

Part D Metering Arrangements

1. Contents of part D

Part D sets out certain obligations of **participants** in relation to **metering standards**.

2. Responsibility for meter installations at points of connection on the grid

2.1 Metering installations to be provided

Metering installations are to be provided at each **point of connection** on the **grid**. The **participant** responsible for providing a **metering installation** at existing **points of connection** is identified in schedule D2 (as updated from time to time in accordance with rule 2.3). For any new **point of connection** the **participant** responsible for providing the **metering installation** will be determined by the **Board** following consultation with the **grid owner** and any other **asset owners** at the **point of connection**. The **Board** will have regard to the following:

2.1.1 Agreements reached

Any agreement reached between the **grid owner** and another **participant** as to assumption of responsibility for provision of a **metering installation** at the **point of connection**;

2.1.2 Participants transferring energy

The **participants** who will be transferring electrical energy across the **point of connection**; and

2.1.3 Other matters

Any other matters the **Board** considers relevant, with the intention that, in the absence of agreement between the **grid owner** and a **participant** as to responsibility for provision of a **metering installation** at the **point of connection**:

2.1.3.1 Grid owner responsible

The **grid owner** will be responsible when it is anticipated that **electricity** will predominantly flow out of the **grid** at the **point of connection**; and

2.1.3.2 Asset owner responsible

The **asset owner** connecting **assets** to the **grid** at the **point of connection** will be responsible when it is expected that **electricity** will predominantly flow into the **grid**.

2.2 Assignment

A **participant** may assign responsibility for providing a **metering installation** at a **point of connection** on the **grid** to any other **participant**, provided that:

2.2.1 Board satisfied

The **Board** is satisfied as to the form and effectiveness of the assignment; and

2.2.2 Responsible until notification received by Board

The first **participant** will remain responsible under the **rules** for all obligations in relation to the **metering installation** (including provision of **submission information** under rule 4 part J) until written notification of the assignment, signed by both the assignor and assignee, is received by the **Board**.

2.3 Board will update the schedule

The **Board** will advise all **registered participants** when a new **point of connection** is added or it receives advice of an assignment of responsibility for provision of a **metering installation** and will from time to time **publish** updates to the details in schedule D2 to reflect such advice.

3. Responsibility for quantification at points of connection on local networks and embedded networks

The responsibility for quantification at **points of connection** on **local networks** and **embedded networks** is as follows:

3.1 Retailers responsible for quantification at points of connection

Each **retailer** must quantify the conveyance of **electricity** at each **point of connection** in relation to the **ICPs** for which it is responsible by using either:

3.1.1 a **metering installation**; or

3.1.2 in the case of **unmetered load**, a method of calculation approved by the **Board**;

3.2 Unmetered threshold

Where the quantity of **electricity** conveyed at a single **point of connection** is not quantified using a **metering installation** the amount of **electricity** conveyed per annum must not exceed 3,000 kWh;

3.3 Direct purchaser's responsibilities for meters

Each **direct purchaser** with a **point of connection** to a **local network** or an **embedded network** is responsible for ensuring that a **metering installation** is provided at that **point of connection**;

3.4 Responsibility for metering installations for embedded generation

Each **embedded generator** with a **point of connection** to a **local network** or an **embedded network** (except any **point of connection** in respect of **embedded generating stations** to which rule 3.2 of part J applies), who sells **electricity** to, or purchases **electricity** from, the **clearing manager**, and which does not sell **electricity** to or purchase **electricity** from a **retailer** at that **point of connection** must:

3.4.1 provide a **metering installation** at that **point of connection**;
and

3.4.2 ensure that the **metering installation** quantifies the conveyance of **electricity** at that **point of connection**;

3.5 Net metering not to be used

Where **electricity** may flow in either direction through a **metering installation** the quantity flowing in one direction must be measured separately from the quantity flowing in the reverse direction;

3.6 Net metering to be replaced

If a **metering installation** does not comply with rule 3.5 as at the date rule 3.5 comes into effect then the **metering installation** shall be brought into compliance by the **reconciliation participant** responsible for that **metering installation** on or before the date falling six months after the date on which this rule becomes effective, or 1 January 2007, whichever is the later; and

3.7 Responsibility of network owners for meters

Each:

- (a) **embedded network** owner who initiates a **point of connection** (other than an **interconnection point**) to another **network**; and
- (b) **embedded network** owner or **local network** owner who initiates an **interconnection point** to another **local network** or **embedded network**

must provide a **metering installation** at that **point of connection** and quantify the conveyance of **electricity** through that **point of connection** by using that **metering installation**.

4. Electricity recorded will be the record of supply

4.1 Supply at points of connection on the grid

Electricity recorded or deemed to be recorded on any **metering installation** referred to in rule 2 will comprise the record of the supply of **electricity** across the **point of connection** at which the **metering installation** is located.

4.2 Supply to retailers

Electricity recorded or deemed to be recorded on any **metering installation** referred to in rule 3.1 will comprise the record of the supply of **electricity** across the **point of connection** at which the **metering installation** is located to that **retailer** as a **purchaser**.

4.3 Supply to direct purchasers

Electricity recorded or deemed to be recorded on any **metering installation** referred to in rule 3.3 will comprise the record of the supply of **electricity** across the **point of connection** at which the **metering installation** is located to that **direct purchaser**.

4.4 Supply to embedded generators

Electricity recorded or deemed to be recorded on any **metering installation** referred to in rule 3.4 will comprise the record of the supply of **electricity** across the **point of connection** at which the **metering installation** is located from that **embedded generator** into the **local network** or **embedded network**.

5. Metering installations not always located at point of connection

Where any **participant** is required to provide a **metering installation** at a **point of connection**, it will be sufficient if a **metering installation** which is not situated at that **point of connection**:

5.1 Where remote metering installation can measure electricity at point of connection

Measures the flow of **electricity** at that **point of connection**; or

5.2 Where calculation possible from raw meter data

Measures the flow of **electricity** from the **metering installation** if the flow of **electricity** at the **point of connection** is able to be calculated from the **raw meter data** available.

6. Metering installations to comply with codes of practice

Each **participant** responsible for providing a **metering installation** will ensure that the **metering installation** meets the requirements of the **codes of practice**.

7. Raw meter data to be archived in accordance with schedule J2

The **participant** responsible for a **metering installation** in accordance with rules 2 and 3 will ensure that:

7.1 Manner in which metering installations to be read

All the **metering installation's meters** are read in accordance with the schedule J2 of the rules;

7.2 Data transfer and storage must leave audit trail

The data is transferred and stored in such a manner that it cannot be altered without leaving a detailed **audit** trail; and

7.3 Raw meter data to be kept

A copy of the **raw meter data** is kept for a minimum period of twenty months and is made available to the **reconciliation manager** or its agent on request.

8. When metering installations are to be tested

Each **participant** will, at its cost, test in accordance with the **metering testing requirements**, the **metering installations** for which it is responsible.

9. Requests for metering installation tests

9.1 Affected participant may request test

Any **participant** likely to be affected by a defective **metering installation** may, upon giving reasonable notice to the **participant** responsible under the **rules** for providing the **metering installation**, request a test of the **metering installation**.

9.2 Who bears cost of test

If any requested test indicates that the **metering installation** is inaccurate with respect to the **metering standards**, the cost of the test will be borne by the **participant** responsible for the inaccurate **metering installation**. If any requested test indicates that the **metering installation** is not inaccurate with respect to the **metering standards**, the cost of the test will be borne by the **participant** requesting the test to be performed.

10. Who conducts tests

10.1 Participant's own test

Any test carried out under rule 8 must be conducted by an **approved test house** appointed by the **participant** responsible for the **metering installation**.

10.2 Requested test

Any test carried out under rule 9 will be conducted by an **approved test house** appointed by the **participant** requesting the test and approved by the **participant** responsible for the **metering installation**. If the **participants** in question cannot agree on the test house, the **market administrator** must, on the written request of either **participant**, nominate an **approved test house** to conduct the test.

11. Adjustment of defective metering installation

Any **metering installation** found to be inaccurate must, once the **participants** involved (if more than one) have agreed, be adjusted, repaired or replaced as necessary. If the **participants** concerned cannot agree, the **reconciliation manager** will direct how any adjustment, repair or replacement will occur.

Following the adjustment, repair or replacement, a test must be completed in accordance with rule 8.

12. Reconciliation manager will determine inaccuracies

If a **metering installation** at a **point of connection** to the **grid** should cease to operate (temporarily or permanently) or be proven to be inaccurate, the **reconciliation manager** will determine the quantity of **electricity** conveyed or consumed during the period of inoperation or inaccuracy as follows:

12.1 Reconciliation manager to use backup metering installations

By any additional **metering installation** used for backup by the **participant** responsible for supplying the **metering installation** or, if such backup **metering installation** should be proven to be inaccurate or, if no such backup **metering installation** exists, then;

12.2 Reconciliation manager to use check metering installations

By any **metering installation** of any other **participant** or, if such check **metering installation** should be proven to be inaccurate or, if no such check **metering installation** exists, then;

12.3 Reconciliation manager to use such other means as agreed

By such other means as the **reconciliation manager** will agree with all **participants** concerned or, failing agreement, as determined by the **Board**.

13. Participants will notify reconciliation manager of inaccuracies

Where a **participant** ascertains or believes a **metering installation** of Category 3, 4, 5 or 6 (as described in **code of practice D1**) is or may be materially inaccurate, that **participant** will forthwith notify the **reconciliation manager** who will, as soon as practicable after receipt of such notice, will advise all **participants** that are likely to be materially affected by such an inaccuracy.

14. Information to be included with reconciliation manager's notice

The information or advice to be given by the **reconciliation manager** pursuant to rule 12 will include:

14.1 Point of measurement's location

The location of the **point of measurement**;

14.2 Participant responsible for metering installation

The **participant** responsible under the **rules** for the **metering installation**; and

14.3 Details of any intended test

Whether a test will be held and, if so, the time and place of the test.

15. Reconciliation manager will distribute further information

Upon the information concerning an inaccuracy becoming available (and to the extent it is available) the **reconciliation manager** will give to the persons it believes are entitled to receive such advice or information a description of the means of ascertaining the inaccuracy and, to the extent possible:

15.1 The commencement of inaccuracy

The time and date of the commencement of the inaccuracy;

15.2 The time of correction

The date and time the inaccuracy was corrected in accordance with rule 12;

15.3 The level of inaccuracy

The amount of the inaccuracy for each **half hour** during the period of inaccuracy; and

15.4 Statement setting out correct reconciliation information

A statement setting out a correction of the **reconciliation information** during the period of inaccuracy for the transactions to which the person receiving the information was a **purchaser** or **generator**.

16. If conflicted, reconciliation manager will appoint an independent person

If the person responsible for the **metering installation** being tested under rule 8 or rule 9 is the **reconciliation manager** (or a person **related** to the **reconciliation manager**), upon the request of any **participant**, the **reconciliation manager** must appoint an **independent** person to carry out its duties under rules 11 to 13 in respect of that **metering installation**.

