ROTTNEST IS

2017

Rottnest Island - Metrology Procedure

Authority

Document Control

Endorsement/ Approvals	Title	Signature	Date
Janett Enke	A/Manager Major Contracts		22/08/2017

Record of revisions

Revision no.	Date	Version	Revised by	Description
Initial	11 April 2017	1 Draft	Qualeng	First issue
Version 2	19 May 2017	2 Draft	Janett Enke	Second issue
Version 3	6 June 2017	3 Draft	Janett Enke	Third issue to stakeholders for consultation process (closed 20 June 2017)
Version 4	22 August 2017	Final	Janett Enke	Submitted to ERA

Stakeholders

Note: In the process of document update, the following Internal and External Stakeholders must be consulted:

Internal Sections Rottnest Island Authority	External Organisations Major Clients
Project and Contract Services	Rottnest Island Chamber of Commerce (RICC)
	Economic Regulation Authority (ERA)

Notification list

Note: When this document is updated, the following positions must be notified of any authorised change:

Rottnest Island Authority

General Manager Project and Contract Services

Manager Major Contracts

Table of Contents

1 General

1.1 Introduction

1.1.1 The title of this document is the "*Rottnest Island Metrology Procedure*".

1.1.2 The short title of this document is the "*Metrology Procedure*".

1.1.3 The *Metrology Procedure* has been prepared in accordance with clauses 6.2 and 6.8 of the "Metering Code" (the *Code*).

1.2 Purpose

1.2.1 The purpose of this *Metrology Procedure* is to provide guidance:

a) to the *responsible person* on the correct provision, installation and maintenance of *metering installations* in line with the principles of the *Code*; and

b) to interested third parties, such as *metering equipment* manufacturers, on the requirements for metering within the Rottnest Island Authority *electricity network*.

1.3 Scope

1.3.1 The *Metrology Procedure* sets out those obligations and duties that are imposed on the *Network Operator* with regard to *meter* and *energy data* provision of the *Code*.[1]

1.3.2 The *Metrology Procedure* provides information on the application of *metering installations* at *connection points*. In particular this *Metrology Procedure* sets out provisions for *metering installations* relating to:

a) the *device*s and methods that are used by the *Network Operator* to:

1. measure, or determine by means other than a *device*, *electricity* produced and consumed at a *metering point*;
2. not used;
3. prepare the information using *devices* or methods to form *energy data*;
4. not used;

b) the minimum requirements for *meters* and *metering installations*, including:

1. *accumulation meters*
2. interfaces that allow *interval energy data* to be downloaded;
3. direct connected *meters* for Type 4 to Type 6 *metering installations*;
4. *CTs* and *VTs*; and
5. programmable settings under clause 3.10 of the *Code*.

c) the procedures for estimating, substituting and validating *energy data* under the *Code*;

d) the sampling and testing of *meters* for the purposes of and in accordance with clause 3.11A(1) of the *Code*;

e) consistency with the approved asset management system required by section 14 of the *Act*;

f) defining the rights of access to *energy data* in the *metering installation* and

g) defining the procedures for the auditing of *metering installations*.

1.3.3 The *Metrology Procedure* applies to *Code Participants* and the *Network Operator* in relation to the *load* and / or generation at each *connection point* on the *network*

[1] Removed "and Market Rules", Rottnest Island Network does not fall within the Market operation

1.3.4 The *Metrology Procedure* covers the full extent of a *metering installation*, from the *connection point* at one extreme to the boundary of the *telecommunications network* at the other extreme. It includes connection of the *metering installation* to the *telecommunications network*.

1.3.5 This *Metrology Procedure* applies to the *electricity network* for which Rottnest Island Authority is the *Network Operator* or for which Rottnest Island Authority has been appointed *metering data agent*.

1.3.6 It should be noted that the *Metrology Procedure* presents the minimum requirements and does not preclude a *meter* supplier or the *Network Operator* from deploying products or developing processes that exceed or complement the requirements described herein provided that such features are compatible with the requirements of the *Metrology Procedure*.

1.4 Interpretation

1.4.1 If a provision of this *Metrology Procedure* is inconsistent with the *Code*, the *Code* prevails to the extent of the inconsistency.

1.4.2 For the purpose of clarification, to the extent that this *Metrology Procedure* and the *National Measurement Act* are inconsistent, the *National Measurement Act* is to prevail.

1.4.3 The *Network Operator* may issue guidelines and procedures that clarify aspects of this *Metrology Procedure*.

1.4.4 Unless the contrary intention is apparent:

a) The Interpretation Act 1984 applies to the interpretation of this *Metrology Procedure*.

b) A reference in this *Metrology Procedure* to a document or a provision of a document includes an amendment or supplement to, or replacement of or novation of, the document or provision.

c) A reference in this *Metrology Procedure* to a person includes the person's executors, administrators, successors, and substitutes and permitted assigns.

d) Where italic typeface has been applied to words and expressions in this *Metrology Procedure*, it is solely to indicate that those words or expressions may be defined in section 2, Definitions, or elsewhere.

e) Where information in this *Metrology Procedure* is placed in brackets "{" and "}" the information is provided for information only and does not form part of this *Metrology Procedure*.

f) "Including" and similar expressions are not words of limitation in this *Metrology Procedure*.

g) Meaning of 'publish.' If the *Network Operator* is required to "publish" a thing, the *Network Operator* must: place the thing upon an internet website under the *Network Operator*'s control; and send an *electronic* notice to each *Code Participant* advising the *Code Participant* that the thing has been placed on the internet website.

1.5 Commencement

1.5.1 The date of publication of the *Metrology Procedure* is ten days following approval by the *Authority*.

1.5.2 This *Metrology Procedure* comes into operation three months after the date of publication.

1.6 Metering Installation Components

1.6.1 The components of a *metering installation* covered by this *Metrology Procedure* are:

a) One or more *metering points*;

b) The *instrument transformers*;

c) The *measurement element*;

d) The *data logger*;

e) The *communications link*;

f) The associated wiring, connectors, fuses, mounting boards and housings.

1.6.2 This document also addresses the following associated services

a) *Meter data services* within the *communications link*

b) Testing and inspection

c) Management, maintenance and auditing.

1.6.3 The primary components, their characteristics and associated service requirements have been itemised in the Schedules for the purpose of allowing the *Network Operator* to exercise discretion in a transparent manner, or to provide the information required by the *Code*.

1.6.4 The information contained in the Schedules is largely a replication of the requirements in the *Code* with practical clarification by the *Network Operator* where necessary.

2 Definitions

2.1.1 Words shown in italics have the following meaning:

Phrase/Term	Meaning
access arrangement	has the meaning given to it in the *Access Code* 2004.
Access Code	means the *Access Code* made by the Minister under Part 8 of the *Act*.
access contract	agreement between the *Network Operator* and a person for the person to have 'access' (as defined in section 103 of the *Act*) to "services' (as defined in section 103 of the *Act*) on a network.
accumulated energy	means the visible indication displayed on an *accumulation meter*, or the *register* memory location within the *meter*, that records *accumulated energy data*.
accumulated energy data	is to be expressed as a measure of *energy* over time and means a *data* measurement (including an *estimated* or *substituted* measurement) of the production or consumption of *electricity* at a *metering point*.
accumulated energy register	the visible indication displayed on an *accumulation meter*, or the register memory location within the *meter*, that records *accumulated energy data*.
accumulation meter	a *meter* that measures *accumulated energy data* and records it in one or more *accumulated energy registers*.
Act	the Electricity Industry Act 2004 (WA).
active energy	a measure of *electricity*, being the time integral of the product of *voltage* and the in-phase component of *electric current* flow across a *metering point* expressed in Watt hours (Wh) and/or multiples thereof.
actual value	*energy data* for a *metering point* which has physically been read (or remotely collected by way of a *communications link* or an automated *meter* reading system) from the *meter* associated with the *metering point*, and includes a *deemed actual value*.
apparent energy	a measure of *electricity*, being the time integral of the product of *voltage* and the *electric current* flow across a *metering point* expressed in Volt Amp hours (Vah) and or multiples thereof.
applications and queuing policy	that part of the *Network Operator*'s *Access Arrangement* defining the *applications and queuing policy*.
AS	followed by a designation means a standard so designated published by Standards Australia Limited and current as at the *Code* commencement date.
attachment point	a point on the *network* at which *network* assets are connected to assets owned by another person.
Authority	means the Economic Regulation Authority established under the Economic Regulation Authority Act 2003 (WA).
average daily consumption	for a *metering point* is to be expressed in *energy units* per day, and means a measurement (including an *estimated* or *substituted* measurement) of *electricity* production or consumption over a period at the *metering point*, divided by the number of days in the period.
business day	means any day that is not a Saturday, a Sunday or a public holiday throughout Western Australia.
business hours	means the hours from 08:00 to 17:00 on a *business day*.

check metering installation	means a *metering installation* that meets the requirements of clause 3.13 of the *Code* and is used as the secondary source of *energy data*. [Used for *validation* and *substitution* purposes but not routinely used as a source of billing data]
checksum	means a single digit numeric identifier that is calculated to reduce the frequency of *NMI data* entry errors.
Code	the Electricity Industry (Metering) Code 2012.
Code of Conduct	the Code of Conduct made by the Minister under Schedule 3, section 1 of the *Act*.
code participant	a *Network Operator*, a *retailer,* a *generator,* a *user* or the *Authority* as specified in clause 1.2 of the *Code.*
Communication Rules	means, in relation to the *Network Operator*'s *network* and subject to clause 6.7 of the *Code*, a document governing rules governing the communication protocols, file formats and timeframes for the communication of information and *data* between *Code participants*, which have been published under clause 6.19A of the *Code*.
communication link	all communications equipment, processes and arrangements which facilitate the collection of *energy data* from a *data logger* or *a measurement element* so as to enable a remote interface to be established that lie: a) if the *data logger* is internal to the *device* containing the *measurement elements* — between the *data logger* and the *telecommunications network*; and b) if the *data* logger is external to the *device* containing the *measurement elements* but is located at the same site — between the *meter* and the *data logger* and between *data logger* and the *telecommunications network*; and c) if the *data logger* is not located at the same site as the *device* containing the *measurement elements* — between the *meter* and the *telecommunications network*.
confidential information	has the meaning given to it in clause 7.4 of the *Code*.
connect	to form a physical link to or through a *network*.
connection point	an exit point or an entry point identified or to be identified as such in an *electricity* transfer *access contract*.
contact details	the notified *electronic* communication address, notified facsimile number, notified postal address and notified telephone number of a *Code participant*.
covered network	has the meaning given to it under the *Access Code*; {Note: At the time this Code was made, the definition in the Access Code was: " 'covered network' means a network that is covered."}
current	in connection with the flow of *electricity*, means the flow of *electricity* in a conductor.
current transformer, or CT	a *transformer* for use with *meters* and protection *device*s in which the *electric current* in the secondary winding is, within prescribed error limits, proportional to and in phase with the *electric current* in the primary winding.
current user	the *user* recorded as such in the *registry*;

customer	has the meaning given in section 3 of the *Act*.
Customer Transfer Code	the Customer Transfer Code made by the Minister under Part 8 of the *Act*.
data	*energy data* or *standing data*.
data logger	a *metering installation database*, *metering database* or a *device* that collects *electronic* signals from a *measurement element* and records *interval energy data*. {Note: A data logger may contain data storage capability, it be a separate item of equipment and/or it be combined with the energy measuring components within one physical *device* or it may be a combination of the foregoing elements.}
data stream	a stream of *energy data* or metering *data* associated with a *metering point*, as represented by an NMI and a NMI suffix. A NMI can have multiple *data streams*.
day	means unless otherwise specified, the 24 hour period beginning and ending at midnight Western Standard Time (WST).
demand	is the power requirement in a period expressed in kW. E.g. if the consumption in a period is 1kWh and the period under consideration is half an hour long then the demand is 2kW.
deemed actual value	an *estimated* or *substituted* value designated as such for a *metering point* under clause 5.23(1) of the *Code*.
device	includes equipment
dispute	any dispute or difference arising in respect of any matter under or in connection with this *Code* between any *Code participants*, the subject of matter of which is not also an access dispute under the *Access Code*, a dispute or a complaint under the *Code of Conduct* (For the Supply of *Electricity* to Small Use *Customers*).
distribution connection	a point at which *electricity* is transferred to or from the *distribution system*.
distribution system	has the meaning given to it in the *Act*.
electric	Of, relating to, producing, or operated by *electricity*.
electricity	has the meaning given to it in the *Act*.
electronic	in relation to connection with a *meter*, means the transfer of information into or out of the *meter* by way of a *telecommunications network* for the delivery of *energy data* or pulsing signals or other widely accepted communications protocols used for the transfer of *data* between computerised equipment.
energy	*active energy* and/or *reactive energy* or both as applicable.
energy data	*interval energy data* or *accumulated energy data*.
energy data services	the services related to the determination, processing or storage of *energy data*.
energy units	Wh, VAh or VARh as appropriate.
enhanced technology	In relation to a *metering installation*, means evolving technologies that provide the *metering installation* with advanced features over and above the standard specified for installations of type 1-6; for example, those features described in Division 3.4 of the *Code*.

