Electricity Industry Participation Code Audit Report

For

Advanced Metering Services Limited
Class A and B
Approved Test House

Prepared by Brett Piskulic – Veritek Limited

Date of Audit: 26/08/21

Date Audit Report Complete: 30/09/21

Date Audit Report Due: 26/09/21

Executive Summary

Advanced Metering Services Limited (AMS) is a Class A and B Approved Test House and is required to undergo an audit by 26 September 2021, in accordance with clause 16A.19(b).

Non-compliance is recorded in 14 sections of this audit. Seven of the non-compliances relate to changes to several areas of the Code that were announced on 15th December 2020 and implemented on 1st February 2021.

The Code now requires the ATH to record each services access interface and the associated maximum interrogation cycles for each. AMS has implemented changes to its Category 1 certification process to encompass the new requirements, but this has not yet been applied to higher category certifications and does not always cover all possible combinations.

When certifying a measuring transformer, the ATH must determine the range that the in-service burden must be within to ensure the measuring transformer remains accurate. When certifying metering installations with measuring transformers, the ATH must ensure that the in-service burden is within the burden range of the measuring transformers. AMS has improved its processes to ensure that burden is added when required to ensure that in-service burden is within CT burden ranges but has not added a burden range statement to its certification reports.

The Code changes included new requirements related to certification tests as follows:

- minimum load for raw meter data tests,
- recording of accumulation of pulses when conducting raw meter data tests, and
- ensuring that the least significant digit advances when conducting a raw meter data test.

AMS has not updated its testing processes to meet these new requirements.

A nominally Category 3 metering installation was recertified as Category 2 with no details of the lower category certification recorded in the metering installation certification report. This installation also had burden lower than the burden range of the CTs. Non-compliance has been recorded in six sections of this audit due to these two issues. The AMS processes with regard to lower category certification and in-service burden are normally sound. In this case the recertification was conducted when a technician replaced a meter due to a communications fault. The technician and reviewer of the certification report failed to identify the issues before the certification was approved.

The date of the next audit is determined by the Electricity Authority and is dependent on the level of compliance during this audit. The Future Risk Rating table provides some guidance on this matter and recommends a next audit frequency of six months. After considering AMS's responses and the remedial actions taken I recommend an audit frequency of 12 months.

The matters raised are shown in the tables below.

Table of Non-Compliance

Subject	Section	Clause	Non-compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Accurate information	2.2	10.6 of Part 10	Each services access interface not recorded for 16 of 79 metering installations metering installations certified since 1 February 2021. Metering installation type recorded incorrectly for 18 of 79 metering installations certified since 1 February 2021. All information regarding lower category certification not included in the certification report for one metering installation. Incorrect maximum interrogation cycle recorded in 41 of 79 metering installations certified since 1 February 2021. Maximum interrogation cycle not recorded for each services access interface in 17 of 79 metering installations since 1 February 2021.	Moderate	Low	2	Identified
Metering Installation Type	3.2	8(2) of Schedule 10.7	Metering installation type recorded incorrectly for 18 of 79 metering installations. Each services access interface not recorded correctly for 16 of 79 metering installations.	Moderate	Low	2	Identified
Services Access Interface	3.5	10 of Schedule 10.4	Each services access interface not recorded for 16 of 79 metering installations certified since 1/02/21.	Moderate	Low	2	Identified

Subject	Section	Clause	Non-compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Certification at a Lower Category	3.10	6(4) Of Schedule 10.7	All information regarding lower category certification not included in the certification report for one metering installation.	Strong	Low	1	Cleared
Meter Requirements	3.11	26 (4) of Schedule 10.7	41 metering installation certification reports with maximum interrogation cycle incorrectly recorded.	Moderate	Low	2	Identified
Maximum interrogation cycle	3.14	36(3) & (4) of Schedule 10.7	Maximum interrogation cycle not recorded for each services access interface in 17 metering installations.	Moderate	Low	2	Identified
Compliance with part 10	5.1	8(1) Of Schedule 10.7	One category 2 metering installation certified with in-service burden lower than the burden range of the CTs.	Strong	Low	1	Cleared
Certification as a Lower Category	5.5	6(1) Of Schedule 10.7	All information regarding lower category certification not included in the certification report for one metering installation.	Strong	Low	1	Cleared

Subject	Section	Clause	Non-compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Certification tests	5.12	9(1) of Schedule 10.7	ATH process does not ensure that minimum load requirement is always met for Category 1 raw meter data tests. ATH did not record the accumulation of pulses when conducting raw meter data tests. Meter register not incrementing when raw meter date tests conducted on Intellihub Elster gRex meters. Category 2 raw meter data test conducted with load of less than 10 amps on each phase for one metering installation. Prevailing load test not conducted during recertification of one category 1 metering installation.	Moderate	Low	2	Identified
Test Results	5.16	10(1) & (2) of Schedule 10.7	One category 2 metering installation certified with in-service burden lower than the burden range of the CTs.	Strong	Low	1	Cleared
Measuring Transformers used in a Certified Metering Installation	5.37	28(4) Of Schedule 10.7	One category 2 metering installation certified with in-service burden lower than the burden range of the CTs.	Strong	Low	1	Cleared
Low burden	5.40	31 Of Schedule 10.7	One category 2 metering installation certified with in-service burden lower than the burden range of the CTs.	Strong	Low	1	Cleared

Subject	Section	Clause	Non-compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Measuring Transformer Certification	5.67	3 of Schedule 10.8	Burden range not recorded in CT certification reports for 22 metering installations. Three category 2 metering installations with CTs certified without calibration being carried out.	Moderate	Low	2	Identified
Measuring transformers in-service burden.	5.68	2(1)(E) Of Schedule 10.8	Burden range not recorded in CT certification reports for 22 metering installations.	Moderate	Low	2	Identified
					Future Risk Rating	**22**	
					Indicative Audit Frequency	**6 months**	

Future risk rating	1-3	4-6	7-8	9-17	18-26	27+
Indicative audit frequency	36 months	24 months	18 months	12 months	6 months	3 months

Table of Recommendations

Subject	Section	Clause	Recommendation for improvement	Remedial Action
Insufficient Load	5.25	14 of Schedule 10.7	Review the Insufficient Load Certification process to ensure consistency in the recording of the details of the additional checks conducted.	Identified
Error calculation	5.30	22 of Schedule 10.7	Investigate the addition of an allowance in the uncertainty calculation for the influence of the reaction time when using the Hioki 3169 working standards.	Identified

Table of Issues

Issue	Description
	Nil

Persons Involved in This Audit

Auditor:

Brett Piskulic
Veritek Limited
Electricity Authority Approved Auditor

AMS personnel assisting in this audit were:

Name	Title
Trish Johnson	Field Support Manager
Scott Caldwell	Authorised Test House Manager
Andrew Baken	Compliance Manager
Paul Gardiner	Electricity Metering Specialist

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1. ADMINISTRATIVE

1.1 Exemptions from Obligations to Comply with Code (Section 11 of Electricity Industry Act 2010)

Code related audit information

Section 11 of the Electricity Industry Act provides for the Electricity Authority to exempt any participant from compliance with all or any of the clauses.

Audit observation

I checked the Authority's website for any relevant exemptions.

Audit commentary

An exemption was granted on 4th August 2021 (Exemption N0. 297) related to the certification of metering installations for the ARC MEP as follows,

Advanced Metering Services Limited ("AMS") is exempted from complying with the obligations in clause 5(b)(xii) of Schedule 10.8 of the Electricity Industry Participation Code 2010 ("Code") to ensure that the memory and clock of the metering device continues to operate for at least 15 days after power is lost to the device for ARC metering installations, and clause 21 of Schedule 10.7 of the Code which would allow AMS to certify an ARC metering installation that is outside the accuracy tolerances.

AMS confirmed that they had not yet completed any certifications under this exemption.

1.2 Scope of Audit

AMS is a Class A and B ATH, and this audit was performed at their request, to encompass the Electricity Industry Participation Code requirement for an audit to undergo an audit by 26 September 2021, in accordance with clause 16A.19(b).

The audit was conducted in accordance with the ATH Audit Guidelines V1.3 produced by the Electricity Authority.

AMS provides field Test House services to a number of metering equipment owners, retailers and other Test Houses for category 1 to 4 metering. This work is conducted by a combination of staff, subcontractors and other Test Houses.

Most audit requirements of the Class A Test House are covered in their external ISO 17025 Audit, conducted annually by IANZ.

The boundaries of this audit are shown below for greater clarity.

AMS wishes its ATH approval to include the following functions of Clauses 3(2) 4(2) of Schedule 10.3:

<u>Class A Approval:</u>
(a) calibration of—
    (i) working standards:
    (ii) metering components (other than a calibration referred to in paragraph (c)):
    (iii) metering installations:
(b) issuing calibration reports:
(c) calibration of metering components onsite:
(d) installation and modification of metering installations:
(e) installation and modification of metering components:
(f) certification of all categories of metering installations under this Code, and issuing of certification reports:

(g) testing of metering installations under clause 10.44 and production of statements of situation under clause 10.46:
(h) inspection of metering installations.

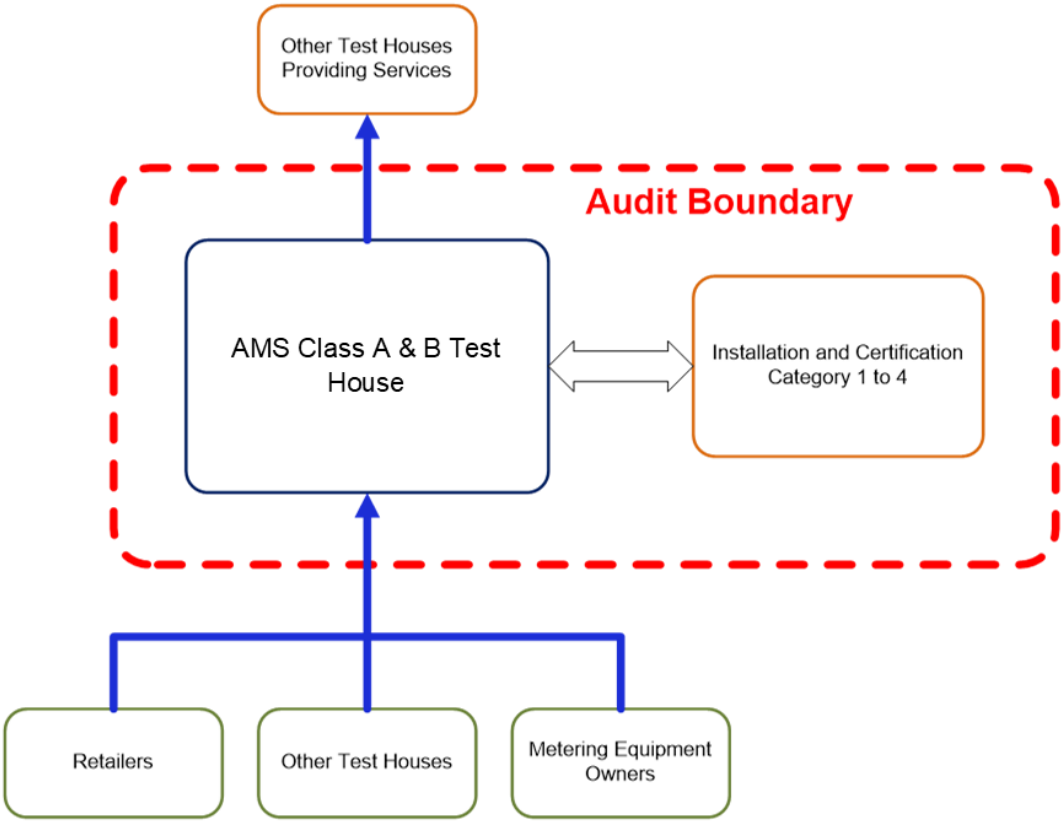
AMS also requires approval to certify metering components. I note that the Class A functions listed in Clause 3(2) of Schedule 10.3 do not include certification of metering components.

Class B Approval

(b) installation and modification of metering installations:
(c) installation and modification of metering components:
(d) calibration of metering components on site:
(e) certification, using the selected component certification method, of:
(i) category 1 metering installations:
(ii) category 2 metering installations:
(iii) category 3 metering installations with a primary voltage of less than 1kV:
(g) certification, using the comparative recertification method, of category 2 metering installations:
(h) issuing of certification reports in respect of certifications of metering installations under paragraphs (e) to (g):
(i) inspection of:
(i) category 1 metering installations:
(ii) category 2 metering installations:
(iii) category 3 metering installations with a primary voltage of less than 1kV.

AMS also requires approval to certify metering components. I note that the Class B functions listed in Clause 4(2) of Schedule 10.3 do not include certification of metering components.

The boundaries of this audit are shown below for greater clarity.



1.3 Previous Audit Results

The last audit was conducted in December 2020 by Steve Woods of Veritek. The findings and current statuses are shown below.

Table of Non-Compliance

Subject	Section	Clause	Non-compliance	Status
Quality Management Systems	2.6	3(1)(b) & (d)(ii) of Schedule 10.3	The ISO 17025 accreditation does not cover field activities for Category 4 installations.	Cleared
Calibration Errors	4.9	5 of Schedule 10.4	Working standard 25505 has a calibration error because its overall error is 1.185%.	Cleared
Data Storage Device Certification	4.12	5 of Schedule 10.8	10 data storage devices certified since the previous audit when they do not comply with the Code, as recorded in the type test report.	Cleared
Compliance with part 10	5.1	8(1) Of Schedule 10.7	ICP 0000030636UNFBB had a test result of + 1.987%, meaning at least one of the components is operating outside its class.	Cleared
Test Results	5.16	10(1) & (2) of Schedule 10.7	ICP 0000030636UNFBB had a test result of + 1.987%, meaning at least one of the components is operating outside its class. 10 installations certified despite the data storage device failing type testing.	Cleared
Selected component certification	5.18	11(4) of Schedule 10.7	10 installations certified as HHR despite the data storage devices not being accurate or fit for purpose.	Cleared
Insufficient Load	5.25	14 of Schedule 10.7	Inadequate additional integrity checks conducted for two ICPs.	Cleared
Data storage device requirements	5.45	5(1) of Schedule 10.8	10 installations certified as HHR despite the data storage devices not being accurate or fit for purpose.	Cleared

Table of Recommendations

Subject	Section	Clause	Recommendation for improvement	Status
Use of contractors	2.1	10.3 of Part 10	Ensure training date is populated for all technicians.	Cleared
Certification & Calibration Reports	3.6	11(1) of Schedule 10.4	Expand type test report table to include each individual requirement in the Code.	Cleared
Calibration Errors	4.9	Clause 5 of Schedule 10.4	Retest working standard 25505 to determine if it has a calibration error. Develop a pass/fail threshold for working standards to ensure they are operating within their class.	Cleared
Management of Burden	5.1	8(1) Of Schedule 10.7	When burden resistance is added, state the VA rating of the resistors or the additional secondary length. Ensure the in-service burden is as close as possible to the rated burden, not just above the minimum burden allowable. This will ensure the best possible accuracy of the metering installation.	Not planned
Category 2 certification tests	5.1	8(1) Of Schedule 10.7	I recommend VEMS sets a pass/fail threshold for Category 2 comparative testing which takes into account the class of the metering components.	Cleared
Insufficient Load	5.25	14 of Schedule 10.7	Change instructions for photo checking to describe what the photo is depicting. Strengthen the photo checking for insufficient load certification.	Cleared

2. ATH REQUIREMENTS

2.1 Use of Contractors (Clause 10.3 of Part 10)

Code related audit information

A participant may perform its obligations and exercise its rights under this Part by using a contractor. A participant who uses a contractor to perform the participant's obligation under this Part remains responsible and liable for, and is not released from, the obligation, or any other obligation under this Part.

Audit observation

I checked AMS understands this requirement by conducting a walk-through of contractor management processes. I checked the processes in place to ensure contractors are competent and are following the AMS instructions.

Audit commentary

The Code states that AMS "must ensure that the contractor has at least the specified level of skill, expertise, experience, or qualification that the participant would be required to have if it were performing the obligation itself." The initial training of technicians involves one day of theory followed by one day in the field with a trainer. A training plan is then determined based on the individual's experience and competency. Work completed by newly approved technicians is flagged for photo checking for a minimum of 30 days and audits are completed of samples of their work.

At the time of the audit AMS had 117 active contractors operating under their Test House.

A competency and assurance plan has been implemented by AMS. A competency assessment of each technician is completed at least once per year. Live and post job audits are completed as part of the competency assessment. The assessment considers the technicians current competency in relation to both technical and health and safety requirements. The assessment has been extended to also cover personal attributes such as attitude and behaviour.

The results of competency assessments and audits are recorded in the technician database, and remedial actions are taken as a result of the audit findings.

I consider the management of contractors to be compliant and the intended improvements appear to be well thought out.

Audit outcome

Compliant

2.2 Provision of Accurate Information (Clause 10.6 of Part 10)

Code related audit information

A participant must take all practicable steps to ensure that information that it provides under this Part is:

- *complete and accurate*
- *not misleading or deceptive*
- *not likely to mislead or deceive.*

If a participant, having provided information under this Part, becomes aware that the participant has not complied with these requirements, the participant must, except if clause 10.43 applies, as soon as

practicable provide such further information, or corrected information, as is necessary to ensure that the participant complies.

Audit observation

I checked compliance with this clause to determine whether compliance had been achieved.

Audit commentary

Five issues were identified during the audit where incomplete or inaccurate information was recorded in metering installation certification reports. The issues are as follows:

- each services access interface not recorded for 16 of 79 metering installations metering installations certified since 1 February 2021 (**sections 3.2** and **3.5**),
- metering installation type recorded incorrectly for 18 of 79 metering installations certified since 1 February 2021 (**section 3.2**),
- all information regarding lower category certification not included in the certification report for one metering installation (**sections 3.10** and **5.5**).
- incorrect maximum interrogation cycle recorded in 41 of 79 metering installations certified since 1 February 2021 (**section 3.11**).
- maximum interrogation cycle not recorded for each services access interface in 17 of 79 metering installations since 1 February 2021 (**section 3.14**).

