



VERITEK

Electricity Industry Participation Code Audit Report

For



Class A and B
Approved Test House

Prepared by Steve Woods – Veritek Limited

Date of Audit: 01/08/17

Date Audit Report Complete: 26/08/17

Executive Summary

Delta 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 has stipulated that the next audit was due by 05 August 2017, in accordance with clause 1(4)(c) of schedule 10.3.

Two non-compliances have been recorded.

The matter of error and uncertainty calculation is still a subject of considerable debate in the industry and I've recommended the Authority assists the industry because IANZ audit reports are recording compliance of ATH calculations, but they do not comply with the Code. This is raised as non-compliance and as an "issue" below. Delta's Category 2 comparative certification uncertainty calculations have previously been recorded as compliant, however when evaluating this matter in more detail it appears the temperature coefficient of the working standard should be used in the calculation not just the operating range. This is now recorded as non-compliance and may mean the uncertainty result is too high at low temperatures.

One recommendation is made regarding the lack of clarity of certification and expiry dates in certification records. This can cause MEPs and other participants to use the incorrect dates in their systems and on the registry.

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 36 months.

The matters found are shown in the tables below:

Table of Non-Compliance

Subject	Section	Clause	Non compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Use of 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
Error calculation	5.30	22 Of Schedule 10.7	Temperature variations not considered in uncertainty calculations.	Moderate	Low	2	Disputed
Future Risk Rating						3	
Indicative Audit Frequency						36 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
Certification & Calibration Reports	3.6	11 of schedule 10.4	Improve clarity of titles and dates in certification reports.	Investigating

Issue	Description
Regarding: Clause 4(1)(a) of schedule 10.7	<p><u>Use of meter class accuracy when determining errors</u></p> <p>Keith Jones from 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 Keith has been confirmed by the Authority as complying with JCGM 100:2008, but the calculator requires measured accuracy figures not meter class accuracy figures.</p>

Persons Involved in This Audit

Auditor:

Steve Woods

Veritek Limited

Electricity Authority Approved Auditor

Delta personnel assisting in this audit were:

Name	Title
Steven Jenkins	Metering Compliance Coordinator

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1. ADMINISTRATIVE

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

Code related audit information

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

Audit observation

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

Audit commentary

There are no exemptions in place.

1.2 Scope of Audit

Delta 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 05 August 2017, in accordance with clause 1(4)(c) of schedule 10.3.

The audit was conducted in accordance with the ATH Audit Guidelines V1.2 produced by the Electricity Authority.

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

Class A Approval:

(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 on site:

(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.

Delta 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

- (a) calibration of class 0.5 meters, class 1 meters and class 2 meters, and class 0.5 current transformers and class 1.0 current transformers, provided that the calibrations are carried out under their approved quality certification and in accordance with this Part, and included within the ATH audit for 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:
- (f) certification, using the fully calibrated 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.

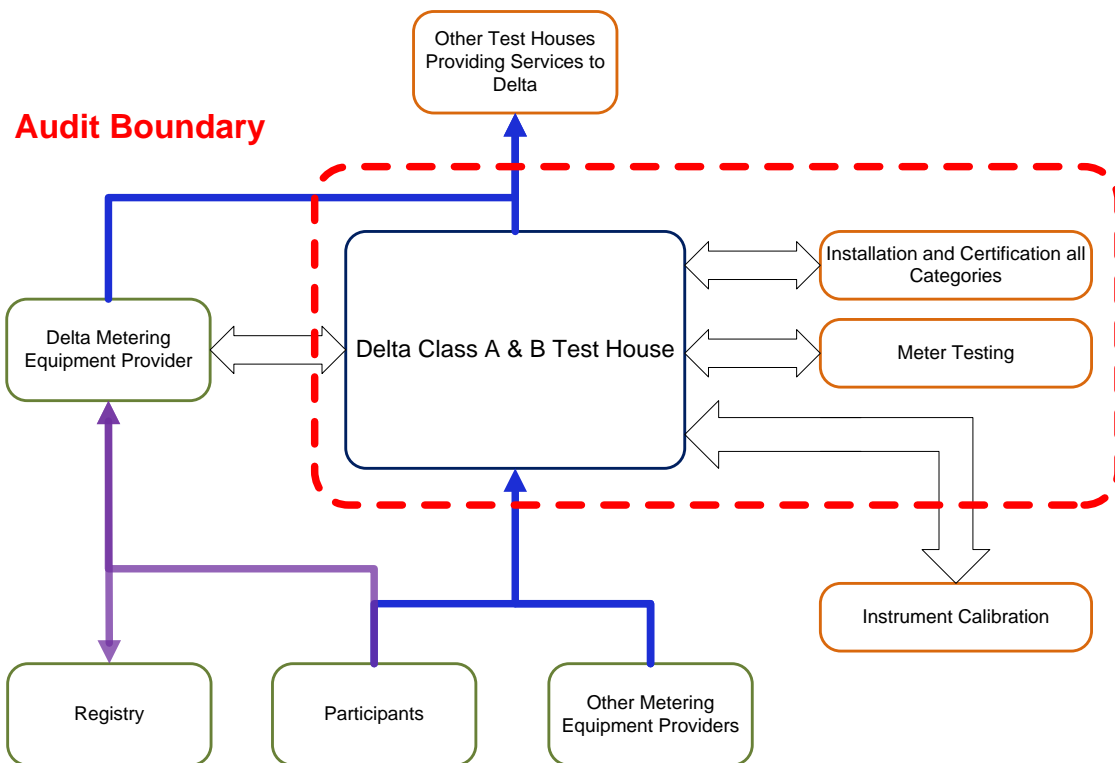
Delta also requires approval to certify metering components. I note that the Class B functions listed in Clause 4(2) of Schedule 10.3 do not include certification of metering components.

Delta has a Class A laboratory, which provides services to a number of MEPS as well as supporting their own MEP function.

Delta provides field ATH services to a number of other ATHs in respect of the installation and/or re-certification of time-of-use (TOU) and high voltage metering. Delta also provides installation of Category 1 and Category 2 metering using their own staff and subcontractors. Delta provides training, and also audits the ongoing compliance and competence of these staff and subcontractors by internal audit.

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.



1.3 Previous Audit Results

The last audit was conducted in August 2015 by Steve Woods of Veritek. This audit found three non-compliances and one recommendation was made. Two of the three non-compliances are now resolved, as is the recommendation. There was one issue for the Authority to resolve which is still outstanding.