entry point	a single, indivisible (except as allowed under the applications and queuing policy) point, that for purposes under the *access arrangement* involving the transfer of *electricity*, is deemed to consist of a single *attachment point*, connected or to be connected to a *user*'s *connection point*, with a single *meter* (regardless of the actual configuration of *network* assets making up the *entry point*), at which *electricity* is more likely to be transferred into the *network* than out of the *network*.
estimate	an estimate calculation of *energy data electricity* production or consumption at a *metering point* for a future period, such calculation being made in compliance with the schedules to this *Metrology Procedure*.
estimated energy data	the *data* that results from an estimation of *electricity* where the *data* applies to a *trading interval* or a period in excess of a *trading interval*.
exit point	a single, indivisible (except as allowed under the applications and queuing policy) point, that for purposes under the *access arrangement* involving the transfer of *electricity*, is deemed to consist of a single *attachment point*, connected or to be connected to a *user*'s *connection point*, with a single *meter* (regardless of the actual configuration of *network* assets making up the *entry point*), at which *electricity* is more likely to be transferred out of the *network* than into the *network*.
General Purpose	the term applied by the National Measurement Institute constituted under Part 3 of the *National Measurement Act* to refer to the classification of a *meter*.
generating plant	in relation to a *connection point*, means all equipment involved in generating *electricity*.
generator	a person who generates *electricity* who holds (or but for an exemption order under section 8 of the *Act* would be required by section 7 of the *Act* to hold) a generation licence or integrated regional licence under Part 2 of the *Act*.
good electricity industry practice	the exercise of that degree of skill, diligence, prudence and foresight that a skilled and experienced person would reasonably and ordinarily exercise under comparable conditions and circumstances consistent with applicable written laws and statutory instruments and applicable recognised codes, standards and guidelines.
historical energy data	*energy data* that relates to one or more previous *meter*-reading periods.
IEC	the International Electrotechnical Commission.
IMO	the Independent Market Operator appointed under the Market Rules Part 9 of the *Act*.
incoming retailer	has the same meaning as in the *Customer Transfer Code*.
instrument transformer	means either a *CT* or a *VT*.
interval energy data	is to be expressed in *energy* units or multiples thereof, and means a measurement (including an *estimated* or *substituted* measurement) of the production or consumption of *electricity* production or consumption at a *metering point* which is accumulated for each *trading interval*, or such sub-interval as has been previously agreed between the *Network Operator* and relevant *Code Participant*.
interval meter	a *meter* that measures *interval energy data* and records it in a *data logger*.
ISO	the International Standards Organisation.
life support equipment	has the meaning given to it in the *Code of Conduct*.

load	the amount of electrical power *energy* transferred out of a *network* at a *connection point* at a specified time or across a specified period.
maintain	includes (as necessary and as applicable) renew, replace or update.
Manager Major Contracts	Is the person appointed by the *Network Operator* under clause 4.11 as the main contact for *Code Participants* to carry overall responsibility for the provision of metering services for the *network*..
market	the wholesale *electricity market* established under Part 9 of the *Act*. The *Network Operator network* does not form part of the wholesale *electricity market*.
market rules	has the meaning given to it in the *Act*.
measurement element	an *energy* measuring component of a *meter* which converts *electricity* into either or both of: a) an *electronic* signal; and b) a mechanically recorded electrical measurement.
meter	a *device* [complying with the relevant requirements of the AS 1284 series of standards] which measures and records the production or consumption of electrical *energy*, *electricity* production or consumption.
metering data agent	of a *Network Operator* for a *network*, means the body appointed by the *Network Operator* to be the *Network Operator*'s *metering data agent* for the *network* in accordance with the *Code*.
metering data alarms and data status	Where interval capable *metering installations* assign specific alarms to the *data* channel and or the interval metering *data*.
metering database	a database containing the *registry* and *energy data*.
metering equipment	one or more parts of a *metering installation* and includes a *meter*.
metering installation	means the equipment, processes and arrangements for the purpose of metrology which lie between: at one boundary, either: a) for a *connection point* of Type 1 to 6 — the *metering point*; or b) for a *connection point* of Type 7 — the *connection point*; and at the other boundary, either: a) if a *telecommunications network* is used for the delivery of *energy data* from the *connection point* or *metering point* — the point of connection to the *telecommunications network*; or b) if there is no such *telecommunications network* — the interface port of either the *meter* or *data logger* or both.
metering point	means a) for types 1-6, the point at which *electricity* is measured by a *revenue meter* b) for a type 7 *meter*, the *connection point*.
metering protocol	A document required under the WA Electricity Market Rules, Part 8.7. This *Metrology Procedure* document meets the requirements for the *metering protocol* and will act as the *network metering protocol*.

metering service	activities that are performed by or on behalf of the *Network Operator* or its *metering data agent* and are related to the provision of *metering installations*, *standing data* and *energy data*.
metering service order	has the meaning given to it in the *Code*.
meter reading period	For past dates, is the period between the date of a *meter* reading and the date of the previous *meter* reading. For future dates, is the period between the scheduled date of a *meter* reading and the previous scheduled or *actual meter* read.
metrology coordinator	the officer appointed by the *Network Operator* to assume responsibility for maintaining and enforcing the *Metrology Procedure*.
Metrology Procedure	this document, the *Metrology Procedure* for *Metering Installations* on the *Rottnest Island Authority Network*.
model service level agreement	in relation to a *Network Operator*'s *network*, means: a) if the *network* is a covered *network* with an *access arrangement* — the part or parts of the *access arrangement* which deal with metering as a "supplementary matter" under the *Access Code*; and b) otherwise — a *model service level agreement* approved by the *Authority* under the provisions of the *Code*.
National Measurement Act	the National Measurement Act 1960 (Cth) and any regulations made under that Act.
National Metering Identifier or NMI	the reference number required by the *Code*, which uniquely identifies a *connection point* and which is issued under the Western Australian NMI Allocation Procedures {Western Power DMS reference # 2300622}.
NEM12	the file format established for the dissemination and transfer of *interval energy data* in the Australian National Electricity Market.
NEM13	the file format established for the dissemination and transfer of basic *energy data* in the Australian National Electricity Market.
network	the *transmission system*, *distribution system* or both, as applicable, operated by the *Network Operator*. In this document this means the *transmission system* and *distribution systems* operated by Rottnest Island Authority.
Network Operator	in relation to a *network* means a person who holds (or but for an exemption order under section 8 of the *Act* would be required by section 7 of the *Act* to hold) a distribution licence, integrated regional licence or transmission licence under Part 2 of the *Act*. In this document this means the Rottnest Island Authority.
operational data	*energy data* that is not obliged to have its accuracy and quality determined obtained via a system used to control and operate a *network* and the *generating plant* connected to a *network*.
power factor	the ratio of the *active energy* to the *apparent energy* at a *metering point*.
reactive energy	a measure in volt-ampère reactive hours (varh) of the alternating exchange of stored *energy* in inductors and capacitors, which is the time- integral of the product of *voltage* and the out-of-phase component of *electric current* flow across a *connection point*.

registered metering installation provider	a person registered by the *Network Operator* in accordance with the *registration process* to undertake some or all of the Activities relating to the installation of *metering installations*, and who has not been deregistered under the *registration process*.
registration process	the approved *registration process* established by a *Network Operator* and approved by the *Authority* under the provisions of the *Code*.
registry	a registry containing *standing data* in accordance with the *Code*.
related body corporate	in relation to a body corporate, means a body corporate that is related to the first mentioned body corporate under the Corporations Act 2001 of the Commonwealth.
Responsible Person	the person who has responsibility for the provision of a *metering installation* for a particular *connection point*.
retailer	a person who holds (or but for an exemption order under section 8 of the *Act* would be required by section 7 of the *Act* to hold) a retail licence or integrated regional licence under Part 2 of the *Act* for the sale of *electricity* to *customers*.
revenue meter	the *meter* that is used for obtaining the primary source of *energy data*.
revenue metering installation	a *metering installation* (or, where a partial *check metering installation* is permitted under clause 3.13 of the *Code*, that part of a *metering installation*) which contains a *revenue meter*.
rule participant	a member of the class of persons as set out in clause 2.28.1 of the *Market Rules*.
SCADA	Supervisory Control and Data Acquisition.
scheduled meter reading	an *actual meter* reading on a cycle that equates to the a *customer*'s billing cycle. For the *network* it means a reading taken anytime between one working day ahead of, and two working days after, the scheduled *meter* reading date.
scheduled meter reading date	the date scheduled for the next scheduled *meter* reading.
service level agreement	a written agreement that sets out the terms and conditions under which a *Network Operator* must provide *metering services* to a *user*, whether or not that agreement also contains other provisions governing the parties' rights, liabilities and obligations.
standing data	the periodically updated information about a *connection point* that is maintained in accordance with the *Code* and the associated *Communication Rules*.
substitute	the substitution of *energy data* obtained, or scheduled to be obtained from an actual *meter* reading with *energy data* obtained in accordance with the data substitution procedures defined in section 4.4 under the circumstances described in the *Code*.
supply	the delivery of *electricity*.
testing class	a collection of *meters* of the same physical type that are treated as a single class for testing purposes.
telecommunication network	a communication network governed by telecommunication regulations which is used for the delivery of *energy data* from the metering *point*.
trading interval	a 30 minute period ending on the hour (WST) or on the half hour and, where identified by a time, means the 30 minute period ending at that time.

transfer	in relation to a *customer*, has the meaning given to it in section 1.3 of the *Customer Transfer Code*.
transformer	a plant or *device* that reduces or increases alternating *voltage* or *electric current*.
transmission connection	a point at which *electricity* is transferred to or from the *transmission system*.
transmission system	has the meaning given to it in the *Act*.
Type	"Type", in relation to a *metering installation* or *connection point*, has the meaning given in clause 3.9(1) or, if applicable, clause 3.9(2) of the *Code*.
user	[in respect to a *connection point*] means a person who has an *Access Contract* in respect of the *connection point* for the transfer of *electricity* [at the *connection point*].
validation	means validation in accordance with this *Metrology Procedure*.
voltage	the *electric* force or *electric* potential between two points that gives rise to an *electric current*.
voltage transformer or VT	a *transformer* for use with *meters* and protection *device*s in which the *voltage* across the secondary terminals is, within prescribed error limits, proportional to and in phase with the *voltage* across the primary terminals.

3 Responsibility for Meters

3.1 Network Operator is Responsible for Meters

3.1.1 The *Network Operator* is responsible for the design, provision, installation and maintenance of *metering installations*.

3.2 Enhanced Technology Features [HP 2.2]

3.2.1 Where reasonably requested by a *Code Participant*, the *Network Operator* will provide *metering installations* with *enhanced technology* features in accordance with clause 3.20(1) of the *Code*.

3.2.2 *Metering installations* with *enhanced technology* features will only be used where they meet or exceed the standards required of the un-enhanced type 1-6 *metering installation* that would otherwise be used at the *connection point* under consideration.

3.2.3 Where a *meter* includes enhanced features more normally associated with a *meter* of a more advanced type, the normal provisions of the original type of *meter* apply for all aspects other than the enhanced feature.

3.2.4 Notwithstanding section 2.3.3, a *meter* will be reported as a different type within the *metering database* where this is necessary to support the *enhanced technology* feature.

3.2.5 Not used.

3.2.6 Not used.

3.2.7 Not used.

3.2.8 Where bi-directional capability is required for the *metering installation*, the *Network Operator,* in accordance with clause 3.3C of the *Code*, must ensure the net electricity production and consumption is separately measured and recorded by the meter.

3.2.9 If *metering installations* with *enhanced technology* are introduced to the *network* this *Metrology Procedure* will be amended if necessary to cater for other features of these *metering installations*.

3.3 Prepayment Meters [HP 2.3]

3.3.1 The Network Operator will not provide prepayment meters.

3.4 Installation of Meters [HP 2.8]

3.4.1 The *Network Operator* will ensure that when each *meter* and associated *data logger* (where the *data logger* is located at the *metering point*) is installed, it is checked to ensure that:

a) it complies with the relevant requirements of Schedules 1, 2 and 3 of this document

b) the *CT* cores of *revenue metering installations* must not be used for any purpose other than *revenue metering* and *check metering* as per clauses 3.12(1)(a) and 3.12(1)(b) of the *Code*

3.5 Metering Installation Components [HP 2.4]

3.5.1 The requirements in this clause are applicable to Types 1 – 6 metering installations.

3.5.2 The *Network Operator* will ensure that the components, characteristics and requirements for *meter* provision for Type 1 – 6 *metering installations* are in accordance with Schedules 1, 2 and 3.

3.5.3 Schedule 1 details the minimum requirements for *meter* provision for the type 1 – 6 *metering installations*, schedule 2 details additional minimum requirements for type 5 *metering installations* and schedule 3 details additional minimum requirements for type 6 *metering installations*.

3.5.4 Subject to clauses 3.5.1 and 3.5.2, *metering installations* which have been installed, or which are held in stock for the *Network Operator*, prior to the effective date of the initial *Metrology Procedure* and which do not meet the requirements in Schedules 1, 2 or 3 may be used at the discretion of the *Network Operator*.

3.5.5 The *Network Operator* will make a determination of the *metering installation* type based on the historic or anticipated annual consumption and peak *load* at the *connection point*.

3.5.6 An increase in annual or peak consumption that, in the opinion of the *Network Operator* places the *connection point* into a higher type will result in a *meter* upgrade. Where annual consumption has decreased with time no *meter* change is necessary.

3.5.7 Where a Type 6 *meter* is capable of recording both *interval energy data* and *accumulated energy data*, it will be treated as an *accumulation meter*.