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.2 With: Clause 10.6 of Part 10 From: 01-Feb-21 To: 26-Aug-21	Each services access interface not recorded for 16 of 79 metering installations metering installations certified since 1 February 2021. Metering installation type recorded incorrectly for 18 of 79 metering installations certified since 1 February 2021. All information regarding lower category certification not included in the certification report for one metering installation. Incorrect maximum interrogation cycle recorded in 41 of 79 metering installations certified since 1 February 2021. Maximum interrogation cycle not recorded for each services access interface in 17 of 79 metering installations since 1 February 2021. Potential impact: Low Actual impact: Low Audit history: None Controls: Moderate Breach risk rating: 2

Audit risk rating	Rationale for audit risk rating		
Low	The controls are recorded as moderate because they mitigate risk most of the time but there is room for improvement. The MEP has correctly recorded the certification information in the registry therefore the impact is recorded as low.		
Actions taken to resolve the issue		**Completion date**	**Remedial action status**
Actions covered in following Non-compliances		31/10/2021	Identified
Preventative actions taken to ensure no further issues will occur		**Completion date**	
Ongoing QA activities and controls to ensure we maintain compliance in this area.		Ongoing	

2.3 Dispute Resolution (Clause 10.50(1) to (3) of Part 10)

Code related audit information

Participants must in good faith use best endeavours to resolve any disputes related to Part 10 of the Code. Disputes that are unable to be resolved may be referred to the Authority for determination. Complaints that are not resolved by the parties or the Authority may be referred to the Rulings Panel by the Authority or participant.

Audit observation

I checked whether any disputes had been dealt with by AMS during the audit period.

Audit commentary

AMS has not needed to resolve any disputes in accordance with these clauses.

Audit outcome

Compliant

2.4 ATH Approval (Clause 10.40 of Part 10)

Code related audit information

A person wishing to be approved as an ATH, or an ATH wishing to renew its approval, must apply to the Authority:

- *at least two months before the intended effective date of the approval or renewal*
- *in writing*
- *in the prescribed form*
- *in accordance with Schedule 10.3.*

A person making an application must satisfy the Authority (providing, where appropriate, suitable evidence) that the person:

- *has the facilities and procedures to reliably meet, for the requested term of the approval, the minimum requirements of this Code for the class or classes of ATH for which it is seeking approval*
- *has had an audit under Schedule 10.3*
- *is a fit and proper person for approval.*

Audit observation

I checked the most recent application for re-certification.

Audit commentary

AMS has appropriate approval and appropriate facilities and procedures to meet the minimum requirements of the Code.

Audit outcome

Compliant

2.5 ATH Requirements (Clause 10.41 of Part 10)

Code related audit information

An ATH must, when carrying out activities under this Part:

- *only carry out activities for which it has been approved by the Authority*
- *exercise a degree of skill, diligence, prudence, foresight, and economic management, taking into account the technological complexity of the metering components and metering installations being tested:*
  - *determined by reference to good industry practice*
  - *that would reasonably be expected from a skilled and experienced ATH engaged in the management and operation of an approved ATH*
- *comply with all applicable safety, employment, environmental, and other enactments*
- *exercise any discretion given to it under this Part by:*
  - *taking into account the relevant circumstances of the particular instance*
  - *acting professionally*
- *recording the manner in which it carried out its activities and its reasons for carrying the activities out in that manner.*

Audit observation

I checked policy and process documentation along with the ISO reports to confirm compliance with these clauses.

Audit commentary

AMS has only conducted activities that fall within the scope of their approval. I have concluded from this audit that AMS currently meets the requirements of this clause.

I checked compliance with other enactments, specifically the electricity regulations with regard to safety practices and I confirm the following critical points are managed in a robust manner:

- livening practices, specifically polarity testing - photo checks are conducted for 20% of all work completed by technicians and supply polarity testing using Trailing earth leads are conducted for all new connections,

- Safety practices with regard to the management of asbestos switchboards - the instruction is very comprehensive for this activity and the overall regime includes health monitoring, and the agents do not conduct work on asbestos boards, and

- general safety practices and the appropriate use and testing of personal protective equipment - there is good instruction on the use of PPE, working on live installations and the reporting of incidents.

Competency assessments of all technicians include health and safety requirements.

Audit outcome

Compliant

2.6 Quality Management Systems (Clauses 3(1) & 4(1) of Schedule 10.3)

Code related audit information

An ATH must establish, document, implement, maintain, and comply with a quality management system which records its processes and procedures to ensure compliance with this Part.

An applicant applying for approval or renewal of approval, as a class A ATH must, as part of its application, confirm that it holds and complies with AS/NZS ISO 17025 accreditation, for at least the requested term of the approval.

An applicant applying for approval, or renewal of approval, as a class B ATH must, as part of its application to the Authority, confirm that it holds and complies with AS/NZS ISO 9001:2008 or AS/NZS ISO 9001:2016 certification for at least the requested term of the approval.

Audit observation

I obtained and reviewed the most recent ISO reports to confirm the scopes were appropriate and that certification was in place.

Audit commentary

AMS provided a copy of their most recent ISO 9001:2015 audit report, dated June 2021, which was conducted by Telarc. There were no issues raised relevant to the operation of the Class A and B ATHs. The overall findings of the report are as follows:

Overall, it was observed that the organisation continues to embrace the principles of implementing a quality management system approach for their services and activities. This was reinforced by those spoken to and documented information presented which underpins the organisation commitment to the requirements of the ISO quality management standard to both enhance their practises and provide better outcomes for their clients.

The scope of the ISO 9001: 2015 certification includes the following statements relevant to the operation of the class A and B ATHs:

> *The management of contracts for the installation, maintenance, testing and certification for Mass-Market and Commercial & Industrial metering installations.*
>
> *The design and specification of Commercial & Industrial customer metering solutions.*
>
> *The management of contracts for the installation, maintenance, testing and certification of metering installations, including the design and specification of customer metering solutions.*
>
> *The provision of Class A Approved Test House metering services, including:*
>
> *1. Category 4 - Low voltage.*
>
> *2. Meter Testing Class 0.2 and Class 0.5*
>
> *The provision of Class B Approved Test House metering services, including:*
>
> *1. Calibration of Class 1 and Class 2 meters and Class 0.5 CTs, and issuing resulting calibrations reports.*

2. Installation of metering equipment.

Commissioning and certifying category 1-3 metering installations under the provisions of the Electricity Industry Participation Code.

AMS also provided a copy of their most recent ISO 17025 Technical Assessment audit report, dated June 2021, which was conducted by IANZ.

The scope of their ISO 17025 certification is noted as:

Field of operations: Metrology and Calibration Laboratory

Subfields: Energy meters and current transformers

Key Technical Personnel are noted as:

Grant Batchelor 5.85, 5.89

Scott Caldwell 5.85, 5.89

Paul Gardiner 5.85, 5.89

Ban Glanville 5.85, 5.89

The report states the following in relation to the Metrology & Calibration Laboratory:

With the exceptions of those Corrective Action Requests (CARs) listed below, the assessment found the laboratory was in compliance with the requirements of accreditation.

· CAR 1 – Laboratory accreditation number

· CAR 2 – Verification of calibration frequency extension

· CAR 3 – Correction factors and uncertainty

· CAR 4 – Laboratory methods

· CAR 5 – Analysis of intra-laboratory comparison results

Laboratory staff were observed to be technically competent and had improved in their knowledge of measurement uncertainty. Improvements were being implemented including increasing the frequency of the management review meetings to help keep track of quality processes.

The non-conformances raised and their current status are shown in the table below.

Issue	Description	Status
Corrective Action	**Laboratory accreditation number** The laboratory had updated their calibration certificate templates to include the latest version of the IANZ logo. However, the version of the logo added did not include the laboratory's accreditation number nor was the number quoted on the certificate. The laboratory is requested to update the calibration certificate templates with a logo or reference to the laboratory's accreditation number. Please advise what action was undertaken and provide supporting evidence including the updated templates. Agreed clearance date: 9 August 2021	Cleared

Corrective Action	**Verification of calibration frequency extension** The Zera WM303I current transformer test system had been calibrated on the 12 December 2017 and had been affixed with a calibration sticker with a due date of 12 December 2020. A review of the calibration schedule indicated that the calibration interval had been extended to 5 years i.e. a due date of 12 December 2022. However, there was no evidence that the laboratory had verified that the calibration interval could be extended whilst maintaining confidence in the equipment. The laboratory is requested to verify the calibration interval extension, affix an updated calibration sticker and perform a root cause analysis. Please advise what action was undertaken and provide supporting evidence including the verification documentation and the results of the root cause analysis. Agreed clearance date: 9 August 2021	Cleared
Corrective Action	**Correction factors and uncertainty** Issues relating to the use of corrections and uncertainty calculations for the Landis & Gyr test bench were found: A. The uncertainty for the TVH4.322 standard was traceable to the MA10. However, the values and comments at 0.5 lag were incorrect and instead included the value of the MA10 unity power factor uncertainty. B. The corrections associated with the MA10 were not applied to the TVH4.322 standard. However, an uncertainty component that took the correction into account was not included in the TVH4.322 uncertainty calculation. C. The corrections associated with the TVH4.322 standard were not applied to the meter under calibration. However, an uncertainty component that took the correction into account was not included in the meter uncertainty calculation. Note that this had been raised in CAR 1 of the 2019 IANZ assessment. The laboratory is requested to correct the errors in the Landis & Gyr test bench uncertainty calculations and perform a root cause analysis. Please advise what action was undertaken and provide supporting evidence including the updated calculations and the results of the root cause analysis. Agreed clearance date: 9 August 2021	Cleared
Corrective Action	**Laboratory methods** A process was in place for demagnetizing the current transformers when requested, the unit failed or if unusual results are found when compared to other units. However, the current procedure for demagnetization did not include checking the wave form for distortion associated with core saturation. The laboratory is requested to update its current transformer demagnetization process and procedures to include a check of the wave form. Please advise what action was undertaken and provide supporting evidence including the updated procedure. Agreed clearance date: 9 August 2021	Cleared

Corrective Action	**Analysis of intra-laboratory comparison results** A criteria had been defined for intra-laboratory comparisons based on the difference in results between two operators. All results were entered into Proficiency Testing Spreadsheet 2020.xlsx where the difference was calculated, and a column used to manually enter whether the result passed. However, there were numerous instances in the spreadsheet where the difference was outside of the criteria limit yet was marked as having passed with no analysis or comments as to the reason. For example, in the most recent intra-laboratory comparison performed in November and December 2020, the difference for the test point Y 2.5 A Pf 1.0 was -0.103 % and outside the limit of ±0.028 %. The laboratory is requested to analyse and comment on the results from the November/December 2020 comparison, update the spreadsheet to automatically check pass/fail of the criteria and to perform a root cause analysis. Please advise what action was undertaken and provide supporting evidence including results of the analysis, the updated spreadsheet and results of the root cause analysis. Agreed clearance date: 9 August 2021	Cleared

In the last audit it was recorded that the ISO 17025 scope did not include field work, as required by Clause 3(1)(d)(ii) of Schedule 10.3. I viewed the Certificate of Accreditation issued by IANZ on 28th June 2021 and confirmed the scope has been updated to include the field calibration of current transformers.

Audit outcome

Compliant

2.7 Organisation and Management (Clause 15 of Schedule 10.4)

Code related audit information

An ATH must ensure that it has managerial staff who, unless otherwise permitted in the relevant approval, all have the authority and resources needed to discharge their duties; and the responsibilities, authority, and functional relationships of all its personnel are fully and accurately specified and recorded in the ATH's records.

An ATH must appoint a technical manager (however named) with overall responsibility for technical operations, who must have appropriate engineering qualifications and experience in the operation of an approved ATH; and a quality manager (however named), with responsibility for the quality management certification and the implementation of the quality management system.

Audit observation

I checked records in the quality manual to confirm compliance.

Audit commentary

An ATH must appoint a technical manager (however named) with overall responsibility for technical operations, who must have appropriate engineering qualifications and experience in the operation of an approved ATH; and a quality manager (however named), with responsibility for the quality management certification and the implementation of the quality management system.

AMS has appointed Scott Caldwell as Technical Manager and Quality Manager.

The AMS quality system consists of a contractor's manual for field activities and a laboratory quality manual. Technical procedures/work instructions are now in a cycle of internal audit.

An ATH must ensure that all staff who perform or supervise work or activities regulated under this Part are technically competent, experienced, qualified, and trained for the functions they perform. As recorded in **section 2.6**, AMS conducts regular competency assessments to ensure current competency of all technicians.

Audit outcome

Compliant

2.8 Document Processes and Procedures (Clause 16 Of Schedule 10.4)

Code related audit information

An ATH must establish, document, implement, maintain, and comply with a quality management system which records its processes and procedures.

Audit observation

I checked the Class A and Class B quality documentation, and I reviewed the relevant ISO reports.

Audit commentary

The quality management system meets the requirements of the Code, this is confirmed by the ISO reports.

Audit outcome

Compliant

2.9 Quality Standard Required for Field Work (Clause 17 Of Schedule 10.4)

Code related audit information

If a class A ATH arranges for another person to carry out field work, it must ensure that person is certified to the relevant AS/NZS ISO9001:2008 or AS/NZS ISO9001:2016 standard at all times while the person carries out the work.

Audit observation

AMS has not required other parties to carry out field work.

Audit commentary

AMS has not required other parties to carry out field work.

Audit outcome

Not applicable

2.10 Material Change Requirements (Clause 16A.11)

Code related audit information

If the ATH intends to make a material change to any of its facilities, processes, procedures, or the scope of the ATH's ISO accreditation is reduced, the ATH must arrange for an additional audit at least five business days before the change or reduction in scope take place.

Audit observation

I checked whether AMS had made any material changes during the audit period.

Audit commentary

AMS has not made any material changes during the audit period.

Audit outcome

Not applicable

2.11 Audit Required for ATH Approval (Clause 16A.12 and 16A.13)

Code related audit information

The ATH must provide an audit report to the Authority by the due date. If there are areas where compliance is not achieved, the ATH must also submit a compliance plan which specifies the actions that the ATH intends to address, any issues identified in the audit report and the time frames to complete those actions.

Audit observation

AMS is currently undergoing an audit and the report will be provided with a compliance plan.

Audit commentary

AMS is currently undergoing an audit and the report will be provided with a compliance plan.

Audit outcome

Compliant

2.12 Accommodation & Environment (Clause 1 of Schedule 10.4)

Code related audit information

An ATH must maintain a list of personnel who are authorised to access and use its laboratory and storage facilities and restrict access to its laboratory and storage facilities to:

(i) the personnel specified

(ii) the Authority

(iii) an auditor conducting an audit

(iv) any other person who is, at all times, directly supervised by a member of personnel specified.

Audit observation

I checked records to confirm compliance.

Audit commentary

Access to the laboratory is via the storage area which is always manned or locked. The quality manual identifies authorised personnel in various sections and there is a list attached to the laboratory door.

The Class A laboratory is audited annually by IANZ, and this audit considers environmental issues. Recent audits found that the accommodation and environmental conditions were appropriate. Temperature control is being maintained at 23º ±2º Celsius.

Audit outcome

Compliant

2.13 Compensation Factors (Clause 8 of Schedule 10.4)

Code related audit information

If an ATH is approved to certify metering installations, the ATH must have a documented process for the determination of compensation factors.

Audit observation

I checked the documentation in relation to compensation factors.

Audit commentary

AMS applies compensation factors related to current transformer ratios only. The ratios are confirmed as correct via calculation from primary and secondary values recorded in the installation check sheets by the technicians on site. The documentation achieves compliance with the Code.

Audit outcome

Compliant

2.14 Metering Component Stickers (Clause 8(3) of Schedule 10.8)

Code related audit information

An ATH must ensure that a certification sticker is:

- made of weather-proof material

- permanently attached

- filled out using permanent markings.

Audit observation

I checked the AMS component stickers to confirm compliance.

Audit commentary

All component stickers are compliant with this clause.

Audit outcome

Compliant

2.15 Interference with Metering Installations (Clause 10.12)

Code related audit information

An ATH may not directly or indirectly interfere with a metering installation unless it is also the MEP or has been instructed to do so by the existing or gaining MEP for the installation.

Audit observation

I audited this clause by exception.

Audit commentary

I did not identify any interference by AMS during the audit.

Audit outcome

Compliant

2.16 Participants to give access (Clause 16A.4)

Code related audit information

A participant must give the auditor full access to all information that may be required for the purposes of carrying out an audit. The participant must provide the information no later than 15 business days after receiving a request.

Audit observation

I requested a large number of certification reports and other records for the audit.

Audit commentary

All records were provided within the required timeframe.

Audit outcome

Compliant

3. METERING RECORDS AND REPORTS

3.1 Physical Location of Metering Installations (Clause 10.35 of Part 10)

Code related audit information

If it is not practical in the circumstances to locate the metering installation at the point of connection, the reconciliation participant must calculate the quantity of electricity conveyed through the point of connection using a loss compensation process approved by the certifying ATH.

If this occurs the ATH must record the calculation, measurements, and assumptions in the installation certification report.

Audit observation

I checked whether AMS had certified any installations with loss compensation.

Audit commentary

AMS has not been required to conduct any loss compensation calculations.

Audit outcome

Not applicable

3.2 Metering Installation Type (Clause 8(2) of Schedule 10.7)

Code related audit information

The metering installation certification report must specify whether the installation is half hour, non-half hour or half hour and non-half hour metering.

The metering installation certification report must also record each services access interface and the conditions under which each services access interface may be used.

Audit observation

I checked 79 certification reports to confirm compliance.

Audit commentary

This clause was changed from 1st February 2021 to require the ATH to record each services access interface and the conditions under which each services access interface may be used and whether the installation is half hour, non-half hour or half hour and non-half hour metering. The code change was announced on 15th December 2021. Prior to this change the ATH was required to determine and record a single services access interface and whether the installation is half hour or non-half hour.
All 79 of the certification records checked were for certifications completed after 1st February 2021.
My checks of the 79 records found that the installation type was recorded incorrectly for 18 metering installations and each services access interface was not recorded correctly for 16 metering installations. A breakdown of this is shown in the table below.