The matters raised are shown in the tables below:

Table of Non-Compliance

Subject	Section	Clause	Non compliance	Status
Use of contractors	3.1	10.3 of part 10	Audits not conducted for non-AMI field activities.	Cleared
Error calculation	4.17	13(7) & 22(1)(a)(ii) of schedule 10.7	Meter measured accuracy used instead of meter class accuracy for fully calibrated installations. Estimated load and temperature not considered during error calculation.	Still existing
Control signals	4.25.2	34(1) of schedule 10.7	Check not made to determine if control device is likely to receive a signal.	Cleared

Table of Recommendations

Subject	Section	Clause	Recommendation for improvement	Status
Meter certification reports	8.2	1(1)(d)(ii) of schedule 10.8	Clearly record certification validity period in certification records.	Cleared

Issue	Description
Regarding: Clause 4(1)(a) of schedule 10.7	<u>Use of meter class accuracy when determining errors</u> Keith Jones from 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 Keith has been confirmed by the Authority as complying with JCGM 100:2008, but the calculator requires measured accuracy figures not meter class accuracy figures.

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 Delta's understanding of 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 Delta's instructions.

Audit commentary

Delta has a number of contractors operating under their ATH. Clause 10.3(c) requires that Delta *"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."*

All AMI project activities are subject to an audit regime and Delta demonstrated appropriate reporting for this work. The previous audit report recorded that other non-AMI work had not been subject to audit for approx. 2.5 years. This matter is now resolved and all work is subject to audit of approx. 3% to 5% of all jobs. The most recent report contained 480 results and recorded 25 failures, none that were major failures.

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 Delta during the audit period.

Audit commentary

Delta 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

Delta 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 to confirm compliance with these clauses.

Audit commentary

Delta has only conducted activities that fall within the scope of their approval. I have concluded from this audit that Delta has met the requirements of this clause. I checked compliance with other enactments, specifically the electricity regulations with regard to safety practices and I confirm the following critical points are managed in a robust manner:

- Livening practices, specifically polarity testing. This area is under review but processes are currently in place for new connections and recertification. Livening is conducted by Aurora, not by the ATH, but there are processes in place for polarity testing. MP-032 details polarity testing for meter replacement and it is complete and thorough. Some MEPs require a photo showing the polarity test being conducted.
- Safety practices with regard to the management of asbestos switchboards. Appropriate instructions (SM-P014) are contained in the installer's manual.
- General safety practices and the appropriate use and testing of personal protective equipment. Instructions are in place for staff and contractors.

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

Delta provided a copy of their most recent ISO 9001:2008 audit report, dated December 2016, which was conducted by Telarc SAI Limited. The scope of the ISO 9001: 2008 registration has changed during the audit period and is now noted as:

"...installations and inspection of metering installations, repairs and associated services, including audits in accordance with the requirements of the Electricity Industry Participation Code 2010."

The December 2016 report raised the following relevant issue:

Issue	Description	Status
Opportunity for improvement	As you review your Test House documentation in preparation to transferring into Q-Pulse, give consideration to: (i) restating the frequency of your management reviews, or (ii) if quarterly is preferred, complying with your requirement.	In progress

Delta also provided a copy of their most recent ISO 17025: 2005 audit report, dated April 2017, which was conducted by IANZ.

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

Field of operations: *Metrology and Calibration Laboratory*

Subfields : *PPE HV testing, electrical calibration and metering site certification*

The audit report contained three corrective action requests and 15 recommendations.

The matters raised are shown in the table below.

Issue	Description	Status
Corrective Action	<p>Traceability of Measurement / Scope of Accreditation</p> <p>There were some significant anomalies between the range of a parameter covered by the scope of accreditation and calibration certificate for the Fluke 5522A Calibrator providing measurement traceability. It appeared that the calibration certificate included some extrapolations from points calibrated to the extent of the specification range (which the scope was currently based on) of parameters without clear justification/validation. Examples of this noted during the assessment included:</p> <ul style="list-style-type: none"> ▣ AC voltage output below 10 Hz calibration minimum frequency ▣ AC voltage output at 1020 V above 8 kHz maximum calibration point ▣ Capacitance output frequency limitations not included ▣ Phase angle measurements not made at higher frequencies ▣ Power factor measurement not on scope currently <p>Frequency ranges and CMCs also need updating.</p> <p>Further investigation is required to establish an appropriate scope for measurements that meet the traceability requirements for accreditation. If a satisfactory technical validation cannot be provided by the manufacturer's calibration laboratory the scope of accreditation will need to be reduced to reflect what can be validated by the calibration results provided.</p>	The instrument mentioned is not used by the ATH and is not relevant to this audit.
Corrective Action	<p><i>Measurement Uncertainty / Calibration and Measurement Capabilities</i></p> <p><i>An error was found in the CMC calculations for energy meter capabilities using the MTE PWS 3.3 reference standard where the calibration errors were entered for the meter uncertainties rather than the reported uncertainties from the Ausgrid calibration certificate.</i></p> <p><i>The laboratory is requested to recalculate its energy meter CMCs using the reported measurement uncertainties as well as including the contributions of the calibration errors that were not being corrected (or alternatively, they can be corrected). Note that unapplied calibration corrections should be added to the expanded uncertainty of measurement; however, there is an alternative method in JCGM 100-2008 Appendix F clause 2.4.5 that could be applied to determine statistically representative errors and uncertainties rather than using the worst-cases.</i></p>	This has been done and sent to IANZ. A discussion is planned to ensure the solution is appropriate.