3.5.8 The *meter* internal real time clock must be referenced to Australian Western Standard TIME (AWST) and maintained within an absolute error of:

a) Type 1 ±5 seconds.

b) Type 2 ±7 seconds.

c) Type 3 ±10 seconds.

d) Types 4 – 5 ± 20 seconds.

3.5.9 The *metering* database must permit collection of *data* within the timeframes specified in the relevant *service level agreement* at a level of availability of at least 99% per annum if the *metering installation* does not have a *communications link*.

3.6 Testing and Inspection of Meters [HP 2.7]

3.6.1 The *Network Operator* will ensure that *meters* on its *network* are sampled and tested in accordance with Schedules 1, 2 or 3 and *AS*1284.13, "In-service compliance testing'".

3.6.2 Not used.

3.6.3 Not used.

3.6.4 Not used.

3.6.5 Not used.

3.6.6 Not used.

3.6.7 Not used.

3.6.8 Not used.

3.6.9 Not used.

3.6.10 Not used.

3.6.11 Not used.

3.6.12 The *Network Operator* will ensure that its *meters* meet the specifications and/or guidelines outlined by the National Measurement Institute under the *National Measurement Act*.

3.7 Maintenance of Metering Installations

3.7.1 Where the *Network Operator* identifies that a component of a *metering installation* is not performing in accordance with the *Code*, the *meter* specifications, or in accordance with *good electricity industry practice*, the component will be repaired or replaced.

3.7.2 Notwithstanding section 3.7.1, if the *Network Operator* identifies any performance issues with wiring, fuses, or modems that form part of a *metering installation*, those components must be repaired or replaced in accordance with *good electricity industry practice*.

3.7.3 A *code participant* who becomes aware of an outage or malfunction of a *metering installation* or any of its components must advise the *Network Operator* as soon as practicable.

3.8 Replacement

3.8.1 Where a population of meters has been sampled and tested in accordance with section 3.6.1 and deemed to have failed, the *Network Operator* will remove and replace all *meters* within that population in accordance with the requirements of the *Code*.

4 Responsibility for Energy Data Services

4.1 Overview

4.1.1 *Energy data services* covers all aspects of retrieving, storing and disseminating the *energy data* readings recorded by the *meter*.

4.2 Metering Installation Components – Energy Data Services

4.2.1 The *Network Operator* must ensure that the components, characteristics and requirements for *energy data services* for all *metering installations* are:

a) for *metering installations* of types 1-5, as described in section 8, Schedule 4 – Components of a Type 1 - 5 Metering Installation – Energy Data Services;

b) for *metering installations* of type 6, as described in section 9, Schedule 5 – Components of a Type 6 Metering Installation – Energy Data Services;

c) for *metering installations* of type 7, as described in section 10, Schedule 6 – Components of a Type 7 Metering Installation – Energy Data Services.

4.3 Energy Data Collection from Metering Installations

4.3.1 The *Network Operator* collects *energy data* from *metering installations* by the following methods:

a) Manual *meter* read.

4.3.2 The *Network Operator* must for each *meter* on its *network*, at least once in any 12 month period undertake a *meter reading* that provides an *actual value* that passes the *validation* process as per clause 5.4 of the *Code*.

4.3.3 The *Network Operator* will ensure that for Type 5 *metering installations*, *interval energy data* will be collected on a monthly basis or in accordance with the relevant *service level agreement*.

4.3.4 The *Network Operator* will ensure that for Type 6 *metering installations*, *energy data* will be collected on a monthly or bi-monthly basis or in accordance with the relevant *service level agreement*.

4.3.5 The *Network Operator* will ensure that for Type 7 *metering installations*, *energy data* is calculated, *validated* and *substituted* in accordance with the *Code*.

4.3.6 Where a Type 6 *metering installation* is capable of recording both *interval* and *accumulated energy data*, it will be treated as an *accumulation meter*.

4.3.7 Energy Data Collection Schedule
The *Network Operator* and *customer* may agree other reading frequencies for specific *meters* or classes of *meters*, as documented in a *service level agreement*.

4.3.8 Not used.

4.3.9 The *Network Operator* will ensure that *energy data* is collected from a *meter* or a *meter's* associated *data logger* and this *energy data* is transferred to the relevant *metering database*, no later than 2 *business days* after the scheduled reading date for that *metering installation*, or within the time frame specified in the applicable *service level agreement*.

4.3.10 Where energy data is collected from a meter or meter/associated data logger by a user this data must be provided to the Network Operator no more than two (2) business days after collecting or receiving the data, or within the period specified in the applicable service level agreement.

4.3.11 The *Network Operator* will ensure that a schedule is developed and maintained to determine the scheduled dates for reading each *metering installation* in accordance with clauses 5.3 and 5.4 of the *Code*, or such time specified in the applicable *service level agreement*.

4.3.12 Where the *Network Operator* chooses to gather and issue *energy data* more frequently than the published *meter* reading schedule, the *customer* will only be charged for reading in accordance with the published *meter* reading schedule or in accordance with the applicable *service level agreement*.

4.3.13 The *Network Operator* and the *code participant* may choose, by agreement, to disseminate the *energy data* for *metering installation* Types 1-5 more frequently. Under these circumstances the published *meter* reading schedule, substitution and other deadlines will not be affected.

4.3.14 The *Network Operator* and a *user* can agree other reading frequencies for specific *meters* or classes of *meters*, as documented in a *service level agreement*.

4.3.15 The *Network Operator* will accept requests for special *meter* reads outside the published schedule in accordance with the provisions of the *Communication Rules* or the *Code*, and will respond to valid requests within the response times specified in the applicable *service level agreement.*

4.3.16 Where the *Network Operator* receives a request from a *customer* to provide *energy data* or *standing data*, the *Network Operator* will provide such *energy data* or *standing data* in accordance with clauses 5.17 and 5.17A of the *Code*. Further requirements may be expressed in other enhancements such as clause 10.7 of the *Code of Conduct*.

4.3.17 After conducting a *meter* reading and obtaining *energy data* for a *metering point*, the *Network Operator* will provide access to that *energy data* to the *user* for the *metering point* in accordance with clauses 5.6 and 5.7 of the *Code* and in accordance with the *Communication Rules*.

4.3.18 Following a successful *meter* read or, substitution or estimation of *energy data*, the *metering database* will store the *energy data* for a period of at least 13 months in a readily accessible online format and for a further period of 5 years and 11 months in archive that is accessible independently of the format in which the *data* is stored.

4.3.19 The format of the *energy data* must be in accordance with the *Communication Rules*.

4.3.20 Energy data (*actual*, *substituted* or *estimated*) is required by the *Network Operator* by *data stream* for all *trading intervals* (that is, 48 *intervals* per 24 hour period) within the timeframe outlined in the *Code* or the applicable *service level agreement*.

4.3.21 The *Network Operator* will maintain a disaster recovery plan for the *metering database*, in accordance with clause 4.1(3) of the *Code* to ensure that following an event causing loss of access to *energy data*, *Code Participants* regain access to *energy data* within 2 *business days*.

4.4 Validation And Substitution/Estimation of Energy Data

4.4.1 The *Network Operator* will ensure that *energy data* collected for a *metering installation* of types 1 to 5 in accordance with clause 4.3 is *validated* in accordance with the *validation* rules in section 11, Schedule 7 – Metering Installation Types 1-5 – Validation.

4.4.2 The *Network Operator* must ensure that *energy data* collected for a *metering installation* of type 6 in accordance with clause 3.3 is *validated* in accordance with the *validation* rules in section 13, Schedule 9 – Metering Installation Type 6 – Validation, Substitution and Estimation.

4.4.3 The *Network Operator* must ensure that *energy data* collected for a *metering installation* of type 7 in accordance with clause 3.3 is *validated* in accordance with the *validation* rules in section 15, Schedule 11 – Metering Installation Type 7 – Validation and Substitution.

4.4.4 Where a *Code Participant* requests *validation* of *data* under clause 5.20 of the *Code*, the *Network Operator* will repeat the applicable tests specified in clauses 4.4.1, 4.4.2 or 4.4.3.

4.4.5 Where the *energy data* fails the *validation* tests under clauses 4.4.1, 4.4.2, 4.4.3 or 4.4.4, the *Network Operator* will review the *validation* failures to determine the cause of any apparently lost or erroneous *energy data* and take such corrective action as *Network*

Operator believes is warranted. Such corrective action may include:

a) manual correction of the reading, if the correct reading can be determined;

b) re-reading the *meter*, if no correction has been possible and the *meter* can be re-read prior to the applicable deadline for the dissemination of *energy data* as documented in the published *meter reading schedule*;

c) placing the associated *meter installation* under test;

d) replacing the *metering installation*;

e) repairing the *metering installation*.

{Note –

- There is always a manual review where validation fails.
- an example of where manual correction is appropriate would be the case where a review of a suspect reading reveals that the error is probably due to a transcription error such as the reversal of adjacent digits.
- an example of where a re-read may be appropriate is if it is still within the current billing cycle and the meter has remote reading capability or can be easily visited by a meter reader or other metering personnel.}

4.4.6 Following the review under clause 4.4.5, except in the cases of 4.4.5a) and 4.4.5b), or where it has not been possible to successfully read the *meter*, the *Network Operator* may elect to *substitute* the *energy data* for the period under consideration.

4.4.7 Where the *energy data* is required for *market* settlement purposes and a reading is not scheduled for the *meter* prior to the end of the settlement period, the *Network Operator* may *estimate* the *energy data* for the period under consideration.

4.4.8 For *metering installations* of types 1-5 the *Network Operator* must ensure that the *energy data* is *substituted* or *estimated* in accordance with section 12, Schedule 8 – Metering Installation Types 1-5 – Accumulation, Substitution and Estimation, where:

a) the *Network Operator* has elected to perform *substitution* under clause 4.4.6; or

b) the *Network Operator* has elected to perform estimation under section 4.4.7; or

c) there has been a failure of the *metering equipment*; or

d) an inspection or test on the *metering equipment* has established that the measurement uncertainty exceeds the specified standard for that class of *meter*.

4.4.9 For metering installations of type 6 the *Network Operator* must ensure that the *energy data* is *substituted* or *estimated* in accordance with section 13, Schedule 9 – Metering Installation Type 6 – Validation, Substitution and Estimation, where:

a) the *Network Operator* has elected to perform *substitution* or *estimation* under clause 4.4.6; or

b) the *Network Operator* has elected to perform

c) there has been a failure of the *metering equipment*; or,

d) an inspection or test on the *metering equipment* has established that the measurement uncertainty exceeds the specified standard for that class of meter.

4.4.10 For metering installations of type 7 the *Network Operator* must ensure that the *energy data* is *substituted* or *estimated* in accordance with section 15, Schedule 11 – Metering Installation Type 7 – Validation and Substitution, clause 15.2, where:

a) a check or verification under clause 15.1 of the information and algorithms used in the calculation of *energy data* for a Type 7 *metering installation* establishes that an error exists in the *energy data* calculation.

4.4.11 Where the *energy data substituted* or estimated in accordance with section 4.4, Validation And Substitution/Estimation of Energy Data, pertains to an *energy data* channel of a *meter* for which *reactive energy data* is recorded in addition to an *active*

energy channel, then both channels must be substituted or estimated as a set to ensure consistency and the availability of correct *power factors*.

4.4.12 Where any of the alarm status descriptions listed in section 10, Schedule 7 – Metering Installation Types 1-5 – Validation, occur, the *energy data* may be substituted except where the reported status is determined to be incorrect by *Network Operator*. Where an incorrect error condition has been detected, the *Network Operator* may consult with the *user* over the correct course of action or apply procedures in line with this *Metrology Procedure* or *good electricity industry practice*.

4.4.13 Where an alarm outlined in section 10, Schedule 7 – Metering Installation Types 1-5 – Validation, is triggered by the meter, regardless of whether it requires substitution of *energy data,* which is not caused by a *metering installation* fault but which can be compensated for by an adjustment to the *metering installation,* the *metering installation* may be reset, reprogrammed or otherwise adjusted as applicable, within the period defined in the applicable *service level agreement* for *meter* repairs, unless the *Network Operator* is satisfied that the alarm condition triggered will not recur.

4.4.14 *Substituted energy data* may be marked as a final *substitute* when no further updates are possible. For the avoidance of doubt, it is not necessary to issue a final *substitute* for any particular reading.

4.4.15 Where it is necessary to *substitute* a *meter* reading because of an inability to access the *meter*, a reason code will be supplied in accordance with the *NEM12* and *NEM13 meter data* file format specification and in accordance with Appendix 3 of the *Code*.

4.5 Calculation of Energy Data For Type 7 Metering Installations

4.5.1 The *customers* and the *Network Operator* have agreed that type 7 consumption calculations will continue to be made by the methods and systems in place prior to the *Commencement Date* specified in section 1.5 of this *Metrology Procedure*, for the foreseeable future. The method of substitution under this agreement is thus treated as type 74 under the *Code* and this *Metrology Procedure* sub-clause 15.2.2d), Substitution Method 74 - Agreed Method..

4.5.2 Street lighting and all UMS installations are classified as Type 7 *connection points* and the *energy data* is estimated using the following calculations:

Street Lighting	**kW x hours of operation x number of applicable billing days x number of assets** In addition, the following daily charges apply: Fixed charge x number of assets Daily asset type charge x number of asset types

4.5.3 The *metering installation* and *metering database* associated with each type 7 *meter* are therefore the systems in use at the *Commencement Date*, or as agreed between the *customers* at type 7 *metering installations* and the *Network Operator.*

4.5.4 The *Network Operator* must ensure that *energy data* for a type 7 *metering installation* is calculated in accordance with section 14, Schedule 10 – Metering Installation Type 7 – Energy Calculation.