Category	Records checked	Installation type correctly recorded	Each services access interface recorded
1	30	28	28
2	30	14	17
3	9	9	8
4	10	10	10

Audit outcome

Non-compliant

<table>
<tr><th>Non-compliance</th><th>Description</th></tr>
<tr><td>Audit Ref: 3.2
With: Clause 8(2) of Schedule 10.7

From: 01-Feb-21
To: 26-Aug-21</td><td>Metering installation type recorded incorrectly for 18 of 79 metering installations.
Each services access interface not recorded correctly for 16 of 79 metering installations.
Potential impact: Low
Actual impact: None
Audit history: None
Controls: Moderate
Breach risk rating: 2</td></tr>
<tr><th>Audit risk rating</th><th>Rationale for audit risk rating</th></tr>
<tr><td>Low</td><td>I have recorded the controls as moderate as not all AMS processes have been updated to record each services access interface and installation type.
There is no impact because the MEP normally determines the location of the services access interface and metering installation type; therefore, the audit risk rating is low.</td></tr>
</table>

Actions taken to resolve the issue	Completion date	Remedial action status
As detailed below. Cat 1& 2 mass market implemented. Cat 2 – 4 TOU will be rolled out by mid-October. For Cat 1 and 2 Mass Market sites the following information will be included on the issued certifications. The example below is for an EDMI whole current meter. Interval: HHR NHH HHR NHH Maximum Interrogation Cycle: 90 90 90 90 Service Access Point: Remote Remote Local Local Condition: Comm. Comm. No Comm. No Comm. For Cat 2 - 4 TOU CT sites the following format will be used: Interval: HHR HHR Maximum Interrogation Cycle: 30 30 Service Access Point: Local Local Condition: Comm. No Comm. The MIC numbers are place holders as we are waiting for EDMI to respond with regards the technical information we have requested from them.	31/10/2021	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	

Implementation of the meter interval classification documentation will be automated.	31/10/2021	

3.3 Record Metering Installation Category (Clause 8(4) Of Schedule 10.7)

Code related audit information

An ATH must record the category of the metering installation in the metering installation certification report.

Audit observation

I checked 79 certification reports to confirm compliance.

Audit commentary

All reports correctly recorded the metering category.

Audit outcome

Compliant

3.4 Calibration Test Points (Clause 7(7) Of Schedule 10.4)

Code related audit information

An ATH may select a test point other than those specified in the relevant standard listed in Table 5 of Schedule 10.1, or at a lower burden than specified in the standard, but must, if it does this, document its reasons for the selection of these test points in the calibration report.

Audit observation

I checked with AMS whether any different test points had been used.

Audit commentary

There were no different test points used other than those specified in the standards.

Audit outcome

Compliant

3.5 Services Access Interface (Clause 10 of Schedule 10.4)

Code related audit information

An ATH must, when preparing a metering installation certification report, determine, and record in the certification report, the services access interfaces and the conditions under which each services access interface may be used. The services access interface means the point, at which access may be gained to the services available from a metering installation, that is:

- *recorded in the certification report by the certifying ATH for the metering installation,*
- *where information received from the metering installation can be made available to another person*
- *where signals for services such as remote control of load (but not ripple control) can be injected.*

Audit observation

I checked a sample of 79 certification records to confirm compliance.

Audit commentary

This clause was changed from 1st February 2021 to require the ATH to record each services access interface and the conditions under which each services access interface may be used. The code change was announced on 15th December 2021. Prior to this change the ATH was required to determine and record a single services access interface.

All 79 of the certification records checked took place after 1st February 2021.
My checks of the 79 records found that each services access interface was not recorded correctly for 16 metering installations. A breakdown of this is shown in the table below.

Category	Records checked	Each services access interface recorded
1	30	28
2	30	17
3	9	8
4	10	10

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.5 With: Clause 10 of Schedule 10.4 From: 01-Feb-21 To: 26-Aug-21	Each services access interface not recorded for 16 of 79 metering installations certified since 1/02/21. Potential impact: Low Actual impact: None Audit history: None Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	I have recorded the controls as moderate as not all AMS processes have been updated to record each services access interface. There is no impact because the MEP normally determines the location of the services access interface; therefore, the audit risk rating is low.

Actions taken to resolve the issue	Completion date	Remedial action status
As detailed in 3.2	31/10/2021	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Implementation of the meter interval classification documentation will be automated.	31/10/2021	

3.6 Certification & Calibration Reports (Clause 11(1) of Schedule 10.4)

Code related audit information

An ATH must, for each metering installation that it certifies, produce a certification report in accordance with Schedule 10.7. An ATH must, for each metering component:

- *that it calibrates, produce a calibration report in accordance with Schedule 10.8*
- *that it certifies, produce a certification report in accordance with Schedule 10.8.*

Audit observation

I requested a sample of 79 certification records to confirm compliance.

Audit commentary

Metering installation certification reports were provided for all 79 installations. The metering installation and metering component certification reports are combined and include all the required information. AMS calibrates meters and CTs and produces a calibration report that meets the requirements of this clause, this is also confirmed by the ISO 17025 audit report.

Audit outcome

Compliant

3.7 ATH Record Keeping Requirements (Clause 12 of Schedule 10.4)

Code related audit information

The ATH must document and maintain its record keeping system for certificates, reports, and any other records. The records can be stored in any media, such as hard copy or electronically. The records should be stored in a manner that prevents deterioration or damage and that retrieval of a record cannot result in change or damage to the record. Electronic storage should be backed up.

The ATH must securely store all records, certificates, and reports and ensure that each metering installation is:

- uniquely identified

- sufficiently detailed to verify the tests carried out including test conditions, the test equipment used and the personnel carrying out the tests.

Audit observation

I checked the certification records for 79 metering installations along with the storage practices.

Audit commentary

All records were available, and records are stored indefinitely.

Audit outcome

Compliant

3.8 Retention of Records (Clause 13 of Schedule 10.4)

Code related audit information

The ATH must keep all records, certificates, and calibration reports for all components and installations certified for at least 48 months after the date of decommissioning.

Audit observation

I checked the certification records for 79 metering installations along with the storage practices.

Audit commentary

Records are stored indefinitely.

Audit outcome

Compliant

3.9 Advise MEP of Records, Certificates or Reports for a Metering Installation (Clause 14 Of Schedule 10.4)

Code related audit information

The ATH must provide the MEP responsible for the metering installation with the record, certificate, or report for the metering installation within five business days of certification. The ATH must ensure the MEP receives the record. This can be either as an electronic copy or any other agreed format.

Audit observation

I checked the process for sending records to MEPs.

Audit commentary

As soon as a record is created, it is sent to the MEP, therefore there are no delays.

Audit outcome

Compliant

3.10 Certification at a Lower Category (Clause 6(4) Of Schedule 10.7)

Code related audit information

If the ATH makes a determination to certify a metering installation at a lower category under clause 6 of Schedule 10.7, the certification report must include all information required to demonstrate compliance.

Audit observation

I checked the AMS processes and two examples of certification as a lower category.

Audit commentary

The AMS process requires the inclusion in the metering installation certification report of details of the lower category certification including advice to the MEP regarding the requirement to monitor the load or the consumption.

In one of the examples checked (ICP 0006146333RND66, Certification No. VC13203) the nominal installation category was Category 3 based on the 1200/5 CTs. The installation was certified as Category 2 but there were no details of the lower category certification or advise to the MEP regarding monitoring of load recorded in the metering installation certification report. The AMS process normally includes the provision of details of the information regarding load or current limiting devices to the technician in the work instructions. In this case the technician was issued the job as a comms fault job and did not include these details. The technician replaced the meter to resolve the comms fault and did not include the lower category certification details. This was also not picked up by the validation process which is applied to all Category 2 and above certifications.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.10 With: Clause 6(4) Of Schedule 10.7 From: 20-May-21 To: 26-Aug-21	All information regarding lower category certification not included in the certification report for one metering installation. Potential impact: Low Actual impact: None Audit history: None Controls: Strong Breach risk rating: 1
Audit risk rating	**Rationale for audit risk rating**
Low	I have recorded the controls as strong as the AMS process normally includes all required details. The impact on settlement is low because there was only one example identified. There is also an impact on the MEP because certification is cancelled.

Actions taken to resolve the issue	Completion date	Remedial action status
Certificate has been retracted due to the incorrect burdening identified in a subsequent non-compliance and the MEP informed and asked to arrange for recertification. The recertification will use Schedule 10.7 clause 6 Lower category of installation than the rating of the current transformers as the correct certification method and conditions for the MEP. Load profile has been confirmed to be <500A.	Completed	Cleared
Preventative actions taken to ensure no further issues will occur	**Completion date**	
The issues with this particular job have been reviewed with all validators and they all showed a good understanding of the correct approach to be taken and what factors to be checked/requested. From our review this was an isolated incident. We are confident that the current processes and training should prevent further such mistakes occurring.	Completed	

3.11 Meter Requirements (Clause 26(3) & (4) of Schedule 10.7)

Code related audit information

The ATH needs to document the following in the metering records:

- the meter manufacturer's required recommendations for regular maintenance

- any maintenance that has been carried out on the meter, such as battery monitoring and replacement.

An ATH must record in the metering installation certification report, the maximum interrogation cycle for the metering installation before it certifies a metering installation incorporating a meter.

Audit observation

I checked process documentation, conducted a walk-through of the process and checked 79 certification records.

Audit commentary

AMS as a Class A ATH has not certified any installations where the meter requires maintenance and they have not conducted any maintenance on any components. As a Class B ATH, AMS is unlikely to deal with any meters where maintenance is required. All AMI devices installed have battery monitoring conducted as part of the data collection function.

I checked 79 certification reports to confirm if the maximum interrogation cycle is recorded. In 41 of the 79 certification reports, the maximum interrogation cycle was recorded incorrectly when compared to the figure recorded by the MEP in the Registry. Details of these are included in the table below:

MEP	Meter type	Number	MIC recorded by AMS ATH	Registry MIC
LMGL	Non-smart Cat 1	1	90	365
MTRX	EDMI Cat 1	2	90	365
MTRX	Elster Cat 1	1	30	40
MTRX	EDMI Cat 2	1	90	150
MTRX	EDMI Cat 2	1	30	150
MTRX	EDMI Cat 3	1	30	150
AMCI	EDMI Cat 2 & 4	9	90	200
AMCI	EDMI Cat 2,3 & 4	17	30	200
NGCM	EDMI Cat 2	4	30	90
FCLM	EDMI Cat 2 & 3	4	30	90

I have also recorded non-compliance in **section 3.14** as the maximum interrogation cycle was not recorded for each services access interface.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.11 With: Clause 26 (4) of Schedule 10.7 From: 01-Feb-21 To: 26-Aug-21	41 metering installation certification reports with maximum interrogation cycle incorrectly recorded. Potential impact: Low Actual impact: Low Audit history: None Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are recorded as moderate because there is room for improvement. There is very little impact on other participants; therefore, the audit risk rating is low.

Actions taken to resolve the issue	Completion date	Remedial action status
As detailed in 3.2 This is an area where all industry participants have been inattentive and working to the status quo for several years. The new clarifications on the requirements for MIC has highlighted inconsistencies which are now being addressed. The MIC values supplied by other MEPs is under review.	31/10/2021	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Implementation of the meter interval classification documentation will be automated.	31/10/2021	

3.12 Meter Certification Expiry Date (Clause 27(5) of Schedule 10.7)

Code related audit information

The ATH must record the certification expiry date for each meter in a metering installation in the metering installation certification report and the meter certification report.

Audit observation

I checked 79 certification records to confirm compliance.

Audit commentary

Certification expiry dates are correctly calculated and recorded.

Audit outcome

Compliant

3.13 Measuring Transformer Requirements (Clause 28(3) of Schedule 10.7)

Code related audit information

The ATH needs to document the following in the metering records:

- the manufacturer's recommendations for any regular maintenance required for the measuring transformer

- any maintenance that has been carried out on the measuring transformer.

Audit observation

I checked whether any measuring transformers required maintenance.

Audit commentary

AMS has not installed any measuring transformers where maintenance is required. Certification reports confirm this fact.

Audit outcome

Not applicable

3.14 Determine Maximum Interrogation Cycle (Clause 36(3) & (4) Of Schedule 10.7)

Code related audit information

An ATH must record the maximum interrogation cycle for each services access interface for the metering installation. The maximum interrogation cycle for a metering installation is the shortest of the following periods:

- the period of inherent data loss protection for the metering installation

- the period of memory availability given the data storage device configuration

- the period in which the accumulated drift of a data storage device clock is expected to exceed the maximum time error set out in Table 1 of clause 2 of Schedule 15.2 for the category of the metering installation.

Audit observation

I checked processes and the records for 79 metering installations to confirm compliance.

Audit commentary

All 79 certification reports included one maximum interrogation cycle. This clause was changed from 1st February 2021 to require the ATH to record the maximum interrogation cycle for each services access interface.

The NGCM MEP has specified that the maximum interrogation cycle remains the same for both remote and local services access interfaces. Certifications for the NGCM MEP therefore correctly include only one maximum interrogation cycle.

Other MEPs require the maximum interrogation cycle of 365 days to be recorded for the local services access interface when mass market Category 1 and 2 AMI meters are certified for both AMI and non-AMI operation.

I have recorded non-compliance with this clause as the maximum interrogation cycle was not recorded for each services access interface in 17 certification records.

I have recorded in **section 3.11** that the maximum interrogation cycle was incorrectly recorded in 41 of the certification reports.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.14 With: Clause 36(3) & (4) of Schedule 10.7 From: 01-Feb-21 To: 26-Aug-21	Maximum interrogation cycle not recorded for each services access interface in 17 metering installations. Potential impact: None Actual impact: None Audit history: Once Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**

Low	I have recorded the controls as moderate because there is room for improvement. There is no impact on MEPs because they are the source of this information anyway; therefore, the audit risk rating is low.

Actions taken to resolve the issue	**Completion date**	**Remedial action status**
As detailed in 3.2 This is an area where all industry participants have been inattentive and working to the status quo for several years. The new clarifications on the requirements for MIC has highlighted inconsistencies which are now being addressed. The MIC values supplied by other MEPs is under review.	31/10/2021	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Implementation of the meter interval classification documentation will be automated.	31/10/2021	

4. CALIBRATION AND CERTIFICATION OF METERING COMPONENTS

4.1 Accommodation and Environment (Clause 1(D)-(E) Of Schedule 10.4)

Code related audit information

The ATH must ensure that the environment in which its activities are undertaken is monitored, appropriate for the tests being carried out and unlikely to affect the required accuracy.

Audit observation

I checked the IANZ report which confirmed the test laboratory environment was appropriate.

Audit commentary

I checked the IANZ report which confirmed the test laboratory environment was appropriate.

Audit outcome

Compliant

4.2 Use of Measurement Standards (Clause 1(F) Of Schedule 10.4)

Code related audit information

The ATH must comply with the specific requirements of the applicable standard listed in Table 5 of Schedule 10.1.

Audit observation

I checked the standards being used and the test points to confirm compliance.

Audit commentary

AMS uses the correct standards.

Audit outcome

Compliant

4.3 Test Equipment (Clause 2 of Schedule 10.4)

Code related audit information

An ATH must, at all times, ensure that it has access to all items of equipment required for the performance of the calibrations and tests it is approved to undertake under this Part; and each item of equipment it uses is maintained in accordance with the manufacturer's recommendations and this Code. A class B ATH must have and maintain procedures for the purchase of test equipment and associated consumables.

Audit observation

I checked records in the faults log and maintenance log to confirm compliance.

Audit commentary

The requirement for maintenance or repairs to test equipment is an uncommon event. AMS has a spreadsheet which contains all maintenance and testing records for all test equipment. Compliance is confirmed.

A class B ATH must have and maintain procedures for the purchase of test equipment and associated consumables. The relevant operating procedure was demonstrated during the audit. The relevant consumables are seals, and stickers.

Audit outcome

Compliant

4.4 Calibration of Reference & Working Standards (Clause 3(1)(a), (b)(i) and (6) of Schedule 10.4)

Code related audit information

An ATH must ensure that any reference standard is calibrated by an approved calibration laboratory and that any working standard is calibrated by an approved calibration laboratory or class A ATH. The calibration reports for the calibrated standards must be held by the ATH and indicate that the standard is within the manufacturer's accuracy specifications.

Audit observation

I checked the records of the AMS reference and working standards to confirm they had current calibration certificates.

Audit commentary

AMS provided calibration records confirming the following standards have current calibration:

- AVO MA10-08 - Meter reference standard, which was last calibrated by MSL in March 2021,
- L+G TVH 4.322 - Meter test bench working standard - June 2021,
- L+G TVH 4.32 – Meter test bench working standard - June 2021,
- Avo Optima, MET-6120 - Meter test bench working standard - June 2021,
- Avo Phazer T-20 - Meter test bench working standard - June 2021,
- TWS CT Working standard, which was last calibrated by MSL in October 2017,
- Zera WM3031 CT comparator – calibrated by MSL,
- 21 Hioki field working standards for Category 2+ testing; these all have current calibration, and the certification records contain a field for working standard expiry, so there is little risk an uncalibrated standard can be used,
- two PWS Field working standards for Category 2+ comparative testing; these both have current calibration, and
- five red phase testers for field CT calibration have current calibration.

Audit outcome

Compliant

4.5 Calibration Interval (Clause 3(2) of Schedule 10.4)

Code related audit information

Each reference standard or working standard must be calibrated within the applicable calibration interval set out in Table 1 of Schedule 10.4.

Audit observation

I checked all of the AMS reference and working standards to confirm they had current calibration certificates.

Audit commentary

Compliance is recorded in **section 4.4**.

