identified in the relevant CoP will have a category 2.06 non-compliance raised.

Corrective Action

The HHMOA should select a pulse multiplier that is compliant with CoP meter resolution and ensure that MTDs are updated and re-issued as per BSCP514.



Technical Assurance of Metering Working Instructions

Reference 012 – Sealing

Reference	012
Version	1 Issue 1
Title	Sealing
Issue Date	16 th September 2009
Status	Final
Related NCs	Category 2.11

Purpose

This TAA Working Instruction acknowledges the provision and use of seals on the associated Metering Equipment and not only describes the TAA process but also brings to the reader's attention the BSCCo directive for those installations that have a higher potential risk when employing wire rope seals.

The BSCCo issued the following instruction to the TAA following a successful appeal by a HHMOA:

"Sites where the CT enclosures employ approved paper seals instead of wire rope crimped seals are permitted as long as the paper seal meets the following criteria:

- *The use of wire rope seal would introduce a safety risk*
- *The paper seal must not be able to be peeled off once applied*
- *The seal should contain a traceable serial number."*

Requirement Summary

The BSC, CoPs and the MOCOPA[®] stipulate the controls surrounding the breaking and remaking of appropriate Metering Seals.

BSCP06 (CVA Meter Operations for Metering Systems Registered in CMRS) obligates CVA MOAs to provide access to the appropriate on-site CVA Metering Equipment sealing register. A template of this record is contained within BSCP06.

The use of tamperproof seals has been long since established. Participants are expected to adhere to guidelines referred to in this summary.

The CoPs provide a definition for 'Appropriate Seals':

"All SVA Metering Equipment shall be sealed in accordance with Appendix 8 and 9 of the Meter Operation Code of Practice Agreement.

Technical Assurance of Metering Working Instructions

All CVA Metering Equipment shall be sealed using Settlement Seals and in accordance with BSC Procedure BSCP06”.

Approach to be applied

Having ensured all on-site procedures are complied with and a risk assessment has been completed, the TAA will inspect all relevant sealing points which, under the remit of the BSC, include LV cut-outs, ensuring the HHMOA is using the appropriate seals. This action should be taken before asking the HHMOA to break any seals providing access to the Metering Equipment.

The TAA will review and validate that all crimp seals have been securely crimped and recognised crimping pliers have been used.

SVA HHMOAs must maintain all Metering Equipment seals in accordance with the relevant sections of BSCP514, the MOCOPA® and the relevant CoP.

CVA MOAs must maintain all Metering Equipment seals in accordance with the relevant sections of BSCP06 and the relevant CoP and an on-site sealing register. Where the site is registered in CVA, the TAA will examine the sealing register and observe that the CVA HHMOA completes the register, recording TAA activity. Where the sealing register is not evident or the attending CVA HHMOA does not record the breaking and remaking of seals the TAA will record a Category 2.11 non-compliance.

It is not within the TAA scope of work to confirm or collate crimp serial number details. Any seals that are identified as not complying with the description of an appropriate seal are photographically recorded before the inspection proceeds.

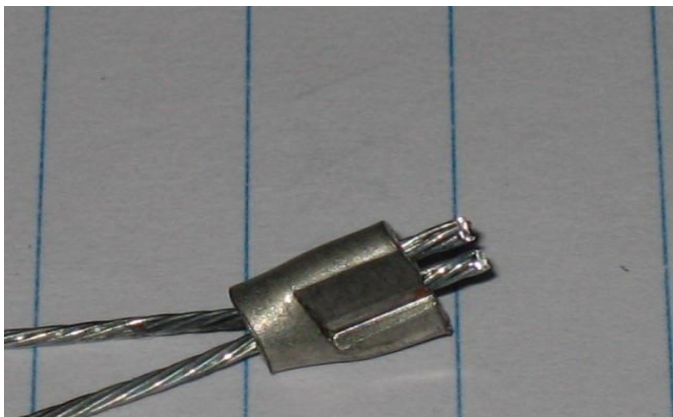


Figure 1 – Example of an inappropriate wire seal, which has not been crimped with recognised sealing pliers

Where there is suspicion that the Metering Equipment has been tampered with the TAA will continue with the inspection (safety permitting), collating and recording evidence. The TAA will, where possible, try not to draw attention to any other party or individual of their suspicion on site, other than the HHMOA and, if present, the Registrant and the BSCCo.

Where site evidence confirms or raises suspicion of tampering to a Metering System, a Category 1 non-compliance will be applied. The TAA will alert the TAA Administrator as soon as possible, who will notify the BSCCo of any suspicion of tampering.



Technical Assurance of Metering Working Instructions

Where sites are identified as non-compliant with the BSC, CSD's and / or the MOCOPA[®] due to inappropriate seals, but there is no evidence that the Metering System has been tampered with, the TAA will record Category 2.11 non-compliance.

Where the HHMOA is in a position, on completion of the inspection, to remake the seal, the TAA, where satisfied, will update the associated non-compliance as "Rectified at time of Visit".

Corrective Action

The HHMOA will need to correct the non-compliance.



Technical Assurance of Metering Working Instructions

Reference 013 – Prevailing Load Test

Reference	013
Version	1 Issue 2
Title	Prevailing Load Test
Issue Date	17 th January 2013
Status	BSCP27 Review
Related NCs	Category 1.02

Purpose

This TAA Working Instruction is intended to provide assurance to the Registrant and other Market Participants that the process engaged by the TAA, in assessing that there is the correct recording of energy, which it is consistent and that there is a practical methodology.

The assessment conducted by the TAA is indicative and is not meant to be interpreted as an accuracy test. Measurement accuracy is the responsibility of the Registrant and this responsibility is discharged through a HHMOA.

Requirement Summary

In accordance with BSCP27, the TAA provides assurance as to whether or not the Half Hourly Metering System is correctly recording energy.

Approach to be applied

In its scope of work, the TAA independently measures the Metering System parameters by conducting a Prevailing Load Test (PLT). The results of which are compared with Meter register advances and evidence provided by the HHMOA and other Responsible Parties, including MTDs and Commissioning Records.

The PLT can be conducted using a number of measurement instruments and techniques. The aim is to identify metering inaccuracies such as Measurement Transformer ratio selection, failed protection fuses, wiring errors, potential Meter faults, etc.

In conjunction with the PLT, the TAA conducts a visual inspection of the Metering System and its associated wiring and connections, looking to obtain assurance that CT polarity and orientation are correct (see Figure -1).



Technical Assurance of Metering Working Instructions



Figure 1 Incorrect CT Orientation

The net effect of a CT being installed, wired in reverse or whose polarity is incorrect will result in the meter potentially under recording (typically 66%). Should more than one CT be incorrectly orientated etc. the resultant will be as if the site was exporting rather than importing. This clearly would severely impact Settlement.

Equipment used by the TAA in performing the PLT:

1. Handheld energy analyser

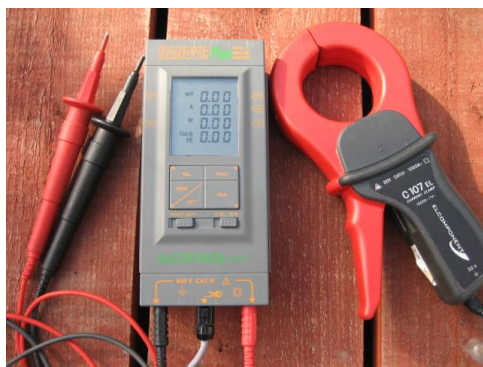


Figure 2 Handheld energy analyser

2. Fused test leads
3. 10A, 200A and 1000A Current clamps (for use on insulated conductors only)
4. Phase Rotation Meter
5. Personnel Protective Equipment

Technical Assurance of Metering Working Instructions

The TAA ascertains which of the following testing methods can be best employed to provide confidence in the metered data.

- **Option 1**

Preferred method is to perform a PLT on the Metering System's primary circuit, (see Figure 3). The result of this testing method provides evidence that confirms the Settlement Meter is programmed to the correct system Measurement Transformer ratio.



Figure 3 Primary circuit illustration



Technical Assurance of Metering Working Instructions

- **Option 2**

Where circumstances dictate that it is not feasible to perform a PLT on the Metering System's primary circuit, the alternative option is to conduct a PLT on the secondary circuit (see Figure 4). In these situations the TAA will, via additional evidence, attempt to assure that the load measured by the Meter is a true reflection of the primary load. Where possible, and site conditions permit, the TAA will take into account any other on-site instrumentation (see Figure 5) and attempt to measure loads at alternative points on system e.g. use transformer tails and, where available, inspect the Commissioning records – see TAA Instruction 014.



Figure 4 Secondary circuit illustration

- **Option 3**

On those very rare occasions where access to the Half Hourly Metering System is either not possible or is severely restricted preventing neither a primary and/or secondary conductor PLT from being performed, the TAA will conduct a limited inspection by reviewing other site evidence as indicated in Option 2. In these unusual circumstances the TAA will provide a field entry explanation of the problem(s) encountered in the TAAMT notes facility.



Figure 5 A switchgear ammeter

Technical Assurance of Metering Working Instructions

Prevailing Load Test Process

1. In co-operation with the HHMOA the potential of the Meter cabinet is checked with a reference earth ensuring the metering cabinet is not live. Any voltage detected is reported to the HHMOA. The visit is aborted where the fault cannot be immediately and safely rectified by the HHMOA. The TAAMT will be updated to record and report the condition, including what action the HHMOA has taken to ensure public safety from the equipment.
2. The Meter test facility is accessed (appropriate seals removed) and inspected for serviceability, (see figure 6). A visual inspection of the test facility and associated conductors is made to ensure measurement current transformers are not open circuited or short circuited. In accordance with TAA Working Instruction 010 – Phase Rotation the Metering System phase rotation is checked.

