VERITEK

Electricity Industry Participation Code Audit Report

For

VIRCOM EMS
Energy Management Services

Class A and B
Approved Test House

Prepared by Steve Woods – Veritek Limited

Date of Audit: 07/03/18 & 08/03/18

Date Audit Report Complete: 29/03/18

Date Audit Report Due: 31/03/18

Executive Summary

VIRCOM EMS (VEMS) is a Class A and B Approved Test House and this audit was performed at their request, to encompass the Electricity Industry Participation Code (Code) requirement for an audit, in accordance with clause 2 of schedule 10.3.

The Authority had stipulated that the next audit was due by 31 March 2018, in accordance with clause 1(4)(c) of schedule 10.3.

Eight non-compliances are recorded. The main issue is that VEMS has not confirmed the accuracy of CTs when the in-service burden is lower than the lowest test point recorded in the IEC standard. The process documentation is compliant but practices differ from those intended. Two ICPs had alternative certification incorrectly applied and uncertainty calculations were not conducted. The inspection process for installations with AMI metering needs improvement to be fully compliant.

After the most recent IANZ audit, dated August 2017, IANZ issued VEMS with a notice that it cannot issue endorsed calibration reports for energy meters, nor claim compliance with the Electricity Industry Participation Code (EIPC) Part 10 Metering for calibrations of energy meters, until formal notification is received from IANZ that certain corrective actions were cleared. The main corrective action related to the lack of an internal audit program. This matter was cleared within one month and VEMS was able to recommence calibration activities. VEMS is in the process of identifying an external resource to assist with internal audits.

The date of the next audit is determined by the Electricity Authority and is dependent on the level of compliance during this audit. The table below provides some guidance on this matter and recommends a next audit frequency of six months. I have considered this result in conjunction with the responses from VEMS. I have also taken into account that the issues of incorrect alternative certification and missing steps in the inspection process each have two non-compliances recorded. My recommendation for the next audit frequency is 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
Certification records	3.9	14 Of Schedule 10.4	Certification records provided to the MEP late for two of 26 metering installations.	Moderate	Low	2	Identified
Meter class accuracy	5.24	13(7) Of Schedule 10.7	Meter measured accuracy used instead of meter class accuracy for fully calibrated installations.	Strong	Low	1	Unknown
Uncertainty calculations	5.30	22 of Schedule 10.7	Uncertainty calculations not conducted for two ICPs.	Moderate	Low	2	Identified

Subject	Section	Clause	Non compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Low burden	5.40	31 Of Schedule 10.7	VEMS has not confirmed the accuracy of non-TWS CTs when the in-service burden is lower than the lowest test point recorded in the IEC standard. Three burden calculations were incorrect	None	Low	5	Identified
Alternative certification	5.41	32(2), (3) and (4) of Schedule 10.7	Invalid alternative certification applied.	Moderate	Low	2	Identified
CT secondary wiring	5.55	6 of Schedule 10.8	Three of five installations without CT wiring identification.	Moderate	Low	2	Identified
General inspection requirements	6.1	44 (1) (a) to (e) of Schedule 10.7	Category 1 inspection process does not confirm the operation of the data storage device or check the remaining battery life.	Weak	Low	3	Identified
Raw meter data test	6.2	44 (1) (f) of Schedule 10.7	Category 1 inspection process does not does not include a check of the master accumulation register and the sum of the meter registers.	None	Low	5	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
Use of contractors	2.1	10.3 of Part 10	Create a report showing field audit quantities and results by individual contractor as well, to ensure each individual is included in the schedule.	Identified
ISO scope	2.6	3(1) & 4(1) of schedule 10.3	Change wording of ISO scope.	Identified

Subject	Section	Clause	Recommendation for improvement	Remedial Action
Insufficient load certification	5.25	14 of schedule 10.7	I recommend the certification reports are more explicit with regard to the "additional integrity checks" conducted as part of insufficient load certification.	Cleared

Table of Issues

Issue	Description
Regarding: Clause 4(1)(a) of schedule 10.7	Use of meter class accuracy when determining errors The Measurement Standards Laboratory of NZ has advised that it is scientifically impossible to comply with both ISO17025 and with clause 13(7) of schedule 10.7 which requires that meter class accuracy is used. Furthermore, the MSL calculator provided by MSL has been confirmed by the Authority as complying with JCGM 100:2008, but the calculator requires measured accuracy figures not meter class accuracy figures.
Regarding: Clause 44(1) of Schedule 10.7	Clarification required regarding whether the following 3 checks achieve compliance with Clause 44(1) of Schedule 10.7: 1. That there are no events recorded which could affect the operation of the data storage device 2. Date of the last sumcheck and confirmation that it passed 3. Confirmation that there are no battery alarms present.

Persons Involved in This Audit

Auditor:

Steve Woods
Veritek Limited
Electricity Authority Approved Auditor

VEMS personnel assisting in this audit were:

Name	Title
Grant Batchelor	Technical Compliance Manager

Contents

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

There are no exemptions in place.

1.2 Scope of Audit

VEMS 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, in accordance with clause 2 of schedule 10.3.

The Authority has stipulated that the next audit was due by 31 March 2018, in accordance with clause 1(4)(c) of schedule 10.3.

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

VEMS 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.

VEMS 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.