Audit outcome

Compliant

4.6 Calibration of Reference Standards (Clause 3(1)(B)(Ii), (2), (3)(C), (4) And (5) Of Schedule 10.4)

Code related audit information

Class A ATHs must ensure that in calibration of reference standards, any uncertainties are sufficiently small so that the overall uncertainty in the measurements used to test a metering installation does not exceed one third of the maximum permitted error set out in Table 1 of Schedule 10.1 for the category of metering installation that the reference standard will be used to calibrate.

If a reference standard is used in conditions that deviate from those in the calibration report, the class A ATH must calculate and apply adjustments using its own processes and procedures so that the reference standard achieves the reference conditions.

If a reference standard is used in conditions that deviate from those in the calibration report, the class A ATH must calculate and apply adjustments using its own processes and procedures so that the reference standard achieves the reference conditions.

Audit observation

I checked all of the AMS reference standards to confirm they had current calibration certificates.

Audit commentary

There were no situations where calibration occurred, or standards were used in non-reference situations.

Audit outcome

Compliant

4.7 33kv or above Calibrated by an Approved Calibration Laboratory (Clause 3(3)(B) Of Schedule 10.4)

Code related audit information

Class A ATHs must ensure that a working standard on a system operating at a voltage of 33kV or above has been calibrated by an approved calibration laboratory.

Audit observation

AMS does not conduct testing of systems of 33kV or above.

Audit commentary

AMS does not conduct testing of systems of 33kV or above.

Audit outcome

Not applicable

4.8 Metering Component Testing System (Clause 4 of Schedule 10.4)

Code related audit information

An ATH may use a complete calibrated metering component testing system (a test bench) as an alternative to a separately calibrated working standard only if the ATH:

- calibrates the test bench as if it was a working standard

- carries out a testing system accuracy test, using approved reference standards before completing the calibration report.

Audit observation

Compliance is recorded in **section 4.4**.

Audit commentary

Compliance is recorded in **section 4.4**.

Audit outcome

Compliant

4.9 Calibration Errors (Clause 5 of Schedule 10.4)

Code related audit information

A Standard cannot be used if the ATH believes is has a calibration error. If an error is found then all ATH's that have used the standard must be notified. All metering installations certified using the standard must be treated as defective in accordance with Clause 10.43.

Audit observation

I checked the understanding of this requirement through interview with AMS. I checked whether this situation had occurred.

Audit commentary

In the last audit non-compliance was recorded as a PWS working standard was being used with a known calibration error of -1.185%. This working standard has since been recalibrated; the calibration process repeats each test point three times. The results confirm that the error has remained constant at the same levels as previous calibrations. AMS record and monitor the results of calibrations to ensure the test equipment remains stable. The AMS error calculation process includes an adjustment to the test results to account for "known test equipment error".

I have recorded compliance with this clause as the AMS process correctly accounts for the known test equipment errors and ensures on-going reliability of results.

Audit outcome

Compliant

4.10 Measurement Traceability (Clause 6 of Schedule 10.4)

Code related audit information

An ATH must document, maintain, and comply with a system that ensures, whenever it undertakes a calibration test or measurement, the ATH can replicate the test or measurement in every respect and the results of the measurements are traceable.

Audit observation

I checked this by reviewing the IANZ audit report.

Audit commentary

The IANZ report confirms compliance.

Audit outcome

Compliant

4.11 Calibration Methods (Clause 7(6) of Schedule 10.4)

Code related audit information

An ATH must only use components that have been certified by an ATH or calibration laboratory.

A Class B ATH must follow 17025 calibration methods for components.

The test points must be those listed in the relevant IEC standard.

An ATH must ensure that uncertainty of measurement does not exceed one third of the error listed in the relevant IEC standard listed in Table 5.

If a CT is to be used in a Metering Installation is certified using the selected component method, then it must be tested for errors at 5% to 120% of rated current.

An ATH must have documented instructions for calibration that match the IEC standard.

Audit observation

I checked a sample of calibration and certification reports to confirm compliance with this clause.

Audit commentary

All components are calibrated and certified. Calibration is conducted by the Class A ATH not the Class B ATH. Uncertainty of measurement does not exceed one third of the error listed in the standard. CT test points are compliant.

Audit outcome

Compliant

4.12 Data Storage Device Certification (Clause 5 of Schedule 10.8)

Code related audit information

All data storage devices must be certified before they can be used in a metering installation. The ATH must ensure that the data storage devices in a metering installation have been type tested by an approved test laboratory, that the results for data storage devices are appropriate for that model and version and have a calibration report.

Audit observation

I checked the certification records for 79 metering installations to confirm compliance.

Audit commentary

AMS certifies data storage devices in accordance with these clauses. The certification report is combined with the metering installation certification report and contains the required details. AMS has a directory of type test reports for relevant devices.

The previous audit recorded that AMS had certified 10 ARC Innovations installations containing non-compliant data loggers. I checked the certification records for the audit period and confirmed that no ARC Innovations data loggers had been certified. All ARC dataloggers are displaced if recertification is required.

Audit outcome

Compliant

4.13 Metering Component Stickers (8(1) and 8(4) of Schedule 10.8)

Code related audit information

An ATH must confirm certification by attaching a metering component certification sticker to the metering component or, if not practicable, provide the sticker with the metering component.

If an ATH certifies the metering component on the same day it certifies the metering installation that the metering component is installed in, the ATH may combine the certification stickers and attach it to the metering installation in accordance with clause 41 of Schedule 10.7.

Audit observation

I checked the AMS component stickers to confirm compliance.

Audit commentary

All component stickers are compliant with this clause. AMS has a combined installation and component sticker.

Audit outcome

Compliant

4.14 Metering Component Stickers (Clause 8(2) of Schedule 10.8)

Code related audit information

A metering component certification sticker must show:

- the name of the metering component owner (if available)

- if the metering component is a meter or a measuring transformer:

a) *the name of the ATH or the approved calibration laboratory who calibrated the metering component*

b) the name of the ATH who certified the metering component

c) the date on which the metering component was certified

d) the initials or other unique identifier of the person who carried out the certification of the metering component.

Audit observation

I checked the AMS component stickers to confirm compliance.

Audit commentary

AMS has a combined installation and component sticker. The AMS sticker does not contain the name of the calibration laboratory who calibrated the metering component, but the AMS process requires the technician to confirm that there is a calibration sticker on the component. I have accepted that this meets the requirement of this clause. All other fields are included.

Audit outcome

Compliant

4.15 Sealing and Monitoring of Seals (Clause 9 of Schedule 10.4 & Clause 47(7) of Schedule 10.7)

Code related audit information

An ATH is required to have a documented system for applying seals to a metering installation to ensure that each metering component in the metering installation that could be expected to affect the accuracy or reliability of the metering installation is sealed. The system of sealing will ensure monitoring of the integrity of the metering installation and that unauthorised access to the metering installation will be identifiable so that the MEP can be notified.

The sealing system will identify:

- the ATH who affixed the seal

- the person (or the sealing tool) who applied the seal

- when the seal was applied.

Audit observation

I checked the quality documentation and a sample of 49 certification records to confirm compliance.

Audit commentary

AMS uses numbered seals and has appropriate processes for the issue, management, and application of seals.

When a seal is discovered to be broken or missing there is a procedure that ensures the MEP is notified. There is an appropriate policy and procedures contained in the quality manual in relation to the management of sealing.

Audit outcome

Compliant

5. CALIBRATION AND CERTIFICATION OF METERING INSTALLATIONS

5.1 ATH must not Certify Metering Installations under Certain Circumstances (Clause 8(1) Of Schedule 10.7)

Code related audit information

The ATH must not certify a metering installation if the installation does not comply with Part 10.

Audit observation

I checked a sample of 79 certification records to confirm compliance.

Audit commentary

Clause 31 of schedule 7 requires the ATH to ensure that the in-service burden is within the burden range of the measuring transformers when certifying metering installations. The AMS process includes testing of the in-service burden and burden is added to CTs with burden lower than the lowest test point unless the CTs have been confirmed to be accurate at lower burden by the manufacturer.

My checks of 49 Category 2 and above metering installation certification reports found the in-service burden was within the burden range of the CTs in all except one of the 49 metering installations. The certification of ICP 0006146333RND66, Certification No. VC13203, had in-service burden lower than the burden range of the CTs. The CTs were 1200/5 15VA Secura CTs with a rated burden of 15VA. The burden range of these CTs is 3.75 to 15VA the in-service burden was recorded as 0.780, 0.437 and 0.530 VA and no additional burden was added.

The last audit found a Category 2 metering installation which was certified with an error result which indicated that one of the components is operating outside its class, which does not comply with the Code. My checks of 49 category 2 and above metering installation certification reports confirmed that the error limit had been correctly applied.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 5.1 With: Clause 8(1) Of Schedule 10.7 From: 20-May-21 To: 26-Aug-21	One category 2 metering installation certified with in-service burden lower than the burden range of the CTs. Potential impact: Medium Actual impact: Low Audit history: None Controls: Strong Breach risk rating: 1
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are recorded as strong because the AMS processes ensure certification is correctly applied in most cases. The impact on settlement is low because there was only one example identified. There is also an impact on the MEP because certification needs to be cancelled.

Actions taken to resolve the issue	Completion date	Remedial action status
See below. Certificate has been retracted due to the incorrect burdening identified in a subsequent non-compliance and the MEP informed and asked to arrange for recertification. The recertification will use Schedule 10.7 clause 6 Lower category of installation than the rating of the current transformers as the correct certification method and conditions for the MEP. Load profile has been confirmed to be <500A. ICP 0006146333RND66 VC13203 (see 3.10) Cat3 to 2 1200/5 CTs done in May. Was a recertification after replacement of meter as comms fault for an existing downgrade certification, the validator missed the sizing of the CTs. CTS 1200/5 15VA SECURA CTs, burden range should be 3.75 to 15VA. Testing showed compliance with 5VA requirements. Also, the way the testing sheets are setup this non-standard type of CT was not available in the drop-down menu, so the tech used the closest type to get the correct ratio, which was a TWS model type. Current process is very rigorous and well understood by the field techs and validators. A reminder will be issued with regards the burdening requirements. The testing sheets have been updated to show the max and minimum burden requirements dependent on whether the CTS are exempt or not from burdening. "Allowed burden range is 25% to 100%" for non-exempt (TWS <500/5, all TWS multi-tap and all non-TWS CTs) "Allowed burden range is 0% to 100%" for exempt (TWS >500/5 single tap)	Completed	Cleared
Preventative actions taken to ensure no further issues will occur	**Completion date**	
The issues with this particular job have been reviewed with all validators and they all showed a good understanding of the correct approach to be taken and what factors to be checked/requested. From our review this was an isolated incident. We are confident that the current processes and training should prevent further such mistakes occurring.	Completed	

5.2 Determination of Metering Categories (Clause 5 of Schedule 10.7 & Clause 10.11)

Code related audit information

An ATH is required to determine the category of the metering installation in accordance with Table 1 of Schedule 10.1 before it certifies a metering installation.

Audit observation

I checked certification records for 79 metering installations to confirm compliance.

Audit commentary

All 79 certification reports had the metering category recorded correctly.

Audit outcome

Compliant

5.3 Requirement for Metering Installation Design Report (Clause 2(4) Of Schedule 10.7)

Code related audit information

The ATH must receive a design report from the MEP before installing or modifying a metering installation or a component in a metering installation.

Audit observation

I checked the current suite of design reports and the certification records for 79 metering installations.

Audit commentary

AMS has checked and approved design reports. I examined these during the audit. There were no new design reports during the audit period.

Audit outcome

Compliant

5.4 ATH Design Report Obligations (Clause 3 of Schedule 10.7)

Code related audit information

Before certifying a metering installation, the ATH must check the design report to confirm the metering installation will function as designed and that the metering installation will comply with Part 10.

The certifying ATH must update the design report with any changes and provide it to the MEP responsible for the installation within 10 days of installation certification.

Audit observation

I checked the current suite of design reports and the certification records for 79 metering installations.

Audit commentary

AMS has checked and approved design reports. I examined these during the audit. Compliance is achieved.

Audit outcome

Compliant

5.5 Certification as a Lower Category (Clause 6(1) of Schedule 10.7)

Code related audit information

An ATH may determine that the metering category of a current transformer installation is lower than would otherwise be the case and certify the installation at that lower category only if:

- a protection device, like a fuse or a circuit breaker, is installed so that it limits the maximum current; or

- the MEP provides evidence from historical data that the maximum current will be lower than the current setting of the protection device for the category that metering installation is currently certified at; or

- the components in the metering installation will use less than 0.5 GWh in any 12-month period; or

- the MEP provides evidence from historical data that the installation will use less than 0.5 GWh in any 12-month period.

Audit observation

I checked two examples of certification as a lower category.

Audit commentary

The AMS process requires the inclusion in the metering installation certification report of details of the lower category certification including advice to the MEP regarding the requirement to monitor the load or the consumption.

In one of the examples checked (ICP 0006146333RND66, Certification No. VC13203) the nominal installation category was Category 3 based on the 1200/5 CTs. The installation was certified as Category 2 but there were no details of the lower category certification or advise to the MEP regarding monitoring of load recorded in the metering installation certification report. The AMS process normally includes the provision of details of the information regarding load or current limiting devices to the technician in the work instructions. In this case the technician was issued the job as a comms fault job and did not include these details. The technician replaced the meter to resolve the comms fault and did not include the lower category certification details. This was also not picked up by the validation process which is applied to all Category 2 and above certifications.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 5.5 With: Clause 6(1) Of Schedule 10.7 From: 20-May-21 To: 26-Aug-21	All information regarding lower category certification not included in the certification report for one metering installation. Potential impact: Low Actual impact: None Audit history: None Controls: Strong Breach risk rating: 1
Audit risk rating	**Rationale for audit risk rating**

Low	I have recorded the controls as strong as the AMS process normally includes all required details. The impact on settlement is low because there was only one example identified. There is also an impact on the MEP because certification is cancelled.

Actions taken to resolve the issue	Completion date	Remedial action status
As detailed in 5.1	Completed	Cleared
Preventative actions taken to ensure no further issues will occur	**Completion date**	
As detailed in 5.1	Completed	

5.6 Use of Current Transformer Rating Lower Than Supply Capacity (Clause 6(2)(a) of Schedule 10.7)

Code related audit information

If the ATH determines the category of a current transformer metering installation is lower than would otherwise be the case and a current limiting device is used, the ATH must:

- confirm the suitability and operational condition of the protection device

- record the rating and setting of the protection device in the metering records

- seal the protection device

- apply, if practicable, a warning tag or label to the seal.

Audit observation

I checked two examples of certification as a lower category.

Audit commentary

The certification records checked were certified on the basis of the load or consumption remaining within the lower category limit and require monitoring by the MEP. No certifications were completed based on the setting of a current limiting device. The AMS process requires the MEP to provide details of the protective devices installed in order to certify under this clause.

Audit outcome

Compliant

5.7 Determining Metering Installation Category at a Lower Category Using Current Transformer Rating (Clause 6(2)(b) & (d) of Schedule 10.7)

Code related audit information

The ATH may determine the metering installation category according to the metering installation's expected maximum current, if:

- there has been a request to do so from the MEP,

- the MEP provides evidence from historical data that the maximum current will be lower than the current setting of the protection device for the category that metering installation is currently certified; and

- the ATH considers it is appropriate to do so in the circumstances.

The MEP must obtain the maximum current that flows through the installation each month from the participant interrogating the installation. From this data the ATH can calculate the maximum current from the raw meter data by either calculation from the kVA by trading period if available or from a maximum current indicator if fitted. If the MEP does not receive the monthly report from the participant interrogating the installation or if the current exceeds the maximum calculated rating of the installation, the certification of the installation is automatically cancelled.

Audit observation

I checked two examples of certification as a lower category.

Audit commentary

The certification records checked were certified on the basis of the load or consumption remaining within the lower category limit and require monitoring by the MEP. No certifications were completed based on the setting of a current limiting device. I have recorded non-compliance in **sections 3.10** and **5.5** as the metering installation certification report for one metering installation did not include advice to the MEP of the lower category certification.

Audit outcome

Compliant

5.8 Suitability of Determination of a Metering Installation Category at a Lower Category Using Current Transformer Rating (Clause 6(3) Of Schedule 10.7)

Code related audit information

Before the ATH determines a metering installation to be a lower category, the ATH must first visit the site of the metering installation to ensure it is suitable for the metering installation to be determined to be a lower category.

Audit observation

I checked two examples of certification as a lower category.

Audit commentary

In both examples checked AMS visited the sites at the time of certification and determined that the metering installations were suitable to be determined to be a lower category.

Audit outcome

Compliant

5.9 Use of Metering Installation Certification Methods (Clause 7(1) Of Schedule 10.7)

Code related audit information

When certifying a metering installation, the ATH must use either of the following methods:

a) the selected component certification method if the metering installation is category 1, 2, or 3; or

b) the fully calibrated certification method.

Audit observation

I checked certification records for 79 metering installations to confirm compliance.

Audit commentary

AMS correctly uses the fully calibrated method of certification for certification of Category 3 and 4 metering installations and the selected component method for new installations or where components are replaced in Category 1,2 and 3 metering installations.

Audit outcome

Compliant

5.10 Certification of a Metering Installation Using Statistical Sampling or Comparative Recertification (Clause 7(2) Of Schedule 10.7)

Code related audit information

In addition to the selected component and fully calibrated methods, the ATH may also recertify an installation using:

a) an approved statistical sampling process for category 1 metering installations; or

b) the approved comparative recertification method for a category 2 metering installation.

Audit observation

I checked certification records for 79 metering installations to confirm compliance.

Audit commentary

AMS has correctly conducted comparative recertification during the audit period. AMS has not completed any statistical sampling recertification during the audit period. A statistical recertification project is currently in-progress.

Audit outcome

Compliant

5.11 Metering Installation Certification Requirements (Clause 8(3) Of Schedule 10.7)

Code related audit information

An ATH may only certify a metering installation as category 3 or higher if the metering installation incorporates a half hour meter.

Audit observation

I checked certification records for 19 metering installations to confirm compliance.