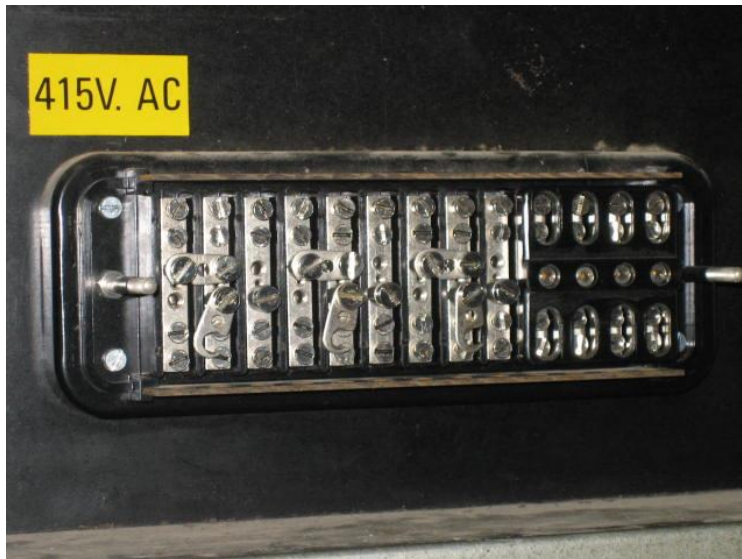


Figure 6 Example test facility

Using the handheld energy analyser the TAA measures and records the phase/line voltages. The voltage range will vary depending on the system arrangement - typically 110v line voltage for high voltage installations and 240V phase to neutral and 415v phase to phase for low voltage installations. (It should be noted that on the National Grid and some high voltage sites, it is possible that the voltage measurement could be 63.5v phase to neutral with metering arranged 3ph 4w).

3. In conjunction with step 2 whilst the recording voltage measurements, following a risk assessment and determination of system arrangement, the TAA will apply the handheld energy analyser's clip-on CT either on the primary or secondary conductor(s). The corresponding measurements are recorded including system power factor (multiple reads maybe necessary because of variations of load / generation in the primary circuit at the time the measurements are being taken).
4. All measurement parameters are entered into the prevailing load database in the TAAMT.



Technical Assurance of Metering Working Instructions

5. Over the measurement period a timed interval is monitored and Meter readings taken depending on the Meter display programming. Preferably the Meter will have a demand register displaying either kW and/or kVA. Start and end readings are taken over a time period, typically ten minutes, however this can be adjusted in reflection of site load/generation. The TAA will ensure that the test period does not cross a half hour boundary, as the demand register resets. Alternatively if no demand registers are available the cumulative reading can be used noting the value of the Meter Register Multiplier.
 6. The voltage, current and where appropriate power factor measurements, are used to derive a kW and/or kVA demand for the measured time interval. The calculated results are populated into the TAAMT and compared with the Meter advance for the same time period. The advance comparison result must be within +/-10%.
 7. For those sites where the load is considered too low to obtain a valid test result (typically less than 5% of the circuit capacity) the TAA will refer to the Commissioning record where available as confirmation of measurement accuracy and record these findings in the field notes facility.
 8. To complete end-to-end checks the cumulative kWh Meter register is recorded at the start and end of a half hour demand period. The advance is compared to the results obtained by local interrogation of the Metering System. Local interrogation results utilising propriety software are recorded and are used as evidence not only for checking the Meter advance but also to perform a CDCC check upon receipt of data made available by the HHDC. Performing a local Meter interrogation validates Meter password security arrangements.
 9. Category 1 or 2 non-compliances will be raised where the test results indicate either that Settlement Data Quality is, or there is a potential that Settlement Data Quality is, affected.
 10. A "Note for ELEXON" is recorded in TAAMT to confirm if Measurement Transformer Ratio was established
- Once the TAA has completed the inspection in accordance with BSCP27 the HHMOA is requested to reseal the Metering System. Before vacating the inspection location, the TAA in cooperation with the HHMOA, ensures the site is left in a safe and functional state.

Corrective Action

The HHMOA should review the Metering System and determine appropriate action required to rectify the Settlement non-compliance.



Technical Assurance of Metering Working Instructions

Reference 014 – Commissioning for Metering Equipment installed before 6th November 2014 or where the Metering Equipment is owned by the Customer

Reference	014
Version	1 Issue 2
Title	Commissioning
Issue Date	1 st April 2018
Status	Final
Related NCs	Category 2.15

Purpose

This TAA Working Instruction conveys the process and approach used by the TAA, as directed by the BSCCo, when seeking assurance that the Metering System has been appropriately commissioned.

Requirement Summary

The Registrant, who is ultimately responsible for the Metering System under the BSC, relies upon the Half Hourly Meter Operator Agent (HHMOA) to provide assurance that the Metering Equipment used for Settlement provides a true reflection of energy transfer at the Defined Meter Point (DMP).

The BSC and the CoPs stipulate the requirements and controls surrounding Commissioning tests.

BSCP27 defines the process of inspections for SVA and CVA Metering Systems. The BSCP describes the key interfaces for the role of the TAA, including provision of Commissioning records and historic proving test information to the TAA.

Approach to be applied

The TAA approaches the Metering System in accordance with TAA Working Instructions 012 and 013 (Sealing and Prevailing Load Test). Having established safe access/egress and that all appropriate seals are available for inspection, the TAA, in combination with the MTD and the physical installation, reviews the Commissioning information.

The suite of documentation forming the Commissioning record should provide a traceable link to the Metering System via MSID, Meter Serial Number and where applicable Measurement Transformer Serial Numbers.

Failure to present a valid Commissioning record will be considered non-compliant and the relevant Category 2 Non-Compliance will be recorded. When reviewing the Commissioning record, the TAA will establish that the information presented meets the minimum requirements identified in Section 5.5.2 of CoP4 (the relevant issue at the time the item was commissioned). Should the TAA be in any doubt or has concerns as to the completeness or validity of the information provided, clarification will be sought with the HHMOA attendee. Those circumstances where the TAA interprets that the information presented does not satisfy the requirements of CoP4, an explanation



Technical Assurance of Metering Working Instructions

is provided to the HHMOA highlighting the TAA concerns before the appropriate Category 2.15 Non-Compliance is recorded.

It is acknowledged that in some circumstances it may not be possible for the HHMOA to have conducted a Primary Prevailing Load or Injection Test. In the event where the HHMOA has only conducted a Secondary Prevailing Load or secondary Injection Test the TAA will seek other supplementary evidence that may be available to provide assurance of the accurate registration of energy, at the DMP, by the Metering System. This may comprise:

- Documentation confirming the Measurement Transformer ratio recorded by the LDSO: or
- Evidence recorded or calculated from alternative measurement sources available.

Where the TAA cannot establish assurance of accurate energy registration, evidenced from the additional documentation, the record will be considered incomplete and reported as non-compliant with the requirements CoP4.

For the purposes of clarity, all of the above is applicable regardless of the age of the Metering System installation.

Corrective Action

The Registrant will need to liaise with the HHMOA to obtain the appropriate commissioning records, even if that means recommissioning the Metering System.



Technical Assurance of Metering Working Instructions

Reference 014(A) – Commissioning for Metering Equipment installed on or after 6th November 2014 where the Metering Equipment is owned by the Licenced Distribution System Operator (LDSO) or Transmission Company

Reference	014(A)
Version	1 Issue 1
Title	Commissioning
Issue Date	1 st April 2018
Status	Final
Related NCs	Category 2.15

Purpose

This TAA Working Instruction conveys the process and approach used by the TAA, as directed by the BSCCo, when seeking assurance that the Metering System has been appropriately commissioned.

Requirement Summary

The Registrant, who is ultimately responsible for the Metering System under the BSC, relies upon the Licenced Distribution System Operator (LDSO) or Transmission Company and the Half Hourly Meter Operator Agent (HHMOA) to provide assurance that the Metering Equipment used for Settlement provides a true reflection of energy transfer at the Defined Meter Point (DMP).

The BSC and the CoPs stipulate the requirements and controls surrounding Commissioning tests.

BSCP27 defines the process of inspections for SVA and CVA Metering Systems. The BSCP describes the key interfaces for the role of the TAA, including provision of Commissioning records and historic proving test information to the TAA.

Approach to be applied

The TAA approaches the Metering System in accordance with TAA Working Instructions 012 and 013 (Sealing and Prevailing Load Test). Having established safe access/egress and that all appropriate seals are available for inspection, the TAA, in combination with the MTD and the physical installation, reviews the Commissioning information.

Modification P283 (reinforcing the Commissioning of Metering Equipment Processes) proposal was implemented on 6th November 2014. The Modification placed new obligations on the Transmission Company and Licence Distribution System Operators in respect of newly installed measurement transformers which are, or are to be, installed on its system for Settlement purposes relating to the requirements of CoP4. This means that the relevant system operator is required to commission and provide, or make readily available, CT/VT certificates as well as commissioning records to the Registrant.