Schedule D1- The codes of practice

Code of practice D1 – Metering installations

1. Total metering installation accuracy

Unless **certified** in accordance with rule 6 of **code of practice D3** or in accordance with **code of practice D5**, **metering installations** will have the maximum permitted percentage of error specified in the following table:

Metering Installation Category	Voltage* & Current	Measuring Transformers	Maximum Permitted Error (Including Uncertainty)
1	1 \emptyset & 3 \emptyset , $V \leq 400V$ $I \leq 100A$	None (Whole current metering)	$\pm 2.5\%$
2	3 \emptyset , $V \leq 400V$ $I \leq 500A$	CT	$\pm 2.5\%$
3	3 \emptyset , $V \leq 400V$ $I \leq 1200A$	CT	$\pm 1.25\%$
	3 \emptyset , $400V < V \leq 11kV$ $I \leq 100A$	VT & CT	
4	3 \emptyset , $V \leq 400V$ $I \leq 2000A$	CT	$\pm 1.25\%$
	3 \emptyset , $400V < V \leq 11kV$ $I \leq 200A$	VT & CT	
5	3 \emptyset , $400V < V \leq 11kV$ $I \leq 300A$	VT & CT	$\pm 0.75\%$
6	3 \emptyset , $400V < V \leq 11kV$ $I \geq 300A$; 3 \emptyset , $V > 11kV$	VT & CT	$\pm 0.75\%$

* Voltages referred to are nominal \emptyset - \emptyset , where \emptyset is used to denote phase.

2. Error Calculation

The error calculation will include an assessment of uncertainty in measurement. The measured error plus the uncertainty will be no greater than the maximum permitted error specified above. Uncertainty figures will have a 95% level of confidence. Refer to **code of practice D3** for guidance.

The percentage error of a **metering installation** will be calculated using appropriate mathematical methods, taking account of all sources of measurement error, and will apply to the total throughput over an annual period or such other period, not exceeding 12 months, as will be reasonably expected for the specific installation.

3. Half-hour metering installations to be in place

All **metering installations** that fall within categories 3, 4, 5 or 6 (as defined in rule 2 of this schedule) will be **half-hour** (or sub-multiple of) **metering installations**.

Code of practice D2 - Requirements for approved test houses

Contents

- 1. Scope**
 - 2. IEC standards used**
 - 3. Class A approved test houses**
 - 3.1 Permitted activities
 - 3.2 ISO accreditation and certification
 - 4. Class B approved test houses**
 - 4.1 Permitted Activities
 - 4.2 ISO certification
 - 5. General requirements for approval**
 - 5.1 General
 - 5.2 Organisation and management
 - 5.3 Quality management system
 - 5.4 Seals
 - 5.5 Accommodation and environment
 - 5.6 Equipment
 - 5.7 Measurement traceability and calibration
 - 5.8 Commissioning reports
 - 5.9 Documentation and records – general requirements
 - 6. Additional requirements for class A approved test houses**
 - 6.1 Reference and working standards
 - 6.2 Meter testing systems
 - 6.3 Calibration methods
 - 6.4 Calibration reports
 - 7. Approval process**
 - 7.1 Application for approval
 - 7.2 Requirements for approval
 - 7.3 Register of approved test houses
 - 7.4 Annual renewal
 - 7.5 Audits
 - 7.6 Payment of costs relating to additional audits
 - 7.7 Cancellation of approval
 - 8. Sub-contracting**
 - 8.1 Sub-contracting of activities
 - 8.2 Purchases
 - 9. Complaints**
- APPENDIX 1: Tables**

Code of practice D2 - Requirements for approved test houses

1. Scope

This **code of practice** covers the requirements for obtaining **class A** or **class B approved test house** status, **calibration** of components of **metering installations**, and testing and maintaining of records of **metering installations** and equipment.

2. IEC Standards used

In order to maintain consistency throughout this **code of practice**, IEC Standards have been used. Equipment must comply with the IEC Standards in force when originally **certified** or an alternative standard **certified** in writing by an **approved calibration laboratory** as being equivalent to, or better than, the specified IEC Standard.

3. Class A approved test houses

3.1 Permitted activities

Class A approved test houses are approved to carry out all or any of the following:

3.1.1 Calibration

Calibration of **working standards**, metering equipment and **metering installations** and issuing of **calibration reports**;

3.1.2 Installation

Installation of metering equipment; and

3.1.3 Commissioning and certifying

Commissioning and **certifying** all categories of **metering installations** under the provisions of the **rules** and associated **codes of practice** and issuing of **certification reports**.

Individual **class A approved test houses** may carry out any or all of the above functions to varying degrees, dependent upon any limitations that may be specified in the **class A approved test house's** ISO 17025 (formerly ISO Guide 25) accreditation. (Refer rule 3.2 below).

Where such an **approved test house** considers site conditions are appropriate, metering equipment may be **calibrated** in-situ, following appropriate procedures.

3.2 ISO accreditation and certification

All **class A approved test houses** will be accredited to ISO 17025 (formerly ISO Guide 25). In addition all **class A approved test houses** will be **certified** to the relevant AS/NZS ISO 9001:2000 series quality certification or a quality certification that the **market administrator** deems to be equivalent to the relevant AS/NZS ISO 9001:2000 series quality certification.

While the appropriate accreditation and certification is a pre-requisite for approval, the possession of such accreditation will not imply an assurance that approval will be granted.

4. Class B approved test houses

4.1 Permitted activities

Class B approved test houses are approved to carry out all or any of the following:

4.1.1 Calibration

Calibration of class 1 and class 2 **meters** and class 0.5 CTs, provided these activities are carried out under the relevant provisions of ISO 17025 (formerly ISO Guide 25), and issuing of resulting **calibration reports**;

4.1.2 Installation

Installation of metering equipment; and

4.1.3 Commissioning and certifying

Commissioning and **certifying** category 1 - 3 **metering installations** under the provisions of the **rules** and associated **codes of practice**.

Metering equipment **calibrated** by a **class B approved test house** in accordance with rule 4.1.1 will be used only in **metering installations certified** under the provisions of rule 6 of **code of practice** D3 and as described in rule 4.1.1. **Working standards** used for such **calibrations** will comply with rule 6.1.

Where such an **approved test house** considers site conditions are appropriate, metering equipment may be **calibrated** in-situ following appropriate procedures.

4.2 ISO certification

Class B approved test houses will be **certified** to the relevant AS/NZS ISO 9001:2000 series quality certification or a quality certification that the **market administrator** deems to be equivalent to the relevant AS/NZS ISO 9001:2000 series quality certification.

While the appropriate **certification** is a pre-requisite for approval, the possession of such **certification** will not imply an assurance that approval will be granted.

5. General requirements for approval

5.1 General

A person applying for approval as a **class A** or **class B approved test house** must be able to satisfy the **market administrator**, that it has the facilities and procedures to consistently meet, for the term of the approval, the requirements of the **regulations** and the **rules** for the class of test house for which it is seeking approval, and that it is a fit and proper person for approval.

5.2 Organisation and Management

Class B approved test houses will be organised in such a way that confidence in their independence of judgement and integrity is maintained at all times. Managerial staff will have the authority and resources needed to discharge their duties. The responsibilities, authority and functional relationships of all relevant personnel will be specified and documented.

Each **class B approved test house** will appoint a technical manager (however named) with overall responsibility for technical operations. The technical manager would normally be expected to hold appropriate qualifications. There will also be a quality manager (however named) with responsibility for the quality system and its implementation.

Each **class B approved test house** will ensure that all staff who perform or supervise work are technically competent and appropriately qualified and trained for the functions they perform.

Class A approved test houses must comply with any requirements which may be specified in the **class A approved test house's** ISO 17025 (formerly ISO Guide 25) accreditation.

5.3 Quality management system

The **approved test house** will establish, implement and maintain a documented quality management system. In addition to the requirements of the ISO Standard or Guide appropriate to the class of **approved test house**, the quality management system will cover all the relevant requirements of the **rules**.

5.4 Seals

Approved test houses will have documented systems for applying seals to **metering installations** to:

5.4.1 Monitor integrity

Monitor the **metering installations'** continued integrity; and

5.4.2 Alert to unauthorised access

Enable the **participants** with a commercial interest in them to be alerted to any unauthorised access.

5.5 Accommodation and environment

Subject to rule 4.1, the environment in which **class B approved test house** activities are undertaken will not invalidate test results or adversely affect the required accuracy of measurement. Particular care will be taken when such activities are undertaken on sites other than the permanent **class B approved test house** laboratory premises. Access to the testing facilities and records will be controlled. Environmental conditions within the laboratory will comply with the specific requirements for temperature, humidity, dust and electromagnetic interference for the **calibrations** or tests being carried out.

The **certification** of **metering installations** requires work outside the laboratory. In all cases, relevant conditions will meet statutory requirements and will be monitored and recorded.

Subject to rule 3.1, **class A approved test houses** will comply with any requirements which may be specified in the **class A approved test house's** ISO 17025 (formerly ISO Guide 25) Accreditation.

5.6 Equipment

The **approved test house** will be furnished with all items of equipment required for the correct performance of the **calibrations** and tests it undertakes. This code does not prescribe the specific equipment required.

All equipment will be maintained in accordance with the manufacturer's recommendations and records of each item of equipment will be kept, including:

5.6.1 Maintenance

Details of maintenance;

5.6.2 Calibration

Calibration records and records of in-service checks; and

5.6.3 History

A history of damage, malfunction, modification or repair.

Class A approved test houses will comply with any requirements which may be specified in the **class A approved test house's** ISO 17025 (formerly ISO Guide 25) accreditation.

5.7 Measurement trace-ability and calibration

The **approved test house** will establish and maintain a system that ensures that, whenever a test or measurement is undertaken, the equipment utilised will have been previously **calibrated** within an appropriate period of time, and that sufficient records are kept that would enable the test or measurement to be replicated in every respect should the need arise.

5.8 Commissioning reports

Commissioning reports are required as part of the input to **certification reports** for category 1, 2 and 3 **metering installations certified** under the provisions of rule 6 of **code of practice D3**. **Commissioning reports** will contain details of all tests carried out to **commission the metering installation**. All test results will be recorded accurately, clearly, unambiguously and objectively.

5.9 Documentation and records – general requirements

The **approved test house** will maintain a record system which will ensure that all requirements for record keeping specified in these **codes of practice** are followed. All records pertaining to the quality system, **calibration, commissioning** and test equipment, certificates and reports will be stored safely and made available at all reasonable times upon request from the **auditor** or other **participant** with a legitimate requirement. Such requests, and any subsequent supply of information, will satisfy the confidentiality requirements of part A.

Records will be retained for not less than six months beyond the period specified in rule 7.3 of part D.