Audit commentary

All installations had HHR meters.

Audit outcome

Compliant

5.12 Certification Tests (Clause 9(1) of Schedule 10.7)

Code related audit information

An ATH, when required to carry out tests specified in Tables 3 or 4 of Schedule 10.1, must comply with the provisions of clause 9(1) of Schedule 10.7 for the following tests:

- a prevailing load test

- an installation or component configuration test

- a raw meter data output test.

A prevailing load test is defined in the Code as a test that is carried out by comparing the output of the metering installation against a working standard connected to the metering installation. For a category 2 or higher metering installation, the prevailing load check must be done against a calibrated instrument (working standard). For a category 1 metering installation industry, best practice has defined a prevailing load test as a measurement of disk revolutions or pulses compared with time and current measurements. The revolutions or pulses are compared against a table or chart to validate the accuracy of the measurement. The prevailing load check is more than simply confirming that the meter operates but is only intended to identify a "gross error" like a phase missing or reversed or a significant metering error.

If the ATH carries out an installation or component configuration test on a metering installation or a metering component, it must ensure that the test equipment configuration is the same as the metering installation or component configuration recorded in the design report.

To carry out a raw meter data output test for a category 1 metering installation or category 2 metering installation, the ATH must apply a load on each phase that is:

- *greater than 5% of the meter's maximum rated current for category 1 installations,*
- *10 amps on each phase for category 2 metering installations.*

In addition, the ATH must use either the working standard referred to in subclause (1)(a) or an ammeter in good working order with an accuracy range of +/-5% to measure the load applied to the metering installation and recording the resulting increment of the meter register value over a measured period of time or recording the resulting accumulation of pulses from the load over a measured period of time.

The ATH must also ensure that the change in the meter register that occurs under subclause (ii)(A) or (ii)(B) is at least "1" in the least significant digit, or one mark if the least significant digit does not have numerical markings.

If the meter is a Ferraris disc meter, the ATH must undertake two raw meter data output tests in which the second test must have a load applied to the meter that is at least double the load applied in the first test.

To carry out a raw meter data output test for a half-hour installation, the ATH must either compare the output from a working standard to the raw meter data from the metering installation for a minimum of 1 trading period, or if the raw meter data is to be used for the purposes of Part 15, confirm that the MEP's back-office processes include a comparison of:

- *the increment of the accumulating meter registers, and*
- *the sum of the half-hour metering raw meter data for the same period.*

Audit observation

I checked process documentation and 79 certification reports to confirm compliance.

Audit commentary

This clause was changed from 1st February 2021 introducing minimum load requirements for ATHs when conducting raw meter data tests on Category 1 and 2 metering installations. The minimum load required on each phase is:

- greater than 5% of the meter's maximum rated current for Category 1 installations, and
- 10 amps for Category 2 metering installations.

When conducting a raw meter data test on Category 1 and 2 metering installations the code change also requires the ATH to record either:

- the resulting increment of the meter register value over a measured period of time, or
- the resulting accumulation of pulses from the load over a measured period of time.

Prior to this change there was no specified minimum load requirement and the ATH was not required to record the increment of the meter register value or the resulting accumulation of pulses. All of the records checked were for certifications that took place after 1st February 2021.

My certification report checks included 30 Category 1 and 30 Category 2 metering installations. The AMS Category 1 testing process requires the technician to apply an external load to conduct the raw meter data test but does not specify a minimum load required to meet the code requirement of 5% of the meter's maximum rated current. Technicians use heat guns for this purpose which are commonly rated at 1,800 or 2,000 watts, which would meet the 5% requirement for all Category 1 meter types. The technician applies the load and counts the number of pulse and measures the time taken and takes a photo of the register advance. The details of the load applied, number of pulses and time taken are not recorded by the technician. I have recorded non-compliance as the process does not ensure that the minimum load requirement is always met and for not recording the accumulation of pulses.

The ATH must also ensure that the change in the meter register that occurs when conducting a raw meter data test is at least "1" in the least significant digit, or one mark if the least significant digit does not have numerical markings. The technician confirms the meter register by taking a photo of the advanced meter register, this also confirms the meter register advance test has been conducted. There was one example in my checks where the register had not advanced on an Elster gRex meter owned by the Intellihub Limited MEP. This type of meter does not have any decimals places in the meter register, so the least significant digit is 1 kWh. AMS had previously been advised by Intellihub that the requirement to conduct a register advance test was met by confirming that the meter pulsed with the application of load. This meets the requirements for a register advance test both before and after the 1st February changes. It does not meet the requirement for the increment of the meter register whilst conducting the raw meter data test, which was implemented on 1st February, I have therefore recorded non-compliance.

The AMS Category 2 process specifies a minimum load of 5% of the CT primary current rating. This will meet the Code requirement of a minimum load of 10 amps on each phase for Category 2 metering installations for installations CTs with primary ratings of 200 amps and above. AMS records the current at the time of testing in the certification report. My checks of 30 Category 2 certification reports confirmed that the minimum requirement of 10 amps was met for all except one report. ICP 0000718590TEEA0, Certification No. VC12642 was certified with the primary current per phase recorded as Red 5.78A, White 16.17A and 11.02A. I have recorded non-compliance as the required minimum of 10 amps on each phase was not met.

Raw meter data output tests for an HHR metering installation which are category 1 or category 2 must be conducted by either:

- comparing the output from a working standard to the raw meter data from the metering installation for a minimum of one trading period, or
- confirming that the metering equipment provider's back-office processes include a comparison of the difference in the increment of the meter registers to the half-hour metering raw meter data, if the raw meter data is to be used for the purposes of Part 15.

AMS compares the output from a working standard to the raw meter data from the metering installation for a minimum of one trading period for category 2 installations, the results are recorded in the metering installation certification report. For category 1 installations AMS has received confirmation from the MEP that the comparison occurs.

Raw meter data output tests for category 3 or higher HHR metering installations must compare the output of a working standard to the raw meter data from the metering installation for a minimum of one trading period. This test is conducted for all HHR metering installations.

Prevailing load tests must be conducted on a metering installation or metering component by using a working standard connected to the metering installation. AMS has conducted prevailing load tests in accordance with this clause using a working standard for installations at Category 2 and above.

The AMS processes do not include prevailing load tests when certifying Category 1 installations. Table 3 of Schedule 10.1 requires that a prevailing load test is conducted when a category 1 metering installation is recertified without the meter being changed. Clause 9(1)(a) of Schedule 10.7 requires that prevailing load tests must be conducted using a working standard connected to the metering installation. There was one example, ICP 1000024794BPA9D Certification No. A1336379, where a Category 1 metering installation was recertified by AMS after the meter was unbridged. I have recorded non-compliance as the ATH did not conduct a prevailing load test using a working standard.

Installation or component configuration tests must ensure that the actual configuration scheme is the same as the scheme for the metering installation or metering component recorded in the design report. The configuration scheme is recorded on the design report and confirmed in the metering installation certification report.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 5.12 With: Clause 9(1)(ii)(B) of Schedule 10.7 From: 01-Feb-21 To: 26-Aug-21	ATH process does not ensure that minimum load requirement is always met for Category 1 raw meter data tests. ATH did not record the accumulation of pulses when conducting raw meter data tests. Meter register not incrementing when raw meter date tests conducted on Intellihub Elster gRex meters. Category 2 raw meter data test conducted with load of less than 10 amps on each phase for one metering installation. Prevailing load test not conducted during recertification of one category 1 metering installation. Potential impact: Low Actual impact: None Audit history: None Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**

Low	I have recorded the controls as moderate as the AMS process does ensure that testing is conducted but does not meet all of the requirements of the 1 February 2021 Code changes. The impact is low as the AMS process has ensured that testing has been conducted; therefore, the audit risk rating is low.

Actions taken to resolve the issue	Completion date	Remedial action status
Mass Market *Minimum requirements for the load used by techs.* Training and procedures will be updated with the minimum requirements for Cat 1 and 2.	31/10/2021	Identified
The results of the pulse counting test must be recorded, Current measured, time and number of pulses. Result compared to Table 1. The current automated testing sheets for Cat 1 does not have the provision for recording the results, the changes on the meter display are recorded by photos. A new process will be introduced to capture these results and confirm compliance with the requirements of Table 1 of the code. It is expected this will be paper based initially and them implemented in the automated testing sheets. The current test process is also being reviewed and concerns around the requirements for using working standards will be raised with the EA.	30/11/2021	
Test must be run long enough for register to increment for at least 1 least significant bit/mark. Current testing procedures being reviewed, in particular for incremental error considerations and appropriate changes made with follow on comms to Techs. This will be initiated in the field by the end of November.		
ICP0000718590TEEA0 VC12642 3 phase meter with 5.8A, 16.2A and 11.0A, so not all phases were above 10A, This would have shown higher than 10A on average. Comms to techs will advise that all phases must exceed the minimum current requirements. This will be initiated in the field by the end of October. MEP will be informed to cancel the certification of this ICP.		
ICP1000024794BPA9D A1336379 Cat 1, recertification after un-bridging, no prevailing load test with a working standard. This is an issue we will be raising with the Authority. MEP will be informed to cancel the certification of this ICP.		

Preventative actions taken to ensure no further issues will occur	Completion date	
Retraining of field techs to ensure they are implementing the new code changes correctly. Routine QA checks to continue. More focus to be placed on future code amendments to ensure detailed impact assessments are undertaken.	Ongoing	

5.13 Raw Meter Data Test for all Metering Installations (Clause 9(1A) Of Schedule 10.7)

Code related audit information

If the ATH performs a raw meter data output test under sub-clause (1)(c) or sub-clause (1)(d), for a metering installation that will be certified for remote meter reading, the ATH must:

a) *obtain the raw meter data from the back-office system where the raw meter data is held; or*

b) ensure that the metering equipment provider responsible for the metering installation has a process to validate a meter reading taken at the time of the metering installation certification with a meter reading from the metering equipment provider's back-office system.

Audit observation

I checked process documentation and 79 certification reports to confirm compliance.

Audit commentary

AMS has written confirmation from relevant MEPs that this comparison occurs.

Audit outcome

Compliant

5.14 Alternate Raw Meter Data Test for Category 1 and 2 Metering Installations (Clause 9(1)(C) Of Schedule 10.7)

Code related audit information

A raw meter data output test is carried out for a category 1 metering installation or category 2 metering installation by comparing a known load change against the increment of the sum of the meter registers.

Audit observation

Refer to **sections 5.12** and **5.13.**

Audit commentary

Refer to **sections 5.12** and **5.13.**

Audit outcome

Compliant

5.15 Raw Meter Data Output Test (Clause 9(2) And 9(3) Of Schedule 10.7)

Code related audit information

If the ATH performs a raw meter data output test that requires a comparison between two quantities, the ATH must not certify the metering installation unless the test demonstrates that the difference

between the two quantities is within the applicable accuracy tolerances set out in Table 1 of Schedule 10.1.

Audit observation

I checked process documentation and records for 79 metering installations to confirm compliance.

Audit commentary

There were no examples of inaccurate or failed test results.

Audit outcome

Compliant

5.16 Test Results (Clause 10(1) & (2) of Schedule 10.7)

Code related audit information

An ATH must not certify a metering installation if the results of tests on the metering installation or any of its metering components find that:

- a metering component did not pass all the tests

- the metering installation did not meet the requirements for certification.

Within five business days of reviewing the tests, the ATH must advise the relevant MEP why it did not certify the metering installation.

Audit observation

I checked process documentation and records for 49 metering installations to confirm compliance.

Audit commentary

As recorded in **sections 5.1** and **5.40**, one Category 2 metering installation did not meet the requirements for certification because the in-service burden is lower than the burden range of the CTs.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 5.16 With: Clause 10(1) & (2) of Schedule 10.7 From: 20-May-21 To: 26-Aug-21	One category 2 metering installation certified with in-service burden lower than the burden range of the CTs. Potential impact: Medium Actual impact: Low Audit history: None Controls: Strong Breach risk rating: 1
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are recorded as strong because the AMS processes ensure certification is correctly applied in most cases. The impact on settlement is low because there was only one example identified. There is also an impact on the MEP because certification is cancelled.

Actions taken to resolve the issue	Completion date	Remedial action status
As detailed in 5.1	Completed	Cleared
Preventative actions taken to ensure no further issues will occur	**Completion date**	
As detailed in 5.1	Completed	

5.17 Selected Component Certification (Clause 11(2) of Schedule 10.7)

Code related audit information

An ATH may only use the selected component certification method to certify a metering installation which complies with the categories and component specifications set out in Table 1 of Schedule 10.1.

Audit observation

I checked process documentation and records for 54 metering installations to confirm compliance.

I also checked that components were checked to determine they were fit for purpose.

Audit commentary

Selected component certification was used for the appropriate metering categories.

Audit outcome

Compliant

5.18 Selected Component - Circumstances Where Method May Be Used (Clause 11(3) Of Schedule 10.7)

Code related audit information

An ATH must only use the selected component certification method to certify the metering installation if:

- the required tests in Table 3 of Schedule 10.1 are carried out

- each data storage device, meter, and measuring transformer has been calibrated and certified

- each data storage device is certified in accordance with clause 5 of Schedule 10.8

- the ATH provides a certification report for the metering installation.

Audit observation

I checked process documentation and records for 54 metering installations to confirm compliance.

I also checked that components were checked to determine they were fit for purpose.

Audit commentary

The process documentation is clear, and all selected component certification reports were compliant.

The previous audit recorded that AMS had certified 10 ARC Innovations installations containing non-compliant data loggers. I checked the certification records for the audit period and confirmed that no ARC Innovations data loggers had been certified. All ARC dataloggers are displaced if recertification is required.

Audit outcome

Compliant

5.19 Comparative Recertification – Circumstances Where Method May be Used (Clause 12(2) of Schedule 10.7)

Code related audit information

An ATH may only use the comparative recertification method to recertify a category 2 metering installation if:

- the certification of the current transformers in the metering installation expires before the meter certification expiry date

- each data storage device and/or meter has been calibrated and certified.

Audit observation

I checked process documentation and records for 15 metering installations to confirm compliance.

Audit commentary

The process documentation is clear, and all comparative certification reports contained confirmation that the meter was replaced by another certified meter.

Audit outcome

Compliant

5.20 Comparative Recertification Tests (Clause 12(3) And 12(5)(A) Of Schedule 10.7)

Code related audit information

An ATH must, when recertifying the category 2 metering installation using the comparative recertification metering installation certification method, ensure that:

- the metering installation has passed the tests set out in Table 3 of Schedule 10.1 using a working standard

- the accuracy of the current measurement sensor (current transformer or high accuracy Rogowski coil) enables the metering installation to meet the specified accuracy requirements of Table 1 of Schedule 10.1

- the overall metering installation accuracy meets the requirements of Table 1 of Schedule 10.1 and

- the ATH provides a certification report for the metering installation.

Audit observation

I checked process documentation and records for 15 metering installations to confirm compliance.

Audit commentary

The certification reports confirmed that appropriate testing was conducted and the and that the total accuracy was within the requirements of table 1. The results of the tests conducted, and details of the test instruments used, were recorded in the metering installation certification reports for each metering installation checked.

Audit outcome

Compliant

5.21 Fully Calibrated – Circumstances Where Method May be Used (Clause 13(3) of Schedule 10.7)

Code related audit information

An ATH must use the fully calibrated certification method to certify the metering installation:

- by carrying out the tests set out in Table 4 of Schedule 10.1

- if each of the components (the data storage device, meter, and measuring transformer) has been calibrated and certified.

Audit observation

I checked process documentation and records for 10 metering installations to confirm compliance.

Audit commentary

The records confirm the appropriate tests are performed and components are calibrated and certified. The results of the tests conducted, and details of the test instruments used, were recorded in the metering installation certification reports for each metering installation checked.

Audit outcome

Compliant

5.22 Fully Calibrated - Certify Each Metering Component (Clause 13(4) Of Schedule 10.7)

Code related audit information

Each individual metering component in the metering installation must have a current certification report that confirms that the metering component complies with the requirements of its accuracy class; and includes the certification date of the metering component.

Audit observation

I checked process documentation and records for 10 metering installations to confirm compliance.

Audit commentary

The certification report confirmed that appropriate testing was conducted, and that all components were certified and that certification reports were prepared.

Audit outcome

Compliant

5.23 Fully Calibrated - Additional Metering Installation Certification Report Requirements (Clause 13(5) & (6) Of Schedule 10.7)

Code related audit information

The ATH must provide a certification report for the metering installation. The certification report must include confirmation that:

- the ATH has checked the design report of the metering installation to confirm the metering installation functions in accordance with the report

- the overall metering installation accuracy meets the requirements of Table 1 of Schedule 10.1

- the accuracy of the metering installation remains within the maximum permitted error for the relevant metering installation

- each metering component in the metering installation is used only in a permitted combination as set out in table 1 of Schedule 10.1.

Audit observation

I checked process documentation and records for 10 metering installations to confirm compliance.

Audit commentary

The certification reports confirmed that appropriate testing was conducted, and that all components were certified and that certification reports were prepared. The certification report recorded all of the points listed above.

Audit outcome

Compliant

5.24 Fully Calibrated – Use Meter Class Accuracy (Clause 13(7) Of Schedule 10.7)

Code related audit information

An ATH must, before it certifies a metering installation, ensure that the ATH uses the meter class accuracy, and not the actual accuracy, to calculate whether the actual error is within the maximum permitted error.

Audit observation

I checked process documentation and records for 10 metering installations to confirm compliance.

Audit commentary

The certification report and process documentation confirmed that meter class accuracy is now used to calculate the overall error.

Audit outcome

Compliant

5.25 Insufficient Load (Clause 14 of Schedule 10.7)

Code related audit information

Every metering installation requires a test to ensure that the installation is correctly recording the energy used at the installation. The tests required are defined in Tables 3 and 4 of Schedule 10.1. The checks range from a minimum check that the meter registers increment through to a full raw meter data output check against a working standard and a check against the back-office data for a half hour installation.