4.5.5 The *Network Operator* must ensure that the *energy data* for a type 7 *metering installation* is *validated* in accordance with section 15, Schedule 11 – Metering Installation Type 7 – Validation and Substitution.

4.5.6 The *Network Operator* must ensure that the *energy data* is *substituted* in accordance with substitution method 74 as defined in section 15, Schedule 11 – Metering Installation Type

7 – Validation and Substitution, where the *energy data* calculated for a type 7 metering installation fails the *validation* test conducted in accordance with clause 4.5.5

4.5.7 The *Network Operator* must ensure that, where *energy data* for a type 7 metering installation is *substituted* in accordance with clause 4.5.6, affected *Code Participants* are advised that *substituted* data will be used for settlements purposes.

4.6 Data Storage

4.6.1 The *Network Operator* must provide a *metering database* containing *energy data* in respect of each types 1-5, 6 and 7 *metering installations*, in accordance with the requirements,:

a) for *metering installations* of types 1-5, as described Section 8, Schedule 4 – Components of a Type 1 - 5 Metering Installation – Energy Data Services; and,

b) for *metering installations* of types 6, as described Section 9, Schedule 5 – Components of a Type 6 Metering Installation – Energy Data Services; and,

c) for *metering installations* of types 7, as described Section 10, Schedule 6 – Components of a Type 7 Metering Installation – Energy Data Services.

4.6.2 For the avoidance of doubt, the *energy data* for a type 5 or type 6 *metering installation* is the *data* collected from the *meter* or associated *data logger* in accordance with clause 4.3 subject to clause 4.4, and/or the *data* that is *estimated* in accordance with clause 4.5.

4.6.3 The rights of access to the *data* held within the *metering database* are set out in clauses 4.8 and 7.6 of the *Code* and in clause 4.7.1 of this *Metrology Procedure*.

4.6.4 The *Network Operator* will ensure that *energy data* is collected from a *meter* or a *meter*'s associated *data logger* and this *energy data* is transferred to the relevant *metering database*, no later than 2 *business days* after the scheduled reading date for that *metering installation*, or within the time frame specified in the applicable *service level agreement*.

4.6.5 After conducting a *meter* reading and obtaining *energy data* for a *metering point,* the *Network Operator* will provide access to that *energy data* to the *user* for the *metering point* and the *IMO* in accordance with clauses 5.6 and 5.7 of the *Code* and in accordance with the *Communication Rules*.

4.6.6 Following a successful *meter* read or, *substitution* or *estimation* of *energy data*, the *metering database* will store the *energy data* for a period of at least 13 months in a readily accessible online format and for a further period of 5 years and 11 months in archive that is accessible independently of the format in which the *data* is stored.

4.6.7 The format of the *energy data* must be in accordance with the *Communication Rules*.

4.6.8 *Energy data* (actual, *substituted* or *estimated*) is required by the *Network Operator* by *data stream* for all *trading intervals* (that is, 48 intervals per 24 hour period) within the timeframe outlined in the *Code* or the applicable *service level agreement*.

4.7 Information, Access and Security

4.7.1 The *Network Operator* must provide access to *energy data* to a *Code Participant* for each *connection point* at which the *Code Participant* supplies, generates or purchases electricity and has an *access contract* with the *Network Operator*.

4.7.2 Where a *communication link* is installed for a *metering installation*, the *Network Operator* will provide a read-only password and *connection details* to the *Code Participants* who have access under clause 4.7.1.

4.7.3 Not used.

4.7.4 The *Network Operator* must provide access to *energy data* to the *Authority* for auditing and compliance purposes upon request.

4.7.5 For the purposes of clauses 4.7.1 to 4.7.4 access to *energy data* must be provided as follows:

a) where *energy data* for a type 1-6 *metering installation* has been collected in accordance with clause 4.3, and *validated* in accordance with clause 4.4, by 5.00 pm on the second *business day* after that *energy data* has been collected; or

b) where *energy data* for a type 1-6 *metering installation* has been *substituted* in accordance with clause 4.4, by 5.00pm on the second *business day* after that *energy data* has been *estimated*; or

c) where *energy data* for a type 7 *metering installation* has been *validated* and *substituted* in accordance with clause 4.4 by 5.00pm on the second *business day* after that *energy data* has been calculated in accordance with clause 4.5.

4.7.6 The *Network Operator* must ensure that access to the *metering installation* is secured from unauthorised access in line with clause 4.8.4(a) of the *Code* and in line with *good electricity* and IT *industry practice*.

4.7.7 The *Network Operator* must ensure that access to the *metering database* is secured from unauthorised access in line with clause 4.8.4(a) of the *Code* and in line with *good electricity* and IT *industry practice*.

4.7.8 The *Network Operator* will provide local access to the *energy data* from a *metering installation* to a *user* who is a *retailer* or *generator* of the *connection point* with which the *metering installation* is associated.

4.8 Validation of Metering Database

4.8.1 The *Network Operator* must ensure that a sampling plan is established and maintained, in accordance with Australian Standards "AS1199: Sampling Procedures and Tables for Inspection by Attributes" or "AS2490: Sampling Procedures and Charts for Inspection by Variables for Percent Nonconforming" to *validate* that the *data* stored in the *metering database* with respect to a type 5 or type 6 *metering installations* is consistent with the *data* stored in the *meter* or *meter*/associated *data logger*.

4.8.2 The *validation* test must be conducted at a frequency in accordance with the sampling plan described in clause 4.8.1, which must not be less than once every twelve (12) months.

4.8.3 If there is an inconsistency between the *data* held in a *meter* or *meter*/associated *data logger*, and the *data* held in the *metering database*, the *data* in the *meter* or *meter*/associated *data logger* is to be taken as prima facie evidence of the *energy data* for that *metering point*.

4.8.4 The *Network Operator* must ensure that a sampling plan is established and maintained in accordance with section 15, Schedule 11 – Metering Installation Type 7 – Validation and Substitution, to validate that the *data* stored in the *metering database* with respect to a type 7 *metering installation* is consistent with the physical inventory.

4.8.5 A *validation* test must be conducted at a frequency in accordance with the sampling plan described in clause 4.8.4, which must not be less than once every twelve (12) months.

4.8.6 The *energy data* stored in a *metering database* for a type 7 *metering installation*, for an *NMI*, is consistent with the physical inventory if the error associated with calculating the *energy* value for the sample is within the accuracy requirement determined in accordance with clause 4.8.7. That is,

$$\Delta E = \frac{\sum_{i=1}^{n} m_i n_i}{\sum_{i=1}^{n} x_i y_i} - 1$$

Where,

ΔE is the error associated with calculating the energy value for the sample geographic area.

m_i is the agreed load of *device* type i, as per the Load Table.

n_i is the actual number of *device*s of *device* type i in the sample geographic area.

x_i is the agreed load of *device* type i, as per the Load Table.

y_i is the actual number of *device*s of *device* type i in the sample geographic area, as per the Inventory Table.

4.8.7 The accuracy requirement for the *energy data* for a type 7 *metering installation*, based on the formula in clause 4.8.6, shall be +/-2.0% by a date determined by the *Network Operator*. The accuracy requirement prior to this date will be determined by the *Network Operator* and the affected *Code Participants* in a transition plan which will be developed when the Inventory Table and Load Table are first agreed and the accuracy of those initial tables has been determined by the *Network Operator*.

4.8.8 If there is an inconsistency between the *data* held in the *metering database* and the physical inventory, the physical inventory is to be taken as prima facie evidence of the actual *data*.

4.8.9 Actions in event of non-compliance with accuracy requirements are set out in:

a) Section 5, Schedule 1 – Components of Types 1- 6 Metering Installations – Meter Provision

b) Section 6, Schedule 2 – Additional Components of Type 5 Metering Installations – Meter Provision

c) Section 7, Schedule 3 – Additional Components of Type 6 Metering Installations – Meter Provision

d) Section 8, Schedule 4 – Components of a Type 1 - 5 Metering Installation – Energy Data Services

e) Section 9, Schedule 5 – Components of a Type 6 Metering Installation – Energy Data Services

f) Section 10, Schedule 6 – Components of a Type 7 Metering Installation – Energy Data Services

g) Section 11, Schedule 7 – Metering Installation Types 1-5 – Validation.

4.9 Request for Testing of the Metering Installation [RIA 4.2]

4.9.1 If requested by a *Code Participant*, the *Network Operator* must conduct a test to determine the consistency of *data* held in the *metering database* and *data* held in the *meter* or *meter*/associated *data logger* of a *metering installation*.

4.9.2 The *Network Operator* must make available the results of the test described in clause 4.9.1 to the *Code Participant* as soon as practicable.

4.9.3 The *Code Participant* who requested the test under clause 4.9.1 must pay the costs of, and associated with, that test unless the test determines an inconsistency, in which case the *Network Operator* must pay the costs of, and associated with, that test.

4.9.4 Not used.

4.9.5 Where there is a discrepancy between:

a) *energy data* stored in the *meter* or *meter*/associated *data logger*; and

b) *energy data* stored in the *metering database* in respect of the respective *meter* or *meter*/associated *data logger*, the *energy data* stored in the *meter* or *meter*/associated *data logger* is prima facie evidence of the amount of *electricity* supplied to that *metering* point.

4.9.6 If requested by a *Code Participant*, the *Network Operator* must conduct a test to determine the accuracy of *data* held in the *metering database* and the physical inventory of a type 7 *metering installation*.

4.9.7 The *Network Operator* must make available the results of the test described in clause 4.9.6 to the *Code Participant* as soon as practicable.

4.9.8 The *Code Participant* who requested the test under clause 4.9.6 must pay the costs of, and associated with, that test unless the test determines an error between the *data* held in the *metering database* and the physical inventory which is greater than the accuracy requirement as set out in clause 4.8.7, in which case the *Network Operator* must pay the costs of, and associated with, that test.

4.9.9 Where the test undertaken in accordance with clause 4.9.6 determines that the error between the data held in the metering *database* and the physical inventory is within the accuracy requirement as set out in clause 4.8.7, the *Code* Participant who requested the test under clause 4.9.6 must pay the costs of, and associated with, that test.

4.9.10 Where there is a discrepancy between the *data* held in the *metering database* and the physical inventory, the physical inventory is to be taken as prima facie evidence of the actual *data*.

4.9.11 If requested by a *Code Participant*, the *Network Operator* must, prior to any test being undertaken in accordance with clause 4.9.24.9.1 or clause 4.9.6, provide an estimate of the costs of, or associated with, that test.

{Note – the service level agreement dictates the charges associated with performing a test on the meter itself. The clauses in this section deal with different tests – namely, validation of the data in the database against the meter – that are not covered by the standard fees and which will be costed on a case by case basis.}

4.9.12 Where a *Code Participant* requests a *metering point* to be tested, the *meter* will be tested at Base *load current* (Full *load* test) and 10% Base *load current* (Light *load* test). The *Network Operator* will use the result of the Full *load* test and the Light *load* test to calculate the Weighted Average Error for the *meter*. The *meter* will be deemed defective if the result of applying the Weighted Average Error equation exceeds the accuracy limit of the *meter* under test. The equation used is:

$$WAerror(\%) = \frac{(4 x FullLoad) + LightLoad}{5}$$

Where

WA error	percentage Weighted Average Error for the meter [overall meter error] at time of test
Full Load	percentage full load error of *meter* at time of test,
Light Load	percentage light load error of *meter* at time of test.

4.10 Procedure Changes

4.10.1 This *Metrology Procedure* may be changed in accordance with Part 6 of the *Code*.

4.11 Disputes

4.11.1 The *Network Operator* will appoint an *Manager Major Contracts* to be available to *Code Participants* to contact during normal *business hours*. Each *Code Participant* is also to nominate a contact person during *business hours*.

4.11.2 The *Manager Major Contracts* will be ultimately accountable for the relationship of the *Network Operator* with the *Code Participants*.

4.11.3 Any *disputes* associated with this *Metrology Procedure* will be addressed in the first instance to the *Manager Major Contracts* for resolution. The *Manager Major Contracts* will investigate the *dispute* and provide a response within 10 *business days* of any dispute being notified in writing.

4.11.4 In the event that an issue cannot be resolved to the *Code Participant*'s satisfaction, the matter should then be escalated to the *Manager Major Contracts*, again in writing, who

will respond to the complaint within 10 *business days*.

4.11.5 In the event that the issue remains unresolved following consideration by the *Manager Major Contracts*, then the *dispute* should follow the *dispute* resolution process set out Part 8, *Dispute* Resolution, in the *Code*.

4.12 Disaster Recovery

4.12.1 The *Network Operator* must ensure that disaster recovery procedures are prepared and developed in relation to the *energy data* for *metering installations* and the information stored in the *metering database*.

4.12.2 The *Network Operator* must ensure that disaster recovery procedures are prepared and developed in relation to *energy data* for *metering installations*, including the *metering database*. A disaster recovery guideline must seek to ensure that, within two *business days* after the *day* of any disaster:

a) the *metering database* can be rebuilt; and

b) *energy data* can be provided to the relevant *Code Participants* including *energy data* for any of the *days* during which the *Network Operator* was affected by the disaster.

{NOTES:

Failures necessitating the implementation of the disaster recover guidelines may include, for example, the failure of components of the computer systems hosting the metering database, a fire or other natural disaster impacting the data processing centre, etc.