6. Additional requirements for class A approved test houses

6.1 Reference and working standards

Reference standards will be **calibrated** by an **approved calibration laboratory**. **Working standards** will be **calibrated** by either an **approved calibration laboratory** or by a **class A approved test house**. In all cases, **calibration** is required at intervals not greater than those given in Table 1, and results must be available as **calibration reports**:

Table 1: - Calibration intervals

Standard		Basic Calibration Interval (months)	Maximum Calibration Interval (months)
Reference	Measuring transformers	36	60
	Comparator bridges	36	60
	Meters	12	24
	Power factor, voltage and current meters	12	24
Working	All	2	12

Before a **reference** or **working standard** is put into service, it will be **calibrated**. Thereafter, it will be **calibrated** at intervals no greater than the basic calibration interval, unless the **approved calibration laboratory** or **Class A approved test house** (for **working standards**) responsible for the **calibration** chooses a longer calibration interval up to the maximum specified in the above table. The choice of any Calibration Interval longer than the basic calibration interval requires evidence in the form of **calibration reports** showing that differences between **calibrations** are either negligible or predictable. During periods of use (i.e. between **calibrations** at **approved calibration laboratories**), procedures will be carried out and the results recorded to substantiate the stability of **reference standards**.

Calibration of a **working standard** by a **class A approved test house** will normally be carried out against a **reference standard**. However, the **calibration** may be carried out against another **working standard** immediately after return of this second **working standard** from **calibration** at an **approved calibration laboratory** and prior to its use for any other purpose. A measurement assurance programme can also provide the **reference standard** where an **approved calibration laboratory** controls a reference standard that is transported around a group of **class A approved test houses**. In all cases, the **uncertainties** given in the **calibration reports** must be acceptably small.

The cost and difficulty of **calibrating working standards** intended for use on systems operating at voltages greater than a nominal 33kV between active conductors is recognised. Consequently, the above calibration Intervals and other relevant requirements for **reference standards** may also be applied to these **working standards**.

Where **adjustment** of reference and **working standards** is required, **calibration reports** will include both before and after **adjustment** results.

When a **reference** or **working standard** is **calibrated** and is found to be outside the manufacturer's specification for that apparatus, the reason for failure will be investigated. Following this investigation, and without evidence to the contrary, all **meters calibrated** since the previous **calibration** will be

considered as **calibrated** with faulty apparatus. Remedial action will be taken in accordance with rules 11 to 16 of part D.

Reference standards, other than standard measuring transformers, will be maintained at the appropriate reference conditions set out in the relevant IEC Standards or equivalent standard certified in accordance with rule 2.

6.2 Meter testing systems

A **calibrated** complete **meter** testing system (test bench) may be used as an alternative to separately **calibrated** energy standards and associated measuring transformers. In such situations, the **meter** calibration intervals specified in the above table will apply to the overall system. After **commissioning** such a system, an **overall accuracy** test will be carried out using approved **reference standards**. When **meter** testing systems are found to be outside the maximum overall **uncertainty** limits specified in appendix 1, the energy standard and measuring transformers will be separately **calibrated**.

6.3 Calibration methods

Components of **metering installations** will be **calibrated** and **adjusted** under the appropriate physical and electrical **reference conditions** detailed in the relevant IEC Standards or equivalents or under conditions which will permit the calculation of the results and their **uncertainty** at the **reference conditions**. The individual test points will be as described in the relevant IEC Standards specified in appendix 1 of **code of practice D3** or, where the **approved test house** considers it appropriate and in accordance with rules 5.4.2 and 6.1 of **code of practice D3** (if relevant), at points sufficient to ensure that the **calibration** is within the prescribed limits for the whole of the operating range and the service conditions. The **calibration** procedures will be referenced to these documents and included as part of the formal procedures of the **class A approved test house**.

The **uncertainty** of measurement during the **calibration** of **active meters**, **reactive meters** and measuring transformers will not exceed the limits stated in appendix 1 for the class and type of component.

The **class A approved test house** will have documented instructions on the use and operation of all relevant equipment. Documented **calibration** procedures will be available to staff carrying out **calibrations**.

The overall **uncertainty** of measurement shown on the **meter** record will be determined using all **uncertainties** in the chain of **calibration** from the SI Unit to the **meter** under test.

Components of a **metering installation** may be **calibrated** on site in their normal working environment only if the effects of departures from the **reference conditions** specified in the relevant IEC Standards can be calculated. This will require measurement on site of all influence variables and inclusion of their effects in the **uncertainty** calculation. For example, if the temperature co-efficients of a component and **calibration** apparatus have been previously determined, a correction

can be applied to give the value at the reference temperature. However, the overall **uncertainty** may be greater because of contributions from both the temperature and temperature co-efficient measurements. The standards of accuracy and **uncertainty** laid down in appendix 1 must be met after taking into account all influence variables.

Meters will be **calibrated** and if necessary, **adjusted**, or **error compensation** applied, such that the **overall accuracy** is within the percentage error limits as defined in table 1 of appendix 1 (for **active meters**) and table 2 (for **reactive meters**). It is expected that actual **meter** errors over a group of **meters** will exhibit a pattern approaching a normal distribution with a mean error of zero at the specified load. An error pattern over a group of **meters** showing a consistent bias towards the extremes of error band may need to be justified.

Following any internal adjustments, appropriate seals will be applied.

Calculations and data transfers will be subject to appropriate checks.

Where computers or automated equipment are used for the capture, processing, manipulation, recording, reporting, storage or retrieval of **calibration** data, the **approved test house** will ensure that:

6.3.1 Codes are complied with

The requirements of this **code of practice** and other relevant **codes of practice** are complied with;

6.3.2 Software is documented

Computer software is documented and adequate for use;

6.3.3 Procedures for protection of data

Procedures are established and implemented for protecting the integrity of data entry, storage, transmission and processing;

6.3.4 Maintenance of computers

Computer and automated equipment is maintained to ensure proper functioning; and

6.3.5 Procedures for maintenance of security

Procedures are established for the maintenance of security of data including the prevention of unauthorised access to, and amendment of, computer records.

The **approved test house** will have a documented system for uniquely identifying the items to be **calibrated**. All observations and calculations will be recorded in a permanent manner. Original **calibration** records will be uniquely identifiable and **traceable** to the items to which they refer and to any reports based on them. **Calibration** records will contain

sufficient information to permit identification of possible sources of error and to permit satisfactory repetition of the calibration under original conditions. **Calibration** records will identify the person(s) responsible for their generation and for the checking of data transcriptions and calculations.

6.4 Calibration reports

Calibration reports are required as part of the input to **certification reports** for **metering installations** and will include all information required to confirm compliance with **code of practice D3**.

7. Approval process

7.1 Applications for Approval

Any person wishing to be approved as an **approved test house** will apply in writing to the **market administrator** in the form specified from time to time by the **market administrator**. A copy of the applicant's quality assurance manual will accompany all applications. The applicant will also provide such other information as the **market administrator** may reasonably request.

7.2 Requirements for approval

The **market administrator** will approve an application made in accordance with rule 7.1, provided that the applicant has satisfied the **market administrator** as set out in rule 5.1.

The **market administrator** may appoint an **auditor** to carry out an initial **audit** of the applicant to address such matters as the **market administrator** may reasonably require. The **auditor** may request such additional information and carry out such inspections of the applicant and **audits** of its procedures as the **auditor** may consider necessary to enable it to carry out such **audit** and make recommendations to the **market administrator**. The **auditor** will produce an **audit** report that addresses the matters required of it, including, if so required, the extent to which the facilities and procedures of the applicant will comply with the **regulations** and the **rules**, and also identify areas for improvement. The applicant will pay for the costs associated with the initial **audit**.

7.3 Register of approved test houses

When a person is approved as an **approved test house** by the **market administrator**, it will be placed on the register of **approved test houses** held and maintained by the **market administrator** and a certificate of approval will be issued by the **market administrator**. The **market administrator** will provide all **registered participants** with reasonable access to the register.

7.4 Annual renewal

Approval of an **approved test house** will be for a term of 12 months. At least two calendar months prior to expiry of the approval an

approved test house must, if it wishes to continue to be an **approved test house**, apply for renewal of that approval for a further 12 months and provide such information as the **market administrator** may reasonably request. Such approval will be renewed provided the **market administrator** is satisfied the **approved test house** continues to meet the criteria set out in rule 5.1. In considering any application for renewal the **market administrator** will review the **approved test house**, and information from the **approved test house** register held by the **market administrator** will be confirmed with the **approved test house**. Where the information supplied in the review is considered to be incomplete or unsatisfactory, the **market administrator** will advise the **approved test house** of its concerns and may, after giving the **approved test house** reasonable opportunity to address those concerns, carry out an **audit** of the **approved test house** as set out in rule 7.5.

If approval is renewed for a further twelve months a certificate of approval will be issued for that term.

7.5 Audits

7.5.1 Right to carry out audits

The **market administrator**, or any **auditor** appointed by the **market administrator** to address such matters as the **market administrator** may reasonably require, may carry out **audits** (including as to compliance with the **regulations** and **rules** and whether the **approved test house** continues to meet the criteria for approval) of the **approved test house** (including its records and procedures). The **approved test house** will afford the **market administrator** or any **auditor** appointed by the **market administrator** for this purpose full access to all relevant facilities, personnel, records and manuals at any time within normal working hours, and will provide to the **market administrator** or **auditor** (as the case may be) any additional information which the **market administrator** or **auditor** reasonably considers is necessary.

7.5.2 Production of audit report

The **auditor** will produce an **audit** report which addresses the matters required of it and also identifies, if the **market administrator** so requires, the extent to which the facilities and procedures of the **approved test house** comply with the requirements of the **regulations** and **rules**, and also identify areas for improvement.

Before the **audit** report is submitted to the **market administrator**, any non-conformances noted by the **auditor** are to be referred back to the **approved test house**. Details of action taken by the **approved test house** to correct the non-conformances will be submitted to the **auditor** for inclusion in the report.

7.5.3 Regular audits

Unless an additional **audit** is requested in accordance with rule 7.5.4, **audits** will be carried out at intervals of three years for **class A approved test houses** and two years for **class B approved test houses** or at shorter intervals at the request of the **approved test house**. The **approved test house** will pay for the costs of a regular **audit**.

7.5.4 Additional audits

If a **participant** reasonably considers that an **approved test house** may no longer meet the relevant criteria for approval that **participant** may request that the **market administrator** carry out, or request an auditor to carry out under rule 7.5.1 an additional **audit**. The costs of any additional **audit** requested by a **participant** will be paid in accordance with rule 7.6.

7.6 Payment of costs relating to additional audits

7.6.1 If approved test house has not performed its obligations

If an additional **audit** establishes, to the satisfaction of the **market administrator**, that an **approved test house** has not performed its obligations under the **regulations** and **rules**, then that **approved test house** will pay for the **audit**. Where the **market administrator** believes the non-performance of a **approved test house's** obligations is minor the **market administrator** may, in his or her discretion, make an assessment regarding the proportion of the costs of the **audit** that are to be paid by the **approved test house** and the requesting **participant**, and those costs shall be paid by the **approved test house** and that **participant** accordingly.