Corrective Action	<p>Proficiency Testing</p> <p>The laboratory was not able to demonstrate appropriate participation in PT programmes as required by accreditation criteria. These requirements are documented in the IANZ Technical Policy No.2: Participation in Proficiency Testing Activities (available on our website here).</p> <p>The laboratory is requested to enhance its procedures as required to meet the requirements for planning and scheduling PT activities and for analysing the results. Please provide details of your corrective actions.</p> <p>Please refer to recommendations 13 and 14 for further comment.</p> <p>Note, PT was covered in the Laboratory Quality Manual (LQM) clause 11.6 in the equipment calibration section, which may not be the most appropriate section for this type of activity.</p>	Delta believes this action should be initiated by IANZ with an IANZ meter. This will be the response to IANZ.
Recommendation	It is strongly recommended that the laboratory creates (and maintains) a spreadsheet comparing its scope of accreditation with the calibration certificate ranges and uncertainties of its primary reference equipment that provide measurement traceability. It is anticipated that this resource will assist in future scope/CMC revisions and for evaluating calibration certificates as reference equipment is recalibrated (IANZ SCS 5 Cl. 3, 5 & 11).	Recommendation will be adopted
Recommendation	It is strongly recommended that the laboratory obtains a second thermometer to place near the item being calibrated, especially when it is on the floor away from the reference equipment. The temperature of the equipment calibrated should be reported to the customer (5.10.4.1a).	Recommendation will be adopted
Recommendation	It is strongly recommended that the laboratory either calibrates its Fluke current coil or carries out a validation check (using the Fluke method provided during the assessment) followed by annual inspections to confirm continued fitness for use (check for damage to coils, etc.; 5.6).	Recommendation will be adopted
Recommendation	It is recommended that the laboratory tests the cold junction compensation (CJC) function of the Fluke 5522A calibrator using the ice-point methodology in MSL's Technical Guide 1 The Ice Point (available here).	Recommendation will be adopted
Recommendation	It is recommended that the laboratory enhances the front page of its calibration reports to indicate clearly when an adjustment has taken place.	Recommendation will be adopted
Recommendation	It is recommended that the laboratory reports the ambient temperature range (or uncertainty) near the item calibrated during the measurement period, for example 25 °C ± 0.5 °C or 24.5 °C to 25.5 °C.	Recommendation will be adopted
Recommendation	It is strongly recommended that the laboratory ensures that the 2-monthly intermediate checks of the meter calibration benches are maintained up-to-date and an appropriate reminder system is in place (5.5.11, 5.9.2).	Recommendation will be adopted
Recommendation	It is recommended that the laboratory only uses its best check meter for the 2-monthly bench intermediate checks and tolerance limits are added to the analysis graphs (ideally this would include both the category limits for EIPC 2010 compliance and a statistical limit of 1.8 x the standard deviation of the mean to indicate the "normal" spread of results).	Recommendation will be adopted
Recommendation	It is recommended that the laboratory adds a validation data set for checking averaging cells in its meter calibration worksheet(s). It would also be best practice to have a second party check new and amended spreadsheets in future.	Recommendation will be adopted
Recommendation	It is strongly recommended that the laboratory adds a description of the rationale for choosing the load profile (for the next 12 months) for EIPC Category 4 and 5 site certification calculations to MP-012. It may be appropriate to add an appendix/annex for this to avoid confusion for the site certification technicians who do not choose the load profile (4.2.1, EIPC 2010 Schedule 10.7 Cl. 22).	Recommendation will be adopted
Recommendation	It is recommended that MP-013 is enhanced with the addition of "because they are uncompensated" to the revised statement about CTs having a rating >500:5 not being so sensitive to burden.	Recommendation will be adopted

Recommendation	It is strongly recommended that the laboratory introduces a programme of inter-operator proficiency testing (meaning internal comparisons between laboratory personnel) to cover the technical scope of accreditation. The results of such a programme would provide evidence of staff competency (to support training assessments and authorisations for staff not performing routine work) as well as evidence of on-going participation in PT, particularly for areas where external PT programmes are infrequent or non-existent (5.9 and SCS 5 Cl. 14 (ref to TP 2)).	Delta recommends IANZ initiates this programme
Recommendation	It is recommended that the laboratory attempts to engage in formal (or informal) inter-laboratory PT with other accredited laboratories for technical fields where there are external PT gaps. Ideally the PT programme would cover all technical fields over the 3-yearly reassessment cycle.	Recommendation will be adopted
Recommendation	It is strongly recommended that the laboratory establishes a programme of compliance audits covering the technical output of each major field of work covered by the scope of accreditation. The audits should create records to demonstrate that a sample of IANZ endorsed test and calibration reports have been reviewed for compliance with ISO 17025 (and other accreditation criteria) along with associated primary data, equipment calibration, staff competency and contract review records (4.14; the current audit programme appears to focus on the documented methods but does not record appropriate evidence that the implementation of the methods is compliant).	Recommendation will be adopted
Recommendation	<p>The LQM was light in detail on how some policies are actually covered/managed/implemented in some areas (or missing altogether?) and it appeared that enhancing these with more detail would benefit the organisation by providing better guidance for personnel to ensure that processes are implemented consistently in compliance with requirements. It is strongly recommended that the following aspects identified from a review of the LQM and its implementation at this visit are reviewed and addressed:</p> <ul style="list-style-type: none"> a. Communication to staff including on the effectiveness of the management system (4.1.6, 4.2.4; easily implemented by inclusion in management review meetings and/or distribution of meeting records). b. While document control appeared to be well-implemented, the LQM did not appear to include adequate policy on what document control information is required (4.3.2.3) or if and how interim amendments are made (4.3.3.3). c. While customer feedback was discussed at management review there was no specific procedure in place to proactively survey customers for their feedback and this should be added (4.7.2). d. The management review procedure needs amending to reflect the new quarterly review schedule (4.15). e. The current system for indicating authorisation for personnel to conduct work in various technical procedures is not appropriate for those signatories that are not performing routine work (and are not authorised to either, according to the records reviewed at this visit). The system needs review and revision to provide a clear path for confirming competence of signatories not performing regular work. Evidence should be obtained through inter-operator proficiency testing, involvement in checking reports and occasional periods conducting accredited work if possible. Competency review records could be maintained via management review if it is considered easier than changing the current system, which works well for those performing regular work (5.2.5). f. The current policy for calculating and reporting measurement uncertainty is "hidden" in clause 11.5 under Calibration of Laboratory Equipment. This needs relocation to better reflect its association with methodology (and reporting results) and expansion to give a more detailed indication of the technical criteria/guidance to be followed and providing an indication of where the detailed uncertainty calculations are located in each technical area of the laboratory (5.4.6). 	Recommendation will be adopted

Recommendation continued	<p>g. The policies and procedure for obtaining metrological traceability through appropriate calibration of reference equipment is light on detail and should be enhanced in regard to obtaining services from NMIs (with current CMCs on the CIPM Key Comparison Database) or currently accredited laboratories (that supply an endorsed calibration certificate with measurement uncertainties); and that the results (corrections, adjustments, uncertainties) need to be comprehensively evaluated (and acted on if needed) before the instrument is returned to service (5.5.2, 5.6.2).</p> <p>h. Reporting requirements should be enhanced to clarify the need to report applicable environmental conditions during testing/calibration, measurement uncertainty, compliance statement rules where applicable, traceability statements and where adjustments have been made (5.10.3, 5.10.4).</p>	
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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

Steven Jenkins is recorded as the Quality Manager and Greg Gray is recorded as the Technical Manager. Steven and Greg have appropriate qualifications and the roles and responsibilities are documented in Section 7 of the quality manual.

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. I checked the training and competency assessment processes and I confirm compliance with this clause.

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.

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

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

Audit commentary

Delta 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 5 business days before the change or reduction in scope take place.

Audit observation

Delta has not conducted any material changes.

Audit commentary

Delta has not conducted any material changes.

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

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

Audit commentary

Delta 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 in the quality manual to confirm compliance.

Audit commentary

Access to the laboratory and storage area is restricted. Roles are defined in quality manual, and this includes whether they can access laboratory or not.

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 Delta's 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 Delta 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 Delta had certified any installations with loss compensation.