The basic principle is that services should be restored within two business days and no energy data should be lost as a result of the metering database being unavailable.

However, it is not practical to implement redundancy and data back up facilities for every metering installation database/data logger. Thus if a physical disaster were to befall a metering installation then some data loss would occur. Under these circumstances substitution/estimation would be utilised to provide energy data values covering any such periods}

4.12.3 The disaster recovery guideline must be prepared in accordance with:

a) the relevant requirements for dispute resolution in Part 8 of the *Code*;

b) the requirements for the repair of an outage or malfunction to a *metering installation* in clause 3.11 of the *Code*; and

c) guidelines for the substitution, estimation, and calculation of *energy data*, provided in clause 3.4 of this *Metrology Procedure*; and

d) *good electricity* and information technology *industry practice*.

4.12.4 The disaster recovery guidelines must be made available to *Code Participants* upon request.

5 Schedule 1 – Components of Types 1- 6 Metering Installations – Meter Provision

Ref	*Metering Equipment Components - HP No*	*Metering Equipment Characteristics*	*Requirements*	*Metering Code Clause or Table*	*Applicable Metering Installation Type*
5.1	*Connection point*	*Metering point*	Electricity flowing through the connection point is to be greater than 1,000 GWh per annum.	Appendix 1 Table 3	Type 1
5.2	*(HP Schedule 1 meant to cover Types 1 – 4 but instead covers also 1 - 6)*		Electricity flowing through the connection point is to be greater than 100 GWh but less than 1,000 GWh per annum.	Appendix 1 Table 3	Type 2
5.3	*5.3*		Electricity flowing through the connection point is to be greater than 0.75 GWh but less than 100 MWh per annum.	Appendix 1 Table 3	Type 3
5.4	*5.4*		Electricity flowing through the connection point is to be greater than 300 MWh but less than 750 MWh per annum.	Appendix 1 Table 3	Type 4
5.5	*6.1*		Electricity flowing through the connection point is to be greater than 50MWh but less than 300 MWh per annum.	Appendix 1 Table 3	Type 5
5.6	*7.1*		Electricity flowing through the connection point is to be less than 50 MWh per annum.	Appendix 1 Table 3	Type 6
5.7	*5.5*	*Metering Installation*	A *metering point* must have two separate *metering installations*, a “revenue” *metering installation* and a “check” *metering installation*.	3.13 Table 1	Type 1

5.8	5.6		A *metering point* must have, a revenue *metering installation* and either a partial check *metering installation* or a check *metering installation*.	3.13 Table 1	Type 2
5.9	5.7, 6.2, 7.2		No check *metering installation* required.	3.13 Table 1	Type 3 - 6
5.10	5.8, 6.3, 7.3, 7.12		The *revenue metering* point is to be located as close as practicable to the *connection point*.	3.5(4)	Type 1 - 6
5.11	5.9, 6.4, 7.4		The *meter* is to be mounted on an appropriately constructed panel.	3.5	Type 1 - 6
5.12	5.10, 6.5, 7.5	Overall accuracy	Overall accuracy for a *metering installation* shall be no greater than 0.5% for *active energy* and 1.0% for *reactive energy*.	Appendix 1 Table 3	Type 1
5.13	5.11		Overall accuracy for a *metering installation* shall be no greater than 1.0% for *active energy* and 2.0% for *reactive energy*.	Appendix 1 Table 3	Type 2
5.14	5.12		Overall accuracy for a *metering installation* shall be no greater than 1.5% for *active energy* and 3.0% for *reactive energy*.	Appendix 1 Table 3	Type 3
5.15	5.13		Overall accuracy for a *metering installation* shall be no greater than 1.5% for *active energy.*	Appendix 1 Table 3	Type 4 - 6
5.16	5.14		High voltage *connection points* with an annual consumption of less than 750 MWh per annum must meet the accuracy requirements for a Type 3 *metering installation.*		Type 4
5.17	5.15, 6.6, 7.6	Testing facilities	Suitable isolation facilities must be provided to facilitate testing and calibration of the *metering installation*.	3.12(3)	Type 1 - 6
5.18	5.16-17	Check metering	If a separate *check metering installation* is required, the *check metering installation* shall use separate *current transformer* cores and separately fused *voltage transformer* secondary circuits preferably from separate secondary windings.	3.13(2)	Type 1 - 2
5.19	5.18		If a separate check *metering installation* is required, the check *metering installation* must not exceed twice the error level permitted under the Code for the revenue meter for the metering point.	3.13(4)(a)	Type 1 - 2

5.20			Partial *check metering installation* may be supplied from secondary circuits used for other purposes.	3.13(3)(a)	Type 2
5.21	5.19		Where the *check metering installation* duplicates the *revenue metering installation* and accuracy level, the average of the two validated data sets may be used to determine the energy measurement.	3.13(5)	Type 1 - 2
5.22	*Instrument transformers* 5.20-21	*Current transformer*	The accuracy of the *current transformer* is to be in accordance with class 0.2.	Appendix 1 Table 3	Type 1
5.23	5.22		The accuracy of the *current transformer* is to be in accordance with class 0.5.	Appendix 1 Table 3	Type 2 – 5
5.24	5.23		The *current transformer* core and secondary wiring associated with the *revenue meter* may not be used for other purposes.	3.12(1)(a) & (b)	Type 1 – 5
5.25	5.24		New *current transformers* must meet the relevant requirements of AS60044.1 and must also comply with any applicable specifications or guidelines (including any transitional arrangements) specified by the National Measurement Institute under the *National Measurement Act*.	3.12(2)	Type 1 – 5
5.26	5.25		*Current transformers* in service at the *Code* commencement date that do not comply with the accuracy requirements are acceptable providing the overall accuracy of the installation meets *Code* requirements for the applicable Type *metering installation*.	3.14(3) Appendix 1 Table 3	Type 1 – 5
5.27	5.26	*Voltage transformer*	The accuracy of the *voltage transformer* is to be in accordance with class 0.2.	Appendix 1 Table 3	Type 1
5.28	un-numbered		The accuracy of the *voltage transformer* is to be in accordance with class 0.5.	Appendix 1 Table 3	Type 2 - 3
5.29	5.27		If separate secondary windings are not provided, then the *voltage supply* to each *metering installation* must be separately fused and located in an accessible position as near as practical to the *voltage transformer* secondary winding.	3.12(1)(d)	Type 1 - 3

5.30	5.28 / RIA 5.30		New *voltage transformers* must meet the relevant requirements of AS60044.2 and must also comply with any applicable specifications or guidelines (including any transitional arrangements) specified by the National Measurement Institute under the National Measurements Act.	3.12(2)	Type 1 - 3
5.31	5.29		*Voltage transformers* in service at the *Code* commencement date that do not comply with the accuracy requirements are acceptable providing the overall accuracy of the installation meets *Code* requirements for the applicable type *metering installation*.	3.14(3)	Type 1 - 3
5.32	- Not in Code	Secondary windings	Separate secondary windings should be provided for each *metering installation*.		Type 1 - 5
5.33	5.30, 6.13		Secondary wiring must be by the most direct route and the number of terminations and links must be kept to a minimum.	3.12(1)(f)	Type 1 - 3
5.34	5.31, 6.14		2.5 mm² cable is required for *current transformer* secondary wiring.		Type 1 - 5
5.35	5.31, 6.14		1.5 mm² cable is required for *voltage transformer* secondary wiring.		Type 1 - 4
5.36	5.32, 6.14		The incidence and magnitude of burden changes on any secondary winding supplying the *metering installation* must be kept to a minimum.	3.9(3)	Type 1 - 5
5.37	5.33, 6.15 removed “for instrument transformers” there is a blank reqt for all at 5.67	Reliability	*Metering installation* must operate consistently with good *electricity industry practice* to measure, record and collect *data* in accordance with the time specified in the applicable *service level agreement* at a level of availability of at least 99% per annum.	3.11(1)(a)	Type 1 - 5
5.38	5.34, 6.16	Outages	If an outage or malfunction occurs to an *instrument transformer,* repairs must be made as soon as practicable, and in any event within the period specified within the relevant *service level agreement.*	3.11(2)	Type 1 - 5

5.39	Measurement element 5.35-36, 6.18, 7.7-8	Design standard	*Meters* must meet the relevant requirements of AS1284 and must also comply with any applicable specifications or guidelines (including any transitional arrangements) specified by the National Measurement Institute under the *National Measurement Act*.	3.1	Type 1 - 6
5.40	5.37, 6.19		If metering class *VTs* and *CTs* are in-service at the *Code* commencement date whose accuracy does not meet *Code* requirements then the *Network Operator* must either, or both, install *meters* of a higher class of accuracy and apply accuracy calibration factors within the *meter* to compensate for the *transformer* errors. Other *meters* in service at the *Code* commencement date whose accuracy does not meet *Code* requirements may remain in service for as long as the overall accuracy of the installation complies with the overall accuracy for a type of *metering installation*.	3.14(3)	Type 1 - 5
5.41	5.37, 7.9		For whole *current* installations, *meters* that are in-service at the *Code* commencement date whose accuracy does not meet *Code* requirements, then the *Network Operator* must replace the *meters*.	3.14	Type 4 - 6
5.42	5.38, 6.20 as per Code / RIA 5.42		Where bi-directional electricity flows occur meters must separately measure bidirectional electricity flows at the metering point and must record: (a) the net electricity production transferred into the network that exceeds electricity consumption, and (b) the net electricity consumption transferred out of the network that exceeds electricity production {NOTE: Division 3.3 of the Code, which includes Clauses 3.15 to 3.18, only applies to the SWIS, this Metrology Procedure does not apply to the SWIS so Division 3.3 is not applicable. Clause 3.16 applies to the Wholesale Electricity Market which does not apply to the *Network Operator* (*Rottnest Island Authority*)}	3.16(1)(b) 3.3C	Type 1 - 6
5.43	5.39	Accuracy	The accuracy of the active and reactive *measurement elements* is to be class 0.2 and class 0.5 respectively.	Appendix 1 Table 3	Type 1
5.44	5.40		The accuracy of the active and reactive *measurement elements* is to be class 0.5 and class 1.0 respectively.	Appendix 1 Table 3	Type 2

5.45	5.41		The accuracy of the active and reactive *measurement elements* is to be class 0.5, 1.0 and class 2.0 respectively.	Appendix 1 Table 3	Type 3
5.46	5.42, 6.21		The accuracy of the active element is to be class 0.5 and 1.0.	Appendix 1 Table 3	Type 4-5
5.47	7.10		The accuracy of the *meter* class is to be *General Purpose*.	Appendix 1 Table 3	Type 6
5.48	5.43, 6.22, 7.11	Visible display	To be provided on a *device* and to display as a minimum the accumulated total *active energy* measured by that *metering installation*.	3.2(1)	Type 1 - 6
5.49	5.45, 6.24, 7.13	Security	The *measurement element* must be secure and associated links, circuits and information storage and processing systems must be secured by means of seals or other *device*s approved by the *Network Operator*.	3.8	Type 1 - 6
5.50	5.46	Storage	The measuring *device* must store *active* and, if required, *reactive energy* data in a *data logger*.	3.5(2) Appendix 1 Table 3	Type 1 - 3
5.51	5.47, 6.25		The measuring *device* must store *active energy* data.	3.5(2)(b)	Type 4 - 5
5.52	5.48, 6.27, 7.14	Access to data	Access to the visible display is to be provided without unreasonable restriction.	3.2(1)	Type 1 - 6
5.53	5.49, 6.28, 7.15		Access to the electronic signal from the *measurement element* is secured. Relays or electronic buffers to prevent accidental or malicious damage to the *meter* must isolate interfaces to *customer* equipment.	3.23	Type 1 - 6
5.54	5.50, 6.29, 7.16		Access to the electronic signal for use in evolving technologies is to be discussed with the *Network Operator*.	3.20	Type 1 - 6
5.55	5.51, 6.30, 7.17		Alteration to the original stored *data* in a *meter* is not permitted except during on-site accuracy testing and calibration of a *metering installation*.	5.21(12)	Type 1 - 6

5.56	5.52, 6.31, 7.18	Outages	If an outage or malfunction occurs to a *measurement element* or associated secondary wiring, repairs must be made within the period specified in the relevant *service level agreement*.	3.11(2)	Type 1 - 6
5.57	Data Logger 5.54, 6.33	Input Connection	The *data logger* is to be electrically connected to the *measurement element* by secure means.		Type 1 - 5
5.58	5.55, 6.34	Design Standard	Any programmable settings available within a *metering installation*, *data logger* or any peripheral *device*, which may affect the resolution of displayed or stored data, must meet the relevant requirements of AS1284 and must comply with any applicable specifications or guidelines (including any transitional arrangements) specified by the National Measurement Institute under the *National Measurement Act*.	3.10	Type 1 - 5
5.59	5.55, 6.35	Location	The *data logger* may be located within the same housing as the *measurement element* or in a separate housing.	1.3	Type 1 - 5
5.60	5.56, 6.36		The *data logger* may be located at the same site as the *measurement element* or at a remote site.	1.3	Type 1 - 5
5.61	5.57, 6.37	Security	The *data logger* is to be secure and associated links, circuits and information storage and processing systems are to be secured by means of seals or other *device*s approved by the *Network Operator*.	3.8	Type 1 - 5
5.62	5.58, 6.38	Processing of data	Data relating to the amount of *active energy* and *reactive energy* passing through a *connection point* must be collated in *trading intervals* or sub-multiples of a *trading interval* within the *metering installation*. {NOTE: Division 3.3 of the Code, which includes Clauses 3.15 to 3.18, only applies to the SWIS, this Metrology Procedure does not include the SWIS so Division 3.3 is not applicable. Clause 3.16 applies to the Wholesale Electricity Market which does not apply to the Network Operator (Rottnest Island Authority)}	3.16(3	Type 1 - 5
5.63	5.59, 6.39	Time Function Accuracy	The *data logger* clock is to be referenced to Australian Western Standard Time and maintained to a standard of : Type 1 ±5 seconds, Type 2 ±7 seconds, Type 3 ±10 seconds, Types 4 – 5 ± 20 seconds.	Appendix 1 Table 3	Type 1 - 5