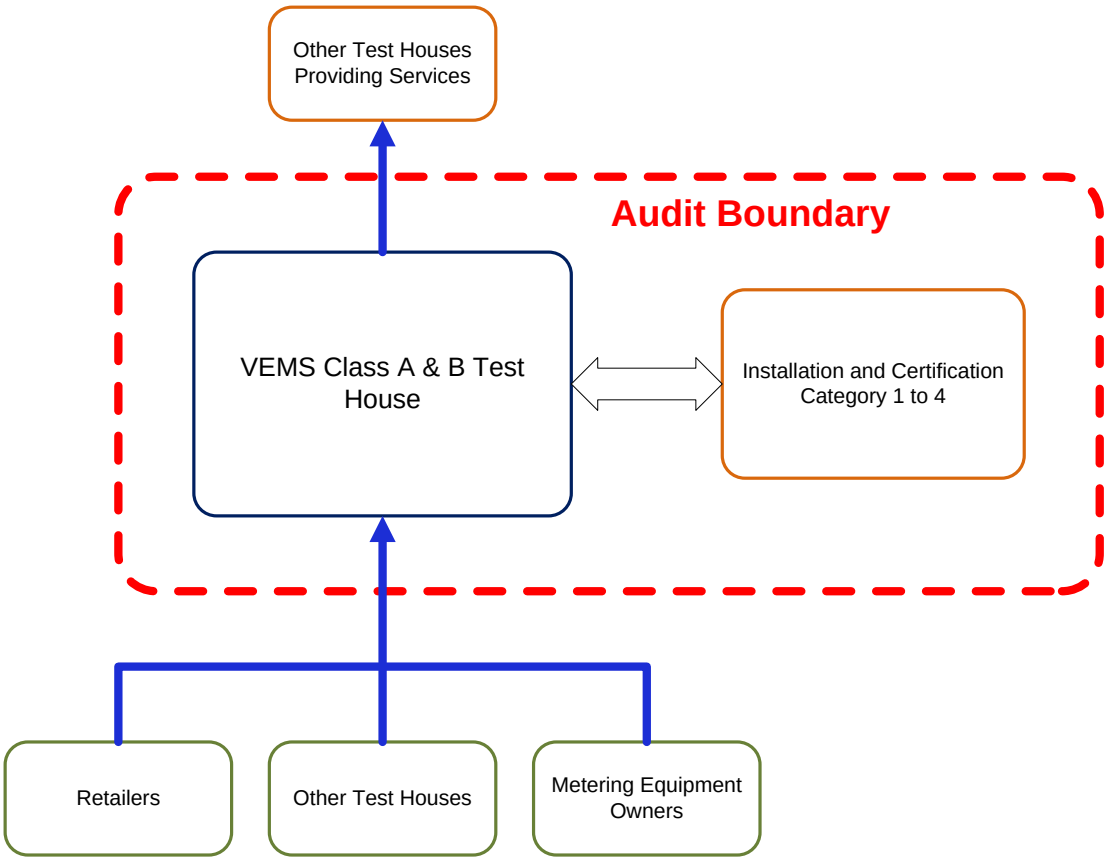
VEMS also requires approval to certify metering components. I note that the Class A functions listed in Clause 3(2) of Schedule 10.3 do not include certification of metering components.

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.

VEMS 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 March 2017 by Steve Woods of Veritek. This audit found compliance with the Code.

Table of Non-Compliance

Subject	Section	Clause	Non compliance	Status
			Nil	

Table of Recommendations

Subject	Section	Clause	Recommendation for improvement	Status
			Nil	

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

Audit commentary

VEMS has over 250 contractors operating under their Test House. The 2016 audit report recorded non-compliance in relation to the lack of an overall schedule of contractor training, competency and audit results. VEMS had made considerable improvements in this area by the time of the 2017 audit; the actions taken by VEMS are listed below and were re-checked during this audit to ensure the solutions are still compliant:

2017 Comment	2018 Comment
All subcontractor contracts are being renewed, including references to the Code, clarification of processes and procedures, H&S expectations and key performance indicators.	This process is still ongoing.
A database called Vault is being developed which will contain training and audit results.	This database is still under development.
There is a schedule of subcontractor audits showing that the total number of audits is ahead of target (3% is the target).	The schedule of subcontractor audits was checked and the 3% target is still being met.
All relevant subcontractors have been audited and the only issues found have been minor workmanship ones.	This is still the case, the only issues are minor ones.
"Live" audits have commenced and will be conducted in smaller numbers for all relevant subcontractors.	Live audits are still being conducted.

The field audit reporting is shown by region. I recommend an additional report is created to show the field audit quantities and results by individual contractor as well to ensure each individual is included in the schedule.

Recommendation	Description	Audited party comment	Remedial action
Regarding: Clause 10.3 of Part 10	Create a report showing field audit quantities and results by individual contractor as well, to ensure each individual is included in the schedule	VircomEMS is developing a IT project to improve our overview of audits completed and more easily look at trends from the results of the audits.	Identified

VEMS engages some contractors directly and some "agents" operate under an "umbrella" arrangement, where they operate independently but they use VEMS processes and documentation. The agents operating under the VEMS "umbrella" are as follows:

The results of the audits are recorded and remedial actions are taken as a result of the audit findings. These audits also include a check of the accuracy of certification records.

Photo checking occurs for all jobs conducted by contractors to ensure Health and Safety requirements are met, but this process does not include compliance responsibilities. Photo checking does not occur for work conducted by the agents operating under the VEMS "umbrella".

The Code states that VEMS "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 a subcontractor involves one day of theory followed by one day in the field with a trainer, who then decides if the individual is competent to work alone. If assessed as competent several sites are completed and these are immediately audited to ensure compliance is achieved. I consider the management of subcontractors to be compliant.

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 at the end of the audit to determine whether compliance had been achieved.

Audit commentary

I did not find any information that was not complete and accurate, or likely to mislead or deceive.

Audit outcome

Compliant

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 VEMS during the audit period.

Audit commentary

VEMS 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

VEMS 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

VEMS has only conducted activities that fall within the scope of their approval. I have concluded from this audit that VEMS currently meets the requirements of this clause. There was a period of approximately four weeks during August 2017 when IANZ issued a notice that the VEMS laboratory could not issue endorsed calibration reports until corrective actions regarding the lack of internal audits and lack of document reviews were cleared. Compliance was unlikely to be achieved with Clause 10.14(b) during that period. The corrective action is now resolved and compliance is now confirmed.

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 all work completed by contractors. Photo checks are not conducted for work conducted by agents. There is a “split neutral” prompt sheet provided to contractors, with an instruction that this is done with a phase imbalance test. The results of this test will be built into the PDA in the near future. There is now a sticker (recently produced) which is to be put on the meter board with the before and after amps for the split neutral test. The process stipulates that neutrals are removed last and installed first and that photos are taken though the process. Trailing earth tests 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 now includes health monitoring.

- 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 events.

Audits of contractors and agents includes health and safety requirements. The upcoming audits of Waitaki and Counties will include health and safety and will include training on the requirements for handling asbestos switchboards.

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

VEMS provided a copy of their most recent ISO 9001:2015 audit report, dated August 2017, which was conducted by SGS. The overall findings of the report are as follows:

The audit team concludes that the organization has established and maintained its management system in line with the requirements of the standard and demonstrated the ability of the system to systematically achieve agreed requirements for products or services within the scope and the organization's policy and objectives.

The scope of the ISO 9001: 2008 certification is noted as:

> *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 Electricity Governance Regulations and Rules.*

During previous audits, over a number of years, I recommended that VEMS require SGS to change the wording of the scope to include reference to the Electricity Industry Participation Code rather than the Electricity Governance Regulations and Rules. VEMS has raised this matter with SGS but the change has not occurred, and I have repeated the recommendation in this audit report.