Audit commentary

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

Audit outcome

Compliant

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 50 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 50 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 Delta 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 50 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 50 certification records to confirm compliance.

Audit commentary

I reviewed Delta's records for each MEP where they provide ATH services. Certification reports are produced for all installations; certification and calibration reports are produced for all components.

Metrix meters are supplied pre-certified and the certification reports are stored appropriately. CTs supplied by TWS are certified and those calibrated by VEMS as a Class A ATH are calibrated and certified.

Whilst compliance is achieved for all of Delta's certification records, some fields are unclear and provide difficulty for MEPs and other participants relying on dates in the reports. I recommend the following changes to Category 2 records:

- The Category 2 reports have a field for “Date”. This field should be renamed “Installation certification date” or similar and there should be an installation expiry date next to this date. The current field is shown below. Delta resolved this matter in the template during the audit for the “installation report” but I recommend the certification report is also changed.
- The Category 2 report should be renamed “Metering Installation Certification Report”

Report / Cert Reference 975988	
INSTALLATION NAME:	Aurora Energy Ltd
INSTALLATION ADDRESS:	302 Taieri Rd
	Dunedin
I.C.P. Number:	0000004052DE-2E4
Date:	7 September 2016
Client Ref No:	WO-2380098
Installers No:	100665
Installation Site Certification No:	975988

METERING INSTALLATION TEST CERTIFICATE

CLIENT: **Vircom EMS**

DATE: 10 October 2016

CLIENT CONTACT: **Coral Weaver**

CLIENT REF: V43977

In many cases for Category 1 installations the records provided were “job close off” reports, which are not certification reports. Many participants think the “job close off” reports are metering installation certification reports and I have only ever been provided with “job close off” reports when I’ve requested certification reports from MEPs. The “job close off” reports are provided to MEPs and Retailers and are very difficult to read. This has caused many errors with regard to dates by participants relying on these reports. I recommend the following changes:

- Clearly state that this is not a “Metering Installation Certification Report” on the front page.
- Reconfigure the front page so it includes, and clearly states the following information:
 - ICP
 - Metering installation certification date
 - Metering installation expiry date
 - Metering category
- Eliminate other dates, which cause confusion. The confusing dates are:
 - Start date
 - Due date
 - Completed date – this appears to be the metering installation certification date and should be renamed.
 - Site expiry date should be “metering installation certification expiry date”

Metering installation certification reports are generated on request, but I suggest these are provided to MEPs along with the “job close off” report in order to achieve full compliance with Clause 14 of Schedule 10.4, which states:

14 Making available of ATH records

An ATH must, within 5 **business days** of creating a record, certificate, or report for a **metering installation** that it **certifies**,—

- (a) send, in electronic form or such other form as may be agreed between the parties, a copy of the record, certificate, or report to the **metering equipment provider** responsible for the **metering installation**; and
- (b) ensure that the **metering equipment provider** receives the record, certificate, or report.

Finally, I recommend some minor change to the Category 1 certification report. There is a date for “Field Complete” which needs to be changed to “Metering Installation Certification Date” and the fields for component certification dates need to be changed from “Meter Test Cert Date” to “Meter Certification Date.”

Recommendation	Description	Audited party comment	Remedial action
Clause 11 of Schedule 10.4	<p>1 -Change the title of the Category 2 report to “Metering Installation Certification Report”</p> <p>2 -Improve clarity of titles and dates in “job close off” reports.</p> <p>3 -Provide certification reports to MEPs for all metering installations certified by the Delta ATH.</p> <p>4 -Change fields in the Category 1 metering installation certification report to improve clarity.</p>	<p>1 - Done. See section 10 ‘Delta Response’</p> <p>2 - Proposal put to IT team. Their response was that they will investigate but requires external developer. Stated that report clearly states ‘Completed Date’ and ‘Site Expiry Date’. Surprise expressed re: ‘confusion’ as not received complaints from MEP.</p> <p>3 - Standing agreement between Delta and MEPs that certificates are stored with ATH until requested.</p> <p>4 – Done. For consistency, in addition to the recommendations above, Delta has also changed the wording of the LCD component to ‘LCD Certification Date’ (Report example sent separately)</p>	Investigating

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 50 metering installations along with the storage practices.

Audit commentary

All records were available and the content was correct. Records are stored indefinitely.

Audit outcome

Compliant

3.8 Retention of Records (Clause 13 of Schedule 10.4)

Code related audit information

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

Audit observation

I checked the certification records for 50 metering installations along with the storage practices.

Audit commentary

All records were available and the content was correct. 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 several metering records.

Audit commentary

All records were provided within five business days.

Audit outcome

Compliant

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

Code related audit information

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

Audit observation

I checked the certification records for the only installation certified under this clause in the audit period.

Audit commentary

The records were compliant with the Code.

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 50 certification records.

Audit commentary

Delta 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, Delta is unlikely to deal with any meters where maintenance is required. All AMI devices installed have battery monitoring conducted as part of the data collection function.

I checked a large number of certification reports to confirm the maximum interrogation cycle is recorded.

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 50 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

Delta has not installed any measuring transformers where maintenance is required.

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 27 metering installations to confirm compliance.

Audit commentary

The maximum interrogation cycle was recorded accurately for all metering installations checked.

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 some test points to confirm compliance.

Audit commentary

Delta 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

Delta has an instrument register containing records of any repairs and maintenance and includes the status of all items of equipment. This database is currently being reviewed with a view to replacement or improvement, but the records are still present. There have been no repairs during the audit period.

A class B ATH must have and maintain procedures for the purchase of test equipment and associated consumables. The only items considered as “consumables” are stickers, seals and sealing tools. The purchasing and control of these items is in accordance with the relevant processes in Delta’s quality system.

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 Delta’s reference and working standards to confirm they had current calibration certificates.

Audit commentary

I checked all of Delta’s reference and working standards and they all had current calibration certificates, as follows

- A PWS 3.3 reference standard was recently calibrated by Ausgrid in December 2016. This was then used to calibrate the following:
 - L&G 1001 with TVE 102-3 working standard, done in December 2016
 - L&G 2001 with TVH 2.1 working standard, done in December 2016
 - L&G 4001 with TVK4 working standard, done in December 2016
- 3 Hioki 3196 (category 2 working standards) done in December 2016.

Every two months a class 0.2 meter is used to conduct a comparison against the test benches.

Delta has a calibration schedule that is reviewed at the monthly management meeting to ensure all equipment has current calibration.

Audit outcome

Compliant

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

Code related audit information

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

Audit observation

I checked all of Delta's reference and working standards to confirm they had current calibration certificates.

Audit commentary

Delta uses the applicable calibration intervals.