7.6.2 If approved test house has performed its obligations

If an **audit** establishes to the satisfaction of the **market administrator** that the **approved test house** has performed its obligations under the **regulations** and the **rules**, then the requesting **participant** will pay for the **audit**.

7.6.3 If approved test house has performed some obligations

If an **audit** establishes to the satisfaction of the **market administrator** that, in respect of some (but not all) matters investigated by the **auditor**, an **approved test house** is at fault, then the **market administrator** will make an assessment regarding the proportion of the costs of the **audit** that are to be paid by the **approved test house** and the requesting **participant** accordingly, and those costs shall be paid by the **approved test house** and that **participant** accordingly.

7.7 Cancellation of Approval

If the approval of an **approved test house** expires and is not renewed, or fails an **audit**, the **market administrator** will remove its name from the register of **approved test houses**, and request return of the certificate of approval. The original certificate of approval will be returned to the **market administrator**. The **market administrator** will notify all **registered participants** of the removal of an **approved test house** from the register.

8. Sub-Contracting

8.1 Sub-contracting of activities

An **approved test house** may subcontract any of its activities to any other party, but will retain full responsibility for ensuring that all activities are carried out in accordance with the **rules**. **Class B approved test house** will establish and maintain procedures for the procurement of sub-contract services which will ensure that this requirement is met and that only suitably competent and qualified organisations and personnel carry out any such activities, as well as ensuring that **certification** and all **commissioning** and **calibration** tests required by any **code of practice** are carried out by organisations approved to do so.

Class A approved test houses will comply with all requirements specified in the **class A approved test house's** ISO 17025 (formerly ISO Guide 25) accreditation.

8.2 Purchases

Class B approved test houses will establish and maintain procedures for the purchase of test equipment and consumables. Each **class B approved test house** will ensure that purchased equipment or consumables will not be used until inspected or otherwise verified as conforming to specified requirements.

Class A approved test houses will comply with all requirements specified in the **class A approved test house's** ISO 17025 (formerly ISO Guide 25) accreditation.

9. Complaints

The **approved test house** will have documented policies and procedures for the resolution of complaints received from clients or other persons about the **approved test house's** activities. Records will be kept of all complaints and of relevant actions taken by the **approved test house**.

Where the complaint raises doubts concerning the **approved test house's** compliance with the requirements of the **codes of practice**, and the complainant is not satisfied with the response of the **approved test house**, the complainant may notify the **market administrator** of the complaint and the response of the **approved test house** to the complaint. The **market administrator** will decide if any further action is required.

APPENDIX 1: Tables

Table 1: Standards of accuracy and overall uncertainty for test house calibration and testing of active meters

- Notes:** (i) Caution should be used when applying information from the following tables to 2 element metering for three phase systems.
- (ii) Current values in this table are modelled on the relevant IEC Standard. The percentage values of current are relative to the meter's base or rated current (I_b or I_n) as appropriate, and it is assumed that this current would be selected at a level appropriate to the specific site where the meter is to be installed.

Class of meter 2.0 and 2.0S

Value of Current %	Power Factor	Maximum Overall Uncertainty %	Percentage Error Limits of Meter, Including Uncertainty
5 to 120	1	± 0.4	± 1.9
10 to 120	0.5 lagging	± 0.6	± 1.9
10 to 120	0.8 leading	± 0.6	± 1.9

Class of meter 1.0 and 1.0S

Value of Current %	Power Factor	Maximum Overall Uncertainty %	Percentage Error Limits of Meter, Including Uncertainty
5 to 120	1	± 0.2	± 0.9
10 to 120	0.5 lagging	± 0.25	± 0.9
10 to 120	0.8 leading	± 0.25	± 0.9

Class of meter 0.5 and 0.5S

Value of Current %	Power Factor	Maximum Overall Uncertainty %	Percentage Error Limits of Meter, Including Uncertainty
5 to 120	1	± 0.1	± 0.5
10 to 120	0.5 lagging	± 0.12	± 0.6
10 to 120	0.8 leading	± 0.12	± 0.6

Class of meter 0.2S

Value of Current %	Power Factor	Maximum Overall Uncertainty %	Percentage Error Limits of Meter, Including Uncertainty
5 to 120	1	±0.06	±0.2
10 to 120	0.5 lagging	±0.09	±0.3
10 to 120	0.8 leading	±0.09	±0.3

Table 2: Standards of accuracy and overall uncertainty for test house calibration and testing of reactive meters (where required)

- Notes:
- (i) Caution should be used when applying information from the following tables to 2 element metering for three phase systems.
 - (ii) Current values in this table are modelled on the relevant IEC Standard. The percentage values of current are relative to the meter's base current (I_b or I_n), and it is assumed that the base current would be selected at a level appropriate to the specific site where the meter is to be installed.

Class of meter 3.0

Value of Current %	Power Factor	Maximum Overall Uncertainty %	Percentage Error Limits of Meter, Including Uncertainty
20 to 120	Zero	±1.0	±3.0
20 to 120	0.8 lead	±1.5	±3.5
20 to 120	0.8 lag	±1.5	±3.5

Class of meter 2.0

Value of Current %	Power Factor	Maximum Overall Uncertainty %	Percentage Error Limits of Meter, Including Uncertainty
20 to 120	Zero	±0.5	±2.0
20 to 120	0.8 lead	±1.0	±2.5
20 to 120	0.8 lag	±1.0	±2.5

Table 3: Voltage and current balance

Polyphase Meters	Class of Meter			
	0.2 & 0.5	1.0	2.0	3.0
Each of the voltages between line and neutral or between any two lines will not differ from the average corresponding voltage by more than:	±0.1%	±1.0%	±1.0%	±1.0%
Each of the currents in the conductors will not differ from the average current by more than:	±1.0%	±2.0%	±2.0%	±2.0%
The phase displacements of each of these currents from the corresponding line-to-neutral voltage, irrespective of the power factor, will not differ from each other by more than:	2°	2°	2°	2°

Code of practice D3 - Requirements of metering installations

Contents

- 1. Scope**
- 2. IEC standards used**
- 3. Metering equipment**
 - 3.1 General installation or replacement of metering equipment
 - 3.2 Measuring transformer secondary circuits
 - 3.3 Wiring/cabling
 - 3.4 Data logger
 - 3.5 Measuring transformers
 - 3.6 Enclosures
 - 3.7 Test facilities
 - 3.8 Control devices
- 4. Certification and recertification of metering installations**
 - 4.1 General
 - 4.2 Method of certification
 - 4.3 Departure from requirements
 - 4.4 Certification confirmation
 - 4.5 Records
 - 4.6 Failure of tests
 - 4.7 Test results
 - 4.8 Existing metering installations
- 5. Full certification - fully calibrated installations**
 - 5.1 Design
 - 5.2 Certification of components
 - 5.3 Statistical sampling
 - 5.4 Certification of metering installations
- 6. Full certification - selected component installations**
 - 6.1 General requirements
 - 6.2 Design
 - 6.3 Installation
 - 6.4 Commissioning
 - 6.5 Certification
 - 6.6 Recertification
- 7. Inspection requirements**
 - 7.1 General
 - 7.2 Certification validity confirmation
 - 7.3 Metering installation
 - 7.4 Inspection for change of retailer
- 8. Record keeping and documentation**
 - 8.1 General
 - 8.2 Test records
 - 8.3 Transfer of records

9. Sealing

10. Reporting of defects, tampering and incidents (emergencies)

APPENDIX 1 Tables

Code of practice D3 - Requirements of metering installations

1. Scope

This **code of practice** covers new and existing **metering installations** which are to be used for energy trading purposes under the **rules**, and applies to all measuring transformers, **test facilities**, wiring/cabling, metering panel construction, **active** and **reactive meters** and **data loggers**.

It details requirements for the initial **certification** that a **metering installation** meets the requirements of the **rules**, including confirmation that any **data logger** is **certified** for use in a **metering installation**, and that a **metering installation** records the energy transferred in accordance with the requirements of the **rules**.

Also described are procedures to ensure that the **metering installation** continues to meet the requirements and steps that must be taken to reconfirm **certification** following any modifications to the **metering installation** or when **certification** has expired for any reason. The **responsible party** will retain responsibility for ensuring that these requirements are met.

Note that where there is multiple ownership of equipment at any site, the respective owners will ensure that their individual responsibilities under this **code of practice** are defined in the relevant agreements.

This **code of practice** does not attempt to cover all possible variations in **metering installations**. Where features additional or alternative to those covered in this document are present, they will be appropriately tested and/or inspected to confirm the integrity of the overall **metering installation**.

2. IEC standards

In order to maintain consistency throughout this document, IEC Standards have been used. Equipment must comply with the IEC Standards in force when originally installed or an alternative standards **certified** in writing by an **approved calibration laboratory** as being equivalent to, or better than, the specified IEC Standard.

3. Metering equipment

3.1 General installation or replacement of metering equipment

Metering equipment shall be installed to meet the requirements of appendix 1. Components of a **metering installation** including auxiliary equipment and wiring may be installed by any suitably qualified personnel, provided that in all cases:

Approved test house employees or their subcontractors only, shall check, test, calibrate or certify, as appropriate, prior to the metering equipment being commissioned.

3.2 Measuring transformer secondary circuits

Any measuring transformer secondary circuit that is earthed will be earthed at no more than one point.

3.3 Wiring/cabling

The wiring and cabling will be run as directly as practicable and will, wherever practicable, be without intermediate terminations for all measuring transformer circuits. With effect from 16 December 2004, all conductors used in connecting measuring transformers to other components in a metering installation will be installed in such a manner that ensures clear and permanent identification of each conductor, for example by the use of colour coding and/or marker ferrules. Where intermediate terminations are unavoidable, they will be sealable.

3.4 Data logger

Certification that any **data logger** complies with **code of practice D4** will be required for both new **metering installations** and where a data logger is added to an existing **metering installation**. **Data loggers** will be installed in such a way that on-site **interrogation** is possible without the need to interfere with **approved test house** seals. Unless they are integral with one another, **meters** and **data loggers** and associated equipment will each have a dedicated power supply.

Where a **metering installation** requires the monitoring of multiple channels of data and more than one **data logger** is used, their time clocks will be automatically synchronised. A single multi-channel **data logger** is preferred to this arrangement.

The design of the **metering installation**, **data logger** and interrogation system shall ensure that the smallest possible increment in the energy value of the metering data is consistent with the required maximum limits of error. IEC 60338 illustrates one way of dealing with this issue.

3.5 Measuring transformers

References to measuring transformers in this **code of practice** do not preclude the use of other measuring techniques which meet the required standards of accuracy.

Where measuring transformers are located within a switchboard, they shall, where practicable, be securely mounted within an enclosure that can be sealed against interference and unauthorised access. Where measuring transformers are not housed within a defined enclosure, where sealing of an enclosure is not practicable or where access to the enclosure is required by any person, other than an employee or subcontractor of an **approved test house**, alternative sealing arrangements such as the use of terminal studs drilled in such a way that sealing wire can be passed through the holes to secure the connections or the use of sealing paint applied to terminal screws shall be acceptable provided their use is covered by appropriate **approved test house** documentation. A label shall be attached in a prominent position inside the enclosure warning of the presence of sealed metering equipment within the enclosure and requesting that care be taken not to disturb connections to such equipment. This label shall be attached to every new such **metering installation** and to existing such **metering installations** at the time of recertification.