Recommendation	Description	Audited party comment	Remedial action
Regarding: Clauses 3(1) & 4(1) of schedule 10.3	Change wording of ISO scope.	This will be completed as part of VricomEMS ISO 9001 Re-accreditation being completed in August 2018	Identified

VEMS also provided a copy of their previous ISO 17025 audit report, dated August 2017, which was conducted by IANZ.

The scope of their ISO 17025 certification is appropriate and is noted as:

Field of operations: Metrology and Calibration Laboratory
Subfields: Energy meters and current transformers

Signatories are noted as:

Grant Batchelor 5.85

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

As indicated in the 2016 assessment report, IANZ has had concerns about the compliance of the laboratory for a few years now. Although all ten corrective actions from 2016 had been cleared by IANZ, this year's assessment found further non-compliances. There had been good progress on a lot of the recommendations from the 2016 report and as follow-up to some of the issues identified in the corrective actions. The major concern that remains, however, is the lack of suitably effective internal auditing, checking and review procedures.
The following corrective actions are raised in this report:

- *CAR 1 – Internal audits, document approval and issue – review of Work Instructions*
- *CAR 2 – Internal audits – management commitment*
- *CAR 3 – Estimation of uncertainty and calculation of CMC.*

Given the level of concern, particularly with those issues presented in CAR 1, the laboratory has been issued by IANZ with a notice ***that it cannot issue endorsed calibration reports for energy meters, nor claim compliance with the Electricity Industry Participation Code (EIPC) Part 10 Metering for calibrations of energy meters, until formal notification is received from IANZ that CAR 1 is cleared.***

Additionally, the laboratory had not been able to get their reference transformer and associated equipment calibrated since it was identified as being necessary at the assessment on 30 August 2016 (with associated 2016 CAR 8). Given that the laboratory cannot calibrate current transformers (CTs) without its reference equipment (and has not been able to for some time), is having to send requested work to other accredited laboratories, and that the timeframe for return and recommissioning of the

*equipment is unknown**, the laboratory agreed that the calibration of current transformers will be removed from the scope of accreditation**.*

An additional comment is that "The laboratory has been issued with CARs relating to internal audits in 2013, 2015, 2016 and now 2017."

I reviewed the documentation from IANZ and this confirms all CARs are cleared.

In addition to the three corrective actions, the report contains five technical recommendations and five quality management system recommendations.

The recommendations are shown in the table below.

Recommendation	Resolution
The following minor amendments may be needed in the manual section 2.7 (pending response to CAR 2): a. The laboratory does not routinely employ a third party to perform internal audits; b. The requirement to record Auditor Approval applies to all types of audit (not just 2.7.1 for quality internal audits).	In progress to identify and engage an external auditor.
In the management review minutes/agenda it is recommended that individual entries are made for each *type* of internal audit to allow the laboratory to properly review the schedules for and summarise the outcomes of each audit.	In progress
It may be of use to update section 3.4 in the manual to list specifically the relevant reporting requirements rather than just referring to the relevant clauses of accreditation criteria.	In progress
It is recommended that the laboratory reviews its process for superseding documents to see if improvements could be made (during the assessment some superseded documents could not be located, for example the Work Instruction 50.02.04).	In progress
It is **strongly recommended** that, with regards to contract review (*4.4*): a. If the client who requested the work reported on calibration certificate 250551 requires the endorsement to be removed for future work, a written instruction from the client to do so should be recorded (or written proposal by the laboratory approved by the client); b. More generally, written records of client requests for work should be retained, particularly if the work is non-routine (for example in 5a above). The laboratory should consider its current practices and mechanisms for doing so and adjust if necessary.	In progress

It is **strongly recommended** that an internal CAR is raised for the investigation into the outliers in MA15001 (*5.9.2*) so that the issue does not get 'lost' while waiting for the reference gear to be recommissioned (this may form part of the laboratory's application to have CTs returned to the scope of accreditation; alternatively if the laboratory does not wish to reinstate that capability this recommendation may be ignored).	The standard is now calibrated and needs to be re-commissioned. Then an investigation will be conducted to see why the results are different. An internal CAR will be raised and it will go into Vault.
In follow-up to strong recommendation 1 last year, it is recommended that procedural detail is added to require periodic validation (6 monthly?) of thermometers in the laboratory (comparison of two non-calibrated thermometers against one calibrated thermometer).	Complete
In follow-up to recommendation 3b last year it is recommended that more than one measurement point for the check meters is included on the control chart(s).	Complete
A **strong recommendation** is made to include Grant in the competency assessments (*5.2* and as required by the manual clause 2.4?).	Ongoing, part of annual review.
It is **strongly recommended** that the laboratory and IANZ review the text entered under class of test 5.89 on the scope to ensure it is valid & relevant (probably in conjunction with clearance of CAR 3).	Now updated.

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.

VEMS has appointed Grant Batchelor as Technical Manager and Corrine Handley as Quality Manger. The previous non-compliance regarding the lack of supporting information for the Quality Manager position is cleared.

The VEMS quality system consists of a contractor's manual for field activities and a laboratory quality manual. These are both in the process of being updated to ensure they are current. 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. Training and competency records for laboratory staff are now complete and up to date.

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. Some corrective actions were required by the most recent ISO 17025 audit and these are now complete.

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

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

Audit commentary

VEMS 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 VEMS had made any material changes during the audit period.

Audit commentary

VEMS 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

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

Audit commentary

VEMS 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

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 VEMS 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 VEMS during the audit.

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 VEMS had certified any installations with loss compensation.

Audit commentary

VEMS 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 or non-half hour metering. It must also record where the services access interface is.

Audit observation

I checked 40 certification reports to confirm compliance.

Audit commentary

All reports have a populated field for NHH/HHR and the location of the services access interface.

Audit outcome

Compliant

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 40 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 VEMS 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 location of the services access interface. 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 the design reports and a sample of 40 certification records to confirm compliance.

Audit commentary

The location of the Services Access Interface is recorded in the certification report as required by this clause.

Audit outcome

Compliant

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 40 certification records to confirm compliance.

Audit commentary

Certification reports are produced for all installations and components. Calibration reports are produced for all calibrated components.

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 40 metering installations along with the storage practices.

Audit commentary

All records are stored securely and are kept 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 40 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 communication trail for 26 metering records.