Audit outcome

Compliant

4.6 Calibration of Reference Standards (Clause 3(1)(B)(li), (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

The main reference standard is calibrated by AusGrid. This standard is used to calibrate the test bench standards. I checked whether there were any situations where non-reference conditions were relevant.

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

Delta does not use HV working standards.

Audit commentary

Delta does not use HV working standards.

Audit outcome

Not applicable

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

Code related audit information

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

- calibrates the test bench as if it was a working standard*
- carries out a testing system accuracy test, using approved reference standards before completing the calibration report.*

Audit observation

Delta uses test benches in their laboratory and they are calibrated in accordance with the Code.

Audit commentary

Delta uses test benches in their laboratory and they are calibrated in accordance with the Code.

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 it 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 Delta's understanding of this requirement through interview. I checked whether this situation had occurred.

Audit commentary

Delta 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 reports to confirm compliance with this clause.

Audit commentary

Delta's processes, documentation and records are compliant with the points listed above.

Each item of test equipment has its own documented and prescribed methods of operation for testing components.

The documentation for field activities was also reviewed. This is comprehensive and compliant with this clause.

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 27 metering installations to confirm compliance.

Audit commentary

Delta certifies control data storage devices in accordance with these clauses. The certification report is combined with the metering installation certification report and contains the required details. Delta 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 Delta's 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 Delta's 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 50 certification records to confirm compliance.

Audit commentary

Delta's Sealing policy and procedures are clearly documented in the quality manual (MP-005). Numbered seals are used for all metering installations.

Seals are kept in a secure location and issued by the ATH.

When a seal is discovered to be broken or missing there is a procedure which ensures that the responsible party is notified.

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 50 certification records to confirm compliance.

Audit commentary

There were no metering installations certified that did not comply with Part 10.

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 50 metering installations to confirm compliance.

Audit commentary

All 50 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 50 metering installations.

Audit commentary

All design reports are approved by the quality manager and they contain the appropriate information required by this clause. The configuration scheme is often confirmed by the technician on-site and recorded in the metering installation certification report. I've accepted this approach because some design report requirements are in the certification records, and some certification information is on the design report, but at the end of the job all records are considered as one.

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 50 metering installations.

Audit commentary

All design reports are approved by the quality manager and they contain the appropriate information required by this clause. The configuration scheme is often confirmed by the technician on-site and recorded in the metering installation certification report. I've accepted this approach because some design report requirements are in the certification records, and some certification information is on the design report, but at the end of the job all records are considered as one.

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 whether any metering installations had been certified as a lower category during the audit period.

Audit commentary

Delta has certified some metering installations in the past as a lower category based on protection rating. Their process is compliant with the Code. I checked a specific example and it had 32 amp fusing recorded in the certification records. There were no additional examples during the audit period.

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 whether any metering installations had been certified as a lower category during the audit period.

Audit commentary

Delta has certified some metering installations in the past as a lower category based on protection rating. Their process is compliant with the Code. I checked a specific example and it had 32 amp fusing recorded in the certification records and the fuse was sealed. There were no additional examples during the audit period.

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 whether any metering installations had been certified as a lower category during the audit period.

Audit commentary

Delta has certified some metering installations in the past as a lower category based on protection rating. Their process is compliant with the Code. I checked a specific example and it had 32 amp fusing recorded in the certification records and the fuse was sealed. There were no additional examples during the audit period.

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 whether any metering installations had been certified as a lower category during the audit period.

Audit commentary

Delta has certified some metering installations in the past as a lower category based on protection rating. Their process is compliant with the Code. I checked a specific example and it had 32 amp fusing recorded in the certification records and the fuse was sealed. A site visit was conducted to confirm the suitability of the installation.

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 50 metering installations to confirm compliance.

Audit commentary

Delta 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

I checked certification records for 26 metering installations and statistical sampling results to confirm compliance.

Audit commentary

Delta correctly applied and recorded the certification methods.

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 six Category 3 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 50 certification reports to confirm compliance.

Audit commentary

Prevailing load tests for comparative recertification are conducted using a working standard.

The design report reference is included in certification records and this serves the purpose of confirming the configuration scheme.

Load tests are conducted by applying a fixed load for a set number of pulses then recording that the elapsed time was correct. It is unclear whether this is compliant or not because a memo was provided by the Authority on 17/06/14 stated *“for all category 1 metering installations – a test at two different measured load values and then checking meter accurately measures the increase. This is done by either counting pulses over a measured time period or recording the register increment, and comparing that to the expected values”* Normal practice has been to increase the load from zero to the load of a heater or heat gun, but it appears the Authority may require two different load settings. I haven't recorded non-compliance until the Authority provides more clarity on this matter.

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 1 trading period. This test is conducted for Category 2 HHR installations. During the audit I recalculated an example to ensure it was correct.
- 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. Delta has a letter from AMS and ARC with this confirmation; Metrix meters 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.

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 27 certification reports to confirm compliance.

Audit commentary

HHR certification (non-AMI) occurs with an “output to host” test as required by this clause. Delta has a letter from relevant MEPs confirming that they have a back office validation process.

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 Delta conducts this test.

Audit commentary

Delta uses pulse outputs for testing, 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 2 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 50 metering installations to confirm compliance.

Audit commentary

Delta's 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 50 metering installations to confirm compliance.

Audit commentary

Delta is relying on the MEP to review the test results and has confirmation from MEPs that this is occurring. There were no examples of metering components failing tests.

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 20 metering installations to confirm compliance.

Audit commentary

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

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 20 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 26 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 26 metering installations to confirm compliance.

Audit commentary

The certification reports confirmed that appropriate testing was conducted and that the total accuracy was within the requirements of table 1. A certification report was provided for each metering installation.

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 one metering installation to confirm compliance. One example is considered sufficient because this type of certification happens infrequently and the same process is used each time.

Audit commentary

The certification report confirmed that appropriate testing was conducted, and that all components were 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 one metering installation to confirm compliance. One example is considered sufficient because this type of certification happens infrequently and the same process is used each time.

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 one metering installation to confirm compliance. One example is considered sufficient because this type of certification happens infrequently and the same process is used each time.

Audit commentary

The certification report 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 one metering installation to confirm compliance. One example is considered sufficient because this type of certification happens infrequently and the same process is used each time.

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 Keith Jones from 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 Keith 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 4(1)(a) of schedule 10.7	<u>Use of meter class accuracy when determining errors</u> Keith Jones from 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 Keith 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-Aug-15 To: 31-Jul-17	Meter measured accuracy used instead of meter class accuracy for fully calibrated installations. Potential impact: None Actual impact: None Audit history: Twice 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
This issue can only be resolved by the EA and IANZ.		Unknown	Unknown
Preventative actions taken to ensure no further issues will occur		Completion date	
To retain our IANZ accreditation the Delta ATH will continue to use the more scientifically valid 'meter measured accuracy'		Unknown	

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 increments through to a full raw meter data output check against a working standard and a check against the back office data for a half hour installation.