Technical Assurance of Metering Working Instructions

The suite of documentation forming the Commissioning record should contain the following:

- "Part A" which is provided to the Registrant by the LDSO or Transmission Company which should detail the commissioning of current and voltage transformers (CTs and VTs).
- "Part B" which is provided by the HHMOA to the Registrant which should detail the Commissioning of the Metering System. It should provide a traceable link to the Metering System via MSID, Meter Serial Number and where applicable Measurement Transformer Serial Numbers.

Failure to present a valid Commissioning record will be considered non-compliant and the relevant Category 2 Non-Compliance will be recorded. When reviewing the Commissioning record, the TAA will establish that the information presented meets the minimum requirements identified in Section 5.5.2 of CoP4 (the relevant issue at the time the item was commissioned). Should the TAA be in any doubt or has concerns as to the completeness or validity of the information provided, clarification will be sought with the HHMOA attendee.

Those circumstances where the TAA interprets that the information presented does not satisfy the requirements of CoP4, an explanation is provided to the LDSO or Transmission Company and HHMOA highlighting the TAA concerns before the appropriate Category 2.15 Non-Compliance is recorded.

Corrective Action

The Registrant will need to liaise with the LDSO or Transmission Company and HHMOA to obtain the appropriate commissioning records, even if that means recommissioning the Metering System.



Technical Assurance of Metering Working Instructions

Reference 014(B) - Pre June 1993 Commissioning

Reference	014(A)
Version	1 Issue 1
Title	Pre June 1993 Commissioning
Issue Date	29 January 2016
Status	Final
Related NCs	Category 2.15

Purpose

The section provides instructions on how the TAA will deal with non-compliances related to the lack of a commissioning record(s) for measurements transformers (i.e. Current Transformers (CTs) and/or Voltage Transformers (VTs)) that were first installed and then registered, as part of a Metering System, for Settlement purposes under the Pooling and Settlement Agreement (P&SA), prior to the introduction of Code of Practice 4 Issue 2 on 1 June 1993. This process has been introduced because prior to CoP4 Issue 2 there was no requirement to produce and retain signed and dated commissioning records for measurement transformers.

Requirement Summary

The process allows for a Cat 2.15 'Commissioning Records' non-compliance raised in such instances to be closed provided the necessary evidence (and therefore assurance) is presented to the TAA, or ELEXON (if escalated), or PAB (if appealed), via the query and appeals processes set out in BSCP27.

To ensure the integrity of Settlement, the process requires the Registrant/MOA to provide evidence to satisfy the TAA (or ELEXON or the PAB) that the measurements transformers were installed and registered as a Metering System prior to 1 June 1993, and also to include other evidence to provide assurance that the Settlement Meters are recording the correct order of magnitude of Active Energy produced or consumed via the circuit (metering subsystem) in question.

Approach to be applied

Power Stations (Generators)

Reference should be made to the Power Station Control Room as generation levels (derived independently from Settlement Meters) will be known. Record, and where possible photograph, data used to confirm independent measurement transducer or measurement transformer ratio.

This information should be recorded against secondary test measurements on the metering subsystem in one Half Hourly (HH) period along with Meter Advance verification recorded in the same HH period.

Alternatively, analogue or similar displays could be referenced (e.g. Current (I) and Voltage (V) or Megawatts MW) and compared against secondary test measurements recorded in one HH period from the metering subsystem.



Technical Assurance of Metering Working Instructions

Photographic evidence of the Settlement CT rating plate should be provided where possible. Where CT rating plates are inaccessible, the CT and VT Purchase Order can be accepted with the CT/VT calibration certificates.

The information in the above points should be contained in a single document with a date and signed by the Registrant or Meter Operator Agent (MOA).

Unit and Station Transformers

Station Transformers are typically connected to the Station Board at 11kV. Secondary testing on the metering subsystem can be verified utilising protection CT measurements (providing the Settlement and protection CT ratios can be established), or local ammeters (providing the Registrant or MOA can provide evidence of how the signals have been derived).

Local secondary testing should be carried out over one HH period.

The Power Station Control Room may hold data for the circuits, and this data can be provided if it can be proven that the source does not originate from the measurement transformers for the Settlement Meters.

For the Station Transformers, power flow direction (i.e. Import) may be proven if the Generating Unit is on shutdown and all Station supplies are being delivered via the Station Transformers. With regards to the Unit Transformers, a record would be needed to establish if the station is generating and to what extent is the generation is being utilised to support the running operations of the station.

Photographic evidence of the Settlement CT rating plate should be provided where possible. Where CT rating plates are inaccessible, the CT and VT Purchase Order can be accepted with the CT/VT calibration certificates.

The information in the above points should be contained in a single document with a date and signed by the Registrant or Meter Operator Agent (MOA).

National Grid Sites

Substation Control Systems (SCS) could be used to gather information that should prove the Settlement measurement transformer ratio. Screen shots and other recorded details should be signed and dated.

The BSCCo hold a copy of the document produced by National Grid to provide assurance around SCS data.

Local testing over one HH period via secondary measurement at the prevailing load would confirm the Meter Advance.

Photographic evidence of the Settlement CT rating plate should be provided where possible. Where CT rating plates are inaccessible, the CT and VT Purchase Order can be accepted with the CT/VT calibration certificates.

For Interconnectors, National Grid should confirm in its opinion which way energy is flowing. Secondary testing can be verified utilising protection CT measurements providing the protection CT ratio and the Settlement CT ratios can be established.

The information in the above points should be contained in a single document with a date and signed by the Registrant or Meter Operator Agent (MOA).

Generally

Each submission to clear non-compliances should be presented as a package cross referencing Metering System Identifier (MSID) and Meter Serial Numbers.

Phase rotation should be confirmed.



Technical Assurance of Metering Working Instructions

Outstation mapping should be confirmed (MTDs vs actual).

Complete burden checks where possible and record evidence.

Any Meter compensation to be identified and evidence provided to confirm applied error compensation.

Corrective Action

The Registrant will need to liaise with the TAA to close non-compliances via the query process.



Technical Assurance of Metering Working Instructions

Reference 015 – CoP4 Records

Reference	015
Version	1 Issue 1
Title	CoP4 Records (Type A, B and C Calibration Certificates)
Issue Date	16 th September 2009
Status	Final
Related NCs	Category 2.13 and 2.17

Purpose

This TAA Working Instruction describes the process that the TAA employs when reviewing Meter Calibration Certificates in line with the latest version of CoP4.

Requirement Summary

The relevant Metering CoP, referred to within the BSC, defines the class accuracy limits of the Metering Equipment used for the measuring and recording energy transfers at a DMP. Each Metering CoP acknowledges CoP4 as the reference document for Calibration and Commissioning of the associated Metering Equipment (since CoP4 Issue 1).

Approach to be applied

In accordance with the BSC and the CSDs, each registered Settlement Meter should have a Meter Certificate confirming the class accuracy as stipulated in the applicable CoP. This is generally produced by the manufacturer and should be provided to the TAA in advance, as part of the inspection, or during the site visit.

The Meter Certificates are reviewed by the inspector to confirm if they meet the prescribed limits detailed in CoP4 Appendix A.

Determining what documentation should be made available to the TAA will be based on several factors;

- the applicable CoP
- when the Settlement Meter was ordered/installed
- the Type A Calibration date

CoPs 1 and 2

Figure 1, flowchart illustrates CoPs 1 and 2 periodic Calibration in accordance with CoP4 Issue 6 version 5 Effective From Date 6th November 2008 (EFD).



Technical Assurance of Metering Working Instructions

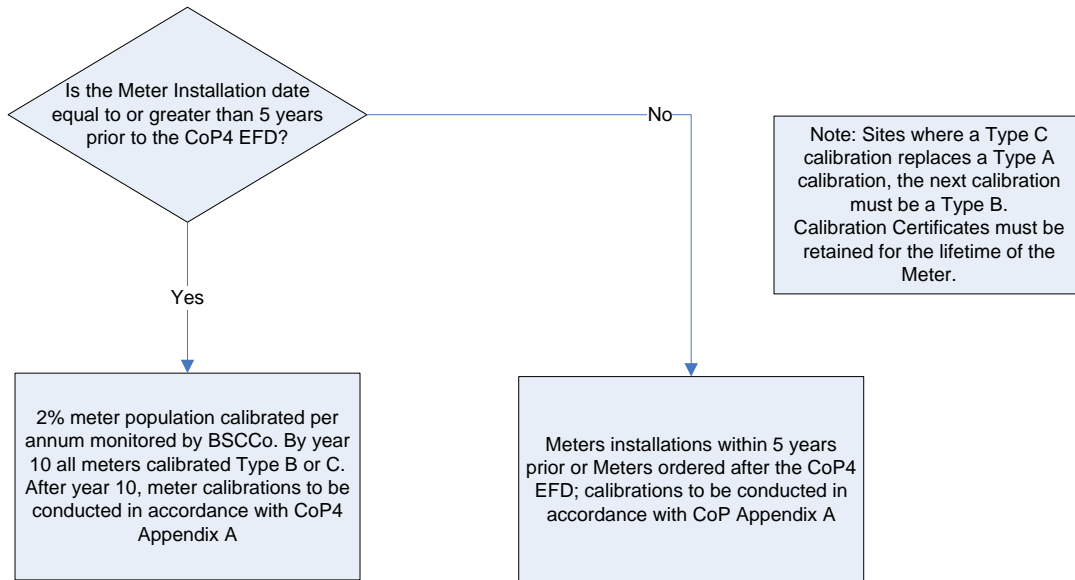


Figure 1 CoPs 1 and 2 Calibration intervals



Technical Assurance of Metering Working Instructions

CoPs 3 and 5

Figure 2 flowchart illustrates CoPs 3 and 5 periodic Calibration in accordance with CoP4 Issue 6 version 5 Effective From Date 6th November 2008 (EFD).