Audit commentary

I checked the records for 26 metering installations covering all six relevant MEPs and all metering categories. 20 records were provided within five business days, but six were provided greater than five business days. VEMS acts as the agent for many of the MEPs with regard to the management and storage of certification records. I checked the relevant contracts to confirm this. VEMS is the agent for four of the six examples where records were provided late, so compliance is confirmed for these, leaving two records where the update to the MEP was later than five business days. One was six business days and the other was 13 business days.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.9 With: Clause 14 Of Schedule 10.4 From: 01-Mar-17 To: 28-Feb-18	Certification records provided to the MEP late for two of 26 metering installations. Potential impact: Medium 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. The impact on MEPs is minor; therefore the audit risk rating is low.

Actions taken to resolve the issue	Completion date	Remedial action status
The two overdue site certifications were CT Metering certification that were delayed being processed through the system. The CT Metering site certification information is required to be manually entered into the system at this stage and then checked from a technical compliance perspective. Additional back office support is now available to help process any backlogs that may develop in the future. Certifications delivery to MEP timeframes has now been added to the Metering 102 training the back office staff receive.	23rd March 2018	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
VircomEMS is developing an electronic platform to collect CT Metering site certification information from the field and automatically upload the data into the system. Additional compliance validations will also be added to reduce the technical compliance checks needing to be completed. This will reduce the time taken from certification completed in the field for CT metering to providing the information to the MEP.	1st September 2018	

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 four examples of certification as a lower category.

Audit commentary

VEMS has certified installations under these clauses, and in all cases, there is a statement on the certification report that the installation has been certified as a lower category and that the MEP must monitor the load or the consumption.

Audit outcome

Compliant

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 40 certification records.

Audit commentary

VEMS 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, VEMS 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.

The maximum interrogation cycle is recorded correctly for all 40 reports checked.

Audit outcome

Compliant

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 40 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

VEMS 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 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 40 metering installations to confirm compliance.

Audit commentary

The maximum interrogation cycle is recorded correctly for all 40 metering installations.

Audit outcome

Compliant

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

VEMS 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 instrument register to confirm compliance.

Audit commentary

The requirement for maintenance or repairs to test equipment is an uncommon event. VEMS has a spreadsheet which contains all maintenance and testing records for all test equipment. Compliance is confirmed. It is intended that these records will eventually be managed in a database.

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 all of the VEMS reference and working standards to confirm they had current calibration certificates.

Audit commentary

VEMS provided calibration records for all standards and the findings were as follows:

- AVO MA10-08 reference standard, which was last calibrated by MSL in May 2016 for two years.
- MET-6120 working standard, which is calibrated every three months and was shown to be "current".
- 11 Hioki working standards for Category 2 comparative 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.
- 2 PWS working standards for Category 2 comparative testing; these both 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.
- TVH-4 (class b test bench), which is calibrated every four months against the MET and has current calibration.
- CT reference standard is currently due for calibration. It is not in use at present.

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 VEMS 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 VEMS 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

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

Audit commentary

Compliance is recorded in **Section 4.4**.

Audit outcome

Compliant

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 VEMS. I checked whether this situation had occurred.

Audit commentary

VEMS understands the requirements of this clause. There are no examples of standards with calibration errors.

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 40 metering installations to confirm compliance.

Audit commentary

VEMS 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. VEMS has a directory of type test reports for relevant devices.

Audit outcome

Compliant

4.13 Metering Component Stickers (Clause 8(1) 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.

Audit observation

I checked the VEMS component stickers to confirm compliance.

Audit commentary

All component stickers are compliant with this clause.

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 VEMS component stickers to confirm compliance.

Audit commentary

All component stickers are compliant with this clause.

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 40 certification records to confirm compliance.

Audit commentary

VEMS uses the wire and ferrule method and numbered seals and has appropriate processes for the issue, management and application of seals. All installations are subject to a photo check process which would identify missing or incorrectly applied 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 40 certification records to confirm compliance.

Audit commentary

There were 13 Category 2 metering installations where the in-service burden was less than the lowest test point (25% of rated burden) and burden resistors were not installed. The Code states:

Before it certifies a measuring transformer where the in-service burden is less than the lowest burden test point specified in a standard set out in Table 5 of Schedule 10.1, the ATH must install burdening resistors to increase the in-service burden to be equal to or greater than the lowest test point of the measuring transformer certification test or confirm from the manufacturer of the instrument transformer that the accuracy will not be adversely affected by the low in service burden.

The issue of the low burden for CTs has been clarified by the Authority through a memo, which confirms that ATHs are required to take certain actions if the in-service burden is less than the lowest test point used when the CT was calibrated. The actions are to install burden resistors or confirm with a Class A ATH or the manufacturer that the CTs will continue to operate accurately at low burden. The industry has confirmed that TWS CTs record accurately at low burden, but there is no information available for other makes of CT. Therefore the 13 installations mentioned above may not comply with some of the relevant clauses of Part 10. I have recorded non-compliance in **Section 5.40** but I haven't recorded non-compliance in this section because the installations are within the allowable 2.5%.

Audit outcome

Compliant

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 40 metering installations to confirm compliance.

Audit commentary

All 40 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 40 metering installations.

Audit commentary

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

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 40 metering installations.

Audit commentary

VEMS 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 four examples of certification as a lower category.

Audit commentary

VEMS has certified installations under these clauses, and in all cases, there is a statement on the certification report that the installation has been certified as a lower category and that the MEP must monitor the load or the consumption.

Audit outcome

Compliant

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 four examples of certification as a lower category.

Audit commentary

VEMS has certified installations under these clauses, and in all cases, there is a statement on the certification report that the installation has been certified as a lower category and that the MEP must monitor the load or the consumption.

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 four examples of certification as a lower category.

Audit commentary

VEMS has certified installations under these clauses, and in all cases, there is a statement on the certification report that the installation has been certified as a lower category and that the MEP must monitor the load or the consumption.

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 four examples of certification as a lower category.

Audit commentary

VEMS has certified installations under these clauses, and in all cases, there is a statement on the certification report that the installation has been certified as a lower category and that the MEP must monitor the load or the consumption.

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 40 metering installations to confirm compliance.

Audit commentary

VEMS correctly applied and recorded the certification methods.

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

VEMS has conducted statistical sampling certification and comparative certification. I checked the processes and certification records to confirm compliance.

Audit commentary

The statistical sampling and comparative processes are compliant.

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 seven 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.
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

I checked process documentation and 40 certification reports to confirm compliance.

Audit commentary

- Prevailing load tests must be conducted on a metering installation or metering component by using a working standard connected to the metering installation. Prevailing load tests for comparative recertification are conducted 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 design report reference field is included in certification records and populating this field serves the purpose of confirming the configuration scheme.