If the ATH decides to certify half hour metering installation that has insufficient load to complete a prevailing load check, the ATH must ensure that:

- it performs an additional integrity check of the metering installation wiring, and records the results of this check in the certification report

- it records in the certification report that the metering installation is certified under clause 14 of Schedule 10.7.

Once load is present and following a request from the MEP, the ATH must carry out prevailing load tests. If the tests demonstrate that the metering installation performs within the maximum permitted error, the certifying ATH must:

- update the metering installation certification report, within five business days of completing the tests, to include the results of the tests carried out

- leave the original metering installation certification expiry date unchanged.

Audit observation

I checked the processes and records for eight examples of insufficient load certification.

Audit commentary

The AMS insufficient load process requires the technician to conduct additional checks in the form of visual checks, wiring continuity tests, phase angle checks and CT ratio checks. The metering installation certification report includes an "Insufficient Load Certification" section. My checks found that the additional checks were recorded either in the "Insufficient Load Certification" section or in the "Details of Work Completed" or "Additional Comments" fields. To improve clarity, I recommend that AMS reviews the process to ensure consistency in the recording of the details of the additional checks conducted.

The front page of metering installation certification reports issued under this clause contain statements advising of the insufficient load certification and the requirement for the MEP to monitor the load notify the ATH when sufficient load is available.

The last audit included a recommendation that the photo instructions and photo checking process was improved in relation to CT metering installations and insufficient load certification. I confirmed that the photo checking now includes checks of test block links and CT chamber wiring as part of the review process for each certification at Category 2 and above.

Recommendation	Description	Audited party comment	Remedial action
Regarding Clause 14 of Schedule 10.7	Review the Insufficient Load Certification process to ensure consistency in the recording of the details of the additional checks conducted.	The difficulty with the code requirements is its lack of specificity and the variety of situations this may be used. Un-energized, Energized no load or insufficient load.	Identified

Audit outcome

Compliant

5.26 Statistical Sampling (Clause 16 of Schedule 10.7)

Code related audit information

A group of meters can be sampled by the ATH, and the results of the sample group can be extended to a larger group of the same meters. This is a process of certification by statistical sampling. The ATH must select a sample using a statistical sampling process that is:

- detailed in AS/NZS1284 (or approved and published by the Authority)

- recertify the group by recertifying each metering installation in the sample using the fully calibrated certification method

- advise the MEP as soon as reasonably practicable whether the sample passes or fails the recertification requirements.

If the ATH carries out a statistical sampling process when recertifying a group of category 1 metering installations on behalf of an MEP, it must document and record:

- the process it follows for selecting samples

- any assumptions about those samples

- the metering installations in the sample

- the metering installations in the recertified group.

An ATH that recertifies a group of metering installations using a statistical sampling process does not need to apply a certification sticker to the remainder of the metering installations in the family or group that was sample tested.

Audit observation

AMS has not completed any statistical sampling recertification during the audit period. A statistical recertification project is currently in-progress.

Audit commentary

AMS has not completed any statistical sampling recertification during the audit period. A statistical recertification project is currently in-progress.

Audit outcome

Compliant

5.27 Statistical Sampling - Certification Method (Clause 7(3) Of Schedule 10.7)

Code related audit information

If the ATH uses statistical sampling, it must use either the selected component method or the fully calibrated method, as applicable, to certify each metering installation in the sample.

Audit observation

AMS has not completed any statistical sampling recertification during the audit period. A project is statistical recertification project is currently in-progress.

Audit commentary

The selected component method will used to certify the installations in the sample.

Audit outcome

Compliant

5.28 Certification Validity Periods (Clause 17 of Schedule 10.7)

Code related audit information

A metering installation certification expiry date is the earliest of:

a) the date of commissioning plus the maximum certification validity period for the relevant category of metering installation, as set out in Table 1 of Schedule 10.1; or

b) the earliest metering component certification expiry date; or

c) a date determined by the ATH if the ATH believes that the circumstances and condition of the components in a metering installation warrant deviation from Table 1 of Schedule 10.1.

The expiry date for a metering installation in a group recertified using a statistical sampling process, is the earliest expiry date of the metering installations in the sample

Audit observation

I checked 79 metering installation certification records to confirm compliance.

Audit commentary

The commissioning date, validity period and expiry date are recorded correctly in the metering installation certification reports.

Audit outcome

Compliant

5.29 Metering Installation Accuracy (Clause 21 of Schedule 10.7)

Code related audit information

An ATH must, before it certifies a metering installation, ensure that the metering installation does not exceed the relevant maximum permitted error after the application of any external compensation factors.

Audit observation

I checked 79 metering installation certification records to confirm compliance.

Audit commentary

The process documentation stipulates the maximum permitted errors for certification. My checks of 79 certification records confirmed this had been applied correctly and the maximum error did not exceed the maximum permitted error.

The error and uncertainty processes are discussed in more detail in **section 5.30**.

Audit outcome

Compliant

5.30 Error Calculation (Clause 22 of Schedule 10.7)

Code related audit information

If a metering installation is certified using the comparative recertification or fully calibrated methods, the ATH must calculate and record the percentage of overall error of the metering installation. The ATH must calculate this using appropriate mathematical methods that include:

- all sources of measurement error including test instrument errors, reference standard variations when used in conditions that deviate from those in the calibration report, variations in repeated observations, the instrument resolution or discrimination threshold and any assumptions incorporated in the measurement method and procedure

- the error calculation must include the uncertainty in the measurement at a 95% level of confidence using JCGM 100:2008

- the error and its calculation must be recorded in the certification report.

The ATH must not certify the metering installation if the uncertainty is greater than the maximum permitted site uncertainty or the combined error that includes the measured error and the uncertainty, is greater than the maximum permitted installation error.

Audit observation

I checked 79 metering installation certification records and discussed the process for error calculation.

Audit commentary

When conducting certification using the Comparative Recertification and Fully Calibrated methods all sources of error are appropriately accounted for including temperature and load. Uncertainty is calculated using the latest version of the MSL calculator, which considers temperature. The temperature is recorded on site and the calculator uses this to account for variation based on the test instrument temperature coefficient in three different temperature ranges, 11 to 18 degrees, 18 to 28 degrees and 28 to 35 degrees. Category 2 certification is not conducted outside of these temperatures. A randomly generated load profile is used within the calculator to achieve compliance with the requirement to consider the total quantity of electricity conveyed.

AMS uses two models of HIOKI working standards, 3196 and 3169. There are currently 16 3169 and five 3169 models in service. The 3196 model uses pulses from the meter under test. The model 3169 does not have pulse inputs, the technician starts and stops the Hioki by pushing a button when the least significant digit on the meter register advances. The uncertainty process does not include any potential error introduced by the reaction time of the technician when pushing the button. I recommend that AMS investigates the addition of an allowance in the uncertainty calculation for the influence of the reaction time.

Recommendation	Description	Audited party comment	Remedial action
Regarding 22 of Schedule 10.7	Investigate the addition of an allowance in the uncertainty calculation for the influence of the reaction time when using the Hioki 3169 working standards.	Testing will be undertaken to better identify the repeatability aspects of the prevailing load test with regards reaction times. This will then be assessed if significant and for inclusion in the uncertainty calculation.	Identified

Audit outcome

Compliant

5.31 Compensation Factors (Clause 24(1)(b) of Schedule 10.7)

Code related audit information

Before it certifies a metering installation that requires a compensation factor to adjust raw meter data, the ATH must:

- advise the MEP of the compensation factor

- ensure that the compensation factor that will be applied to raw meter data external to the metering installation is applied as follows:

a) for ratio compensation, on a category 1 metering installation or higher category of metering installation; or

b) for error compensation, on a metering installation that quantifies electricity conveyed through a point of connection to the grid; or

c) for loss compensation, only on a category 3 or higher metering installation.

Audit observation

I checked 79 metering installation certification records, and process documentation.

Audit commentary

AMS has a documented process for the management of compensation factors (multipliers). The testing procedures provide confirmation of the multiplier and CT ratio, the multiplier is recorded on the metering installation certification report. AMS only deals with multipliers, not loss or error compensation factors.

Audit outcome

Compliant

5.32 Record Metering Installation Compensation Factor (Clause 24(2) Of Schedule 10.7)

Code related audit information

If a compensation factor is applied to a metering installation, the ATH must record in the certification report, the methodology, assumptions, measurements, calculation and details of each compensation factor that is included within the internal configuration of the metering installation and each compensation factor that must be applied to the raw meter data.

Audit observation

I checked 79 metering installation certification records, and process documentation.

Audit commentary

AMS has a documented process for the management of compensation factors (multipliers). The testing procedures provide confirmation of the multiplier and CT ratio, the multiplier is recorded on the metering installation certification report.

Audit outcome

Compliant

5.33 Installation of Metering Components (Clause 25 of Schedule 10.7)

Code related audit information

Before it certifies a metering installation, the ATH must ensure that the installation of the metering components was carried out by an ATH. However, a suitably qualified person such as a switchboard manufacturer may install the measuring transformers and any required associated burden, the test facilities, potential fuses and switchboard wiring.

Before it certifies a metering installation, the ATH must ensure that each metering component is installed in accordance with the installation design report.

Audit observation

I checked process documentation and conducted a walk-through of the process.

Audit commentary

This clause is designed to allow switchboard manufacturers or electricians to install measuring transformers in switchboards at the time of manufacture. This clause does not allow the installation of meters or data loggers. AMS has a process to ensure compliance with this clause. CTs are provided to switchboard manufacturers, but not meters. There were no specific examples to examine during the audit.

Audit outcome

Compliant

5.34 Determine Metering Installation Certification Expiry Date (Clause 27(1) & (2) Of Schedule 10.7)

Code related audit information

The ATH needs to determine the meter certification expiry date for each meter in a metering installation. The meter certification expiry date must be the earliest end date of the following periods, calculated from the date of commissioning of the metering installation:

a) the maximum metering installation certification validity period for the relevant category of metering installation; or

b) the maximum meter certification validity period set out in Table 2 of Schedule 10.1 for the relevant class of meter for the metering installation; or

c) the certification period specified in the meter certification report.

Audit observation

I checked 79 certification records to confirm compliance.

Audit commentary

All meter and metering installation certification expiry dates were correct.

Audit outcome

Compliant

5.35 Meter Certification Shelf Life (Clause 27(4) Of Schedule 10.7)

Code related audit information

If a meter is not installed in a metering installation within 24 months of the date of the meter's certification report, the meter must be recertified before it is installed.

Audit observation

I checked 79 certification records to confirm compliance.

Audit commentary

AMS understands the requirements of this clause and ensures that all meters are certified at the time of installation.

Audit outcome

Compliant

5.36 Measuring Transformers Must Be Certified (Clause 28(2) Of Schedule 10.7)

Code related audit information

All measuring transformers must be certified before they can be used in a metering installation. If a measuring transformer has previously been used in another metering installation, the ATH must ensure that the measuring transformer has been recalibrated since it was removed from the previous metering installation. This must be undertaken either by an approved calibration laboratory or an ATH.

Audit observation

I checked 49 Category 2 and above certification records to confirm compliance.

Audit commentary

The current transformers were certified in all 24 selected component and 10 fully calibrated certifications checked. AMS has a clear understanding of this requirement.

Audit outcome

Compliant

5.37 Measuring Transformers Used in A Certified Metering Installation (Clause 28(4) Of Schedule 10.7)

Code related audit information

To certify any metering installation incorporating measuring transformers, the ATH must ensure that:

- the installation has certified measuring transformers

- the installation has a test facility which has provision for isolation, installed as physically close to the meter as practical in the circumstances

- the test facility is fitted with a transparent cover

- the installation has securely mounted measuring transformers which are, if practicable, in a sealed enclosure

- the maximum permitted error is calculated in accordance with clause 22 for the fully calibrated certification method or the comparative recertification method

- any voltage supplies from a voltage transformer to a meter or that other equipment in the metering installation is protected by appropriately rated fuses or circuit breakers dedicated to the supply. All fuses and circuit breakers must be suitably sealed or located in sealed enclosures,

- the measuring transformer's secondary circuit is earthed and that it is earthed at no more than one point

- the total in-service burden (magnitude and phase angle, where appropriate), complies with clause 31.

Audit observation

I checked 49 certification records, and process documentation to confirm compliance.

Audit commentary

The certification reports and process documentation confirmed compliance with regard to all of the above points with the exception of the total in-service burden requirements. Clause 31 of schedule 7 was changed from 1st February 2021 to require the ATH to ensure that the in-service burden is within the burden range of the measuring transformers.

My checks of 49 Category 2 and above metering installation certification reports found the in-service burden was within the burden range of the CTs in all except one of the 49 metering installations. The certification of ICP 0006146333RND66, Certification No. VC13203, had in-service burden lower than the burden range of the CTs. The CTs were 1200/5 15VA Secura CTs with a rated burden of 15VA. The burden range of these CTs is 3.75 to 15VA the in-service burden was recorded as 0.780, 0.437 and 0.530 VA and no additional burden was added.

Audit outcome

Non-compliant

Non-compliance	Description

Audit Ref: 5.37 With: Clause 28(4) Of Schedule 10.7 From: 20-May-21 To: 26-Aug-21	One category 2 metering installation certified with in-service burden lower than the burden range of the CTs. Potential impact: Medium Actual impact: Low Audit history: None Controls: Strong Breach risk rating: 1
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are recorded as strong because the AMS processes ensure certification is correctly applied in most cases. The impact on settlement is low because there was only one example identified. There is also an impact on the MEP because certification is cancelled.

Actions taken to resolve the issue	**Completion date**	**Remedial action status**
As detailed in 5.1	Completed	Cleared
Preventative actions taken to ensure no further issues will occur	**Completion date**	
As detailed in 5.1	Completed	

5.38 Measuring Transformer Certification Expiry Date (Clause 29 of Schedule 10.7)

Code related audit information

The ATH needs to determine the measuring transformer certification expiry date for each measuring transformer in a metering installation. The measuring transformer certification expiry must be within the validity period specified in the measuring transformer certification report.

Audit observation

I checked 49 certification records to confirm compliance.

Audit commentary

The metering installation certification report contains a field for CT expiry date and my checks of 24 selected component and 10 fully calibrated certifications confirmed this was being calculated and recorded correctly.

Audit outcome

Compliant

5.39 Other Equipment Connected to Measuring Transformers (Clause 30 of Schedule 10.7)

Code related audit information

If the ATH certifies a metering installation incorporating a measuring transformer used by another metering installation, it must ensure that where voltage transformers are connected to more than one meter:

- the meters are included in the metering installation being certified

- appropriate fuses or circuit breakers are provided to protect the metering circuit from short circuits or overloads affecting the other meter.

While it is desirable that only metering equipment is connected to measuring transformers in a metering installation if, in some circumstances, the MEP connects other equipment to measuring transformers, the ATH must ensure that:

- the accuracy of the metering installation remains within the maximum permitted error for the relevant metering installation category

- the metering installation certification report confirms that the accuracy of the metering installation remains within the maximum permitted error for the relevant metering installation

- any wiring between the equipment and any part of the metering installation is continuous

- the equipment is labelled appropriately, including with any de-energisation restrictions

- the connection details of the other equipment are recorded in the metering installation design report

- there are appropriate fuses or circuit breakers provided to protect the voltage transformer and metering circuit from short circuits or overloads affecting the other equipment.

Audit observation

I checked whether the situation arises where other equipment is connected to measuring transformers.

Audit commentary

There were no examples to examine where other equipment was connected to measuring transformers. However, the measurement of burden during commissioning will address this matter.

Audit outcome

Compliant

5.40 Burden & Compensation (Clause 31 of Schedule 10.7)

Code related audit information

An ATH may certify a metering installation for a POC to the grid that includes error compensation factors as an alternative to the use of burden resistors only if the ATH is satisfied the error compensation factors will provide a more accurate result than the use of burden resistors.

An ATH may change the burden on a voltage transformer, without obtaining the approval of the MEP, if the ATH confirms in the certification report that the difference between the new burden and the burden at the time of the most recent metering installation certification is:

a) less than or equal to 1/30th of the VA rating of the voltage transformer, if the voltage transformer is rated at less than 30 VA; or

b) no greater than 1 VA, if the voltage transformer is rated at equal to or greater than 30 VA.

Before it certifies a metering installation incorporating a measuring transformer:

- *ensure that the in-service burden does not exceed the upper limit of the range specified for the measuring transformer, if specified in the design report for the metering installation.*
- *ensure that the in-service burden on the measuring transformer is within the range specified in the certification report by installing burdening resistors, if necessary,*

- *confirm that a class A ATH has confirmed by calibration that the accuracy of the measuring transformer will not be adversely affect by the in-service burden being less than the lowest burden test point specified in the standard, if the primary voltage of the measuring transformer is greater than 1kV,*
- *confirm that the measuring transformer's manufacturer has confirmed that the accuracy of the measuring transformer will not be adversely affected by the in-service burden being less than the lowest burden test point specified in the standard.*

Audit observation

I checked processes and the records for 49 metering installations to confirm compliance.

Audit commentary

The certification reports and process documentation confirmed compliance with regard to all of the above points with the exception of the total in-service burden requirements. Clause 31 of schedule 7 was changed from 1st February 2021 to require the ATH to ensure that the in-service burden is within the burden range of the measuring transformers.

My checks of 49 Category 2 and above metering installation certification reports found the in-service burden was within the burden range of the CTs in all except one of the 49 metering installations. The certification of ICP 0006146333RND66, Certification No. VC13203, had in-service burden lower than the burden range of the CTs. The CTs were 1200/5 15VA Secura CTs with a rated burden of 15VA. The burden range of these CTs is 3.75 to 15VA the in-service burden was recorded as 0.780, 0.437 and 0.530 VA and no additional burden was added.