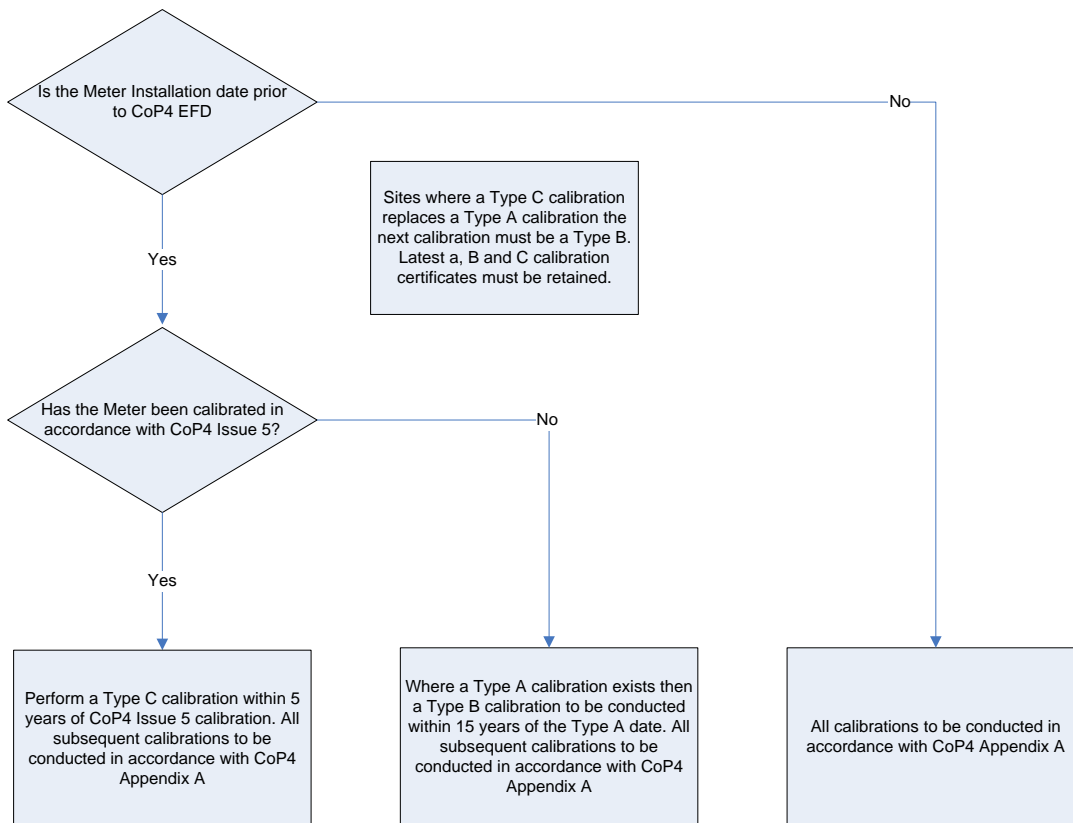


Figure 2 CoPs 3 and 5 Calibration intervals

The TAA, where applicable, will check that it has been presented with a valid periodic Calibration and on-site accuracy test results in accordance with CoP4 prior to the requirements of CoP4 Issue 6 Version 5. Type A Calibration records for Meters ordered prior to CoP4 Effective From Date may possibly not provide a Calibration date, in those instances the TAA will utilise the year of Meter manufacture as the initial Calibration date.

Any Meter Calibration Certificate associated with Meters ordered after CoP4 Effective From Date and any Type B or C Calibration performed after the CoP4 Issue 6 version 5 Effective From Date must account for and include Measurement Uncertainty. Calibration Certificates not providing evidence of Measurement Uncertainty will be considered category 2.13 non-compliant.



Technical Assurance of Metering Working Instructions

The frequency of Calibration is detailed in CoP4 Appendix A;

By Year	0	5	10	15	20	25	30	35	40
CoP1 & CoP2	A	-	C	-	C	-	C	-	C
		B _m ^s	B _c	C _m + B _c	B _m	B _c	C _c + B _m	B _m	B _c
CoP3, 5, 6 & 7	A	-	-	B	C	B	B	B	C

Figure 3 Active Meter Calibration Table

Missing Type A Initial Calibration

In those circumstances where a Meter Calibration Certificate is not available for inspection, the TAA will ask if a Type C Calibration has been performed, under instruction from the BSCCo, as a replacement for a Type A Calibration Certificate. Where a Type C Calibration Certificate replaces the Type A Calibration Certificate the TAA will check the authenticity of the Calibration, requesting the HHMOA to provide a copy of the BSCCo instruction.

Note: BSCCo will provide notification to the TAA of every instance where it has agreed that the HHMOA may replace missing Type A Calibration Certificate with a Type C Calibration.

Calibration Certificates

The TAA will assess the Calibration Certificates presented for inspection against the requirements identified in Appendix A of CoP4. The TAA will then ensure that measurement test points, limits of error and measurement uncertainty comply with reference tables located in Appendices B, C, and D of CoP4 (in line with BSCP27). The TAA should not expect to receive Calibration Certificates where accuracy class limits have been exceeded, as the Meter should have either been replaced or adjusted and re-calibrated.

Calibration Certificates should provide traceability as detailed:

- Serial Number
- Testing body
- Calibration Date



Technical Assurance of Metering Working Instructions

Compensated Meters

To ensure Overall Accuracy limits of the relevant CoP are maintained consideration must be given as to the method and process of the applied compensation.

CoP4 states;

"Where Compensation is to be applied to a Blank Calibrated Meter by means of software, a quality assurance system covering such operations shall be in place to ensure that the Compensation is properly applied. Evidence of such quality assurance system and its use will be made available to the BSCCo on request. In all other cases (save where a Type A Calibration was carried out on a Compensated Meter⁴) the Meter shall be re-calibrated using a Type C Calibration after Compensation is applied to ensure that the relevant Code of Practice overall accuracy requirement is met before return to service."

Non compliance

The absence of Calibration Certificates and any errors in the data fields of the Calibration Certificate will be recorded as either a Category 2.13 and/or 2.17 non-compliant. Any Cat 2.13 reported non-compliance will be reported as miscellaneous with an additional entry identifying the issue.

Corrective Action

The HHMOA must provide the TAA with valid Meter Calibration Certificates for Calibrations that have been conducted, in accordance with CoP4.



Technical Assurance of Metering Working Instructions

Reference 016 – Measurement Transformer Certificates

Reference	016
Version	1 Issue 2
Title	Reviewing Measurement Transformer Certificates
Issue Date	17 th January 2013
Status	BSCP27 Review
Related NCs	Category 2.16

Purpose

This TAA Working Instruction describes the process used by the TAA when reviewing Measurement Transformer certificates and determining the error confirming Overall Accuracy (see TAA Working Instruction 019).

The Metering CoPs (Numeric and Alpha) define the Measurement Transformer characteristics to be used with the Metering System. The Overall Accuracy of the Metering System and the accuracy of each item of Metering Equipment are specific to each CoP.

Requirement Summary

BSCP27 requires that all Measurement Transformer certificates are provided to the TAA, where the sites have been selected for an audit. In the event that any certificate is not provided the TAA will issue a Category 2.16 non-compliance. In its assessment of Overall Accuracy, the TAA may use other sources of information as to the potential accuracy of Measurement Transformers. The process is defined in BSCP27.

Approach to be applied

Figure 1, details a flow chart providing a high level view of the TAA procedure for assessing certificates, this flow chart should be used with this instruction and not as a definitive stand-alone statement.

In accordance with BSCP27 the TAA should receive the Measurement Transformer Certificates in order to assess if the Metering Equipment accuracies and Overall Accuracy of the Metering System are within the limits set out in the relevant CoP.

The Measurement Transformer certificates should be site specific. Where site specific Measurement Transformer certificates are not available there are two options that maybe considered

- On the basis that no change had been made to PA526, or has been made to BSCP27 since an earlier instruction dated November 2000, the TAA will continue with the current practice in accepting similar age, make and model Measurement Transformer Calibration Certificates as substitutes for site specific certificates. This instruction harmonises the procedures applicable to equipment registered as CoP3/5 and S3/5 with that quoted in BSCP27 for CoP1/2 and S1/2.



Technical Assurance of Metering Working Instructions

- NMTES (SVA CoPs 3 and 5) should be used (BSCP514). If the Registrant/HHMOA requests to use the NMTES the TAA must ensure all design limits match without exception (manufacture, burden and class).

In addition, in accordance with the BSCCo directive:

Where there is no CT certificate available for CTs of accuracy class 0.5, at low voltage sites, the TAA shall use the extremes in both directions of the accuracy class in its assessment.

Where certificates are available they must contain the following information:

- Manufacturer
- Rated Burden, Class and Ratio
- Traceability (signed and dated)
- Test Errors
- All newly produced Certificates post 06/11/2008 must include Measurement Uncertainty

Where safety permits, the TAA ensures that the CT/VT information rating plates ⁶ are consistent with the certificates. Those circumstances where the physical design or operational restrictions result in the rating plates not being readily accessible, supplementary traceable evidence should be sought in the form of Commissioning records produced by the HHMOA and, where available, the LDSO.