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

- it performs an additional integrity check of the metering installation wiring, and records the results of this check in the certification report
- it records in the certification report that the metering installation is certified under clause 14 of Schedule 10.7.

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

- update the metering installation certification report, within five business days of completing the tests, to include the results of the tests carried out
- leave the original metering installation certification expiry date unchanged.

Audit observation

I checked process documentation, and records for one metering installation to confirm compliance. One example is considered sufficient because this type of certification happens infrequently and the same process is used each time.

Audit commentary

The example checked clearly recorded that additional integrity checks had been conducted. The MEP notified Delta once the load had increased and the remaining tests were conducted and recorded.

Delta has certified one installation in accordance with this clause during the audit period, and appropriate integrity testing was conducted. The MEP had been advised to monitor the load.

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

I checked the process and test results for the statistical sampling conducted for PowerNet.

Audit commentary

Delta has conducted statistical sampling for a group of approx. 50,000 metering installations. I reviewed the process, the test results and the final analysis that determined the certification period. The sample passed the +/- 2.5% criteria so the group was certified for 5 years. The sample originally failed, but some meter types were removed and the results were re-run, resulting in a pass.

The guideline for statistical sampling, produced by the Authority, stipulates that *“once the ATH has selected the meter sample, it must assess the meter sample to ensure it is representative of the group. Factors that the ATH should take into account to decide whether the meter sample represents the group include, but are not limited to:*

- (e) meter construction principles*
- (f) meter manufacturer*
- (g) the ATH's experience of the accuracy of meter make and model*
- (h) the range of environments in which the meters are installed.”*

Whilst assessing the sample to ensure it is representative of the group is ideal, the Code appears to allow all Category 1 meters to be included in the same group, which Delta has done.

The points I have considered when determining compliance are as follows:

1. Point 16 of the guideline states “The group may be as large or as small as the MEP decides.”
2. AS/NZS 1284 (4.2.10) refers to populations (not groups) and this is where similar construction is considered, but the Code only requires that the sample is selected in accordance with 1284, nothing in the Code refers to how the population is decided.
3. Points 25 and 26 of the guideline state that the ATH will decide if the sample is representative of the group, but AS/NZS 1284 only requires that “quantities” are considered when selecting a sample.
4. Three phase and single phase meters are both Category 1 and are in the same group. The pass fail criteria is split into light load and full load, but if there is a failure at any load point then that is considered a “fail”. There is an additional load point for three phase meters and I think that the additional load point (power factor of 1.5 at full load) can be accommodated and if there is a failure at this point then the meter is considered a “failure” even though single phase meters don’t get tested at this point. In summary, I think the Code and AS/NZS1284 allows three phase meters and single phase meters to be in one population (group).

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

I checked the process and test results for the statistical sampling conducted for PowerNet.

Audit commentary

All installations were recertified using the selected component method.

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 50 metering installation certification records to confirm compliance.

Audit commentary

The commissioning date and expiry date is 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 50 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 26 metering installation certification records and discussed the process for error calculation.

Audit commentary

For Category 2 comparative certification, I have previously recorded that uncertainties are calculated per installation and the calculation includes the working standard, clamps and a temperature range of 0° Celsius to 40° Celsius, within which the standard can operate without affecting the stated uncertainty figure. The operating range of 0° Celsius to 40° Celsius is recorded in the manufacturer's specifications, as shown below. Delta has taken this to mean the working standard will be accurate within this range.

- This product is designed for indoor use, and operates reliably from 0°C to 40°C. It can be used in the temperature range -10°C to 0°C, but LCD operation and accuracy are not assured. Further, 9459 BATTERY PACK and PC Card operation are not guaranteed.

However, on closer analysis of the specifications, two other sections contain additional information relating to temperature. The "Conditions of Guaranteed Accuracy" are shown below and indicate a guaranteed accuracy within the range 18° to 28°.

Conditions of Guaranteed Accuracy

Conditions of guaranteed accuracy	After 30 min warm-up, when measuring AC voltage; sine-wave input, PF=1, synchronized PLL
Temperature and humidity for guaranteed accuracy	23 ±5°C (73±9°F), 80% RH or less (applies to all specifications unless otherwise noted)

Further to this, the temperature characteristic indicates the working standard is within $\pm 0.03\%$ per degree Celsius. When using this figure, it appears the combination of the working standard and clamp uncertainties may result in uncertainties greater than 0.6% at temperatures under approx. 10 degrees Celsius.

Other Characteristics

Frequency characteristic	69Hz to 1kHz: $\pm 3\%$ f.s. 1kHz to 3kHz: $\pm 10\%$ f.s. (RMS voltage and current), $\pm 15\%$ f.s. (active power)
Temperature characteristic	AC: Within $\pm 0.03\%$ f.s./°C at 50 or 60 Hz measurement, Within $\pm 0.05\%$ f.s./°C at 400 Hz measurement (from 0 to 18°C and from 28 to 40°C) DC: Within $\pm 0.1\%$ f.s./°C (from 0 to 18°C and from 28 to 40°C)

This matter was checked with the Authority and it appears Delta's approach to uncertainty calculations for comparative certification does not meet the requirements of the Code

Delta is also not considering temperature variations when calculating uncertainty for fully calibrated metering installations.

Audit outcome

Non-compliant

Non-compliance	Description		
Audit Ref: 5.30 With: Clause 22 Of Schedule 10.7 From: 01-Aug-15 To: 31-Jul-17	Temperature variations not considered in uncertainty calculations. Potential impact: Low Actual impact: Low Audit history: None Controls: Moderate Breach risk rating: 2		
Audit risk rating	Rationale for audit risk rating		
Low	I have rated the controls as moderate because Delta has evaluated temperature variations but improvements may be required The impact on settlement is likely to be minor because very few installations have overall errors close to the threshold.		
Actions taken to resolve the issue		Completion date	Remedial action status
See section 10 ‘Delta Response’		Unknown but ongoing	Disputed
Preventative actions taken to ensure no further issues will occur		Completion date	
See section 10 ‘Delta Response’		Unknown but ongoing	

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 32 metering installation certification records, and process documentation.

Audit commentary

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

Audit outcome

Compliant

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

Code related audit information

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

Audit observation

I checked 32 metering installation certification records, and process documentation.

Audit commentary

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

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. Delta has a documented process to ensure compliance with this clause. Only CTs and test blocks are supplied, 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 50 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

I checked 50 certification records to confirm compliance.

Audit commentary

None of the installations had electromechanical meters. Delta 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 32 certification records to confirm compliance.