- Raw meter data output tests for a category 1 metering installations or category 2 metering installations, must be conducted by applying a measured increase in load and measuring the increment of the sum of the meter registers, or the accumulation of pulses resulting from the increase in load. VEMS provided instructions to the contractors in December 2016, specifying the requirement to connect an external load for a specified period and to ensure the correct number of pulses are counted. The photo checking process ensures these results are recorded. Live auditing includes this test as one of the checks. The register advance is checked by confirming that the smallest digit advances by one.

- Raw meter data output tests for a 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. This test is conducted for Category 2 HHR installations.

- 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. VEMS has written confirmation from AMS and FCLM that this comparison occurs. Metrix metering installations are not certified as HHR.

- 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.

- Raw meter data output tests for NHH Category 2 metering installations must compare the output of a working standard to the increment of the sum of the meter registers. This test is conducted for all NHH Category 2 metering installations.

If an ATH performs a raw meter data output test, for a metering installation that will be certified for remote meter reading, the ATH must obtain the raw meter data from the back office system where the raw meter data is held or 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. The MEP back office checks that a meter reading is the same or more than that recorded on site. This achieves compliance with clause 1A of Clause 9.

Audit outcome

Compliant

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 40 certification reports to confirm compliance.

Audit commentary

VEMS has written confirmation from AMS and FCLM that this comparison occurs. Metrix metering installations are not certified as HHR.

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

I checked process documentation to confirm whether VEMS conducts this test.

Audit commentary

VEMS conducts this test using pulses not meter registers.

Audit outcome

Not applicable

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 40 metering installations to confirm compliance.

Audit commentary

The VEMS records confirmed compliance.

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 40 metering installations to confirm compliance.

Audit commentary

Section 5.40 records that 13 metering installations may not meet the requirements for certification because the in-service burden was less than the lowest test point. Non-compliance is recorded in

Section 5.40 but I haven't recorded non-compliance in this section because the overall accuracy was within 2.5%.

Audit outcome

Compliant

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 11 metering installations to confirm compliance.

Audit commentary

I checked 11 examples of metering installation certification reports which confirmed the points above were recorded.

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 11 metering installations to confirm compliance.

Audit commentary

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

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 expire 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 16 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 16 metering installations to confirm compliance.

Audit commentary

VEMS conducts comparative recertification tests using a working standard as required by this clause. Uncertainty is calculated using the latest version of the MSL calculator, which considers temperature. I checked the calculation for a recently calibrated Hioki working standard. The specification sheet for the standard states that it will remain accurate at temperatures between 18 and 28 degrees Celsius. The uncertainty for that temperature range was calculated at 0.403%. For temperature ranges of 11 to 18 degrees and 28 to 35 degrees the uncertainty is 0.59%. For temperatures outside 11 to 35 degrees, the standard cannot be used because the uncertainty will be greater than 0.60%. A digital temperature device is used to determine the on-site temperature and this is checked against the laboratory temperature standard each time the working standard is calibrated. A randomly generated load profile is used within the calculator to achieve compliance with the requirement to consider the total quantity of electricity conveyed.

An ATH must, before it uses the comparative recertification method:

- check the design report of the metering installation to confirm the metering installation functions in accordance with the design report and ensure the metering installation complies with this Part
- check and confirm that the metering installation is correctly wired in accordance with all applicable requirements and enactments
- carry out any tests and checks required to confirm the integrity of the metering installation and record these and their results in the metering installation certification report.

VEMS conducts the checks above and records the results on the metering installation certification report, along with confirmation that the components are fit for purpose.

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 seven metering installation to confirm compliance.

Audit commentary

The records confirm the appropriate tests are performed and components are calibrated and certified.

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 seven metering installation 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 seven 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 seven metering installations to confirm compliance.

Audit commentary

The certification report and process documentation confirmed that actual accuracy and not meter class accuracy is used to calculate the overall error.

This matter requires some input from the Authority, because the Measurement Standards Laboratory of NZ has advised that it is scientifically impossible to comply with both ISO17025 and with clause 13(7) of schedule 10.7 which requires that meter class accuracy is used. Furthermore, the MSL calculator provided by MSL has been confirmed by the Authority as complying with JCGM 100:2008, but the calculator requires measured accuracy figures not meter class accuracy figures. I've recorded non-compliance and I've also raised this as an issue for consideration by the Authority.

Issue	Description
Regarding: Clause 13(7) of schedule 10.7	Use of meter class accuracy when determining errors The Measurement Standards Laboratory of NZ has advised that it is scientifically impossible to comply with both ISO17025 and with clause 13(7) of schedule 10.7 which requires that meter class accuracy is used. Furthermore, the MSL calculator provided by MSL has been confirmed by the Authority as complying with JCGM 100:2008, but the calculator requires measured accuracy figures not meter class accuracy figures.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 5.24 With: Clause 13(7) Of Schedule 10.7 From: 01-Mar-17 To: 28-Feb-18	Meter measured accuracy used instead of meter class accuracy for fully calibrated installations. Potential impact: None Actual impact: None Audit history: None Controls: Strong Breach risk rating: 1
Audit risk rating	**Rationale for audit risk rating**
Low	I have rated the controls as strong because compliance is achieved with ISO 17025. There is no impact on settlement or other participants therefore the audit risk rating is low.

Actions taken to resolve the issue	Completion date	Remedial action status
VircomEMS requires further explanation from the Authority as to how compliance can be achieved in regard to this and meet the requirement of ISO 17025	NA	Unknown
Preventative actions taken to ensure no further issues will occur	**Completion date**	
VircomEMS requires further explanation from the Authority as to how compliance can be achieved in regard to this and meet the requirement of ISO 17025	NA	

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

Five examples of insufficient load certification were checked.

Audit commentary

The process is generally sound for insufficient load certification; however I recommend the certification reports are more explicit with regard to the "additional integrity checks" conducted as part of the certification.

Recommendation	Description	Audited party comment	Remedial action
Regarding: Clause 14 of schedule 10.7	I recommend the certification reports are more explicit with regard to the "additional integrity checks" conducted as part of insufficient load certification.	A technical memo has been issued to the field to have the results recorded within the certification paperwork what tests have been completed to confirm the integrity of the wiring.	Cleared

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

VEMS has conducted statistical sampling certification for two MEPs. I checked the certification records and detailed results to confirm compliance.

Audit commentary

The process and records are compliant with the Code.

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

VEMS has conducted statistical sampling certification for two MEPs. I checked the certification records and detailed results to confirm compliance.

Audit commentary

The process and records are compliant with the Code. The selected component method was 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 40 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 40 metering installation certification records to confirm compliance.