Installations where the responsible party has failed to present the required Measurement Transformer certificates will result in a Category 2.17 non-compliance "Certificate not provided".

BSCP27 directs the TAA to report all installations where Measurement Transformer certificates do not match Metering Equipment on site. However, the TAA is expected to apply judgement when reviewing presented certificates.

Having established Measurement Transformer certificates are valid for the Metering Equipment, the TAA should seek assurance that the stated accuracy class for each item meets the minimum CoP requirement. Certificates stating errors outside the CoP limit will be determined as non-compliant.

Summation Current Transformers

CoP1 Issue 2 and CoP2 Issue 4 banned the use of Summation Current Transformers.

Depending upon the age of a Metering System it is possible that the Metering Equipment may, in addition to Current and Voltage Transformers, also comprise Summation Current Transformers. Summation Current Transformers are used for installations where two or more flows of electricity are to be added before being measured by the Meter(s). Installations using Summation Current Transformers should also have accuracy certificates available. As above, failure to provide certificates for Summation Current Transformers will result in a non-compliance. Summation Current Transformer errors are subject to the same scrutiny as all other certificates.

⁶ HV/LV CT Metering Labels implemented 1st January 2012 reference MOCOPA are not considered as a replacement for rating plates for the purpose of TAA

Technical Assurance of Metering Working Instructions

Corrective Action

Where certificates are not available the HHMOA is to provide valid Measurement Transformer certificates. In the event that the Overall Accuracy has not met requirements, the HHMOA is required to take steps to bring the Metering System in line with the CoP. Should the Overall Accuracy not be determined, the HHMOA shall take steps to provide the evidence necessary so that Overall Accuracy can be established.

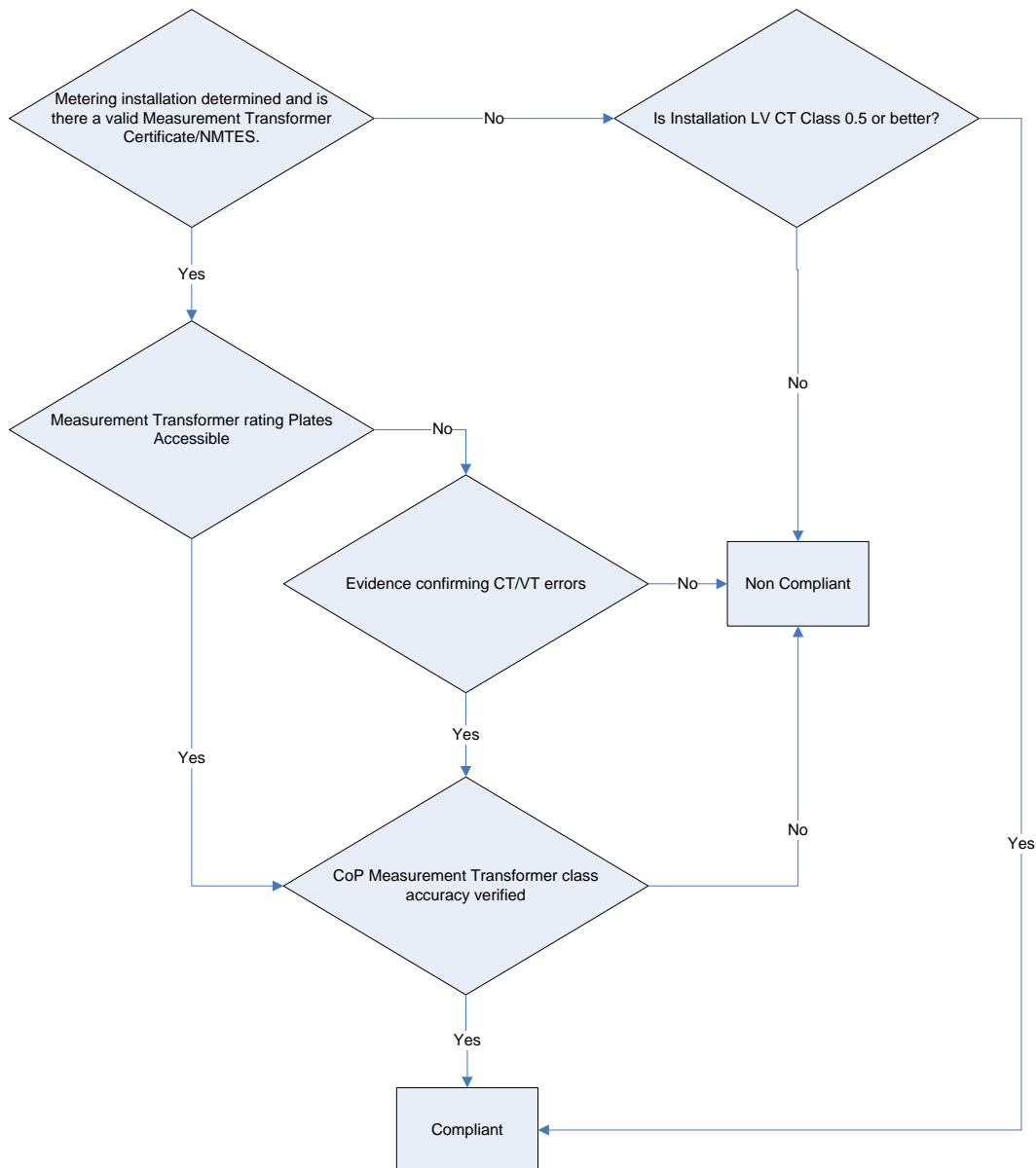


Figure 1 TAA Measurement Transformer Certificate Verification Flow Chart



Technical Assurance of Metering Working Instructions

Reference 017 – Fusing and Links

Reference	017
Version	1 Issue 1
Title	Fusing and Links
Issue Date	16 th September 2009
Status	Final
Related NCs	Category 2.09

Purpose

This TAA Instruction Document provides a list of reference documents used by the TAA when inspecting Metering System protective devices.

Requirement Summary

The Numeric and Alpha CoPs identify a requirement for fusing individual equipment to limit the extent of damage due to a device fault or short circuit. However there are other documents which further clarify fusing and link requirements and this TAA Instruction Document provides a single reference document that collates the relevant BSCCo instructions. These are:

Pool Circular CEO00437 – Neutral Links

Pool Circular CEO00438 – 17/03/2000, Fusing of Metering Equipment

BSC Circular CL00989 – Technical Assurance Inspection of Low Voltage CoP5 Metering Systems, Fusing Arrangements

Multi Tariff Installation (Scottish Power) Fusing arrangements

Approach to be applied

Once the applicable CoP has been established the TAA, in accordance with BSCP27 and mindful of the various directives issued by the BSCCo and the Electricity Pool of England and Wales, checks that the fusing is installed as close as practicable to the voltage source/voltage transformer supplies whilst noting all local fusing should discriminate with source fusing.

Source fusing is normally owned and operated by the LDSO, any non-compliances raised in reference to remote fusing should reflect this. The TAA is mindful that the quantity of fusing is not detailed, other than to note that introducing an undue amount of fusing may increase the risk of high resistance connections and multiple operation of fuses connected in series.



Technical Assurance of Metering Working Instructions

The TAA will give due consideration to whether source and local fusing should have been installed. The Pool Circular CEO00438 guideline suggests that where the length of multicore cabling is greater than 2 metres between supply and test facility, appropriate fusing should be considered. More importantly, can it be isolated easily if necessary?

Metering Systems registered to CoP5 are inspected taking into account of the requirements of circular CL00989. Any Metering System registered to CoP5 Version 6 must provide separate fusing for all Settlement Meters and any additional burden/equipment. For earlier Versions of CoP5 Settlement Meters any additional burden/equipment must be fused from the source but not necessarily separately.

Whilst conducting its inspection the TAA will need to know if a Metering System is Multi Tariff or Multi Feeder. There is a practice in Scotland for Multi Tariff LV CT Metering Systems to be sourced via a common fusing point whilst providing local separate fusing where several meters may have been installed. Those sites determined as Multi Tariff should be considered compliant.

Having reviewed the Metering System, and where safety permits, the TAA, with the HHMOA, will establish fuse ratings.

Where an isolation facility has been installed in the neutral or a connection to an earth source, the TAA will (where safety permits) confirm that a solid link has been used. Metering System installations registered prior to the 30th June 2000 and are not equipped with neutral isolation will be considered compliant.

Where the TAA believes that the CoP and guidance notes are not complied with the TAA will raise the appropriate Category 2.09 non-compliance.

The Meter under inspection will be checked to ensure compliance with the relevant Metering CoP for phase failure monitoring.

Corrective Action

The HHMOA and LDSO should ensure compliant protective devices are installed with suitable discrimination.



Technical Assurance of Metering Working Instructions

Reference 018 – Outstation Time Keeping

Reference	018
Version	2 Issue 1
Title	Outstation Time Keeping
Issue Date	01 April 2018
Status	BSCP27 Review
Related NCs	Category 1.03 and 2.14

Purpose

This TAA Instruction Document describes the process that the TAA will follow in order to assess the accuracy of an Outstation clock.

Requirement Summary

All Settlement Outstations are required to be aligned with Universal Co-ordinated Time (UTC). An allowable limit of error is provided for, which is defined within the relevant CoP.