5.64	5.60, 6.40	Storage	The *data logger* is to have the capability of storing *energy data* for a period of at least 35 days. NOTE: Division 3.3 of the *Code*, which includes Clauses 3.15 to 3.18, only applies to the SWIS, this Metrology Procedure does not include the SWIS so Division 3.3 is not applicable. Clause 3.16 applies to the Wholesale Electricity Market which does not apply to the Network Operator (Rottnest Island Authority)	3.16(1)(c) 3.21(2)	Type 1 - 5
5.65	5.61, 6.41		The *Network Operator* must retain *energy data* in its *metering database* for each *metering point* on its *network* for the periods specified below as per clause 4.9 of the *Code* and clauses 4.3.18 and 4.6.6 of this *Metrology Procedure*: • for at least 13 months from the date when the data was obtained — in a readily accessible format; and • after that period for at least a further 5 years and 11 months — in a format that is accessible within a reasonable period of time.	4.9	Type 1 - 6
5.66	5.62, 6.42	Access to data	Alteration to the original stored data in a *data logger* is not permitted except during on-site accuracy testing.	5.21(12)	Type 1 - 5
5.67	5.63, 6.43	Performance	*Energy data* is required for all *trading intervals* at a level of availability of at least 99% per annum.	3.11(1)(a)	Type 1 - 5
5.68	5.64, 6.44	Outages	If an outage or malfunction occurs to a *data logger*, repairs must be made within the period specified in the relevant *service level agreement*.	3.11(2)	Type 1 - 5
5.69	Communication link 5.65, 6.45	Location	The *electronic* connection between the *data logger* and the telecommunications network boundary is classified as a *communications link*.	1.3	Type 1 - 5
5.70	5.66 - .68, , 6.46-48	Equipment	A *communications link* may consist of a telephone line, *network* connection, modem or any future communication technology, with an isolation *device* that is connected to the *meter*. This *communications link* facilitates the downloading of *interval energy data* through a radio communication system, telecommunications network and other communication systems to connect it to the *Network Operator*'s *metering database* system.	3.3(3)	Type 1 - 5

5.71	5.69, 6.49	Modem	A modem is used to connect the *metering installation* to the telecommunications network at a *data logger* or *metering database*.		Type 1 - 5
5.72	5.70, 6.50	Security	The *communication link* is to be secure and associated links, circuits and information storage and processing systems are to be secured by means of seals or other *device*s approved by the *Network Operator*.	3.8	Type 1 - 5
5.73	5.71 / RIA 5.75	Access to data	The *metering installation* must be capable of remote *electronic* access. {NOTE: Division 3.3 of the Code, which includes Clauses 3.15 to 3.18, only applies to the SWIS, this Metrology Procedure does not include the SWIS so Division 3.3 is not applicable. Clause 3.16 applies to the Wholesale Electricity Market which does not apply to the Network Operator (Rottnest Island Authority)	3.6 3.16(2)	Type 1 - 4
5.74	5.72, 6.51 / RIA 5.76		The *metering installation* must be capable of local *electronic* access.	4.8	Type 5
5.75	5.74, 6.52 / RIA 5.78		The *data* held in the *metering installation* is to be protected from direct or remote *electronic* access by suitable password and security controls.	4.8(3) 4.8(4)(a)	Type 1 - 6
5.76	5.75, 6.53	Performance	*Energy data* is required for all *trading intervals* at a level of availability of at least 95% per annum for the *communication link*.	3.11(1)(b)	Type 1 – 5
5.77	5.76, 6.54 / RIA 5.79 etc		If an outage or malfunction occurs to a *communications link*, repairs must be made in accordance with the applicable *service level agreement*.	3.11(2)	Type 1 - 5

5.78	Testing and inspection 5.77-5.78, , 6.55-56, 7.19-20	Purchase of metering equipment	All *Network Operator meters* must comply with the *National Measurement Act* and in addition: • All new purchased *current transformers* must comply with AS60044.1. • All new purchased *voltage transformers* must comply with AS60044.2. • All new purchased *meters* must comply with AS1284. • All new purchased *meters* must comply with the relevant specifications of the National Measurements Institute's M6.		Type 1 - 6
5.79	5.79, 6.57, 7.21		Appropriate test certificates are to be kept by the equipment owner.	4.3	Type 1 - 6
5.80	5.80		Metering equipment will be tested to the following class accuracy and with less than the following uncertainties: • Class 0.2 *CT* & *VT* 0.05%, 0.05Crad • Class 0.2 Wh *meter* 0.05/cosϕ% • Class 0.5 varh *meter* 0.2/sinϕ%	Appendix 1 Table 3	Type 1
5.81	5.81		The uncertainties associated with testing of the components of the *metering installation* may be carried out as follows: • *CT/VT* in laboratory 0.05%, 0.05Crad • *Meter* Wh in laboratory 0.05/cosϕ% • *Meter* Wh in field 0.1/cosϕ% • *Meter* varh in laboratory 0.2/sinϕ% • *Meter* varh in field 0.3/sinϕ%		Type 1

5.82	5.82		The maximum periods between sample testing are to be: • *CT* & *VT* - 10 years • Burden tests - When changes are made • *Meters* - 2 years Refer to Appendix 2		Type 1
5.83	5.83		*Metering Installation* overall accuracy requirements; At unity *power factor* Energy Rated Load 10% 50% 100% Active 0.7% 0.5% 0.5% At 0.866 lagging *power factor* Energy Rated Load 10% 50% 100% Active 0.7% 0.5% 0.5% Reactive 1.4% 1.0% 1.0% At 0.5 lagging *power factor* Energy Rated Load 10% 50% 100% Active n/a 0.5% n/a Reactive n/a 1.0% n/a At zero *power factor* Energy Rated Load 10% 50% 100% Reactive 1.4% 1.0% 1.0%	Appendix 1 Table 4	Type 1

			The above measurements are referenced to 25ºC Method of calculating the overall error is the vector sum of the errors of each component parts, that is, a + b + c, where: a = the error of *voltage transformer* and wiring b = the error of the *current transformer* and wiring c = the error of the *meter* *energy data* for Type 1 *metering installations* is usually based on watthour (*active energy*). Where *reactive energy* is required the *metering installation* must also satisfy the requirements for varhour in this *Metrology Procedure*.		
5.84	5.84		*Metering equipment* will be tested to the following class accuracy and with less than the following uncertainties: • Class 0.5 *CT* & *VT* 0.1%, 0.1% Crad • Class 0.5 Wh *meter* 0.1/cosΦ% • Class 1.0 varh *meter* 0.3/sinΦ%		Type 2
5.85	5.85		The uncertainties associated with testing of the components of the *metering installation* may be carried out as follows: • *CT*/*VT* in laboratory 0.1%, 0.1 Crad • *Meter* Wh in laboratory 0.1/cosΦ% • *Meter* Wh in field 0.2/cosΦ% • *Meter* varh in laboratory +0.3/sinΦ% • *Meter* Wh in field +0.4/sinΦ%		Type 2

5.86	5.86		The maximum periods between sample testing are to be: • *CT* & *VT* - 10 years • Burden tests - When changes are made • *meters* - 4 years		Type 2
5.87	5.87		*Metering Installation* overall accuracy requirements; At unity *power factor* Energy Rated Load 10% 50% 100% Active 1.4% 1.0% 1.0% At 0.866 lagging *power factor* Energy Rated Load 10% 50% 100% Active 1.4% 1.0% 1.0% Reactive 2.8% 2.0% 2.0% At 0.5 lagging *power factor* Energy Rated Load 10% 50% 100% Active n/a 1.0% n/a Reactive n/a 2.0% n/a At zero *power factor* Energy Rated Load 10% 50% 100% Reactive 2.8% 2.0% 2.0% The above measurements are referenced to 25°C Method of calculating the overall error is the vector sum of the errors of each	Appendix 1 Table 5	Type 2

			component parts, that is, a + b + c, where: a = the error of *voltage transformer* and wiring b = the error of the *current transformer* and wiring c = the error of the *meter*		
5.88	5.88, Removed General Purpose Meter in HP Spec		*Metering equipment* will be tested to the following class accuracy and with less than the following uncertainties: • Class 0.5 *CT* & *VT* 0.1% .01 Crad • Class 1.0 Wh *meter* 0.2/cosΦ% • Class 2.0 varh *meter* 0.4/sinΦ%	Appendix 1 Table 3	Type 3
5.89	5.89		The uncertainties associated with testing of the components of the *metering installation* may be carried out as follows: • *CT*/*VT* in laboratory ±0.1% • *Meter* Wh in laboratory +0.2/cosΦ% • *Meter* Wh in field +0.3/cosΦ% • *Meter* varh in laboratory +0.4/sinΦ% • *Meter* Wh in field +0.5/sinΦ%		Type 3
5.90	5.90		The maximum periods between sample testing are to be: • *CT* & *VT* - 10 years • Burden tests - When changes are made • *Meters* - 5 years		Type 3

5.91	5.91		*Metering Installation* overall accuracy requirements; At unity *power factor* Energy Rated Load 10% 50% 100% Active 2.0% 1.5% 1.5% At 0.866 lagging *power factor* Energy Rated Load 10% 50% 100% Active 2.0% 1.5% 1.5% Reactive 4.0% 3.0% 3.0% At 0.5 lagging *power factor* Energy Rated Load 10% 50% 100% Active n/a 1.5% n/a Reactive n/a 3.0% n/a At zero *power factor* Energy Rated Load 10% 50% 100% Reactive 4.0% 3.0% 3.0% The above measurements are referenced to 25°C Method of calculating the overall error is the vector sum of the errors of each component part, that is, A+B+C, where: A = the error of *voltage transformer* and wiring B = the error of the *current transformer* and wiring C = the error of the *meter*	Appendix 1 Table 6	Type 3

5.92	5.92		*Metering equipment* will be tested to the following class accuracy and with less that the following uncertainties: • Class 0.5 *CT* 0.1%, 0.5 Crad • Class 1.0 Wh *meter* 0.2/cosΦ% • *General Purpose meter* 0.3/cosΦ%	Appendix 1 Table 3	Type 4
5.93	5.93		The uncertainties associated with testing of the components of the *metering installation* may be carried out as follows: • *CT* in laboratory 0.1% • *CT* in field 0.2% • *Meter* Wh in laboratory 0.2/cosΦ% • *Meter* Wh in field 0.3/cosΦ%		Type 4
5.94	5.94		The maximum periods between sample tests are to be: • *CT* & *VT* - 10 years • Burden tests - When changes are made • *Meters* - 5 years • Whole current (direct connected) *General Purpose meter* - 7 years		Type 4

5.95	5.95, 7.26 NOTE HP Does not show it for Type 5 in the Type 5 Table ; HP Values at 0.5PF are not correct / RIA 5.98		*Metering Installation* overall accuracy requirements; At unity *power factor* Energy Rated Load 10% 50% 100% Active 2.0% 1.5% 1.5% At 0.866 lagging *power factor* Energy Rated Load 10% 50% 100% Active 2.0% 1.5% 1.5% At 0.5 lagging *power factor* Energy Rated Load 10% 50% 100% Active n/a 1.5% n/a The above measurements are referenced to 25ºC Method of calculating the overall error is the vector sum of the errors of each component part, that is, A+B+C, where: A = the error of *voltage transformer* and wiring B = the error of the *current transformer* and wiring C = the error of the *meter*	Appendix 1 Table 7	Type 4 - 6
5.96	5.96, 6.62, 7.27 RIA 5.108		Testing of the components of the *metering installation* will be conducted in accordance with AS1284.13 and the *Network Operator*'s Meter Compliance Testing and Sampling Plan.		Type 1 - 6
5.97	5.97, 6.62, 7.27		Where practicable, *current transformer* and *voltage transformer* tests are based on *good electricity industry practice* and relevant applicable Australian Standards.		Type 1 - 6
5.98	5.98, 6.63, 7.28		Other affected parties may witness the tests on request.	5.21(3)	Type 1 - 6