Audit commentary

The process documentation stipulates the maximum permitted errors for certification. I checked a sample of certification records that confirmed this was being applied correctly.

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 23 metering installation certification records and discussed the process for error calculation.

Audit commentary

VEMS conducts comparative recertification tests using a working standard as required by this clause. Uncertainty is calculated using the latest version of the MSL calculator, which considers temperature. I checked the calculation for a recently calibrated Hioki working standard. The specification sheet for the standard states that it will remain accurate at temperatures between 18 and 28 degrees Celsius. The uncertainty for that temperature range was calculated at 0.403%. For temperature ranges of 11 to 18 degrees and 28 to 35 degrees the uncertainty is 0.59%. For temperatures outside 11 to 35 degrees, the standard cannot be used because the uncertainty will be greater than 0.60%. A digital

temperature device is used to determine the on-site temperature and this is checked against the laboratory temperature standard each time the working standard is calibrated. A randomly generated load profile is used within the calculator to achieve compliance with the requirement to consider the total quantity of electricity conveyed.

ICPs 0000100223UN118 and 0103992006LCF3F have both had comparative certification conducted but alternative certification was applied. A further issue is that the uncertainty calculations are not recorded. Both error percentages were recorded as negative when they are in fact positive.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 5.30 With: Clause 22 of Schedule 10.7 From: 15-Jun-17 To: 20-Jun-17	Uncertainty calculations not conducted for two ICPs. Potential impact: Medium 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. 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
The two ICP's in question are in the process of being recertified under clause 12 of Scheduled 10.7 As being issued under clause 32 of Schedule 10.7, clause 32 does not state not a requirement to include uncertainty calculations when issuing certification under clause 32	3rrd April	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Request will be made to the Electricity Authority seeking clarification regarding the application of uncertainties to Alternative certifications.	30th April	

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 26 metering installation certification records, and process documentation.

Audit commentary

VEMS has a documented process for the management of compensation factors (multipliers), although they are normally programmed into the meter. The testing procedures provide confirmation of the multiplier and CT ratio, the multiplier is recorded on the metering installation certification report.

Audit outcome

Compliant

5.32 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 26 metering installation certification records, and process documentation.

Audit commentary

VEMS has a documented process for the management of compensation factors (multipliers), although they are normally programmed into the meter. 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 to install measuring transformers in switchboards at the time of manufacture. This clause does not allow the installation of meters or data loggers. VEMS has a process to ensure compliance with this clause. CTs are provided to switchboard manufacturers, but not meters.

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 40 certification records to confirm compliance.

Audit commentary

All meter and metering installation certification expiry dates were correct.

Audit outcome

Compliant

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

Code related audit information

If an electromechanical 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

None of the installations had electromechanical meters. VEMS understands the requirements of this clause. Electromechanical meters are seldom installed.

Audit commentary

None of the installations had electromechanical meters. VEMS understands the requirements of this clause. Electromechanical meters are seldom installed.

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 26 certification records to confirm compliance.

Audit commentary

All of the installations had certified measuring transformers. VEMS 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 ATH uses the measuring transformer's actual accuracy (rather than class accuracy) when calculating the maximum permitted error for the relevant metering installation category
- 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 burden (magnitude and phase angle, where appropriate), including burden resistors if used, on the measuring transformer does not exceed its name plate rating or an alternative rating lower than the name plate rating, if specified in the metering installation design report.

Audit observation

I checked 26 certification records, and process documentation to confirm compliance.

Audit commentary

VEMS has process documentation to ensure compliance with all of the points above. I checked the records for 26 metering installations and found that CT installation and sealing practices were all compliant.

Audit outcome

Compliant

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 26 certification records to confirm compliance.

Audit commentary

The metering installation certification report contains a field for CT expiry date and a check of 26 records confirmed this was being calculated and used 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

Not applicable

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 measuring transformer where the in-service burden is less than the lowest burden test point specified in a standard set out in Table 5 of Schedule 10.1, the ATH must install burdening resistors to increase the in-service burden to be equal to or greater than the lowest test point of the measuring transformer certification test or confirm from the manufacturer of the instrument transformer that the accuracy will not be adversely affected by the low in service burden.

Audit observation

I checked processes and the records for 26 metering installations to confirm compliance.

Audit commentary

There were 13 Category 2 metering installations where the in-service burden was less than the lowest test point (25% of rated burden) and burden resistors were not installed.

The issue of the low burden for CTs has been clarified by the Authority through a memo, which confirms that ATHs are required to take certain actions if the in-service burden is less than the lowest test point used when the CT was calibrated. The actions are to install burden resistors or confirm with a Class A ATH or the manufacturer that the CTs will continue to operate accurately at low burden. The industry has confirmed that TWS CTs record accurately at low burden, but there is no information available for other makes of CT. Therefore the 13 installations mentioned above do not comply with this clause even though the overall error is within 2.5%.

The table below shows that many of the installations had higher than expected positive errors, which may have been closer to zero with the addition of burden resistance.

ICP	CT make	Rated VA	In-service VA	Installation error
0000100223UN118	Smith and Hobson	10	0.6	-0.34%
0103992006LCF3F	ATCO	7.5	0.6	+1.40%

0113930534LCA64	ATCO	15	0.5	+0.21%
0214124959LCCCC	ATCO	7.5	0.6	+1.32%
0219162468LCDA8	ATCO	15	0.48	-0.18%
0228142938LC841	ATCO	15	0.44	+0.45
0000932970TE58D	Transformer winders	10	0.53	+1.6%
0122388003LC4D7	Gough	15	0.5	+0.37%
0132549433LC9D2	NZ Transformers	7.5	0.4	-0.54%
0145167003LCE08	Transformer winders	10	0.6	-0.77%
0184505720LC8FA	Unknown	Unknown	1.5	-0.3%
0115480005LC3EE	ATCO	15	0.5	+0.43
0150585071LCA8B	ATCO	10	0.5	+1.43

The in-service burden calculations were incorrect for three installations. It appears the rated burden was used instead of the rated secondary current.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 5.40 With: Clause 31 Of Schedule 10.7 From: 01-Apr-17 To: 28-Feb-18	VEMS has not confirmed the accuracy of non-TWS CTs when the in-service burden is lower than the lowest test point recorded in the IEC standard. Three burden calculations were incorrect Potential impact: Low Actual impact: Low Audit history: None Controls: None Breach risk rating: 5
Audit risk rating	**Rationale for audit risk rating**

Low	There is currently a documented process for technicians to follow but this was not followed for any of the sample checked. There do not appear to be any controls in place to identify this issue. The impact on settlement is likely to be minor because the overall error of the installations is measured and recorded.