Audit outcome

Non-compliant

<table>
<tr><th>Non-compliance</th><th colspan="3">Description</th></tr>
<tr><td>Audit Ref: 5.40
With: Clause 31 Of Schedule 10.7

From: 20-May-21
To: 26-Aug-21</td><td colspan="3">One category 2 metering installation certified with in-service burden lower than the burden range of the CTs.
Potential impact: Medium
Actual impact: Low
Audit history: None
Controls: Strong
Breach risk rating: 1</td></tr>
<tr><th>Audit risk rating</th><th colspan="3">Rationale for audit risk rating</th></tr>
<tr><td>Low</td><td colspan="3">The controls are recorded as strong because the AMS processes ensure certification is correctly applied in most cases.
The impact on settlement is low because there was only one example identified. There is also an impact on the MEP because certification is cancelled.</td></tr>
<tr><th colspan="2">Actions taken to resolve the issue</th><th>Completion date</th><th>Remedial action status</th></tr>
<tr><td colspan="2">As detailed in 5.1</td><td>Completed</td><td rowspan="2">Cleared</td></tr>
<tr><th colspan="2">Preventative actions taken to ensure no further issues will occur</th><th>Completion date</th></tr>
</table>

As detailed in 5.1	Completed	

5.41 Alternative Certification (Clause 32(1) of Schedule 10.7)

Code related audit information

If the ATH cannot comply with the requirements for certifying a measuring transformer solely due to the inability to obtain physical access to test the measuring transformers, it can certify the metering installation for a period not exceeding 24 months only if:

- the measuring transformer has not previously been certified due to failure to obtain access

- the ATH is satisfied that the metering installation will comply with the applicable accuracy requirements

- the ATH has advised the MEP that the metering installation has been certified by this method

- the MEP has advised the registry of the certification.

Audit observation

I checked the process documentation and whether any examples had occurred.

Audit commentary

AM has not applied alternative certification during the audit period, but the process documentation is compliant.

Audit outcome

Compliant

5.42 Installations Incorporating Control Devices (Clause 33(2) of Schedule 10.7)

Code related audit information

Before the ATH can certify a metering installation incorporating a control device that must be certified, it must ensure:

- that the certification expiry date for each control device is the same as the metering installation certification expiry date and record that date in the installation certification report

- that the control device complies with the applicable standards listed in Table 5 of Schedule 10.1

- the control device is fit for purpose

- if the metering installation contains a control device that has previously been used in another metering installation, that the control device is still fit for service.

- that the control device is:

a) likely to receive control signals

b) correctly connected

c) correctly programmed.

Audit observation

I checked certification records for six metering installations to confirm compliance.

Audit commentary

AMS is certifying control devices and correctly applying stickers. The control device certification expiry date is correctly recorded in the installation certification report.

Audit outcome

Compliant

5.43 Control Device Reliability (Clause 34(1) & (3) to (5) of Schedule 10.7)

Code related audit information

In order to ensure control device accuracy or the completeness of reconciliation information, the ATH must determine the likelihood of the control device not receiving control signals before it certifies a metering installation incorporating a control device.

If the ATH believes the likelihood of the control device not receiving control signals would affect the accuracy or completeness of the information for consumption reconciliation, the ATH may certify the remainder of the metering components and the installation, excluding the control device. The ATH must advise the MEP within three business days of its decision. The MEP is then responsible for advising both the reconciliation participant for the POC for the metering installation and the control signal provider of the ATH's determination.

Audit observation

AMS has a schedule showing all areas with potential signal propagation issues. This schedule is supplied to the contractors so they can take it into account when conducting metering activities which may involve the installation of a control device.

Audit commentary

AMS has a schedule showing all areas with potential signal propagation issues. This schedule is supplied to the contractors so they can take it into account when conducting metering activities which may involve the installation of a control device. Compliance is confirmed.

Audit outcome

Compliant

5.44 Data Storage Devices (Clauses 36(2) of Schedule 10.7)

Code related audit information

If a data storage device has previously been used in another metering installation, the ATH must ensure that the data storage device has been recalibrated since it was removed from the previous metering installation by an approved calibration laboratory, an approved test laboratory, or an ATH.

Audit observation

I checked processes and the records for 79 metering installations to confirm compliance.

Audit commentary

All data storage devices are recertified prior to being reinstalled.

Audit outcome

Compliant

5.45 Data storage device requirements (Clause 38(1) and (2) of Schedule 10.7 and clause 5(1) of Schedule 10.8)

Code related audit information

An ATH must ensure that each data storage device in the metering installation:

- is installed so that on-site interrogation is possible without the need to interfere with seals

- has a dedicated power supply unless the data storage device is integrated with another metering component

- is compatible with each other metering component of the metering installation

- is suitable for the electrical and environmental site conditions in which it is installed

- has all of its outputs and inputs appropriately electrically isolated and rated for purpose

- has no outputs that will interfere with the operation of the metering installation

- records periods of data identifiable or deducible by both date and time on interrogation

- has memory capacity and functionality that is suitable for the proposed functions of the data storage device specified in the design report for the metering installation

- has availability of memory for a period that is suitable for the proposed functions as set out in the design report for the metering installation, and at least for a minimum continuous period of 15 days.

The data storage device must have an event log which records the following:

a) loss of power supply

b) critical internal alarms

c) meter phase failure if integral to the meter

d) software configuration changes

e) a record of time changes.

Audit observation

I checked the availability of type test reports, and processes for determining environmental suitability.

Audit commentary

The points above, apart from point "d" are documented in the type test report, which is checked as part of the certification process for the data storage device. AMS is ensuring data storage devices are certified and the maximum interrogation cycle is recorded.

The previous audit recorded that AMS had certified 10 ARC Innovations installations containing non-compliant data loggers. I checked the certification records for the audit period and confirmed that no ARC Innovations data loggers had been certified. All ARC dataloggers are displaced if recertification is required.

Audit outcome

Compliant

5.46 Location of Metering Installation Certification Stickers (Clause 41(1) and 41(9) of Schedule 10.7

Code related audit information

An ATH must confirm the metering installation certification by attaching a metering installation certification sticker as close as possible to the meter, while maintaining reasonable visibility of the certification sticker and the meter.

When attaching a metering installation certification sticker, the ATH must remove or obscure any invalid or expired certification stickers.

Audit observation

I checked the photos for five metering installations to confirm compliance.

Audit commentary

In all cases, the certification stickers contained the appropriate detail and were correctly applied. Old certification stickers are either removed or obscured.

Audit outcome

Compliant

5.47 Alternate Location of Metering Installation Certification Sticker (Clause 41(4) Of Schedule 10.7)

Code related audit information

If attaching a certification sticker is not practicable, the ATH must devise and use an alternative means of documenting the information and keep any metering component certification sticker with the documented information.

Audit observation

I checked with AMS whether this scenario had arisen.

Audit commentary

This scenario has not arisen and is unlikely to arise.

Audit outcome

Compliant

5.48 Contents of Metering Installation Certification Sticker (Clause 41(2) Of Schedule 10.7)

Code related audit information

The metering installation certification sticker must show:

- the name of the ATH who certified the metering installation

- the certification date of the installation

- the metering installation category

- the ICP

- the certification number for the metering installation.

Audit observation

I checked the photos for five metering installations to confirm compliance.

Audit commentary

In all cases, the certification stickers contained the appropriate detail and were correctly applied.

Audit outcome

Compliant

5.49 Combining certification stickers (Clause 41(5) – Clause 41(8) of Schedule 10.7)

Code related audit information

If an ATH certifies a metering component on the same day that the ATH certifies the metering installation, the ATH may combine the metering installation certification sticker with the metering component certification sticker.
If the certification sticker is combined, the ATH must:

- *ensure that the combined sticker shows all the information required by subclause (2) and clause 8(2) of Schedule 10.8,*
- *meet the requirements of subclauses (1), (3) and (4), as if the combined sticker were a metering installation certification sticker.*

The combined sticker is immediately invalid if:

- *the metering installation certification expiry date changes; or*
- *a metering component to which the combined certification sticker relates is removed from the metering installation.*

Audit observation

AMS uses a combined metering installation and component sticker.

Audit commentary

The AMS combined metering installation and component sticker meets the requirements of this clause and is applied correctly.

Audit outcome

Compliant

5.50 Enclosures (Clause 42 of Schedule 10.7)

Code related audit information

An ATH must, before it certifies a metering installation, ensure that, if a metering component in the metering installation is housed in a separate enclosure from the meter enclosure, the enclosure is appropriate to the environment in which it is located and has a warning label attached stating that the enclosure houses a metering component.

Audit observation

I checked the photos for five metering installations to confirm compliance.

Audit commentary

Although this clause only refers to enclosures other than the metering enclosure, I have considered this clause to apply to metering enclosures as well.

The photos for five metering installations showed that all enclosures were appropriate for the environment, and the AMS certification sticker has an appropriate warning.

Audit outcome

Compliant

5.51 Metering Component Certification (Clause 43(1) of Schedule 10.7)

Code related audit information

Before certifying an installation, the ATH must ensure that each component has been certified by an ATH and has been stored appropriately since component certification.

Audit observation

I checked the processes for storage of components, and the records for 79 metering installations to confirm compliance.

Audit commentary

AMS conducts calibration of components in their laboratory, and they have appropriate arrangements for storage and transportation. AMS is ensuring components are certified as required by the Code.

Audit outcome

Compliant

5.52 Sealing Requirements (Clause 47(2) (3) (4) and (5) Of Schedule 10.7)

Code related audit information

Before an ATH certifies a metering installation or leaves it unattended, the ATH must ensure that each metering component that could reasonably be expected to affect the accuracy or reliability of the metering installation is sealed.

The metering components which must be sealed include:

- each part and connection of a data storage device in, or attached to, the metering installation except for a port for on-site reading that is not capable of carrying out any other function

- the main switch cover, if the main switch:

a) is on the supply side of the metering installation

b) has provision for sealing.

Audit observation

I checked process documentation, design reports and the photos for five metering installations to confirm compliance.

Audit commentary

The process documentation, design reports and the photos for five metering installations confirm compliance.

Audit outcome

Compliant

5.53 Seals for Metering Component Enclosures (Clause 47(6) Of Schedule 10.7)

Code related audit information

When applying a seal to a metering component in an enclosure, the ATH must attach a warning label in a prominent position inside the enclosure.

Audit observation

I checked process documentation and the photos for five metering installations to confirm compliance.

Audit commentary

Compliance is confirmed. The warning label is attached in a prominent position.

Audit outcome

Compliant

5.54 Requirements for Sealing System (Clause 47(7) Of Schedule 10.7)

Code related audit information

An ATH must use a sealing system that enables identification of:

- the ATH who affixed the seal

- the person (or the sealing tool) who applied the seal

- when the seal was applied.

Audit observation

I checked process documentation and records for 79 installations.

Audit commentary

The certification records contain the relevant details required by this clause.

Audit outcome

Compliant

5.55 Removal or Breakage of Seals (Clause 48(6) of Schedule 10.7)

Code related audit information

When the ATH investigates an unauthorised removal or breakage, it must assess the accuracy and continued integrity of the metering installation. If the ATH considers the accuracy and continued integrity is unaffected, it must replace the removed or broken seals.

If the accuracy and continued integrity is affected, the ATH must replace the removed or broken seal and advise the MEP that the metering installation is potentially inaccurate, defective, or not fit for purpose.

Audit observation

I checked the process documentation to confirm compliance.

Audit commentary

AMS has appropriate instructions in relation to this requirement and there is the ability to record this information on the commissioning record for the installation. There were no recent examples available to check.

Audit outcome

Compliant

5.56 Wiring (Clause 6 of Schedule 10.8)

Code related audit information

An ATH must, before it certifies a metering installation, ensure that all wiring in the metering installation is suitable for the environment in which the metering installation is located, fit for purpose, securely fastened, and compliant with all applicable requirements and enactments.

The ATH must ensure that the wiring between metering components in the metering installation:

- is run as directly as practicable

- is appropriately sized and protected

- does not, to the extent practicable, include intermediate joints for any measuring transformer circuits

- includes conductors that are clearly and permanently identified, by the use of any one or more of the following:

a) colour coding

b) marker ferrules

c) conductor numbering.

If it is not practicable to exclude intermediate joints for any measuring transformer circuits, the ATH must ensure that the intermediate joints are sealed or in a sealed enclosure.

Audit observation

I checked process documentation and the photos for five metering installations to confirm compliance.

Audit commentary

The process documentation and design reports are compliant and the photos for five installations confirmed compliance.

Audit outcome

Compliant

5.57 Fuses and Circuit Breakers (Clause 7 of Schedule 10.8)

Code related audit information

An ATH must, before it certifies a metering installation, ensure that all fuses and circuit breakers that are part of the metering installation are appropriately rated for the electrical duty and discrimination required, clearly labelled and sealed or located in sealed enclosures.

Audit observation

I checked process documentation to confirm compliance.

Audit commentary

The documentation demonstrated compliance with this requirement, metering fuse ratings are recorded in the metering installation certification reports.

Audit outcome

Compliant

5.58 Calibration of Metering Components Where Relevant (Clause 7(1) Of Schedule 10.4)

Code related audit information

Before the ATH certifies a metering installation or metering component, it must ensure that the metering components have been calibrated by an approved calibration laboratory or an ATH with appropriate approval under Schedule 10.3.

Audit observation

I checked process documentation and 79 certification reports to confirm compliance.

Audit commentary

The AMS process requires the technician to confirm the calibration details of metering components on-site and certification does not occur if the component does not have a calibration sticker. The calibration details are recorded in the certification report. I requested a sample of 22 calibration reports and confirmed that the calibration details matched the certification reports.

Audit outcome

Compliant

5.59 Requirement for Calibration of Metering Components (Clause 7(2) Of Schedule 10.4)

Code related audit information

Before the ATH certifies a metering component it must ensure that the component is calibrated or adjusted under the physical and electrical conditions specified in Table 5 of schedule 10.1 and the conditions permit the calculation of uncertainties at the reference conditions.

Audit observation

I checked process documentation and 79 certification reports to confirm compliance.

Audit commentary

The AMS process requires the technician to confirm the calibration details of metering components on-site and certification does not occur if the component does not have a calibration sticker. The calibration details are recorded in the certification report. I requested a sample of 22 calibration reports and confirmed that the calibration details matched the certification reports.

Audit outcome

Compliant

5.60 Metering Component Calibration Method (Clause 7(3) Of Schedule 10.4)

Code related audit information

A class B ATH must follow the relevant requirements of ISO17025 for calibration of components and only use methodologies that have been verified in their most recent audit.

Audit observation

The Class B AMS ATH does not calibrate components. Calibration is conducted by the Class A ATH.

Audit commentary

The Class B AMS ATH does not calibrate components. Calibration is conducted by the Class A ATH.

Audit outcome

Not applicable

5.61 Metering Component Calibration Test Points (Clause 7(4) Of Schedule 10.4)

Code related audit information

If the ATH calibrates a component it must ensure that the test points that it uses are either:

- no less than the test points in Table 5 of Schedule 10.1 or

- sufficient to calculate the metering installation error as defined in clause 22 of Schedule 10.7.

Audit observation

I checked the test points used by AMS.

Audit commentary

AMS uses the test points stipulated in the relevant standards.

Audit outcome

Compliant

5.62 Determine Metering Component Error and Record (Clause 7(5) Of Schedule 10.4)

Code related audit information

An ATH must, when calibrating a metering component:

- if necessary, adjust and document the error compensation

- ensure that any adjustment carried out is appropriate to achieve an error as close as practicable to zero

- ensure that the uncertainty of measurement during the calibration of the metering component does not exceed one third of the maximum permitted error in the relevant standard listed in Table 5 of Schedule 10.1.

If the metering component is intended for a metering installation which will be certified using the selected component certification method, the ATH must ensure that the ATH records the errors of a current transformer from 5 % to 120 % of rated primary current.

Audit observation

I checked the AMS IANZ report to confirm compliance.

Audit commentary

The IANZ report confirms compliance with these points.

Audit outcome

Compliant

5.63 Class B ATH Calibrating Metering Components (Clause 2(3) Of Schedule 10.3)

Code related audit information

If a class B ATH wishes to calibrate components (such as class 0.5 meters, class 1 meters, class 2 meters, class 0.5 current transformers, and class 1.0 current transformers) this must be carried out under the relevant provisions and methodologies of ISO 17025. The final audit report must include a list of all relevant requirements of ISO 17025 for calibrating these metering components and all relevant methodologies audited.

Audit observation

The Class B AMS ATH does not calibrate components. Calibration is conducted by the Class A ATH.

Audit commentary

The Class B AMS ATH does not calibrate components. Calibration is conducted by the Class A ATH.

Audit outcome

Not applicable

5.64 Meter Certification (Clause 1 of Schedule 10.8)

Code related audit information

All meters must be certified before they can be used in a metering installation. The ATH must ensure that the meters in a metering installation have been type tested by an approved test laboratory, that the results for the meter are appropriate for that meter model and version and have a calibration report.

Audit observation

I checked the certification records for 79 metering installations and the AMS directory of type test reports to confirm compliance.

Audit commentary

All meters are certified and AMS has a directory of type test reports along with a summary table showing each report, the date it was checked and who checked it.

The last audit included a recommendation (in section 3.6) that the type test table is expanded to include each requirement of the Code to ensure each one is checked in the report to prevent the situation where non-compliant devices were certified. I confirmed that this information is now included, and the situation has not reoccurred.

Audit outcome

Compliant

5.65 Meter Requirements When Meter Is Relocated (Clause 26(2) Of Schedule 10.7 and Clause 43(2) Of Schedule 10.7)

Code related audit information

If a meter has previously been used in another metering installation, the ATH must ensure that the meter has been recalibrated since it was removed from the previous metering installation by an approved calibration laboratory or an ATH unless it is less than 12 months since the meter was commissioned in the previous installation.

Audit observation

I checked the process documentation in relation to this clause.

Audit commentary

AMS ensures that all meters are calibrated by a class A ATH prior to being reinstalled.

Audit outcome

Compliant

5.66 Measuring Transformer Error Testing (Clause 2(1)(A) & (B) Of Schedule 10.8)

Code related audit information

Before certifying a measuring transformer, an ATH must test the measuring transformer's errors at a range of primary values at their rated burdens. If the measuring transformer is a multi-tap current transformer, an ATH must carry out the calibration tests and only certify the transformer for the ratios that have been calibrated.