Measuring transformers will preferably be dedicated to the **metering installation** but, where this is not the case, any additional burdens will not be added or modified without the prior approval of the **responsible party** for the **metering installation** (See also table 5). The **responsible party** will seek comment from the certifying or other **approved test house** before giving such approval. The total burden (magnitude and phase angle, where appropriate) on any measuring transformer will not exceed its name plate rating or any alternative rating specified by the metering designer. The certifying **approved test house** will be notified of any changes.

The measuring transformer burden will not be changed without the **metering installation** being **calibrated** for the change in burden, except that the burden on VTs rated at 30VA or above may change by up to 1VA from the burden which existed at the last **calibration** without further **calibration** being required. For VTs rated at less than 30VA, this permitted burden change will be proportionately less. Where voltage selection is necessary, the permitted burden changes will apply to the principal VT.

Where **meter** voltage supplies are derived externally to the **meter**, they will be adequately protected by appropriate fuses or circuit breakers dedicated to the metering circuit. Where considered desirable, additional fuses or circuit breakers of lower rating may be installed in the metering enclosure. All fuses and circuit breakers will be sealed or located within sealed enclosures. Where an enclosure also contains fuses or circuit breakers supplying other circuits, those supplying metering circuits will be individually sealed.

Where the **approved test house** is unable to satisfy itself that the **overall accuracy** requirements can be met, or the accuracies of the measuring transformers are known to be lower than required to meet the necessary **overall accuracy**, an application for variation may be made under the provisions of **code of practice D5** to vary the requirements for a **metering installation** in respect to this **code of practice**. An **approved test house** may grant interim **certification** to the **metering installation** for a maximum period of three months while the agreement for variation is being established.

3.6 Enclosures

Metering equipment will be housed in enclosures which the **approved test house** is satisfied are appropriate to the environment in which they are located. In both indoor and outdoor situations, unauthorised access to wiring terminals and equipment will be restricted.

3.7 Test facilities

All **metering installations** using measuring transformers will be fitted with **test facilities**, which will be installed close to the **meter(s)**.

3.8 Control devices

Where a load or **meter** control device has malfunctioned, it may be bridged out by a person who is not an employee or subcontractor of an

approved test house, provided that the **retailer** and the **metering equipment owner** have in place appropriate procedures for ensuring that such activities are carried out only by persons so authorised by the **retailer** and **metering equipment owner**. Such procedures shall also ensure that notification to the **retailer** and remedial work by an **approved test house** are handled in a timely manner.

4. Certification and recertification of metering installations

4.1 General

Subject to the provisions of rule 4.8, every **metering installation** to be used for energy trading under the **rules** will be **certified** pursuant to rule 7.4 or by an **approved test house** pursuant to rule 7.4 or as complying with the requirements of the **rules**. Every **metering installation** will comply with the requirements of Regulation 54 of the Electricity Regulations 1997.

4.2 Method of certification

New **metering installation** categories 1, 2 and 3 as defined in **code of practice** D1, and installations of any other category which consume less than 0.5GWh per annum, may be **certified** by complying with the requirements of either rule 5 or rule 6. All other new sites will be **certified** in accordance with the requirements of rule 5. Where CT metering is installed, the categories will generally be decided by the primary current rating of the CT, but where the actual loading makes it more appropriate, a **metering installation** may be **certified** as a lower category. In such circumstances, and when the 0.5GWh annual consumption limit has been applied as described above, the **retailer** will be responsible for monitoring the **metering installation** maximum loading or consumption, as appropriate. Where the limit is exceeded for the category for which it is **certified**, the **retailer** will initiate the immediate **recertification** of the **metering installation** in its appropriate category.

Existing **metering installations** will be **certified** either as described above (i.e. full **certification**) or as described in rule 4.8 below (i.e. interim **certification**).

4.3 Departure from requirements

In some cases, it may not always be possible or appropriate to require a **metering installation** or item of metering equipment to comply strictly with the engineering requirements of the **rules** and the **codes of practice**. Where the variance from the requirements is minor, and best accuracy and integrity of the **metering installation** or equipment, can be demonstrably maintained, the **approved test house** may use its discretion to **certify** the **metering installation** or equipment despite such variance. All such cases will be documented and a copy of the information forwarded to the **market administrator** for **audit** by the **market administrator** and possible publication as a case study. Where the **market administrator** has concerns that acceptance of the variance from requirements was inappropriate, it may recommend further action, which may include reversal of the decision by the

approved test house. In publishing any material, the **market administrator** shall ensure that information of a commercial nature is not released. Information shall be published on the website of the **market administrator** with comments as an ongoing guideline to **approved test houses.**

4.4 Certification confirmation

When a complete **metering installation** has been fully **certified** or **recertified** under the appropriate provisions, this **certification** will be confirmed by the attachment of a certification sticker by the **approved test house** to a suitable part of the **metering installation** or use of an equivalent procedure as described in rule 5.2 for individual components. The **certification sticker** or equivalent will show the **metering installation** category and the expiry date of the **certification.**

4.5 Records

Records of all **metering installation commissioning** and **certification** tests carried out under the provisions will be kept in accordance with rule 8.

4.6 Failure of tests

If the **metering installation** fails the on-site **commissioning, certification** or **recertification** tests specified in this **code of practice**, any faulty component or components will be identified and replaced with equivalents which comply with the requirements specified in the relevant part of the **codes of practice.** All tests necessary to confirm that the faulty component or components have been eliminated will then be carried out.

4.7 Test results

A **metering installation** or any of its components will not be deemed to be **certified** until the **certification** or **recertification** test results have been formally accepted by an **approved test house.** Where a **metering installation** fails its **recertification** tests, the **reconciliation manager** will be advised and the affected **participants** will agree on the action to be taken. No **adjustments** or replacements of any component of the **metering installation** will be carried out until all affected **participants** have agreed to such action, in accordance with rule 11 of part D. Where the affected **participants** cannot agree on the action to be taken, the procedure described in rule 11 of part D will be followed. (See also rule 10 for emergencies.)

4.8 Existing metering installations

Existing **metering installations** of any type or category which do not comply fully with the requirements for full **certification** under the provisions will be deemed to be **certified** on an interim basis. This interim **certification** will expire on the dates given in table 1:

Table 1: Expiry of interim certification

Metering Installation Category	Expiry Date
1	1/4/2015
2	1/4/2010
3	1/10/2004

For **meters** of accuracy class 2.0, the above dates may be extended provided the **approved test house** responsible for the **metering installation** applies a satisfactory programme of statistical sampling as described in rule 5.3.

The **metering equipment owner(s)** will ensure that a programme of inspection, testing and equipment replacement (as appropriate) is implemented which will ensure full **certification** by the above dates of all **metering installations** in accordance with rule 5 or 6, as appropriate. Any metering equipment used to derive **half-hour metering** data, but not **certified** by the relevant date, will not be permitted to be used for **half hour** trading.

Where any item(s) of metering equipment is replaced prior to full **certification** of the **metering installation**, the replacement item(s) will comply with the requirements of this **code of practice**. Where such replacement is sufficient to enable full **certification** of the **metering installation**, such **certification** will be carried out and **metering installation** records amended accordingly.

The interim **certification** provided for in this rule will cancel and replace all agreements entered into before the **rules** took effect.

5. Full certification - fully calibrated installations

5.1 Design

A design report will be prepared by the metering designer both for a new **metering installation** and where an existing **metering installation** is to be modified.

The design report will be accompanied by a drawing of the system for use by **certification** personnel. Both design report and drawing will identify and be signed by the person who carried out the design. The design report and drawing will be checked to ensure that the proposed **metering installation** will function correctly and comply with the requirements of the **rules** and the **codes of practice**. The person carrying out these checks will sign the design report and drawing to confirm that the checks have been carried out.

Loss compensation arrangements will be documented and will be included in the maximum permitted percentage error calculations.

If the **metering installation** is not at the same physical point as the **point of measurement**, it will be acceptable for the quantity of **electricity** to be derived by a mathematical process, provided this does not compromise the accuracy of the quantity of **electricity** at the **point**

of measurement. (See rule 4 of part D.) The time error in any trading period will not exceed that in table 2:

Table 2: - Maximum permitted time errors

Metering Installation	Maximum Time Error of Data Logger Clock (seconds)	Maximum Time Error in Commencement of any Trading Period (seconds)	Interrogation & Processing Systems (seconds)	Automatic Adjustment (seconds)
1	±10	±10	±5	±10
2	±10	±10	±5	±10
3	±10	±10	±5	±10
4	±10	±10	±5	±10
5	±5	±5	±5	±5
6	±5	±5	±5	±5

The maximum percentage of **uncertainty** for any **metering installation** will not exceed the values listed in table 3 and will have a confidence level of 95%.

Table 3: - Maximum permitted uncertainties

Metering Installation Category	Max % Uncertainty
1	± 0.6
2	± 0.6
3	± 0.3
4	± 0.3
5	± 0.2
6	± 0.2

It is expected that actual **meter installation** errors, over a group of **metering installations**, will exhibit a pattern approaching a normal distribution, with a mean error of zero, at the specified load. An error pattern over a group of **metering installations**, showing a consistent bias towards the extremes of the error band, may need to be justified.

5.2 Certification of components

New or replacement components of a **metering installation** which is or is to be **certified** under the provisions of rule 5 will be individually **certified** by a **class A approved test house** prior to their installation, except where otherwise specified below. Each **certification report** will, where relevant, include a **calibration report** which will comply with the requirements of **code of practice D2** and will confirm that components comply with the requirements of their accuracy class and/or relevant **code of practice**. Copies of the **certification reports**

will be held by the **class A approved test house** carrying out the **certification**. **Certification** of a component will be indicated by the attachment to the component of a **certification sticker** bearing the date of **certification**, the date upon which the **certification** validity period expires (see Table 4 below), the name of the **class A approved test house** which carried out the **certification**, the reference number of the **certification report** and the initials of the person who carried out the **certification**. Where the application of a **certification sticker** is not practicable, the **class A approved test house** will devise and operate an alternative means of providing information equivalent to that provided by the **certification sticker** system. Such a system will be properly documented and maintained.

Any component found to be outside the accuracy limits will be replaced, or appropriate **error compensation** measures applied to the **metering installation**.

Recalibration of components will require the same full laboratory tests as if they were new components. In situ testing will be acceptable for this purpose where the requirements of rules 3.1 and 5.5 of **code of practice D2** are complied with. Note that where it considers such action appropriate, the **class A approved test house** may certify a component for a shorter period than specified.