Approach to be applied

When on site, the TAA will compare the Outstation clock with UTC by using the BT speaking clock or other reliable source. If there is a difference and it is outside of the allowable limits then the TAA will raise a non-compliance (the BSCCo has instructed the TAA to keep a log of all time drifts both compliant and non-compliant).

The non-compliance will either be a category 1 or 2 depending on the amount of error shown in Table 1.

The TAA will monitor time drifts by party and report any potential developing trends to the BSCCo

Table 1 Non Compliance Categories

Code of Practice	Category 1 Non-Compliance	Category 2 Non-Compliance
CoPs 1 and S1	> ± 30 seconds	> ± 20 seconds up to ± 30 seconds
CoPs 2 (G) and S2	> ± 15 minutes	> ± 20 seconds up to ± 15 minutes
CoPs 3 (G) and S3	> ± ± 15 minutes	> ± 20 seconds up to ± 15 minutes
CoPs 5 and S5	> ± 15 minutes	> ± 20 seconds up to ± 15 minutes



Technical Assurance of Metering Working Instructions

Corrective Action

When an error has been identified, the TAA will invite to HHMOA to correct the Outstation clock whilst on site. If the HHMOA is able to correct the error then the TAA will note the non-compliance as rectified.



Technical Assurance of Metering Working Instructions

Reference 019 – Overall Accuracy

Reference	019
Version	1 Issue 2
Title	Overall Accuracy
Issue Date	17 th January 2013
Status	BSCP27 Review
Related NCs	Category 1.02 or 2.06

Purpose

This TAA Working Instruction intends to clarify the approach and procedures used by the TAA as directed by the BSCCo in establishing Overall Accuracy and any associated non-compliance.

Requirement Summary

Section L of the BSC defines the requirements for Metering Equipment with reference to the applicable CoP.

The Overall Accuracy limits of error are defined in each relevant CoP Section 4.2.1 'Overall Accuracy' (the alpha Metering CoP requirements are documented under 'Accuracy'). The limits of error vary for each CoP and for different values of current and power factor.

Approach to be applied

The TAA will determine the configuration of the type of Metering System to be inspected. The TAA can then ascertain the component errors on the Metering System in order to verify Overall Accuracy.

Component Errors

Type of Metering System	Applicable CoP Sections
Whole Current	Meter Meter Compensation
Low Voltage Current Transformer Operated	Meter Meter Compensation Current Transformer
High Voltage Current Transformer Operated	Meter



Technical Assurance of Metering Working Instructions

	Meter Compensation Current Transformer Voltage Transformer
--	--

The TAA reviews Overall Accuracy at values quoted for 10% to 120% at unity power factor for active energy transfer as depicted in the relevant CoP. This instruction reflects the prescribed errors detailed in the Numeric CoPs. Sites registered to the alpha CoPs will be compared by the TAA against the historic CoPs available on the BSCCo website.

Code of Practice	Limits of Error
CoP1	+/- 0.5%
CoP2	+/- 1.0%
CoP3	+/- 1.5%
CoP5	+/- 1.5%

The following chart is for guidance only, indicating that Metering Equipment classification alone is no guarantee that Overall Accuracy will be maintained.

Limit of Error	CoP1	CoP2	CoP3	CoP5
Meter	+/- 0.2	+/- 0.5	+/- 1.0	+/- 2.0
Current Transformer	+/- 0.2	+/- 0.2	+/- 0.5	+/- 0.5
Voltage Transformer	+/- 0.2	+/- 0.5	+/- 1.0	+/- 1.0
Resultant Component Error	+/- 0.6%	+/- 1.2%	+/- 2.5%	+/- 3.5%
CoP Limit of Error	+/- 0.5	+/- 0.5	+/- 1.5	+/- 1.5



Technical Assurance of Metering Working Instructions

In order to determine the Overall Accuracy of the Metering System it is necessary to sum all the individual component errors.

Overall Accuracy Calculation

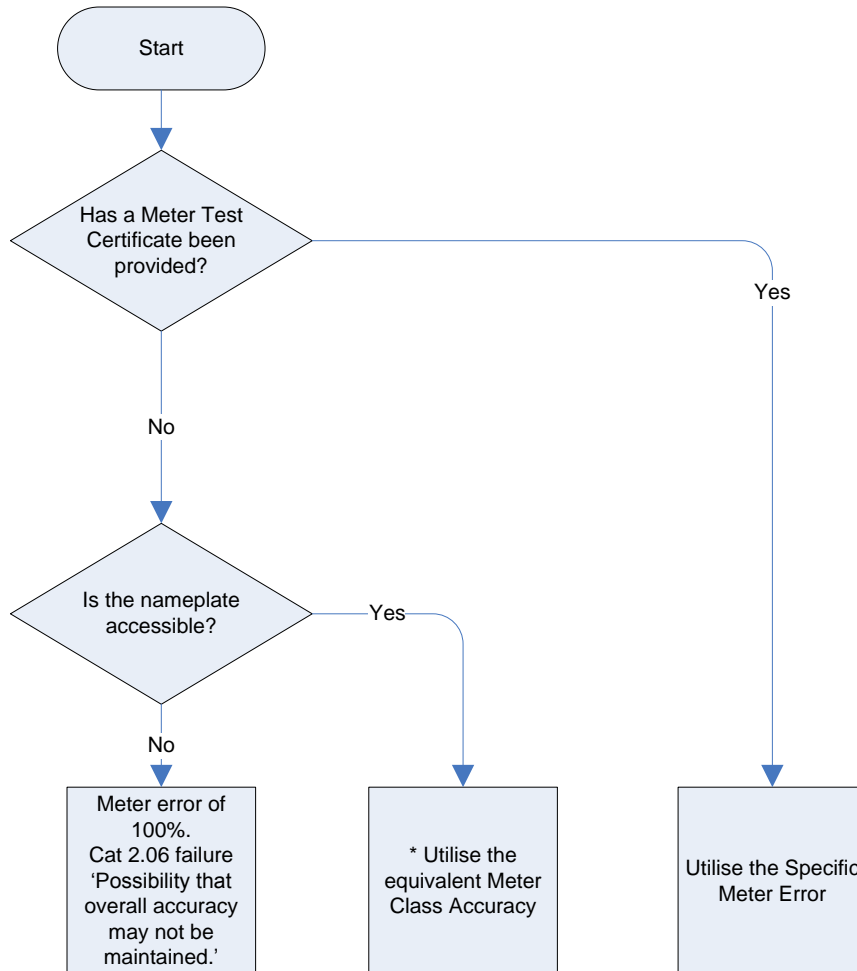
Type of Metering System	Overall Accuracy Calculation
Whole Current	Overall Accuracy = Meter Error + Meter Compensation
LV CT Operated	Overall Accuracy = Meter Error + Meter Compensation + CT Error
HV CT Operated	Overall Accuracy = Meter Error + Meter Compensation + CT Error + VT Error

Another component which influences the error limit of Overall Accuracy is Measurement Uncertainty. This component does not form part of the TAA Overall Accuracy calculation as determined by the BSCCo.

The flow charts identify the processes engaged by the TAA in determining the component errors of the Metering System:

Technical Assurance of Metering Working Instructions

Meter

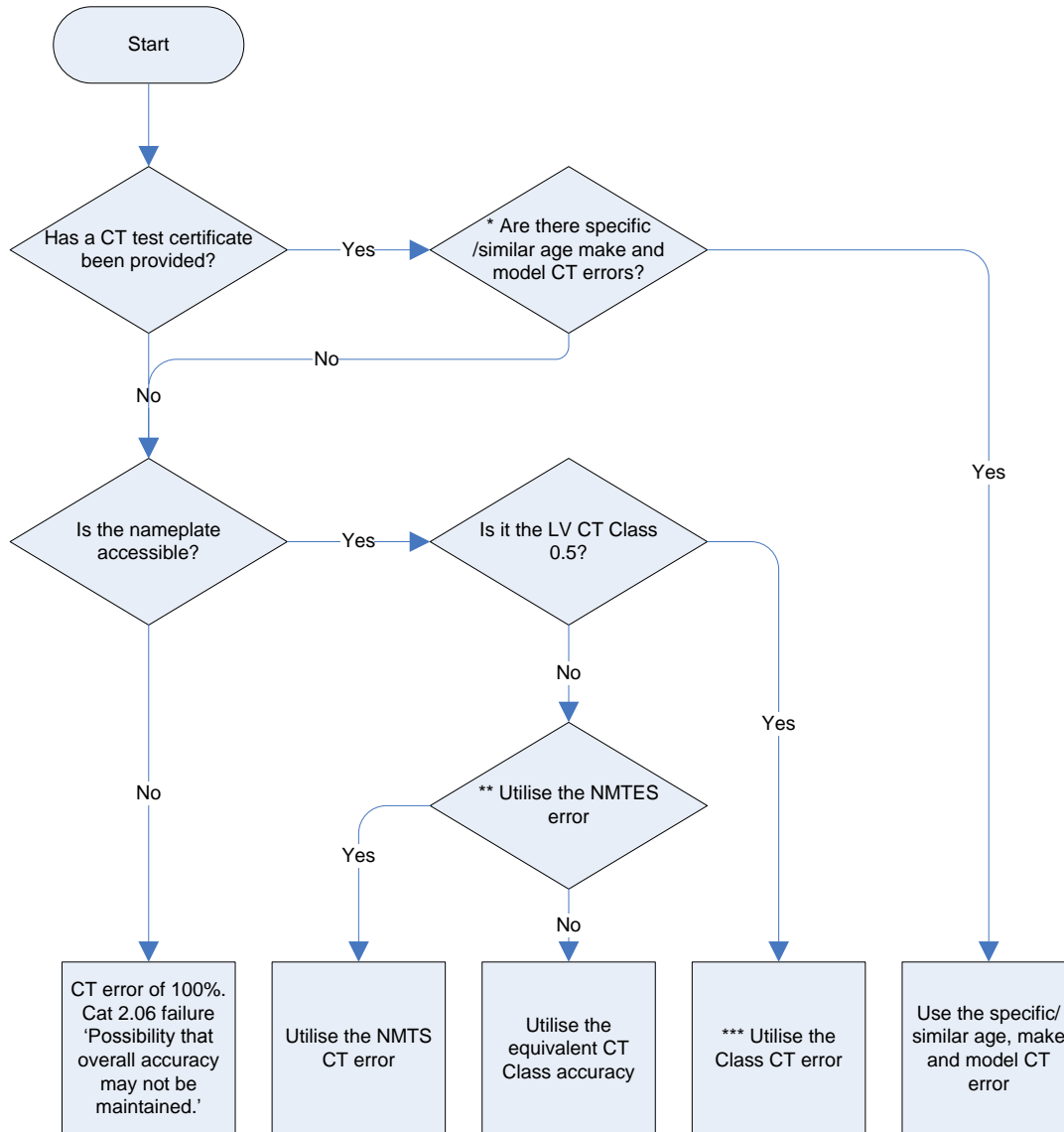


Meter Notes

* Meter error determined via class accuracy the error applied should indicate a worst case scenario of Overall Accuracy.

Technical Assurance of Metering Working Instructions

Current Transformer



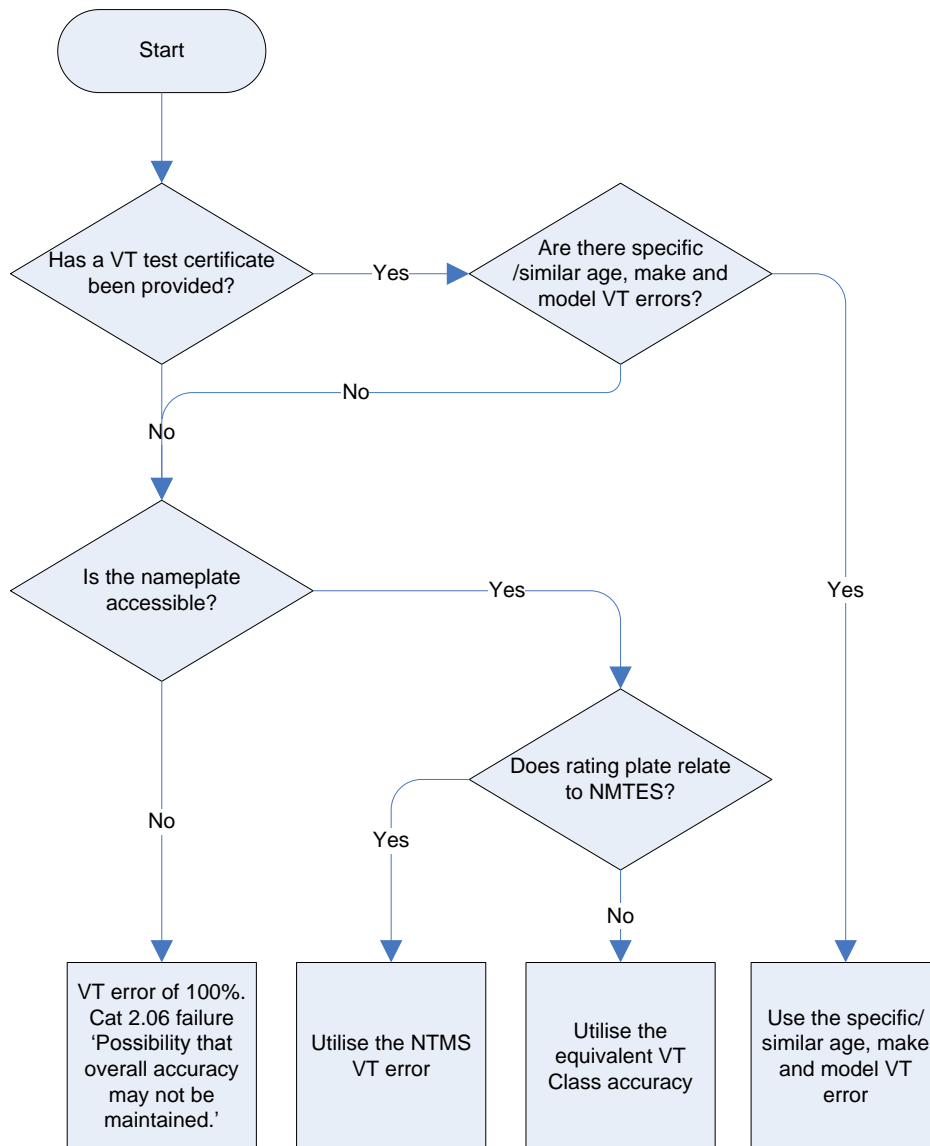
Current Transformer Notes

- *The TAA utilises the CT error that reflects the most suitable scenario for Certificates that have multiple test points. It should be noted errors provided via a CT Test Certificate must be specific to the CTs installed, however CT errors for designs of a similar age, make and model can be accepted. A conformance statement providing a range of error i.e. +/-% is not acceptable.
- **The utilisation of the National Measurement Transformer Error Statement (NMTES) should only be implemented where evidence of transformer manufacture, ratio, class and burden compare.
- ***Installations that are LV CT with class 0.5 observed by the TAA are deemed by the BSCCo not to require a CT Certificate. The TAA in these circumstances applies the error which will indicate a worst case scenario of Overall Accuracy. Where necessary the TAA may refer to the NMTES in order to improve Overall Accuracy.

Technical Assurance of Metering Working Instructions

- Where the CT error is determined via the class accuracy, the error applied should indicate a worst case scenario of Overall Accuracy.

Voltage Transformer



Voltage Transformer Notes

- *The TAA utilises a VT error that reflects the most suitable scenario for Certificates that have multiple test points. It should be noted that errors provided via a VT Test Certificate must be specific to the VTs installed, however VT errors for designs of a similar age, make and model can be accepted. A conformance statement providing a range of error i.e. +/-% is not acceptable.
- **The utilisation of the National Measurement Transformer Error Statement (NMTES) should only be implemented where evidence of transformer manufacture, ratio, class and burden compare.
- Where the VT error is determined via the class accuracy, the error applied should indicate a worst case scenario of Overall Accuracy.



Technical Assurance of Metering Working Instructions

Meter Compensation

Where Meter Compensation is applied, it must be accounted for within the Overall Accuracy calculation⁷. Meter Compensation can be determined in several ways:

- Error displayed via the Meter
- Error detailed on the Meter Test Certificate
- Error made available via other records such as Commissioning Record or Meter Configuration Record.

The TAA collates all the metering system equipment errors and records the error values into the TAAMT.

Where the result is equal to or better than that required by the relevant CoP the site is deemed compliant and a note is recorded of Overall Accuracy for the BSCCo.

Where the result is greater than that required by the relevant CoP the site will be determined non-compliant in accordance with BSCP27. The TAA records the site as non-compliant, registering either category 1.01 or 2.06 non-compliance.

Where Overall Accuracy exceeds the limit of the relevant CoP, but where there is uncertainty in the error, a category 2 non-compliance is raised indicating Overall Accuracy may not be maintained,

Where the Overall Accuracy is determined to be greater than the CoP limit and the errors of the individual Meter and Measurement Transformers is proven, a category 1 non-compliance (Overall CoP Accuracy not maintained) is raised.

As with other recorded category 1 non-compliances there is an associated Materiality Impact to be recorded in accordance with BSCP 27.

Corrective Action

HHMOA in association with the LDSO have a requirement to maintain valid traceable Calibration Certificates. They should also ensure that the Meter has also had the applicable compensation applied to it, where it has not been done already.

⁷ Meter error field is adjusted to reflect compensation



Technical Assurance of Metering Working Instructions

Reference 020 – Meter Compensation

Reference	020
Version	1 Issue 2
Title	Compensated Meters
Issue Date	17 th January 2013
Status	BSCP27 Review
Related NCs	Category 2.13

Purpose

This TAA Working Instruction describes the process used by the TAA when reviewing compensated Meters. This document does not cover the use of Meter Compensation factors by the TAA as this is covered in Working Instruction 19 – Overall Accuracy.

Requirement Summary

As defined in Section L of the BSC, Metering Equipment must be installed, commissioned and maintained to comply with the relevant CoP. Each CoP recognises that in order to maintain the Overall Accuracy of a Metering System it may be necessary to compensate the Settlement Meters.

The CoPs explain the requirements for Meter Compensation. The CoPs breaks this down into two main areas;

- a) Measurement Transformer Error
(Compensation will be applied to Meters for CT and VT errors in order to bring the Overall Accuracy of the Metering System within limits)
- b) Power Transformer Error and Line Losses.