Audit observation

CTs certified by AMS are done so in accordance with these clauses. Compliance is confirmed.

Audit commentary

CTs certified by AMS are done so in accordance with these clauses. Compliance is confirmed.

Audit outcome

Compliant

5.67 Measuring Transformer Certification (Clause 3 of Schedule 10.8)

Code related audit information

Before it certifies a measuring transformer, the ATH must ensure that:

- the measuring transformer has a current calibration report issued by an approved calibration laboratory or an ATH approved to carry out calibration

- the measuring transformer calibration report:

- confirms that the measuring transformer complies with the standards listed in Table 5 of Schedule 10.1

- records any tests the ATH has performed to confirm compliance

- confirms that the measuring transformer has passed the tests

- records any recommendations made by the ATH on error compensation

- includes any manufacturer's calibration test reports.

The ATH is required to produce a measuring transformer certification report that includes:

- the date on which it certified the measuring transformer

- the certification validity period for the measuring transformer, which must be no more than 120 months

- whether the certification was based on batch test certificates

- if the certification was based on batch test certificates, confirmation that the manufacturer's batch testing facility is, in the ATH's opinion, of an acceptable standard

- the range that the in-service burden must be within

The ATH must provide confirmation that the ATH has inspected the manufacturer's test certificates, and carried out any additional tests it considers necessary, to satisfy itself that the measuring transformer meets the accuracy requirements.

Audit observation

I checked the certification records for 49 metering installations to confirm compliance.

Audit commentary

When conducting certification of category 2 and above metering installations AMS certifies the CTs based on calibration reports provided by Class A ATHs, which covers most of the points raised above. This clause was changed from 1st February 2021 to require the ATH to record the burden range of the measuring transformers in the transformer certification report. The AMS processes ensure that in-service burden is within the correct range but have not been updated to include the burden range in the CT certification report. Of the 49 certification records checked there was a total of 22 metering installations where the CTs were certified by AMS after 1st February 2021 and there was no burden range recorded. I have recorded non-compliance for these cases.

My checks of 15 Category 2 comparative recertification records found that there were three category 2 installations where the CTs were certified during comparative recertification (ICPs 0000003259CP4CB, 0241425263LCA2D and 0282008594LCF10). I have recorded non-compliance as

the CTs were certified without calibration being carried out. In February 2021 AMS rolled out changes to its processes to ensure that existing CTs are not certified under comparative recertification but the change had not been fully implemented to at the time of certification for the three examples found.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 5.67 With: Clause 3 of Schedule 10.8 From: 01-Feb-21 To: 26-Aug-21	Burden range not recorded in CT certification reports for 22 metering installations. Three category 2 metering installations with CTs certified without calibration being carried out. Potential impact: Low Actual impact: Low Audit history: None Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	I have recorded that the controls are moderate as the AMS process to certify CTs during comparative recertification has been amended recently but has not updated its processes to record burden ranges. The impact on settlement and participants is minor; therefore, the audit risk rating is low.

Actions taken to resolve the issue	Completion date	Remedial action status
See details in 5.1 ICP0000003259CP4CB ICP0241425263LCA2D ICP0282008594LCF10 Cat 2 sites where the CTs were re-certified as part of comparative certification. Certifications deemed to be still current as the certification state of the CTs is not a requirement of compliance for the installation under Comparative certification.	Completed	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
These sites were certified early 2021, there has been a lot of training and experienced gained since then by the validators and these issues have not been seen since. An additional technical memo will be released in early October to the field technicians to clarify and instruct on the appropriate application of comparative certification.	31/10/2021	

5.68 Measuring Transformers in service burden range (Clause 2(1)(E) Of Schedule 10.8)

Code related audit information

Before certifying a measuring transformer, the ATH must determine the range that the in-service burden must be within to ensure the measuring transformer remains accurate, by using one or more of the following:

- *the measuring transformer's nameplate rating*
- *the calibration report for the measuring transformer*
- *the manufacturer's documentation for the measuring transformer*
- *the standard set out in Table 5 of Schedule 10.1 the measuring transformer was manufactured to.*

Audit observation

I checked processes and the records for 49 metering installations to confirm compliance.

Audit commentary

The requirement to determine the range that the in-service burden must be within to ensure the measuring transformer remains accurate was introduced on 1st February 2021. The AMS processes ensure that in-service burden is within the correct range but have not been updated to include the burden range in the CT certification report. Of the 49 certification records checked there was a total of 22 metering installations where the CTs were certified by AMS after 1st February 2021 and there was no burden range recorded. I have recorded non-compliance for these cases.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 5.68 With: Clause 2(1)(E) Of Schedule 10.8 From: 01-Feb-21 To: 26-Aug-21	Burden range not recorded in CT certification reports for 22 metering installations. Potential impact: Low Actual impact: Low Audit history: None Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	I have recorded that the controls are moderate as the AMS processes ensure that in-service burden is range is determined correctly but the range is not recorded in certification reports. There is no impact on settlement and participants as all CTs certified have in-service burden within the appropriate range; therefore, the audit risk rating is low.

Actions taken to resolve the issue	Completion date	Remedial action status
As detailed in 5.1 and 5.67	31/10/2021	Identified

Preventative actions taken to ensure no further issues will occur	Completion date	
As noted in preceding non-compliances	31/10/2021	

5.69 Measuring Transformer - Epoxy Insulated (Clause 2(2) Of Schedule 10.8)

Code related audit information

Before it certifies an epoxy insulated current transformer, the ATH must ensure that the certification tests allow for, and the metering installation certification report shows, the current transformer's age, temperature, and batch.

Audit observation

I checked the policy regarding epoxy CTs.

Audit commentary

Epoxy insulated CTs are discarded upon discovery**.**

Audit outcome

Compliant

5.70 Control Device Certification (Clause 4 of Schedule 10.8)

Code related audit information

Before it certifies a new control device, the ATH must produce a certification report that:

- confirms that the control device complies with the applicable standards listed in Table 5 of Schedule 10.1

- includes the details and results of any test that the ATH has carried out to confirm compliance under paragraph (a)

- confirms that the control device has passed such tests.

Before it certifies an existing installed control device, the ATH must produce a certification report that confirms:

- that the control device is fit for purpose

- the control device certification validity period that the ATH considers appropriate, which must be no more than 180 months.

Audit observation

I checked the certification records for six metering installations containing control devices to confirm compliance.

Audit commentary

AMS certifies control devices in accordance with these clauses. The certification report is combined with the metering installation certification report.

Audit outcome

Compliant

5.71 Data Storage Devices (Clause 36(2) Of Schedule 10.7)

Code related audit information

If a data storage device has previously been used in another metering installation, the ATH must ensure that the data storage device has been recalibrated since it was removed from the previous metering installation by an approved calibration laboratory, an approved test laboratory, or an ATH.

Audit observation

I checked the certification records for 77 metering installations and the process documentation to confirm compliance.

Audit commentary

The process documentation and certification records confirmed that data storage devices are certified prior to installation.

Audit outcome

Compliant

5.72 On-site Calibration and Certification (Clause 9(1) of Schedule 10.8)

Code related audit information

An ATH may only calibrate a metering component on site in the metering component's normal environment by measuring the influence of all on-site variables and including their estimated effects in the uncertainty calculation. An ATH must ensure that:

- the effects of any departures from the reference conditions can accurately and reliably be calculated

- the metering installation, in which the metering component is incorporated, is within the applicable accuracy tolerances set out in Table 1 of Schedule 10.1 after taking into account all known influences including temperature and temperature co-efficient measurements.

Audit observation

AMS conduct on site calibration of current transformers for fully calibrated installations. I checked the IANZ report to confirm compliance with this clause.

Audit commentary

The IANZ report confirmed compliance.

Audit outcome

Compliant

5.73 On Site Metering Component Calibration (Clause 9(2) Of Schedule 10.8)

Code related audit information

If the ATH calibrates a metering component on site using manual methods, computers, or automated equipment for the capture, processing, manipulation, recording, reporting, storage, or retrieval of calibration data, it must ensure that its computer software:

- is documented in the ATH's procedures

- can manipulate the variables that affect the performance of the metering component in a manner that will produce results that would correctly indicate the level of compliance of the metering component with this Code.

Audit observation

AMS conduct on site calibration of current transformers for fully calibrated installations. I checked the IANZ report to confirm compliance with this clause.

Audit commentary

The IANZ report confirmed compliance.

Audit outcome

Compliant

5.74 On site metering component calibration records (Clause 9(3) of Schedule 10.8)

Code related audit information

An ATH that certifies a metering component on site must include confirmation in the metering component certification report that:

- it has calculated the uncertainty of measurement taking into account all environmental factors for both the metering component being calibrated and the working standards

- the calculation of the uncertainty comprises all uncertainties in the chain of calibration

- the ATH has used a calibration procedure to calibrate the metering component that was included in the ATH's most recent audit and is appropriate for on-site calibration.

Audit observation

AMS conduct on site calibration of current transformers for fully calibrated installations. I checked the IANZ report to confirm compliance with this clause.

Audit commentary

The IANZ report confirmed compliance.

Audit outcome

Compliant

5.75 Data Storage Device Certification Expiry Date (Clause 37 of Schedule 10.7)

Code related audit information

Before certifying a meter installation which incorporates a data storage device, the ATH must determine the expiry date of the data storage device. The ATH must record the expiry date in the certification report for the metering installation and the certification report for the data storage device.

Audit observation

I checked the records for 77 metering installations to confirm compliance.

Audit commentary

AMS is correctly applying certification in accordance with this clause.

Audit outcome

Compliant

5.76 All Functions and Activities Must Be Completed (Clause 10.42(2))

Code related audit information

Where Part 10 requires the ATH to complete a function or activity before a metering installation is certified, the ATH must complete that function or activity as part of the process for certifying the metering installation.

Audit observation

I checked the records for 79 metering installations to confirm compliance.

Audit commentary

There was no evidence of incomplete functions.

Audit outcome

Compliant

6. INSPECTION OF METERING INSTALLATIONS

6.1 General Inspection Requirements (Clause 44 (1) (a) to (e) of Schedule 10.7)

Code related audit information

When carrying out an inspection of a metering installation, the ATH must:

- check and confirm that the data storage device in the metering installation operates as required

- check and confirm that the expected remaining lifetime of each battery in the metering installation will be reasonably likely to meet or exceed the metering installation certification expiry date

- ensure that no modifications have been made to the metering installation without the change having been documented and certification requirements satisfied

- visually inspect all seals, enclosures, metering components, and wiring of the metering installation for evidence of damage, deterioration, or tampering

- ensure that the metering installation and its metering components carry appropriate certification stickers.

Audit observation

I checked the AMS process and a sample of 10 completed inspection reports to confirm compliance.

Audit commentary

AMS has appropriate process documentation for conducting inspections of CT metered installations, and their records are compliant with these clauses. My checks of 10 inspection reports confirmed that the above points were met.

When conducting inspections of AMI metered Category 1 installations, which contain data storage devices. The following information is obtained from the MEP prior to the inspection being conducted:

1. confirmation that there are no events recorded which could affect the operation of the data storage device,
2. date of the last sum-check and confirmation that it passed, and
3. confirmation that there are no battery alarms present.

Audit outcome

Compliant

6.2 Raw Meter Data Test (Clause 44(1)(F) Of Schedule 10.7)

Code related audit information

When carrying out an inspection of a category 1 metering installation, the ATH must also check and confirm there is no difference between the volume of electricity recorded by the master accumulation register of a data storage device, and the sum of the meter registers.

Audit observation

I checked the AMS process and a sample of five completed inspection reports to confirm compliance.

Audit commentary

When conducting inspections of AMI metered Category 1 installations, which contain data storage devices. The process includes confirmation from the MEP that the most recent sum-check has passed.

Audit outcome

Compliant

6.3 Prepare Inspection Report (Clause 44(2) Of Schedule 10.7)

Code related audit information

An ATH must prepare an inspection report for each inspection of a metering installation that it carries out, which includes the following:

- details of the checks carried out, the results, and the installation certification expiry date

- the serial numbers of all components in the metering installation

- any non-compliances and the action taken to remedy the non-compliance

- the name of the inspector and the date on the inspection.

Audit observation

I checked the AMS process and a sample of 10 completed inspection reports to confirm compliance.

Audit commentary

AMS inspection reports contain all of the relevant information above.

Audit outcome

Compliant

6.4 Provide Inspection Report to MEP (Clause 44(3) Of Schedule 10.7)

Code related audit information

The ATH must, within 10 business days of carrying out the inspection, provide the inspection report to the MEP.

Audit observation

I checked the timeframes for sending inspection reports by checking AMS records.

Audit commentary

No late inspection reports were identified.

Audit outcome

Compliant

6.5 Inspections for Category 2 & Above Installations (Clause 46(2) of Schedule 10.7)

Code related audit information

When carrying out an inspection of a category 2 or higher metering installation, the ATH must also conduct the following additional checks:

- a visual inspection of each metering component in the metering installation for damage, tampering, or defect

- if the current transformer can be safely accessed, check the position of the current transformer tap to ensure it is still appropriate for the expected maximum current for the metering installation

- check for the presence of appropriate voltages at the metering installation

- check the voltage circuit alarms and fault indicators.

Audit observation

I checked the AMS process and a sample of five completed inspection reports to confirm compliance.

Audit commentary

AMS inspection reports contain all of the relevant information above.

Audit outcome

Compliant

7. PROCESS FOR HANDLING FAULTY METERING INSTALLATIONS

7.1 Investigation of Faulty Metering Installations (Clause 10.43(3) of Part 10)

Code related audit information

As a participant, the ATH must inform the MEP if it believes a metering installation is faulty, inaccurate, defective, or not fit for purpose.

Audit observation

I checked the AMS process documentation to confirm compliance.

Audit commentary

The process documentation confirmed compliance. There were no recent examples to examine.

Audit outcome

Compliant

7.2 Testing of Faulty Metering Installations (Clause 10.44 of Part 10)

Code related audit information

When advised by an MEP that a metering installation is faulty, inaccurate, defective, or not fit for purpose, the ATH must test the metering installation as soon as practical and provide a statement of situation.

Audit observation

I checked the AMS process documentation to confirm compliance.

Audit commentary

No specific examples of faulty metering installations have been identified. AMS has a process which is compliant with the Code. I viewed AMS's Statement of Situation form and confirmed that it includes all relevant detail.

Audit outcome

Compliant

7.3 Statement of Situation (Clause 10.46(1) of Part 10)

Code related audit information

The ATH must include the following in the statement of situation:

- the details and results of the tests carried out

- a conclusion, with reasons, as to whether or not the metering installation is faulty

- an assessment of the risk to the completeness and accuracy of the raw meter data

- the remedial action proposed or undertaken

- any correction factors to apply to raw meter data to ensure that the volume information is accurate

- the period over which the correction factor must be applied to the raw meter data.

Audit observation

I checked the AMS process documentation to confirm compliance.

Audit commentary

No specific examples of faulty metering installations have been identified. AMS has a process which is compliant with the Code. I viewed AMS's Statement of Situation form and confirmed that it includes all relevant detail.

Audit outcome

Compliant

7.4 ATH to keep records of modifications to correct defects (Clause 10.47 of Part 10)

Code related audit information

When taking action to remedy an inaccuracy or defect within a metering installation, the ATH must ensure that records of any modifications that are carried out to the metering installation are kept for each metering component of the metering installation in the metering records and in a manner reasonable in the circumstances to ensure that further investigation can be carried out.

Audit observation

I checked the AMS process documentation to confirm compliance.

Audit commentary

No specific examples of faulty metering installations have been identified. AMS has a process which is compliant with the Code. The process requires that all modifications carried out on-site are recorded by the technician.

Audit outcome

Compliant

8. CONCLUSIONS

Non-compliance is recorded in 14 sections of this audit. Seven of the non-compliances relate to changes to several areas of the Code that were announced on 15th December 2020 and implemented on 1st February 2021.

The Code now requires the ATH to record each services access interface and the associated maximum interrogation cycles for each. AMS has implemented changes to its Category 1 certification process to encompass the new requirements, but this has not yet been applied to higher category certifications and does not always cover all possible combinations.

When certifying a measuring transformer, the ATH must determine the range that the in-service burden must be within to ensure the measuring transformer remains accurate. When certifying metering installations with measuring transformers, the ATH must ensure that the in-service burden is within the burden range of the measuring transformers. AMS has improved its processes to ensure that burden is added when required to ensure that in-service burden is within CT burden ranges but has not added a burden range statement to its certification reports.

The Code changes included new requirements related to certification tests as follows:

- minimum load for raw meter data tests,
- recording of accumulation of pulses when conducting raw meter data tests, and
- ensuring that the least significant digit advances when conducting a raw meter data test.

AMS has not updated its testing processes to meet these new requirements.

A nominally Category 3 metering installation was recertified as Category 2 with no details of the lower category certification recorded in the metering installation certification report. This installation also had burden lower than the burden range of the CTs. Non-compliance has been recorded in six sections of this audit due to these two issues. The AMS processes with regard to lower category certification and in-service burden are normally sound. In this case the recertification was conducted when a technician replaced a meter due to a communications fault. The technician and reviewer of the certification report failed to identify the issues before the certification was approved.

The date of the next audit is determined by the Electricity Authority and is dependent on the level of compliance during this audit. The Future Risk Rating table provides some guidance on this matter and recommends a next audit frequency of six months. After considering AMS's responses and the remedial actions taken I recommend an audit frequency of 12 months.

9. AMS RESPONSE

AMS test house acknowledges the non-compliances in this report but is concerned the number of non-compliances in this report is disproportionate to the strong controls that have been implemented.

We believe the 14 non-compliances can be reduced down to seven actual incidences and the majority of these are minor with little impact. We take all non-compliances seriously and will endeavor to have rectified the non-compliances in this report within the next two months.

It should also be noted that all previous non-compliances were cleared excluding one that was a recommendation and not required under the code.

We trust the Authority will take this information into consideration when recommending a next audit date.