5.99	5.99, 6.64, 7.29		The test results must be provided as soon as practicable to the requesting C*ode Participant*.		Type 1 - 6
5.100	5.100, 6.65, 7.30		All reference/calibrated equipment shall be tested to ensure full traceability to Australian national measurement standards through verifying authorities or directly referenced to the National Measurement Laboratory.		Type 1 - 6
5.101	5.101, 6.66, 7.31		The calculations of accuracy based on test results, are to include all reference standard errors.		Type 1 - 6
5.102	5.102, 6.67, 7.32 RIA 5.114		An “estimate of testing uncertainties” must be calculated in accordance with the ISO “Guide to the Expression of Uncertainty for Measurement”.		Type 1 - 6
5.103	Inspection of metering equipment 5.103, 6.68, 7.33 / RIA 5.115		The testing and inspection requirements must be in accordance with AS 1284.13 and the *Network Operator*’s Meter Compliance Testing and Sampling Plan.		Type 1 - 6
5.104	5.104, 6.69, 7.34		A typical inspection must include: check the seals; compare the pulse counts; compare the direct readings of *meters*, verify *meter* parameters and physical connections, verify *current transformer* ratios by comparison.		Type 1 - 6
5.105	5.105, 6.70 / RIA 5.117	Actions in event of non-compliance	If the accuracy of *metering installation* types 1, 2 & 3 do not comply with the requirements of the *Code*, the *Network Operator* must advise the affected parties as soon as practicable of the errors detected and the possible duration of the existence of errors and make corrections to the *energy data* up to a maximum of 12 months before the test or audit. The *Network Operator* will ensure the restoration of the accuracy of the *metering installation* in accordance with the applicable *service level agreement*.	5.21(11)	Type 1 - 3

5.106	6.70(removed), 7.35(removed) Revised RIA 5.118, replaced retailer with user		If the accuracy of the *metering installation* does not comply with the requirements of the *Code*, the *Network Operator* must advise the *user* as soon as practicable of the errors detected and the possible duration of the existence of errors, and arrange for the accuracy of the *metering installation* to be restored in a time frame agreed with the *user* in accordance with the applicable *service level agreement*.		Type 4 - 6
5.107	5.106, 6.71, 7.36 / RIA 5.119		If a test or audit of the *metering installation* demonstrates an error of measurement of less than those detailed in the **meter management plan**, no substitution of readings is required unless in *Network Operator*'s opinion a particular party would be significantly affected if no substitution was made.		Type 1 - 6
5.108	5.107, 6.72, 7.37 / RIA 5.120		If a *metering installation* test, inspection or audit demonstrates errors in excess of those prescribed, *meter* accounts shall be determined in accordance with Section 65 of the Energy Operators (Powers) Act 1979, which specifies that where the time at which those errors arose is not known, the error is deemed to have occurred at a time half way between the time of the most recent test or inspection which demonstrated that the *metering installations*, or the *meter* family to which the *meter* of the *meter installation* belongs, complied with the relevant accuracy requirement and the time when the error was detected.		Type 1 - 4
5.109	5.107, 6.72, 7.37 / RIA 5.121		If a *metering installation* test, inspection or audit demonstrates errors in excess of those prescribed and the time at which those errors arose is not known, the error is deemed to have occurred at a time half way between the time of the most recent test or inspection which demonstrated that the *metering installations*, or the *meter* family to which the *meter* of the *meter installation* belongs, complied with the relevant accuracy requirement and the time when the error was detected.		Type 5 - 7
5.110	Management, maintenance and auditing 5.109, 6.74, 7.39 / RIA 5.122	Installation and maintenance	The *Network Operator* must ensure that any *metering equipment* that is installed is suitable for the range of operating conditions to which it will be exposed (e.g. temperature; impulse levels), and operates within the defined limits for that equipment.	3.5(3)(c)	

5.111	5.110, 6.75, 7.40	Supporting information	Suitable supporting information, including drawings, if applicable, detailing the *metering installation*, must be available for maintenance and auditing purposes. This information shall be stored in an appropriate depository managed by the *Network Operator*.	3.12(4)	
5.112	5.111, 6.76, 7.41	Security controls	The *Network Operator* must, for each *metering installation* on its *network*, ensure that the *metering installation* is secured by means of *device*s or methods which, to the standard of *good electricity industry practice*, hinder unauthorised access to the *metering installation* and enable unauthorised access to be detected.	3.8	
5.113	5.112, 6.77, 7.42		The *energy data* held in the *metering installation* is to be protected from direct local or remote *electronic* access by suitable password and security controls.	4.8(4)(a)	
5.114	5.113, 6.78, 7.43		The *Network Operator* must keep records of *electronic* access passwords secure.	4.8(5)(b)	
5.115	5.114, 6.79, 7.44		*Energy data*, *standing data* and passwords are confidential and are to be treated as *confidential information*.	7.4(1)	
5.116	5.115, 6.80, 7.45		A *Registered Metering installation Provider* must be accredited by and registered with the *Network Operator* under a registration scheme approved by the *Authority*, and only for the type of work the *Registered Metering installation Provider* is qualified to provide.	6.9	
5.117	5.116, 6.81, 7.46		Where relevant, *Registered Metering Installation Providers*, who wish to apply for categories of *Registered Metering Installation Provider* accreditation of *metering installations*, must be able to exhibit, to the reasonable satisfaction of the *Network Operator*, the relevant capabilities.	6.9	

6 Schedule 2 – Additional Components of Type 5 Metering Installations – Meter Provision

Ref	*Metering Equipment Components - HP No*	*Metering Equipment Characteristics*	*Requirements*	*Metering Code Clause or Table*	*Applicable Metering Installation Type*
6.1	6.58 (5.99 RIA) Note HP 6.1-6.57 are duplicates of Schedule 1		The *CTs* will be tested to the required class accuracy with less than + 0.1 % uncertainty. The testing of the *CT's* in the *metering installation* is carried out as follows: • Maximum allowable level of testing uncertainty in the laboratory 0.1 %, 0.1 Crad • Maximum period between tests – 10 years.		Type 5
6.2	6.59		The *CT* connected *meters* will be tested to the required class accuracy with less than 0.2/cosϕ% uncertainty.		Type 5
6.3	6.60		The uncertainty associated with testing of the *CT* connected *meters* in the *metering installation* is carried out as follows: • Maximum allowable level of testing uncertainty in the laboratory 0.3/cosϕ% • Maximum allowable level of testing uncertainty in the field 0.3/cosϕ%. • Maximum period between tests – 5 years.		Type 5
6.4	6.61		The direct connected *meters* purchased must be tested to the required class accuracy with less than 0.3/cosϕ% uncertainty.		Type 5

6.5			The uncertainty associated with testing of the whole current connected *meters* in the *metering installation* is carried out as follows: • Maximum allowable level of testing uncertainty in the laboratory 0.3/cosϕ% • Maximum allowable level of testing uncertainty in the field 0.3/cosϕ%. • Maximum period between tests – 7 years.		Type 5
6.6	6.61, also 5.42Revised		The accuracy of the *measurement element* is to be in accordance with class 1.5 for *General Purpose* watt hour *meters* as per AS1284 or in accordance with class 1.0 as per AS1284 or IEC1036 standards.		Type 4 - 6

7 Schedule 3 – Additional Components of Type 6 Metering Installations – Meter Provision

Ref	*Metering Equipment Components - HP No*	*Metering Equipment Characteristics*	*Requirements*	*Metering Code Clause or Table*	*Applicable Metering Installation Type*
7.1	7.22-23 / 5.105		The *metering equipment* purchased must be tested to the following class accuracy and with less that the following uncertainties: • *General Purpose meter* 0.3/cosΦ%	Appendix 1 Table 3	Type 6
7.2	7.24 / 5.106		The uncertainties associated with testing of the components of the *metering installation* may be carried out as follows: • *Meter* Wh in laboratory 0.2/cosΦ% • *Meter* Wh in field 0.3/cosΦ%	Appendix 1 Table 3	Type 6
7.3	7.25 / 5.107		The maximum periods between sample tests are to be: Whole current (direct connected) *meter* is to be tested in accordance with AS1284.13 and the *Network Operator*'s Meter Compliance Testing and Sampling Plan. (Still to be developed)		Type 6
7.4	/ was RIA 5.104		The accuracy of the *measurement element* is to be in accordance with class 1.5 for *General Purpose* watt hour *meters* as per AS1284 or in accordance with class 1.0 as per AS1284 or IEC1036 standards.		Type 4 - 6

8 Schedule 4 – Components of a Type 1 - 5 Metering Installation – Energy Data Services

The components and characteristics and requirements of a *Metrology Procedure* for type 5 *metering installations* (*energy data services*) are as follows:

Ref	***Energy Data Services* Components - HP No**	***Energy Data Services* Characteristics**	**Requirements**	**Clause in *Code***	**Applicable *Metering Installation* Type**
8.1	*Metering Database* 8.1	Location	The *metering database* is located at a site remote from the site of the *meter installation*.		Type 1 - 6
8.2	8.2		The *metering database* is to be secure and the associated links, circuits and information storage and processing systems are to be secured by means of locks, seals or other *device*s approved by the *Network Operator*.	4.8(4)	
8.3	8.3, 8.15		The *metering database* is to be secured and the associated programs and data are to be secured by means of *device*s, passwords, appropriate encryption and other electronic security controls or methods which, to the standard of *good electricity industry practice*, hinder unauthorised local and remote access and enable unauthorised access to be detected.	4.1(2), 4.8(4)	
8.4	8.4, 8.16		*Metering database* passwords are confidential data and are to be treated as *confidential information* subject to Part 7.4 of the *Code*.	7.4.1	
8.5	8.5	Processing and storing of data	The original energy readings must be stored in the *metering database*. Data relating to the amount of *active energy* passing through a *connection point* must be collated and stored either as accumulated *energy data* or *interval energy data* in half hourly *trading intervals* within the *metering database*. The *energy data* may be substituted or estimated in accordance with section 4.4 of this *Metrology Procedure*.	4.1(1)(b)	

8.6	8.6		The *Network Operator* must retain *energy data,* including *substituted* or *estimated energy data*, in the *metering database* for a period of at least 13 months in a readily accessible format and for a further period of five years and 11 months in archive that is accessible within a reasonable period of time.	4.9	
8.7	8.7	Time function	The *metering database* clock must be referenced to Australian Western Standard TIME (AWST) and maintained within an absolute error of 20 seconds, except where allowed under clause 3.9(4) and 3.9(5) of the *Code* .	3.9(4), 3.9(5)	
8.8	8.8	Access	The format of the *energy data* must be in accordance with the *electronic* interface specification as nominated from time to time by the *Network Operator*.		
8.9	8.9, 8.21		The only persons entitled to have either direct or remote access to the *energy data* from a *metering installation* are: • the *Network Operator* • the *user* of the *connection point* with which the *metering installation* is associated, and • authorised personnel of the *registered metering installation provider* that has been authorised under its registration to perform work requiring *meter* programming access .	4.8(3), 4.8(4), 4.8(5)	
8.10	5.58, 6.38, 8.10-.11	Performance	*Energy data* (either actual, *substituted* or *estimated*) is required by the *Network Operator* by data stream for all *trading intervals* (that is, 48 *intervals* per 24 hour period) within the timeframe required for settlements as specified in procedures established by *Network Operator*. NOTE: Division 3.3 of the Code, which includes Clauses 3.15 to 3.18, only applies to the SWIS, this Metrology Procedure does not include the SWIS so Division 3.3 is not applicable. Clause 3.16 applies to the Wholesale Electricity Market which does not apply to the Network Operator (Rottnest Island Authority)	3.16(3)	Type 1 - 5
8.11	5.63, 6.43, 8.12		The *metering installations* must permit collection of *energy data* for storage into the *metering database* within the timeframes specified in the relevant *service level agreement* at a level of availability of at least 99% per annum.	3.11(1)(a)	Type 1 - 5

8.12	8.13	Outages	If an outage or malfunction occurs to a *metering installation*, repairs must be made as soon as practicable, and in any event within the period specified within the relevant *service level agreement*.	3.11(2)	
8.13	8.14		A *Code Participant* who becomes aware of an outage or malfunction of a *metering installation* must advise the *Network Operator* as soon as practicable.	3.11(3)	
8.14	5.71, 8.19	Access to the metering database	The *metering installation* must have *electronic* data transfer facilities to transfer *data* to the *metering database*. {Note: 3.16(2) only requires a link for types1-4, in practice all interval capable *meters* will have some form of remote access.} {NOTE: Division 3.3 of the Code, which includes Clauses 3.15 to 3.18, only applies to the SWIS, this Metrology Procedure does not include the SWIS so Division 3.3 is not applicable. Clause 3.16 applies to the Wholesale Electricity Market which does not apply to the Network Operator (Rottnest Island Authority)}	3.16(2)	Type 1 - 4
8.15	8.20		The format of the *energy data* must be in accordance with the electronic interface specification as nominated from time to time by the *Network Operator*.		
8.16	5.65, 6.45, 8.22 - .23		{(Comment provided for explanation only) The electronic connection between the metering database and the telecommunications network boundary is classified as a communications link. }		
8.17	8.26		{(Comment provided for explanation only) The *Network Operator* is responsible for the remote acquisition of the *energy data* from the *metering installation*.}		
8.18	8.27		Relevant *energy data* must be provided to the *Network Operator* or its agent should a failure of the remote acquisition facility occur, and such an arrangement has been made by the *Network Operator*.		
8.19	8.30		Access to the *metering database* from a *telecommunications network* must be provided to facilitate the remote acquisition of data.		