Table 4: - Certification validity member

Measuring Transformers	Meter				Data Logger
	CI 0.2	CI 0.5	CI 1.0	CI 2.0 or category 1	
10 yr	3 yr	5 yr	10 yr	15 yr	see note (iv)

Notes:

- (i) Class designations with suffix “S” are included in the above
- (ii) Note that care should be exercised when **certifying** epoxy insulated CTs as their characteristics may change significantly with age, temperature or batch.
- (iii) For **meters** installed in category 1 installations, where the **approved test house** applies a satisfactory programme of statistical sampling as detailed in rule 5.3, the **certification** validity periods will be as determined in accordance with the programme of statistical sampling adopted pursuant to rule 5.3
- (iv) Certification validity periods need not be shortened if meters of a higher accuracy class than required are used. **Data loggers** do not require recalibration. However, regular maintenance, such as battery monitoring, in accordance with the manufacturer’s recommendations will be carried out and fully documented.

The **certification reports** will detail the **calibration** and other relevant standards for each component as follows:

5.2.1 Measuring transformers

Measuring transformers will meet the standards specified in appendix 1 and will be suitably rated for the intended installation. Where multi-tap CTs are used, the tap setting will be appropriate for the maximum demand.

Measuring transformers will be of an accuracy class appropriate for the required **overall accuracy** of the **metering installation** as specified in **code of practice D1**. **Calibration reports** from an **approved test house** will indicate the measuring transformers' errors at a range of primary values at their rated burdens or, where **calibration** is being carried out in accordance with rule 5.4.2 or rule 6.1 of this **code of practice** and the **approved test house** considers it appropriate, at their in-service burdens and in-service primary values. Multi-tap CTs will be **certified** only for the ratios that have been **calibrated**.

Where the condition and/or accuracy class of existing measuring transformers are unknown and the cost of replacing them is substantial (particularly if it would require replacement switchgear), the **approved test house** will inspect whatever manufacturers' test certificates or other records may be available, and will carry out whatever tests it considers necessary to satisfy itself that the measuring transformers are suitable for the particular application, and that the **metering installation** meets the **overall accuracy** requirements of the **rules**.

5.2.2 Meters

All **meters** will comply with the standards specified in appendix 1 and will have **approved test house calibration reports**.

5.2.3 Test facilities

Test facilities will meet appropriate standards.

5.2.4 Data logger

Any **data logger** will comply with the requirements of **code of practice D4** and will (as part of the design report) have been confirmed by the designer of the **metering installation** to be compatible with the **meter** and communications network to which it is connected and suitable for the electrical and environmental site conditions in which it will be installed.

5.2.5 Modems

Modems will be approved for connection to the communications networks on which they will operate.

5.3 Statistical sampling

Note (iii) to table 4 and rule 6.6 permit **recertification** of **meters** installed in category 1 **installations** where an **approved test house** adopts a statistical sampling process to ascertain whether an acceptable proportion of the population of installed **meters** remains within its class accuracy. An acceptable minimum statistical sampling methodology is detailed in AS1284 part 13 or any other standard or procedure that gives equivalent or better results as the methodology set out in AS1284 part 13 and is accepted by the **market administrator** may be used.

It shall be the responsibility of the **approved test house** to ensure the credibility of the sampling process and the actions taken in response to it. The procedures to be followed shall be documented and detailed records of every step in the process shall be kept.

Actions to be taken as a result of the **calibration** tests shall be in accordance with documented procedures.

5.4 Certification of metering installations

Certification of the **metering installation** will be valid as long as the **certifications** of all components of the **metering installation** remain current (refer table 4). Note that where it considers such action appropriate, the **approved test house** may **certify** a **metering installation** for shorter periods than those specified in table 4.

5.4.1 Initial certification requirements

For a new **metering installation**, the design will be checked to ensure functionality and compliance with the **rules**. Where required under the provisions of rule 5.2, an **approved test house** will first individually certify components. Table 5 lists various checks and tests which must be carried out on a new **metering installation** prior to its being used for energy trading under the **rules**, and on an existing **metering installation** in the same situation or when it has been modified in any way, to ensure that the **metering installation** meets or continues to meet the requirements of the **rules**.

Note also that, as each component of an existing **metering installation** (other than the measuring transformers, where permitted) is required to be individually **certified**, it would be expected that the **meters** and **data loggers** in an existing **metering installation** would be replaced by **certified** components. Tests and checks (b), (c) and (f) listed in table 5 for existing **metering installations** would therefore be required for the initial **certification** of an existing **metering installation**. Tests and checks (d) and (e) listed in table 5 would apply only when the measuring transformers or the CT ratio were changed at any time.

5.4.2 Recertification of a metering installation

Before the **certification** of a **metering installation** or any of its components has expired, the **metering installation** will require **recertification**. Note that **certification** of the overall **metering installation** expires when the individual **certification** of any one of its components expires. Any such component would be **recertified** by removal and testing, testing in situ or replacement, as appropriate. The tests and checks listed in the appropriate row of table 5 for replacement components will be required for the **metering installation** to be **recertified**.

Table 5 specifies the minimum requirements. Any other tests and checks required to confirm the integrity of a specific **metering installation** will also be carried out. Where **recertification** involves **meter** or measuring transformer **recalibration** in situ, or where the **meter** or measuring transformer is being replaced with a new or refurbished fully **calibrated meter** or measuring transformer, it shall be necessary for the **approved test house** to carry out only those **calibration** tests which it considers are appropriate for the particular **metering installation**. **Calibration** reports shall document the **calibration** tests performed and the methodology used for any assumptions made in the **calibration** process. The reasons for carrying out limited testing shall be documented and shall be subject to **audit**. The records for the **metering installation** shall describe the actual tests carried out.

Other than where covered by the provisions of rule 3.5, if any part of the wiring of the **metering installation** is modified, or if additional components are connected to the **metering installation** (other than testing or monitoring equipment temporarily connected, or to cater for emergencies, via the **test facility**), the **certification** of the **metering installation** will be deemed to be cancelled until the relevant tests and checks have been satisfactorily carried out.

Where an **approved test house** considers site conditions are appropriate, metering equipment may be **calibrated** in situ following appropriate procedures.

For **meters** installed in category 1 **metering installations**, where the **approved test house** applies a satisfactory programme of statistical sampling as described in rule 5.3, the **certification** validity period will be as determined in accordance with the programme of statistical sampling adopted pursuant to rule 5.3.

Table 5: - Tests & checks for compliance

Premises	Design	CT/VT Certification	Meter Certification	Wiring Check	Primary Inj to Meter	Working Standard at Prevailing Load	Multiplier Checks	Data Logger Performance	Review Compensation Arrangements	Output to Host
New Premises: (All new eqpt)	✓	✓	✓	✓	O	✓	✓	✓	-	✓
Existing Premises:										
(a) In Compliance (trader change)	✓	-	-	-	-	-	-	-	-	O
(b) Meter Change	✓	-	✓	✓	O	✓	✓	✓	-	✓
(c) Logger Change	✓	-	-	✓	O	-	✓	✓	-	✓
(d) CT Change, Ratio Change	✓	✓	-	✓	O	✓	✓	O	✓	✓
(e) VT Change	✓	✓	-	✓	O	✓	-✓	O	✓	✓
(f) Additional Wiring Mods Eqpt,	✓	-	O	✓	O	✓	-	✓	✓	O
(g) Non-measuring transformer compliance	✓	N	✓	✓	N	✓	✓	✓	-	✓

Key: ✓ = Mandatory O = Optional N = Within prescribed timeframe

6. Full certification - selected component installations

6.1 General requirements

New and existing **metering installation** categories 1, 2 and 3 may be fully **certified** by compliance with the following:

6.1.1 Certificate as to class based on type-testing

Meters and measuring transformers will have a certificate from an **approved calibration laboratory** or an **approved test laboratory** attesting to the device's type-testing to the appropriate class.

6.1.2 Certificate based on manufacturing sample testing

Meters and measuring transformers will also have a certificate from an **approved calibration laboratory**, **approved test laboratory**, or **approved test house** attesting to the particular device's manufacture to the appropriate class based on appropriate sample testing of manufacturing runs of product. Where the approved organisation has satisfied itself that a manufacturer's own batch testing facility is of an acceptable standard, batch test certificates from the manufacturer will be acceptable and testing need not be repeated.

Where **certification** or **recertification** involves **meter** or measuring transformer **recalibration** in-situ, or where the **meter** or measuring transformer is being replaced with a new or refurbished fully **calibrated meter**, it shall be necessary for the **approved test house** to carry out only those **calibration** tests which it considers are appropriate for the particular **metering installation**. **Calibration** reports shall document the **calibration** tests performed and the methodology used for any assumptions made in the **calibration** process. The reasons for carrying out limited testing shall be documented and shall be subject to **audit**. The records for the **metering installation** shall describe the actual tests carried out.

Where a **meter** or measuring transformer has been previously in service, it shall be **recalibrated** by an **approved test house** in accordance with this **code of practice** before being reinstalled in any **metering installation** (refer rule 4.1.2 of **code of practice D2**), except that the **meter** may be reinstated provided that the new **metering installation certification** period is not longer than that applying to the original installation if:

- (a) the **approved test house** considers that the environment has not been detrimental to the accuracy of the **meter**; and
- (b) the original **metering installation certification** commencement date is within 1 year of the date of the new **metering installation certification**.

6.1.3 Distance from the meter

Measuring transformers will not be of such a distance from the **meter** that rated burdens are exceeded.

6.1.4 Condition or class unknown

Where the condition and/or accuracy class of existing measuring transformers are unknown and cannot be ascertained, they will be deemed to have an accuracy not lower than the minimum appropriate for the **metering installation**.

6.2 Design

Standard master designs and drawings may be used for **metering installation** categories 1, 2 and 3. A design report will be prepared for each master design and the reports and drawings will identify and be signed by the person who carried out the designs. The master design reports and drawings will be checked to ensure that the proposed **metering installations** will function correctly and comply with the requirements of the **rules** and the **codes of practice**. The person carrying out these checks will sign the master design reports and drawings to confirm that the checks have been carried out.

A copy of the master design document may be used by **certification** personnel and will form a part of the site records. The document may have included in it relevant details such as metering equipment model and serial numbers as well as sealing information. Any peculiarities of the site and variations from the design may also be noted on the design document.

Metering equipment will be selected from the combinations in table 6:

Table 6: - Permitted equipment combinations

Metering Installation Category	Meter Class	CT Class	Data Logger (where fitted)
1	2.0	N/A	Complies with the requirements of code of practice 4
2	2.0	1.0	As above
3	1.0	0.5	As above

The use of **meters** and measuring transformers of a higher accuracy will be acceptable.

6.3 Installation

Installation of the metering equipment will be in accordance with appropriate parts of rule 3.

6.4 Commissioning

The **commissioning of metering installations** will include checks that the installation is correctly wired and sufficient testing to verify the correct operation and expected accuracy of the installation, as far as this can be determined without full **calibration** tests. A **commissioning report** will be completed by the **commissioning class A or class B approved test house**. This report will include the results of all **commissioning** tests.

6.5 Certification

When the **class A or class B approved test house** is satisfied that the **metering installation** has been installed and is functioning as designed, the relevant information will be assembled into a **certification report** and the procedure described in rule 4.4 will be followed.