Actions taken to resolve the issue	Completion date	Remedial action status
Technical Memo issued to all CT metering technicians to remind them of the requirement to add additional burdening using extra conductor length to achieve 25% burdening on non-TWS CT's and TWS CT's under 500/5 ratios. All memos have been signed as acknowledged from all CT metering Technicians	24th March 2018	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
All CT metering activities completed by VircomEMS will be handled through the one operations team. The TOU/C&I team within VircomEMS as a technical assessor to review completed certification results and will now review the Category 2 metering results to ensure compliance with this requirement going forward.	4th April 2018	

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 and examined four examples to confirm compliance of the process.

Audit commentary

ICPs 0000100223UN118 and 0103992006LCF3F have both had comparative certification conducted but alternative certification was applied. Clause 32(1) of schedule 10.7 states that alternative certification can only be applied if certification tests cannot be conducted *"…due solely to its inability to obtain physical access to test an installed measuring transformer in a metering installation…"* Access to the CTs is clearly available because comparative certification was conducted; therefore the installations are deemed defective and will need to be correctly re-certified. A further issue is that the in-service burden is too low and the uncertainty calculations are not recorded. When the sites are recertified these matters will need to be addressed. Both error percentages were recorded as negative when they are in fact positive.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 5.41 With: Clauses 32(2), (3) and (4) of Schedule 10.7 From: 15-Jun-17 To: 20-Jun-17	Invalid alternative certification applied. Potential impact: Medium Actual impact: Low 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 because most alternative certification was applied correctly. Alternative certification should not have been applied to these installations and the Code clearly only allows one reason for the application of alternative certification. The test results show that the installations are both within 2.5% but one is over recording by 1.21% and this may be closer to zero once the low burden issue is addressed. The audit risk rating is low.

Actions taken to resolve the issue	Completion date	Remedial action status
The work order for these certification were issued to VircomEMS by another Testhouse who had been issued the work by the MEP but did not have any metering technician in this particular part of the country. That Testhouse Disputed the certification being completed under clause 12 of Schedule 10.7 due to their belief the CT's on site not having a known manufactures standard on them that the Comparative method of the certification could be used. The operations team for VircoMEMS then issued the certification under clause 32. The Site certifications for these two sites have been recertified with the burdening on site being corrected as well.	27th March 2018	Identified
Preventative actions taken to ensure no further issues will occur	Completion date	
Additional information has been added to Metering 102 training to clarify the requirements of when Clause 32 can be used for certification.	23rd March 2018	

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

VEMS is certifying control devices and recording the appropriate information in certification records.

Audit commentary

VEMS is certifying control devices and recording the appropriate information in certification records.

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

VEMS 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

VEMS 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 40 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. VEMS is ensuring data storage devices are certified and the maximum interrogation cycle is recorded.

Audit outcome

Compliant

5.46 Location of Metering Installation Certification Stickers (Clause 41(1) 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.

Audit observation

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

Audit commentary

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

Audit outcome

Compliant

5.47 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 VEMS whether this scenario had arisen.

Audit commentary

This scenario has not arisen and is unlikely to arise.

Audit outcome

Not applicable

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 ten 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 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 process documentation in relation to this clause.

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 stickers used are compliant with this clause.

Audit outcome

Compliant

5.50 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 40 metering installations to confirm compliance.

Audit commentary

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

Audit outcome

Compliant

5.51 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 10 metering installations to confirm compliance.

Audit commentary

The process documentation, design reports and the photos for 10 metering installations confirm compliance.

Audit outcome

Compliant

5.52 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 10 metering installations to confirm compliance.

Audit commentary

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

Audit outcome

Compliant

5.53 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 40 installations.

Audit commentary

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

Audit outcome

Compliant

5.54 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

VEMS 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

5.55 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; however the photos for five metering installations showed that the secondary wiring was not identified for three out of the five.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 5.55 With: Clause 6 of Schedule 10.8 From: 01-Mar-17 To: 28-Feb-18	Three of five installations without CT wiring identification. 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. 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
Technical Memo issued to all CT metering technicians to remind them of the requirement to identify CT secondary conductors. All memos have been signed as acknowledged from all CT metering Technicians	24th March 2018	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Conductor Identification has been added to the Photo checking process and the identification ferrules are being purchased and issued to all CT metering Technicians	28th April 2018	

5.56 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.

Audit outcome

Compliant

5.57 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 40 certification reports to confirm compliance.

Audit commentary

All certified components have been calibrated appropriately.

Audit outcome

Compliant

5.58 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 40 certification reports to confirm compliance.

Audit commentary

All certified components have been calibrated appropriately.

Audit outcome

Compliant

5.59 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 VEMS ATH does not calibrate components. Calibration is conducted by the Class A ATH.

Audit commentary

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

Audit outcome

Not applicable

5.60 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 VEMS.

Audit commentary

VEMS uses the test points stipulated in the relevant standards.

Audit outcome

Compliant

5.61 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 VEMS IANZ report to confirm compliance.

Audit commentary

The IANZ report confirms compliance with these points.

Audit outcome

Compliant

5.62 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 VEMS ATH does not calibrate components. Calibration is conducted by the Class A ATH.

Audit commentary

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

Audit outcome

Not applicable

5.63 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 40 metering installations and the VEMS directory of type test reports to confirm compliance.

Audit commentary

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

Audit outcome

Compliant

5.64 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

This clause is designed to allow builder's temporary supplies to be portable without the need to calibrate the meter every time. VEMS understands the requirements of this clause and has appropriate processes in place to correctly determine expiry dates.

Audit outcome

Compliant

5.65 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

VEMS no longer calibrates and certifies CTs in their laboratory.

Audit commentary

VEMS no longer calibrates and certifies CTs in their laboratory.

Audit outcome

Not applicable

5.66 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 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 26 metering installations to confirm compliance.

Audit commentary

The process documentation and records are compliant. VEMS certifies CTs in the field based on calibration reports from other laboratories but they don't calibrate CTs themselves any longer.

Audit outcome

Compliant

5.67 Measuring Transformers In-Service Burden Lower Than Calibration Test Point Burden (Clause 2(1)(C) Of Schedule 10.8)

Code related audit information

If the in-service burden of a measuring transformer is lower than a test point specified in a standard listed in Table 5 of Schedule 10.1, the ATH must confirm the accuracy of the measuring transformer at the in-service burden by:
a) obtaining confirmation of accuracies at the in-service burden from the measuring transformer's manufacturer; or
b) if the primary voltage of the measuring transformer is greater than 1 kV, a class A ATH calibrating the measuring transformer at the in-service burden.