Approach to be applied

The TAA can determine if the Meter has been compensated in several ways;

- Identifying the Compensation applied to the Meter via scrolling through the Meter displays
- Error recorded on Meter Calibration Certificate
- Error made available via other records such as Commissioning records and Meter configuration details

In accordance with the CoP, the HHMOA should provide evidence to justify the Compensation criteria for inspection by the TAA. Where the TAA does not feel this is sufficient, or appropriate documentation has not been received, or the evidence does not confirm the Compensation factor has been applied to the Meter, a category 2.13 "No



Technical Assurance of Metering Working Instructions

evidence submitted to confirm Meter compensation factor" non-compliance is recorded. Where instances have been established where compensation has been applied to the Metering Equipment, those meters that don't comply with the CoP display requirement are identified as non-compliant to observation level O.18 "Meter fails to display compensation where this is a constant factor applied at security level 3".

Corrective Action

It is more than likely in these instances that additional non-compliances will be recorded, relating to the possibility that the Overall Accuracy of the Metering System may not be maintained.

The Registrant through the HHMOA, should ensure that a Meter is appropriately compensated.



Technical Assurance of Metering Working Instructions

Reference 021 – Duty of Care

Reference	021
Version	1 Issue 2
Title	Duty of Care
Issue Date	17 th January 2013
Status	BSCP27 Review

Purpose

This TAA Working Instruction serves as a guideline and is used by the TAA to record safety issues related to the Metering Systems being inspected. It is not in the remit of the TAA to take responsibility for the reporting of safety issues, evacuation of the property or any corrective or preventative measures.

Requirement Summary

The TAA has a duty of care to himself and other attendees when conducting a TAA inspection. The TAAMT records a formal risk assessment for each audit, which commences at the time that the auditor arrives at the premises. The risk assessment is a questionnaire which includes controls to mitigate risk to the auditor. Any uncontrollable risk or unmitigated safety risk will result in the visit being aborted.

Approach to be applied

These risks are recorded within the TAAMT tablet by using the 'Note for ELEXON' category and filling out a commentary box to record additional findings. This should be used to record any areas of concern that the auditor may have, including who the issue was communicated to.

Examples:

1. The Metering System is heavily overloaded. The TAA has made the HHMOA aware and advised that he will need to make the Registrant aware.
2. There is water entering the room, from the ceiling, where the Metering Equipment is housed. The customer and HHMOA have been informed by the TAA.
3. The window where the Metering Equipment is located has a broken window, which was like this when we entered the room. The customer has been informed.



Technical Assurance of Metering Working Instructions

Corrective Action

It is up to the responsible party, the Registrant, HHMOA, HHDC and/or LDSO, to determine the risk and undertake the appropriate corrective action. It is not the responsibility of the TAA to manage or undertake any remedial work.

Within its scope of work the TAA will not monitor any subsequent activity as a result of the note entry, other than where a relevant non-compliance has been determined as a result of the issue and a rectification plan has been submitted.



Technical Assurance of Metering Working Instructions

Reference 022 – Checking that main and check Meters are correctly identified

Reference	022
Version	1 Issue 2
Title	Checking that main and check Meters are correctly identified
Issue Date	17 th January
Status	BSCP27 Review

Purpose

This TAA Working Instruction describes the process by which the TAA confirms that main Active and Reactive Energy Meters and check (where required by the relevant CoP) Active and Reactive Energy Meters, installed for each circuit, for Settlement purposes, are correctly identified in the MTDs (and by labelling on site, if any). Confirmation of compliance with the requirement to provide main and check Active and Reactive Energy Meters themselves, are covered by TAA Working Instruction 001 and 004 (where relevant).

Requirement Summary

The relevant CoPs require main Active and Reactive Energy Meters and check (where required by the relevant CoP) Active and Reactive Energy Meters to be provided, for each circuit, for Settlement purposes. Where the required main and check Meters are physically installed in accordance with the relevant CoP, the CDCA/HHDC needs to carry out main/check metered data validation (as described in BSCP502 and BSCP03). In order carry out this validation correctly, submit metered data provided by main Meters (primarily) into Settlement and ensure no double counting of metered data occurs (e.g. where a main and check Active Energy Meter for a circuit are identified in the MTDs as two main Active Energy Meters and the HHDC treats them as such and unknowingly adds the metered data together) the TAA needs to confirm that the MTDs provided for the inspection separately, and correctly, identify the installed main Active and Reactive Energy Meters and check (where required by the relevant CoP) Active and Reactive Energy Meters.

Approach to be applied

The TAA will inspect the MTDs provided by the relevant participants and confirm the applicable CoP as set out in TAA Working Instruction 001. Where main and check Active and Reactive Energy Meter are required by the relevant CoP, and are provided, the TAA shall ensure that for each circuit being audited the MTDs identify which Meters are the main Active and Reactive Energy Meters and which Meters are the check Active and Reactive Energy Meters for the relevant circuit. Where a physical label(s) at site identify the main and check Meters and this doesn't coincide with either the physical Meters themselves or (any one of) the MTDs provided, then the TAA should raise an Observation against the relevant participant. Where the CDCA's/HHDC's MTDs do not match what is installed on site then the TAA shall issue a Category 1 or 2 non-compliance to the relevant DC (where main and check meters installed). Where the CDCA's/HHDC's MTDs identify more than one Meter as the main Meter (or more than one Meter as the check Meter) for a single circuit, and the TAA confirms that the identified Meters are measuring the same Measured Quantity on the same circuit, then a Category 1 non-compliance should be issued to the CDCA/HHDC. Where the HHMOAs MTD do not match the Meters installed on site or incorrectly identify more



Technical Assurance of Metering Working Instructions

than one Meter as the main Meter (or more than one Meter as the check Meter) for a single circuit, then a Category 2 non-compliance shall be issued to the HHMOA.

Corrective Action

For labelling errors on site, the MOA should ensure that any labels that identify which Meters are main Meters and which Meters are check Meters match the MTDs and actual installed Meters. Where any MTDs provided fail to correctly identify which are main and which are check Meters for a circuit (or circuits) or incorrectly identify more than one Meter as a main or check Meter for a circuit, then the MOA should correct the MTDs and resend them to the relevant participants (i.e. DC/LDSO and Supplier).



Technical Assurance of Metering Working Instructions

Reference 023– Defined Metering Point

Reference	023
Version	1.0
Title	Defined Metering Point
Issue Date	17 th January 2013
Status	Final
Related NCs	Category 1.02 and 2.13

Purpose:

This TAA working instruction outlines the process utilised by the TAA in establishing the Defined Metering Point.

Requirement Summary:

The numeric Codes of Practice stipulate the Defined Metering Point (DMP) as being the physical location at which the overall accuracy requirements are to be met. The Defined Metering Points are listed in Appendix A of each numeric Code of Practice. Where the Actual Metering Point (AMP) does not coincide with the DMP a Metering Dispensation is required and compensation for electrical losses needs to be considered and implemented (where necessary) within the Meter(s) or via the Aggregation Rule. The Alpha Codes of Practice define the Commercial Interface and in situations where the Metering Point (MP) does not coincide with the Commercial Interface, compensation for electrical losses needs to be considered and implemented (where necessary) within the Meter(s) or via the Aggregation Rule. A Metering Dispensation is not required for this scenario under the Alpha Codes of Practice.

Approach to be applied:

To establish where the Commercial Interface/DMP is, the TAA implements the following procedure:

- The TAA Administrator requests a copy of a Single Line Diagram (SLD) detailing the Commercial Interface/DMP compared to the MP/AMP when scheduling the inspection.
- Confirm measurement transformer location referencing site schematics and/or SLD.
- Review the Meter compensation; this may comprise measurement transformer and power transformer, and accompanying Aggregation Rule line losses/constant.
- Ensure the MOA confirms and can evidence why compensation is not applicable.

The above procedure is not prescriptive in identifying the commercial interface/DMP, what is important is that the TAA is in receipt of sufficient information to establish any difference between AMP/DMP in order to assess compliance with the requirement to have a Dispensation in place (where required) and compensate (where necessary) to the commercial interface/DMP if measurements are being made elsewhere.



Technical Assurance of Metering Working Instructions

The TAA will exercise some judgement as to when such a high level of detail is required e.g. for CVA sites and complex SVA sites. By design, many SVA metering systems can be determined during visual inspection of the Metering Equipment.

Where the Commercial Interface/DMP and MP/AMP do not coincide, the TAA will raise a non-compliance if:

- There is no Metering Dispensation in place, where one is required (i.e. under the suite of numeric Codes of Practice).
 - i. Category 1.02 non-compliance to reflect where metering not compensated and is necessary;
 - ii. Category 2.13 non-compliance to reflect metering compensated (and evidenced) but no Metering Dispensation in place); or
- Where a Metering Dispensation is not required (Alpha Metering Codes), the TAA will raise a Category 1.02 non-compliance if compensation to the Commercial Interface is required (i.e. the losses are materially significant) and this has not been implemented/evidenced.

In the event that the MOA has not been able to satisfactorily establish the Commercial Interface/DMP either prior to or during the inspection, the TAA will raise a Category 2.13 non-compliance, utilising the following description "Commercial Interface/Defined Metering Point not established".

Corrective Action:

Metering arrangements determined non-compliant for no Metering Dispensation will need to be addressed by the Registrant/Supplier in accordance with the BSC, the Registrant/Supplier may need to engage the services of the MOA in providing the detail.

In the event that the MOA has not been able to satisfactorily establish the Commercial Interface/DMP the MOA may need to submit a combination of Single Line Diagrams, Circuit Schematics and evidence to confirm the application of meter compensation.