6.6 Recertification

Certification of the **metering installation** will be valid for the period shown in table 7 or as required by rule 5.3, as appropriate:

Table 7: - Certification validity periods (replacement equipment only)

Metering Installation Category	Certification Validity Period
1	15 yrs
2	15 yrs
3	10 yrs

On the expiry of the **certification** validity period, the **metering installation** will be renewed using items which comply with rule 6.1.2. Full **commissioning** tests will then be carried out on the **metering installation**, including functional checks to confirm the correct operation of any **data loggers**.

Where an **approved test house** considers site conditions are appropriate, metering equipment may be **calibrated** in situ, following appropriate procedures.

For **meters** installed in category 1 **metering installations**, where the **approved test house** applies a satisfactory programme of statistical sampling as described in rule 5.3, the **certification** validity period will be as determined in accordance with the programme of statistical sampling adopted pursuant to rule 5.3.

7. Inspection requirements

7.1 General

All **metering installations** will be subject to non-invasive inspections by a suitably qualified person appointed by the **metering equipment owner**. A copy of the signed inspection report, which will confirm that the **metering installations** continue to comply with the requirements of the **rules**, will be kept with the **certification** records.

Metering installations will undergo inspections at least as often as specified in table 8:

Table 8: - Maximum intervals between inspections

Metering Installation Category	Inspection Interval In Years
1	10
2	10
3	5
4	1
5	1
6	1

Inspections will include the activities outlined in the following **rules**.

For categories 1 and 2, the inspection interval may be extended to 15 years where a low-level visual check of the **metering installation** is carried out by a suitably trained person at least once per year and the check is recorded by the **retailer** or their agent. It is not necessary for such checks to be carried out by **approved test house** personnel or their subcontractors. The **retailer** shall be responsible for ensuring that appropriate training of those carrying out the visual inspections is carried out by suitably competent persons. Details of such training shall be recorded, along with an assessment of the resulting competence of those receiving the training.

7.2 Certification validity confirmation

Where a **metering installation** has been fully **certified** under the provisions of rule 5, each inspection will include confirmation that each component of the **metering installation** carries a current **certification sticker** or equivalent. Where the **certification sticker** or equivalent on any component is not readily visible, **certification** will be confirmed by inspection of the **metering installation** records held by the **approved test house** which carried out the **certification**. The only exceptions will be where measuring transformers were existing when the **metering installation** was originally established and do not yet require **certification** (see rule 5.2.1). The due date for **recertification** or **certification** of each component will be recorded. If any component of

the **metering installation** is found to be overdue for **certification** or **recertification**, the **metering installation** will be deemed to be no longer **certified** under the **rules**, and all **participants** with an interest in the **metering installation** will be notified immediately. Steps will be taken to **recertify** the component and the **metering installation** in accordance with rule 5.4.2. If such **recertification** is not carried out within ten **business days** of the discovery of the expired **certification**, the **metering installation** will be deemed unacceptable for energy trading under the provisions of the **rules**, except with the express approval of the **reconciliation manager**. The **reconciliation manager** will consult with all relevant **participants** before ruling on any requests for such approval.

Where a **metering installation** has been fully **certified** under the provisions of rule 6, the **certification sticker** or equivalent will be inspected to ensure that it is still current.

7.3 Metering installation

If the **metering installation** is found to have current **certification**, each inspection will include the following:

7.3.1 Meter

The **meter** will be read and monitored in such a way that its correct operation can be demonstrated. The responsible party will document the general process for this.

7.3.2 Measuring transformers

Where it can be done without breaking seals, all measuring transformers will be visually inspected. The inspection will note any deterioration of the measuring transformer, confirm the measuring transformer tap position and, where appropriate, confirm that there has been no change to equipment connected to the measuring transformers. The measuring transformer tap position will also be checked to ensure that it is still appropriate for the expected maximum demand of the **metering installation** over the period until the next inspection.

7.3.3 Voltage check

The presence of appropriate voltages will be confirmed at the **meter** or test facility and the correct operation of any voltage circuit alarms and/or fault indicators confirmed.

7.3.4 Data logger

Where fitted, the **data logger** will be confirmed to be operational.

7.3.5 Batteries

The life of each battery will be determined and confirmed to exceed the period until the next scheduled maintenance inspection.

7.3.6 Seals

All equipment and enclosures will be examined to ensure that all security seals are intact and secure. If any seals are found to have been removed or broken, an investigation will be carried out to ascertain who broke the seal and for what reason and the procedures described in rule 10 will be followed. If there is any doubt regarding the continued integrity of the component or **metering installation**, it will be recertified and the **reconciliation manager** notified.

7.3.7 Equipment changes

A check will be made to ensure that no equipment has been added to or removed from the **metering installation** since the last inspection without the change having been documented and **certification** requirements satisfied.

7.3.8 Damage/tampering

All seals, enclosures, components and wiring of the **metering installation** will be visually inspected for evidence of damage or tampering. Where such evidence is found, the procedures described in rule 10 will be followed.

7.4 Inspection for change of retailer

Where a **metering installation** is inspected by an **approved test house** for the purposes of a change of **retailer** and is found to be non-compliant, that or another **approved test house** shall use all reasonable endeavours to correct the non-compliance.

Where it is not practicable to remedy any defects immediately, the **approved test house** may issue temporary **certification** stating that the **metering installation** is undergoing “work in progress”.

Such **certification** will have a validity period of 3 months, deemed to commence from the date of the request for the inspection by the **retailer** to the **approved test house** and shall not be renewable before full **certification** is applied to the **metering installation**. Where such “work in progress” **certification** is applied, the **approved test house** shall notify the **market administrator**, within 10 **business days** of the discovery of non-compliance, of the **ICP**, the deemed effective date of the temporary **certification** and the reason(s) for the non-compliance.

The **market administrator** may request an **audit** of the **metering installation** to review the compliance status of the **metering installation** while supplied by the previous **retailer**.

8. Record keeping and documentation

8.1 General

The **metering equipment owner** will ensure that appropriate records are kept of:

8.1.1 Equipment

All equipment, including serial numbers and manufacturers' details;

8.1.2 Test Certificates

The manufacturers' test certificates for all components;

8.1.3 Category

The metering installation category;

8.1.4 Reports

Approved test house certification reports, calibration reports and commissioning reports showing, among other things, dates tested, tests carried out and test results;

8.1.5 Contractor details

Metering equipment installation contractor details, including personnel carrying out installation;

8.1.6 Certification report

A copy of the initial **certification report** issued for the **metering installation**;

8.1.7 Certification sticker

A copy of the **certification sticker**, or equivalent, details for each component of a **metering installation** which is **certified** under the provisions of rule 5;

8.1.8 Seal

Seal identification information; and

8.1.9 Compensation arrangements

Details of any **loss compensation/error compensation** arrangements.

Records will be retained for not less than six months beyond the life of the **metering installation**.

8.2 Test records

Each test record will be identified by a unique serial number. In each situation, all relevant test records, both for individual components and the overall **metering installation**, will be retained by the **approved test house** carrying out the tests. All records will be sufficiently detailed to ensure that, among other things, test conditions, specific test equipment used and personnel carrying out the tests are recorded to ensure complete **traceability** of all aspects of the tests in accordance with modern quality assurance procedures. Copies of all records will be forwarded to the **responsible party** where requested.

8.3 Transfer of records

If the **metering equipment owner** changes the **approved test house** which it contracted for a **metering installation**, copies of all relevant records held by the first **approved test house** will be handed to the new **approved test house**. Such transfer will not relieve the first **approved test house** of its obligation to keep original records.

9. Sealing

When all tests required for **commissioning, calibration, certification or recertification** have been satisfactorily completed, all **meters, data loggers, test facilities**, terminal block covers, fuses and any other components which could influence the functioning of the **metering installation** will be sealed by the person carrying out the tests and will be resealed following any subsequent work which requires removal of the seals. Each **approved test house** will use a sealing system which will be uniquely identifiable.

10. Reporting of defects, tampering and incidents (emergencies)

If any defects, evidence of tampering, or incidents of any kind which could affect the integrity of a category 3, 4, 5 or 6 **metering installation** (as described in **code of practice D1**) are found, the **responsible party** will immediately notify the **reconciliation manager**. The **responsible party** will prepare, or arrange for the preparation of, a detailed statement of the situation and will ensure that it is forwarded to the **reconciliation manager**. The statement will include full details of what was found, the cause (if known), the effects of the problem and the remedial action proposed. The **reconciliation manager** will forward this statement to all affected **participants** and the **Board** and will seek their agreement to the proposed action. If any **participant** objects to the proposed course of action, their objection will be lodged with the **reconciliation manager** by the end of the **business day** following the day on which the statement was received by them. The **reconciliation manager** will consider any objections received and will decide on the actions to be taken to resolve the situation. Where the remedial action includes testing of the **metering installation**, the procedures laid down in rules 10 and 11 of part D will be followed. When the situation has been remedied, the **reconciliation manager** will advise all affected **participants** of the actions that were taken.

All affected **participants** and **approved test houses** will have an equal obligation to report any incident to the **responsible party** as soon as they become aware of it.

Emergency replacement of metering components is permissible provided that this is followed up by the required checking and documentation procedures as soon as practicable thereafter. Care must be taken to preserve/record the evidence of any defect.

APPENDIX 1: Tables

Table 1: Standards for electricity meters

The standards that contain specific requirements for different metering equipment are in the table below:

Equipment	Standards
Class 1 and 2 induction watt-hour meters	IEC 60521
Class 1 and 2 induction watt-hour meters of the demand type	IEC 60521
Class 1 and class 2 electronic watt-hour meters	IEC 61036
Class 0.2 and class 0.5 electronic watt-hour meters	IEC 60687 Note: Mechanical tests for rack mounted meters not covered by this standard
Class 3 induction var-hour meters	IEC 60145
Class 2 and class 3 electronic var-hour meters	IEC 61268
Ripple control receivers for tariff and load control	IEC 61037
Time clocks for use in meters	IEC 61038

Table 2: Measuring transformers

Measuring transformers will be designed and manufactured generally to the following standards and will be tested to the relevant part of those Standards. The **approved test house** will inspect manufacturer's test certificates and carry out whatever additional tests it considers necessary to satisfy itself that the measuring transformers and **metering installation** meet the accuracy requirements of the **rules**.

Equipment	Standards
Current transformers	IEC 60044-1
Inductive voltage transformers	IEC 60044-2
Combined transformers	IEC 60044-3
Capacitor voltage transformers	IEC 60186 & 60358
Electronic voltage transformers	IEC 60044-7
Electronic current transformers	IEC 60044-8

- Note: (i) Alternative standards will be acceptable provided they are **certified** in writing by an **approved calibration laboratory** as being equivalent to or better than the above.
- (ii) Evidence of a component's compliance with the above requirements will be made available, upon request, to an **auditor**.