Audit observation

Refer to **Section 5.40**.

Audit commentary

Refer to **Section 5.40**.

Audit outcome

Non-compliant

5.68 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

5.69 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

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

Audit commentary

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

Audit outcome

Compliant

5.70 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 40 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

5.71 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

VEMS conducts comparative recertification and they also conduct onsite calibration of metering components for fully calibrated installations.

Audit commentary

The IANZ report confirmed compliance.

Audit outcome

Compliant

5.72 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

Meter and data storage device calibration occurs in the laboratory. I checked the IANZ report for any exceptions to this clause.

Audit commentary

The IANZ report confirmed compliance.

Audit outcome

Compliant

5.73 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

Meter and data storage device calibration occurs in the laboratory. I checked the IANZ report for any exceptions to this clause.

Audit commentary

The IANZ report confirmed compliance.

Audit outcome

Compliant

5.74 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 40 metering installations to confirm compliance.

Audit commentary

VEMS is correctly applying certification in accordance with this clause.

Audit outcome

Compliant

5.75 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 40 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 content of the standard inspection reports to confirm compliance.

Audit commentary

VEMS has appropriate process documentation for conducting inspections of CT metered installations, and their records are compliant with these clauses.

VEMS has recently conducted inspections of AMI metered Category 1 installations, which contain data storage devices. The standard Category 1 process does not achieve compliance with the following two requirements:

- *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*

One way of achieving compliance could be to require the MEP to provide confirmation of three points, as follows:

1. That there are no events recorded which could affect the operation of the data storage device
2. Date of the last sumcheck and confirmation that it passed
3. Confirmation that there are no battery alarms present.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 6.1 With: Clause 44 (1) (a) to (e) of Schedule 10.7 From: 01-Mar-17 To: 28-Feb-18	Category 1 inspection process does not confirm the operation of the data storage device or check the remaining battery life. Potential impact: Low Actual impact: Low Audit history: None Controls: Weak Breach risk rating: 3
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are recorded as weak because the process addresses some but not all of the required inspection steps. The impact on settlement and participants is minor because MEPs conduct the required checks as part of the data collection operation; therefore the audit risk rating is low.

Actions taken to resolve the issue	Completion date	Remedial action status
VEMS Category One Metering Inspection process has been updated to require the MEP to advise VircomEMS for any HHR meters if any of their meters has failed there register sum check or any battery alarms have activated. This is to be completed after the inspection has been completed in the field but prior to submitting the inspection result to the MEP. For any inspections the MEP does not advise the result of the latest sum check or HHR meter alarms the inspections will be deemed to be defective by VircomEMS ATH and the MEP advised as such.	27th March 2018	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	

Advise all MEP's who complete Category One metering inspection with VircomEMS of the new process change. This will take one month to complete the official notifications	28th April 2018	

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 content of the standard inspection reports to confirm compliance.

Audit commentary

VEMS has recently conducted inspections of AMI metered Category 1 installations, which contain data storage devices. The standard Category 1 process does not include a check of the master accumulation register and the sum of the meter registers.

One way of achieving compliance could be to require the MEP to provide confirmation that the most recent "sumcheck" has passed. I've also raised this as an "issue" for the Authority to provide clarification on.

Issue	Description	Remedial action
Clause 44(1) of Schedule 10.7	Clarification required regarding whether the following 3 checks achieve compliance with Clause 44(1) of Schedule 10.7: 1. That there are no events recorded which could affect the operation of the data storage device 2. Date of the last sumcheck and confirmation that it passed 3. Confirmation that there are no battery alarms present	Authority to provide clarification to the industry.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 6.2 With: Clause 44 (1) (f) of Schedule 10.7 From: 01-Mar-17 To: 28-Feb-18	Category 1 inspection process does not does not include a check of the master accumulation register and the sum of the meter registers. Potential impact: Low Actual impact: Low Audit history: None Controls: None Breach risk rating: 5
Audit risk rating	**Rationale for audit risk rating**

Low	Controls or processes are not in place to conduct this check. The impact on settlement and participants is minor because MEPs conduct the required check as part of the data collection operation; therefore the audit risk rating is low.

Actions taken to resolve the issue	Completion date	Remedial action status
VEMS Category One Metering Inspection process has been updated to require the MEP to advise VircomEMS for any HHR meters if any of their meters has failed there register sum check or any battery alarms have activated. This is to be completed after the inspection has been completed in the field but prior to submitting the inspection result to the MEP. For any inspections the MEP does not advise the result of the latest sum check or HHR meter alarms the inspections will be deemed to be defective by VircomEMS ATH and the MEP advised as such.	27th March 2018	Identified
Preventative actions taken to ensure no further issues will occur	**Completion date**	
Advise all MEP's who complete Category One metering inspection with VircomEMS of the new process change. This will take one month to complete the official notifications	28th April 2018	

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 content of the standard inspection reports to confirm compliance.

Audit commentary

VEMS 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 to MEPs for 15 examples.

Audit commentary

All reports were sent within 10 business days.

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 content of nine inspection reports to confirm compliance.

Audit commentary

VEMS 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 VEMS 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 VEMS process documentation to confirm compliance.

Audit commentary

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

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 VEMS process documentation to confirm compliance.

Audit commentary

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

Audit outcome

Compliant

7.4 Correction of 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 VEMS process documentation to confirm compliance.

Audit commentary

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

Audit outcome

Compliant

8. Conclusions

Eight non-compliances are recorded. The main issue is that VEMS has not confirmed the accuracy of CTs when the in-service burden is lower than the lowest test point recorded in the IEC standard. The process documentation is compliant but practices differ from those intended. Two ICPs had alternative certification incorrectly applied and uncertainty calculations were not conducted. The inspection process for installations with AMI metering needs improvement to be fully compliant.

After the most recent IANZ audit, dated August 2017, IANZ issued VEMS with a notice that it cannot issue endorsed calibration reports for energy meters, nor claim compliance with the Electricity Industry Participation Code (EIPC) Part 10 Metering for calibrations of energy meters, until formal notification is received from IANZ that certain corrective actions were cleared. The main corrective action related to the lack of an internal audit program. This matter was cleared within one month and VEMS was able to recommence calibration activities. VEMS is in the process of identifying an external resource to assist with internal audits.

9. VEMS Response

While disappointing that Non Compliances have been found during the course of this Audit, we have found it to be very beneficial to be able to engage with a party who have been able to provide some guidance as to how an ATH can comply with the particular clauses of the code.