Audit commentary

All of the installations had certified measuring transformers. Delta 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 32 certification records, and process documentation to confirm compliance.

Audit commentary

The process documentation and design reports stipulate all of the requirements above. The certification reports confirmed compliance with regard to certification and burden. Delta's photo checking process also checks relevant items related to this clause.

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 32 certification records to confirm compliance.

Audit commentary

CTs supplied by TWS or VEMS are certified with a validity period table in the certification report and with appropriate stickers. Delta then calculates and records the expiry date.

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

Delta arranges for the installation of Control Period Demand metering on some Category 2 metering installations and in all cases, the metering installation is recertified in accordance with this clause.

Audit outcome

Compliant

5.40 Burden & Compensation (Clause 31 of Schedule 10.7)

Code related audit information

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

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

- a) less than or equal to 1/30th of the VA rating of the voltage transformer, if the voltage transformer is rated at less than 30 VA; or*
- b) no greater than 1 VA, if the voltage transformer is rated at equal to or greater than 30 VA.*

Before it certifies a 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 32 metering installations to confirm compliance.

Audit commentary

Delta has not dealt with any changes to VT burdens.

Most new CTs are manufactured and certified by TWS. TWS has conducted testing and confirmed that CTs with ratios of 500/5 or greater will not be affected by low burden. Those under 500/5 may be affected by low burden as will non-TWS CTs. Delta requires a minimum length of secondary wiring or the installation of burden resistors to ensure appropriate burden is added in these situations. I checked several certification reports to ensure this was being carried out correctly.

Audit outcome

Compliant

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 one example to confirm compliance of the process.

Audit commentary

Delta applied alternative certification to one metering installation. The process and records are compliant.

Audit outcome

Compliant

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

Code related audit information

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

- *that the certification expiry date for each control device is the same as the metering installation certification expiry date and record that date in the installation certification report*
- *that the control device complies with the applicable standards listed in Table 5 of Schedule 10.1*
- *the control device is fit for purpose*
- *if the metering installation contains a control device that has previously been used in another metering installation, that the control device is still fit for service.*
- *that the control device is:*
 - a) *likely to receive control signals*
 - b) *correctly connected*
 - c) *correctly programmed.*

Audit observation

I checked certification records for 20 metering installations to confirm compliance.

Audit commentary

Delta is certifying control devices and correctly applying stickers. The control device certification expiry date is correctly recorded in the installation certification report. All points above are met.

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

I checked correspondence in relation to this matter to determine compliance.

Audit commentary

Delta has liaised with distributors over this matter and the response indicates there are no areas with signal propagation issues where Delta operates as an ATH.

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 27 metering installations to confirm compliance.

Audit commentary

All data storage devices are recertified prior to be 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

All of the points above apart from the point regarding environmental suitability are covered by the type test reports. Delta has appropriate instructions for the identification and recording of unsuitable environments.

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 four metering installations to confirm compliance. A small sample was considered appropriate because Delta has a photo checking process for all field activity which includes this point.

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 Delta 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 four metering installations to confirm compliance. A small sample was considered appropriate because Delta has a photo checking process for all field activity which includes this point.

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 photos for four metering installations to confirm compliance. A small sample was considered appropriate because Delta has a photo checking process for all field activity which includes this point.

Audit commentary

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

The photos for four metering installations showed that all enclosures were appropriate for the environment, and the Delta certification sticker has an appropriate warning. Delta reviews photos of all installations to confirm enclosure suitability.

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 50 metering installations to confirm compliance.

Audit commentary

Delta conducts calibration of components in their laboratory and they have appropriate arrangements for storage and transportation. Delta 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 four metering installations to confirm compliance. A small sample was considered appropriate because Delta has a photo checking process for all field activity which includes this point.

Audit commentary

The process documentation, design reports and the photos for four 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, design reports and the photos for four metering installations to confirm compliance. A small sample was considered appropriate because Delta has a photo checking process for all field activity which includes this point.

Audit commentary

The process documentation, design reports and the photos for four metering installations confirm compliance. 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, design reports and the photos for four metering installations to confirm compliance. A small sample was considered appropriate because Delta has a photo checking process for all field activity which includes this point.

Audit commentary

The process documentation, design reports and the photos for four metering installations confirm compliance. 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 and records for two metering installations to confirm compliance. There were only two examples available to check.

Audit commentary

Delta has appropriate instructions in relation to this requirement and there is the ability to record this information on the commissioning record for the installation. Appropriate investigation and reporting occurred for the two examples checked.

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 1 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, design reports and the photos for four metering installations to confirm compliance. A small sample was considered appropriate because Delta has a photo checking process for all field activity which includes this point.

Audit commentary

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

Audit outcome

Compliant

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, design reports and the photos for four metering installations to confirm compliance. A small sample was considered appropriate because Delta has a photo checking process for all field activity which includes this point.

Audit commentary

The checks 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, design reports and 50 certification reports to confirm compliance.

Audit commentary

All certified components have calibration reports and stickers.

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, design reports and 50 certification reports to confirm compliance.

Audit commentary

All certified components have calibration reports and stickers.

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

Delta's Class B ATH does not calibrate components.

Audit commentary

Delta's Class B ATH does not calibrate components.

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 Delta.

Audit commentary

Delta's 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 Delta's 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

Delta's Class B ATH does not calibrate components.

Audit commentary

Delta's Class B ATH does not calibrate components.

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 50 metering installations and Delta's directory of type test reports to confirm compliance.

Audit commentary

All meters are certified and Delta has a directory of type test reports to confirm compliance with this requirement.

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. Delta 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

It is rare for Delta to certify CTs but the process documentation is compliant.

Audit commentary

It is rare for Delta to certify CTs but the process documentation is compliant.

Audit outcome

Compliant

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 32 metering installations and in all cases, the CTs were pre-certified by TWS or VEMS. It is rare for Delta to certify CTs but the process documentation is compliant.

Audit commentary

I checked the certification records for 32 metering installations and in all cases, the CTs were pre-certified by TWS or VEMS. It is rare for Delta to certify CTs but the process documentation is compliant.

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

I checked design reports, process documentation and the certification records for 32 metering installations to confirm compliance.

Audit commentary

TWS has confirmed that some CTs will operate accurately at low burden. For other CTs, Delta installs additional secondary wiring length to increase the burden. Certification records confirm this.

Audit outcome

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

I checked the certification records for 20 metering installations to confirm compliance.

Audit commentary

Delta certifies control devices in accordance with these clauses. The certification report is combined with the metering installation certification report and contains the required details.

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 32 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

Delta conducts comparative recertification, but does not conduct onsite calibration of metering components.

Audit commentary

Delta conducts comparative recertification, but does not conduct onsite calibration of metering components.

Audit outcome

Not applicable

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

Delta conducts comparative recertification, but does not conduct onsite calibration of metering components.