Code of practice D4 - Data logger minimum functional requirements

Contents

- 1. Scope**
- 2. IEC standards used**
- 3. Certification**
- 4. Data logger requirements**
 - 4.1 General requirements
 - 4.2 Outputs and inputs
 - 4.3 Data monitoring characteristics
 - 4.4 Communications
 - 4.5 Time keeping requirements
 - 4.6 Security requirements
 - 4.7 Trading periods
 - 4.8 Quantification error

Code of practice D4: Data logger minimum functional requirements

1. Scope

This **code of practice** covers **data loggers** that are incorporated in **metering installations** to store information related to energy consumption as measured by a **meter**. This information is then transferred to a remote host computer.

Code of practice D3 describes the requirements which **metering installations** must meet in order to be **certified** for energy trading under the provisions of the **rules**. This **code of practice** D4 describes the requirements with which **data loggers**, and **meters** fitted with integral **data loggers**, must comply for them to be used in a **metering installation**.

2. IEC standards used

In order to maintain consistency throughout this document, IEC Standards have been used. Equipment may optionally comply with the IEC Standards in force when originally installed. Alternative Standards shall be acceptable provided they are **certified** in writing by an **approved calibration laboratory** as being equivalent to, or better than, the specified IEC Standard.

3. Certification

Each type (model) of **data logger** used in a **metering installation** will be **type-tested** by an **approved test laboratory** to confirm its specific characteristics and to prove that it complies with the requirements of this **code of practice** D4.

When the **approved test laboratory** is satisfied that the **data logger** can consistently meet the requirements of this **code of practice** D4, it will **certify** that particular type of **data logger** as meeting those requirements.

A **data logger** may be **certified** as complying with the **rules** under qualified circumstances. For example, a **data logger** may be deemed to comply only when used in situations where **interrogation** is carried out on a maximum of 10 day cycles. (The frequency of **interrogation** may be determined by the memory available and the number of channels being used.)

Further information on the **certification** process is given in **code of practice** D3.

If at any time there are any modifications to the specification, hardware or resident (ROM) software of a particular type and model of **data logger**, it will be regarded as a new model and will require repeat **type-tests** to be satisfactorily carried out before it will be considered to be **certified**. Where the modifications affect only part of the device, it may be sufficient to perform only limited tests on the characteristics affected by the modifications. The extent of such tests will be decided by the **approved test laboratory** carrying out the tests.

Designers of a **metering installation**, and the **approved test house** carrying out final **certification** of a **metering installation**, will ensure that only **certified data loggers** are used in the **metering installation** in accordance

with **code of practice D3**. The **responsible party** will have the overall responsibility of ensuring that only **certified data loggers** are used in the **metering installation**.

4. Data logger requirements

4.1 General requirements

Data loggers shall be suitable for the conditions in which they will operate and shall generally comply with the relevant parts of the IEC standard applicable to a **meter** that would be used in the same location. These parts are not restricted to, but would include, the following:

- environmental characteristics;
- mechanical characteristics;
- electrical characteristics;
- electromagnetic compatibility; and
- radio frequency interference.

Where the **approved test house** considers that any such requirements are unreasonably stringent for the particular circumstances in which a **data logger** will be used, and has satisfied itself that the **data logger** can be used in such a situation without in any way compromising the **overall accuracy** of the **metering installation**, the **approved test house** may certify the **data logger** for use in that **metering installation**. In such situations, the **approved test house** shall include in the records for the **metering installation** the reasons for dispensing with the particular requirements of the relevant standard.

4.2 Outputs and inputs

All outputs/inputs will be suitably isolated and rated for the purpose. Outputs will not interfere with the operation of the device.

4.3 Data monitoring characteristics

The requirements detailed below will apply equally to import and export energy and may include information other than kWh, such as kvarh. The **data logger** will retain all data pertaining to energy and events for a minimum period of the interrogation cycle plus five **business days**.

4.3.1 Energy consumption data

The **data logger** will record the metered energy consumption as pulse counts or in engineering units.

Each period of data will be identifiable or deducible by both date and time on **interrogation**.

4.3.2 Events

The **data logger** will record the time and date of all relevant event/fault conditions. Recorded events will be downloaded to the host collection system during **data logger interrogation**. The **data logger** will record the following events:

4.3.2.1 Loss of power

The period(s) in which a loss of the power supply to the **data logger** exceeding 60 seconds duration has occurred.

4.3.2.2 Changes to software, status or time setting

For sites **certified** to provide **half-hour metering** data, the **trading period(s)** in which there have been any software configuration, status or time setting changes, other than time synchronisation in accordance with rule 4.5.

4.3.2.3 Alarms

Critical internal alarms such as memory integrity checking.

The **data logger** will be able to record and store a minimum of 50 events between **interrogations**.

4.3.3 Data loss protection

Data loggers will include data loss protection for all data for the period up to the **interrogation** cycle plus 5 **business days** from the onset of power supply loss. Electronic watchdog mechanisms will be provided to maintain error indication. **Data loggers** will carry out routine checking of memory integrity.

Data loggers will be designed to ensure continued clock and memory operation when the power supply to the **data logger** is lost. When supply is restored, the time and date will remain within the site design specification.

4.4 Communications

4.4.1 Media

Communications with the **data logger** may be via direct connection on site or via recognised media for remote communications.

Where on-site access is required for **interrogation**, the direct connection to the local **interrogation** port will be able to be made without breaking any of the seals placed by the **approved test house**.

4.4.2 Communications media compatibility

Where the **data logger** incorporates remote communications as part of its functionality, the communicating device must satisfy the compatibility and connection requirements of the communications network operator.

4.5 Time keeping requirements

The **data logger** clock will have a time keeping accuracy of better than 60 seconds per month.

Data loggers will have provision for time synchronisation that adjusts time, forwards or backwards, in response to an instruction from the **interrogation** system. All information logged will be referenced to New Zealand Standard Time.

Maximum time errors will not exceed those specified in table 1:

Table 1: - Maximum permitted time errors

Metering Installation Category Group	Maximum Time Error of Data Logger Clock (seconds)	Maximum Time Error in Commencement of any Trading Period (seconds)	Maximum Time Error in Interrogation & Processing Systems (seconds)	Maximum Time Error for Automatic Adjustment (seconds)
1	±10	±10	±5	±10
2	±10	±10	±5	±10
3	±10	±10	±5	±10
4	±10	±10	±5	±10
5	±5	±5	±5	±5
6	±5	±5	±5	±5

4.6 Security requirements

4.6.1 Access codes

Access codes shall be employed in such a manner that the password or identifier offered shall determine the level of access to the information or software within the **data logger**.

There will be a minimum of two access codes to permit access at the following levels:

Level 1: Required for **interrogation** only. This level may also allow synchronisation of time clocks where time errors are within the allowable specified in table 1.

Level 2: Required for all functions, including program parameter changes. This level may also allow synchronisation of time clocks where time errors are outside the allowable limits specified in table 1. The access code shall consist of a string, or series of strings, of elements, where the number of possible combinations of elements overall equals or exceeds 15×10^6 .

Where access codes can be entered on a keypad integral with the **data logger**, neither the password nor the number of characters will be displayed on a screen.

4.6.2 Sealing

With the exception of a port for on-site reading only that is not capable of any other function, all parts and connections and all components of the **data logger** will be contained within, or attached to, the case of the **data logger** in such a way that unauthorised access may be monitored by the application of a seal or seals or by other means.

4.7 Trading periods

For sites **certified** to provide **half-hour metering** data, the **trading period** duration, normally 30 minutes, will be within $\pm 0.1\%$ (± 2 seconds). **Trading periods** will be contiguous.

4.8 Quantification error

The design of the **metering installation, data logger and interrogation** system will ensure that the smallest possible increment in the energy value of the metering data is consistent with the required maximum limits of error. IEC 60338 illustrates one way of dealing with this issue.

Code of practice D5: Variation of requirements

Contents

- 1. Scope**
- 2. Metering installations**
 - 2.1** Application to the **market administrator**
 - 2.2** Review Panel
 - 2.3** Supporting documentation
 - 2.4** Application considered and notified
 - 2.5** Objections
- 3. Effective conditions of variation**
- 4. Expiry of variation**
 - 4.1** Metering installations
 - 4.2** **Market administrator** may terminate variation

Code of practice D5: Variation of requirements

1 Scope

This **code of practice** covers situations where it is considered necessary or desirable to vary the requirements of **codes of practice** D2 - D4 inclusive.

2 Metering installations

Requirements for a **metering installation** as prescribed in any **code of practice**, may be varied only in accordance with the following:

2.1 Application to market administrator

Any application for a variation to any requirement under the **codes of practice** must be made to the **market administrator** in the form as may be required from time to time by the **market administrator**;

2.2 Review panel

The **Board** must appoint a review panel to review every application for variations from any requirement of the **codes of practice**. The review panel must be made up of five persons drawn from technical experts in the industry;

2.3 Supporting documentation

Each application for variation under this **code of practice** must be supported by documentation detailing the reason for the application and the effects on the accuracy of the resultant **volume information**;

2.4 Application considered and notified

The review panel must consider each application for variation under this **code of practice**. The review panel must make a recommendation to the **market administrator** within 15 **business days** of receiving the application for variation. The **market administrator** must, taking into account the review panel's recommendation, either:

2.4.1 approve any such application (with any conditions it considers appropriate), and publish such approval; or

2.4.2 decline any such application

within 5 **business days** of receiving the recommendation from the review panel; and

2.5 Objections

Any objections to any variation or application for variation must be reviewed by the review panel and must be supported by evidence that the variation materially affects the objecting party. The review panel must then decide on the action to be taken as a result of this review and make a recommendation to the **market administrator** within 15 **business days** of receiving the objection. The **market administrator** must, taking into account the review panel's recommendation, either:

2.5.1 adopt (with any conditions it considers appropriate) the review panel's recommendation and publish details; or

2.5.2 decline to adopt the review panel's recommendation

within 5 **business days** of receiving the recommendation from the review panel.

3 Effective conditions of variation

The review panel may impose such conditions on any variation as considered by the review panel to be appropriate for any approval of that variation.

Any variation approved by the **market administrator** under the provisions of this **code of practice** must take effect from a date specified by the review panel.

4 Expiry of variation

4.1 Metering installations

No variation will remain in force for more than ten years. If the **responsible party** decides to terminate that variation for any reason, including where the variation has expired or has been replaced by another means of **certification**, the **responsible party** must ensure that the **market administrator** is notified of the date upon which that variation terminates. Such notification must be in the form of a copy of the **certification** for the **metering installation**.

If, as a result of a review or for any other reason, the **market administrator** wishes to terminate any variation, the **market administrator** must advise the original applicants.

The **market administrator** must consider any responses from the original applicant and, if it decides to terminate the variation, must notify the original applicant and all other **participants**.

4.2 Market administrator may terminate variation

The **market administrator** may terminate any variation under this **code of practice** if, in the **market administrator's** reasonable

opinion, such variation is not necessary or desirable or significantly detracts from the purpose of this **code of practice**.

Schedule D2- Points of connection