Audit commentary

Delta conducts comparative recertification, but does not conduct onsite calibration of metering components.

Audit outcome

Not applicable

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

Delta conducts comparative recertification, but does not conduct onsite calibration of metering components.

Audit commentary

Delta conducts comparative recertification, but does not conduct onsite calibration of metering components.

Audit outcome

Not applicable

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 27 metering installations to confirm compliance.

Audit commentary

Delta 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 50 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

Delta has appropriate process documentation for conducting inspections, and their records are compliant with these clauses.

Audit outcome

Compliant

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

Code related audit information

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

Audit observation

I checked the content of the standard inspection reports to confirm compliance.

Audit commentary

Delta has not conducted any Category 1 inspections where data storage devices are present.

Audit outcome

Not applicable

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

Delta's 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.

Audit commentary

Inspection reports were sent to MEPs within 10 business days for the sample checked.

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 the standard inspection reports to confirm compliance.

Audit commentary

Delta's 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 Delta's process documentation and the most recent two examples.

Audit commentary

Delta has a process which is compliant with the Code. Two examples were examined during the audit where Delta identified faulty installations. The MEP was notified in both cases.

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 Delta's process documentation and the most recent two examples.

Audit commentary

Delta tested the installations immediately and provided statements of situation to the relevant parties.

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 Delta's process documentation and the most recent two examples.

Audit commentary

Delta has provided some statements of situation. The content includes all of the points required by this clause.

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 Delta's process documentation and the most recent two examples.

Audit commentary

The records checked contain all relevant information and are stored along with certification records.

Audit outcome

Compliant

8. Conclusions

Two non-compliances have been recorded.

The matter of error and uncertainty calculation is still a subject of considerable debate in the industry and I've recommended the Authority assists the industry because IANZ audit reports are recording compliance of ATH calculations, but they do not comply with the Code. This is raised as non-compliance and as an "issue" below. Delta's Category 2 comparative certification uncertainty calculations have previously been recorded as compliant, however when evaluating this matter in more detail it appears the temperature coefficient of the working standard should be used in the calculation not just the operating range. This is now recorded as non-compliance and may mean the uncertainty result is too high at low temperatures.

One recommendation is made regarding the lack of clarity of certification and expiry dates in certification records. This can cause MEPs and other participants to use the incorrect dates in their systems and on the registry.

9. Signatures

Signed By:



Steve Woods – Veritek Limited
Electricity Authority Approved Auditor

Signed By:



Steven Jenkins
Metering Compliance Coordinator

10. Delta Response

Section 3.6 Certification & Calibration Reports

"The Category 2 report should be renamed "Metering installation Certification Report"



METERING INSTALLATION CERTIFICATION REPORT

CLIENT: **Vircom EMS**

DATE: 23 August 2017

CLIENT CONTACT: **Coral Weaver**

CLIENT REF: V46977

Installation Certificate No: 2648

Section 5.30 Error Calculation (Category 2 Comparative Recertification)

Delta is an IANZ approved Class A and Class B Test House and has spent considerable time, (in consultation with MSL) on this industry problem. Delta is confident that our approach ensures that the certification of Cat 2 sites meets the requirements of Clause 12(3)(c) of Schedule 10.7 of the EIPC.

But, Delta have publically stated to the EA, IANZ and our auditor that the certification methodology required for this test is poor, (a simple load check on the overall metering installation is not a calibration of the CTs) and that the Delta ATH believes that what was supposed to be cost effective fix for the customer, (but has now become an industry standard) cannot provide the burden of proof that is being asked of it.

Compliance burdens are now making this certification less cost effective as time goes on. This is because there is no reliable temperature data to build a satisfactory model, from the manufacturer of the Working Standards or the manufacturer of the onsite CTs. TWS in conversation has stated that they have no requirement to produce temperature effect data on their CTs unless they are for the purpose or Circuit protection so have none. Hioki claims that the temperature accuracy changes in a linear fashion but this claim is unsubstantiated.

To mitigate errors the Delta ATH has conducted Type A uncertainty tests on the Hioki working standards used for site certification and has achieved the following figures for the 5A, 500A and 1000A clamps of 0.065, 0.066 and 0.062 respectively. In addition, (as stated in my response to IANZ) **Our test, as per the EA issued document is follows. We connect a portable working standard to the site mains conductors, (the PWS has an uncertainty of 0.062) connect the pulse leads and conduct a load test and record the error. The meter, (a class one) has a calibrated uncertainty of 0.07 if from EDM I in Singapore, (and 0.129 if from the Delta Cal lab) and if I RSS those two uncertainties (0.062 and 0.07) I get 0.094 and whatever error, (and with current metering technology, about 0.1% calibrated error). TWS CT are calibrated with an uncertainty of between 0.048 to 0.052 so the total RSS error now becomes 0.107%, (if I don't RSS but just add them I get 0.184) against a maximum site uncertainty of 0.6**

The distinction needs to be made between what I have stated above, (consideration of uncertainty) compared to what the audit commentary discusses, (which is the separate matter of accuracy) but states that the temperature at 10 C degrees “may result in uncertainties greater than 0.6%” when the manufacturers figures do not discuss this aspect of metrology. The Delta ATH respectfully disagrees with the audit comment in that there is no evidence to suggest that possibility and that the comment incorrectly conflates the accuracy characteristics of the PWS with uncertainty. The statement equates accuracy with precision. The manufacturer states that the PWS operates “reliably” between 0 and 40 C degrees and guarantees accuracy between 18 to 28 C degrees but there is no evidence that the uncertainty of the measurement would increase between 3 and 6 times the 0.184 to 0.107% of the lab Type A figures for a change of 8 degrees of temperature. There would be a further question regarding the metering components being certified in that they will also be at the same temperature at the time of testing and what is the impact of that temperature on them?

To mitigate the lack of reliable information the Test House uses the uncertainty figure of 0.445 for our site tests and the rationale behind this has been explained and accepted by IANZ.

The Delta ATH agrees that the risk rating of this issue is low. There has been no situation in Cat 2 site Comparative Recertification where the metering installation has recorded a result that comes close to the maximum allowed error of ± 2.5 . The Delta ATH has full confidence that the technology used to measure a Cat 2 metering installation greatly exceeds the minimum requirements set out in Table 1 of Schedule 10.1 of the EIPC

The Delta ATH agrees 100% with the auditor’s statement that the industry has more work to do on this issue. I have asked MSL whether they have performed any experiments on metering components in an environmental chamber and they answered that there has been some rudimentary testing done but it’s of no real value and is inconclusive. The Delta ATH has not got the facilities to do this type of testing but believes that if it has been done, the data should be made available to all the Test Houses for the benefit of the industry.