8.20	8.31		The *communications link* is to be secure and the associated links, circuits and information storage and processing systems are to be secured by means of locks, seals or other *device*s approved by the *Network Operator.*	4.8(4)	
8.21	8.32		The *communication link* must permit collection of data within the timeframes specified in the relevant *service level agreement* at a level of availability of at least 95% per annum.	3.11(1)(b)	
8.22	8.33		If an outage or malfunction occurs to a *communication link*, repairs must be made as soon as practicable, and in any event within the period specified within the relevant *service level agreement*.	3.11(2)	
8.23	8.34		A Code Participant who becomes aware of an outage or malfunction of a communication link must advise the Network Operator as soon as practicable.	3.11(3)	
8.24	Testing 8.35	Testing by Network Operator	The *Network Operator* must have unrestrained access to the *metering installation* for the purpose of testing the *metering installation* where *Network Operator* agrees to comply with reasonable security and safety requirements and has first given at least two business days' notice of its intention to access the *metering installation* for the purpose of testing the *metering installation*. The notice must include the name of the representative who will be conducting the test on behalf of the *Network Operator,* and the time when the test will commence and the expected time when the inspection will conclude.		
8.25	8.36	Actions in event of non-compliance	If the accuracy of the *metering installation* does not comply with the requirements of the *Code*, the *Network Operator* and the affected *Code Participants* must be advised as soon as practicable of the errors detected and the possible duration of the existence of errors, and arrangements must be made for the accuracy of the *metering installation* to be restored in a time frame agreed by the *Network Operator*.		

8.26	8.37, 5.107, 6.72, 7.37 as per above 5.108 see also RIA 5.120	Errors	If a *metering installation* test, inspection or audit reveals errors in excess of those prescribed and the time at which those errors arose is not known and cannot be determined within a reasonable time or at reasonable cost, the error is deemed to have occurred half way between the time the error was detected and the time of the last test, inspection or audit that demonstrated that the *metering installation* complied with the specification or, if this is the first test, inspection or audit, the time the *metering installation* was commissioned.		
8.27	8.38, 5.106, 6.71, 7.36 as per above 5.107 see also RIA 5.119		If a test or audit of the *metering installation* demonstrates an error of measurement of less than those detailed in the **meter management plan**, no substitution of readings is required unless in *Network Operator*'s opinion a particular party would be significantly affected if no substitution was made.		Type 1 - 6
8.28	8.39	Errors	If a test, audit or inspection reveals a discrepancy between the *metering database energy data* and the *metering installation energy data*, the *metering installation energy data* shall take precedence.		
8.29	Management, maintenance and auditing 8.40	Installation and Maintenance	Only the *Network Operator*, in accordance with this *Metrology Procedure*, must carry out installation and maintenance of *metering installations*.		
8.30	8.41	Security Controls	The *energy data* held in the *metering installation* is to be protected from direct local or remote electronic access by suitable password and security controls in accordance with *good electricity industry practice*.		
8.31	8.42		The *metering installation* is to be secure and the associated programs and data are to be secured from unauthorised local and remote by means of passwords, and other *electronic* security controls, in accordance with *good electricity industry practice*.		
8.32	8.43		*Metering installation passwords* are confidential data and are to be treated as *confidential information* subject to Part 7.4 of the *Metering Code*.	7.4(1)	

8.33	8.44		Read-only" passwords must be allocated to *Code Participant*s, Local Network Service Providers and *Network Operator*, except where separate "read-only" and" write" passwords are not available, in which case a password must be allocated to *Network Operator*, only.		
8.34	8.45		The *Network Operator* is responsible for maintaining the *metering installation* and *metering database* passwords.		

9 Schedule 5 – Components of a Type 6 Metering Installation – Energy Data Services

The components and characteristics and requirements of a *Metrology Procedure* for type 6 *metering installations* (*energy data services*) are as follows:

Ref	***Energy Data Services* Components - HP No**	***Energy Data Services* Characteristics**	**Requirements**	**Clause in *Code***	**Applicable *Metering Installation* Type**
9.1	*Metering Database* 9.1	Location	The *metering database* is located at a site remote from the site of the *meter installation*.		Type 1 - 6
9.2	9.2		The *metering database* is to be secure and the associated links, circuits and information storage and processing systems are to be secured by means of locks, seals or other *device*s approved by the *Network Operator*.	4.8(4)	
9.3	9.3, 9.15		The *metering database* is to be secured and the associated programs and data are to be secured by means of *device*s, passwords, appropriate encryption and other electronic security controls or methods which, to the standard of *good electricity industry practice*, hinder unauthorised local and remote access and enable unauthorised access to be detected.	4.1(2), 4.8(4)	
9.4	9.4, 9.16		*Metering database* passwords are confidential data and are to be treated as *confidential information* subject to Part 7.4 of the *Code*.	7.4.1	
9.5	9.5	Processing and storing of data	The original energy readings must be stored in the *metering database*. Data relating to the amount of *active energy* passing through a *connection point* must be collated and stored either as accumulated *energy data* or *interval energy data* in half hourly *trading intervals* within the *metering database*. The *energy data* may be substituted or estimated in accordance with section 4.4 of this *Metrology Procedure*.	4.1(1)(b)	

9.6	9.6		The *Network Operator* must retain *energy data,* including *substituted* or *estimated energy data*, in the *metering database* for a period of at least 13 months in a readily accessible format and for a further period of five years and 11 months in archive that is accessible within a reasonable period of time.	4.9	
9.7	9.7	Access	The only persons entitled to have either direct or remote access to the *energy data* from a *metering installation* are: • the *Network Operator* • the *user* of the *connection point* with which the *metering installation* is associated.	4.8(3), 4.8(4), 4.8(5)	
9.8	9.8	Outages	If an outage or malfunction occurs to a *metering installation*, repairs must be made as soon as practicable, and in any event within the period specified within the relevant *service level agreement*.	3.11(2)	
9.9	9.9		A *Code Participant* who becomes aware of an outage or malfunction of a *metering installation* must advise the *Network Operator* as soon as practicable.	3.11(3)	
9.10	Testing 9.10	Testing by Network Operator	The *Network Operator* must have unrestrained access to the *metering installation* for the purpose of testing the *metering installation* where *Network Operator* agrees to comply with reasonable security and safety requirements and has first given at least two business days' notice of its intention to access the *metering installation* for the purpose of testing the *metering installation*. The notice must include the name of the representative who will be conducting the test on behalf of the *Network Operator,* and the time when the test will commence and the expected time when the inspection will conclude.		
9.11	9.11	Actions in event of non-compliance	If the accuracy of the *metering installation* does not comply with the requirements of the *Code*, the *Network Operator* and the affected *Code Participants* must be advised as soon as practicable of the errors detected and the possible duration of the existence of errors, and arrangements must be made for the accuracy of the *metering installation* to be restored in a time frame agreed by the *Network Operator*.		

9.12	9.12, 5.107, 6.72, 7.37 as per above 5.108 see also RIA 5.120	Errors	If a *metering installation* test, inspection or audit reveals errors in excess of those prescribed and the time at which those errors arose is not known and cannot be determined within a reasonable time or at reasonable cost, the error is deemed to have occurred half way between the time the error was detected and the time of the last test, inspection or audit that demonstrated that the *metering installation* complied with the specification or, if this is the first test, inspection or audit, the time the *metering installation* was commissioned.		
9.13	9.13, 5.106, 6.71, 7.36 as per above 5.107 see also RIA 5.119		If a test or audit of the *metering installation* demonstrates an error of measurement of less than those detailed in the **meter management plan**, no substitution of readings is required unless in *Network Operator*'s opinion a particular party would be significantly affected if no substitution was made.		Type 1 - 6
9.14	9.14		If a test, audit or inspection reveals a discrepancy between the *metering database energy data* and the *metering installation energy data*, the *metering installation energy data* shall take precedence.		
9.15	Management, maintenance and auditing 9.15	Installation and maintenance	Only the *Network Operator*, in accordance with this *Metrology Procedure*, must carry out installation and maintenance of *metering installations*.		
9.16	9.16 Repeat of 5.112-115	Security Controls	The *energy data* held in the *metering installation* is to be protected from tampering by suitable security controls such as seals, in accordance with *good electricity industry practice*.		

10 Schedule 6 – Components of a Type 7 Metering Installation – Energy Data Services

The components and characteristics and requirements of a *Metrology Procedure* for type 7 *metering installations* (*energy data services*) are as follows:

Type 7 *metering installation*s are associated with un-metered loads, as defined in article 3.9(2) of the *Code*, and it is therefore necessary to define the means by which the *energy data* deemed to flow in the power conductor is determined and validated:

Ref	***Energy Data Services* Components - HP No**	***Energy Data Services* Characteristics**	**Requirements**	**Clause in *Code***	**Applicable *Metering Installation* Type**
10.1	*Metering Database* 10.1	Location	The *metering database* is located at a site remote from the site of the *meter installation*.		Type 1 - 6
10.2	10.2		The *metering database* is to be secure and the associated links, circuits and information storage and processing systems are to be secured by means of locks, seals or other *device*s approved by the *Network Operator*.	4.8(4)	
10.3	10.3, 10.15		The *metering database* is to be secured and the associated programs and data are to be secured by means of *device*s, passwords, appropriate encryption and other electronic security controls or methods which, to the standard of *good electricity industry practice*, hinder unauthorised local and remote access and enable unauthorised access to be detected.	4.1(2), 4.8(4)	
10.4	10.4, 10.16		*Metering database* passwords are confidential data and are to be treated as *confidential information* subject to Part 7.4 of the *Code*.	7.4.1	
10.5	10.5	Standing data	The load tables, inventory tables and On/Off tables must be stored in the *metering database*.	Appendix2 Clause A2.4	

10.6	10.6		Data relating to the amount of *active energy* consumed by the unmetered load must be calculated, validated and substituted where required and stored within the *metering database* in accordance with articles A2.9, A3.6 and A3.7 of the *Code*. {Note: The Metrology Procedures does not require interval data to be calculated}	A3.6-A3.7	
10.7	10.6		The *Network Operator* must retain *energy data,* including *substituted* or *estimated energy data* and the data used in the calculation of the *energy data*, such as the load tables, inventory tables and on/off tables, in the *metering database* for a period of at least 13 months in a readily accessible format and for a further period of five years and 11 months in an archive that is accessible within a reasonable period of time.	4.9	
10.8	10.8	Access	The only persons entitled to have either direct or remote access to the *energy data* from a *metering installation* are: • the *Network Operator* • the *user* of the *connection point* with which the *metering installation* is associated.	4.8(3), 4.8(4), 4.8(5)	
10.9	10.9	Outages	If an outage or malfunction occurs to a *metering installation*, repairs must be made as soon as practicable, and in any event within the period specified within the relevant *service level agreement*.	3.11(2)	
10.10			A *Code Participant* who becomes aware of an outage or malfunction of a *metering installation* must advise the *Network Operator* as soon as practicable.	3.11(3)	
10.11	Testing 10.10	Actions in event of non-compliance	If the accuracy of the *metering installation* does not comply with the requirements of the *Code*, the *Network Operator* and the affected *Code Participants* must be advised as soon as practicable of the errors detected and the possible duration of the existence of errors, and arrangements must be made for the accuracy of the *metering installation* to be restored in a time frame agreed by the *Network Operator*.		

10.12	10.11	Errors	If a *metering installation* test, inspection or audit reveals errors in excess of those prescribed and the time at which those errors arose is not known and cannot be determined within a reasonable time or at reasonable cost, the error is deemed to have occurred half way between the time the error was detected and the time of the last test, inspection or audit that demonstrated that the *metering installation* complied with the specification or, if this is the first test, inspection or audit, the time the *metering installation* was commissioned.		
10.13	10.12		If a test or audit of the *metering installation* demonstrates an error of measurement of less than those detailed in the **meter management plan**, no substitution or estimation is required unless in the *Network Operator*'s opinion a particular party would be significantly affected if no substitution was made.		

11 Schedule 7 – Metering Installation Types 1-5 – Validation

11.1 Requirement to Validate

11.1.1 The *energy data* from *metering installations* of types 1-5 is required to be validated in accordance with this section.

11.2 Validation of energy data from Types 1-5 Metering Installations with Check Metering

11.2.1 The following checks apply to *energy data* from all *metering installations* of types 1-5 which have full *check metering*.

a) The *energy data* must agree with the *check meter* reading to within the uncertainty limits of both *meters*. i.e.

$$\frac{|R - C'|}{\left(\frac{R + C'}{2}\right)} \times 100 \leq |\Delta RC|$$

Where

|x| means the absolute value of a quantity, x

R is the *revenue meter* reading for the data stream, expressed in energy units

C' is the associated *check meter* reading, expressed in energy units, and adjusted for known losses or systemic errors such as transformer losses

ΔRC is the maximum discrepancy between the *revenue* and *check meter* expressed as a percentage and with a maximum value of 1%.

b) Not applicable.

c) The value must be less than the registered maximum value of Wh, Varh or VAh for the *metering installation* data stream.

d) The *Network Operator* and user will agree to either:

1. Check the metered value is greater than the registered minimum value for the *metering installation*, or
2. Check that the number of intervals with zero data is less than a specified number.

e) If an interval has a null value then the reading for that interval will be rejected.

f) If the *meter* has registered significant *meter* alarms over the period since the last successful read, the *energy data* will be rejected. Significant alarms include, but need not be limited to:

1. Power failure,
2. VT or phase failure
3. Pulse overflow
4. CRC error
5. Time tolerance

g) The sum of the interval data readings must agree with the accumulated total for the meter. I.e.

$$\frac{\left|\left(\sum_{i=1}^{n} R_i\right) - A'\right|}{\left(\frac{\sum_{i=1}^{n} R_i + A'}{2}\right)} \times 100 \leq |\Delta RA|$$

Where,

|x| means the absolute value of a quantity, x

Ri is the data stream reading for interval i, expressed in energy units.

n is the total number of intervals in the period

A' is the reading from the associated accumulated energy registers, adjusted for any known systemic error

ΔRA is the maximum discrepancy between the revenue and check meter expressed as a percentage.

11.3 Validation of energy data from Types 1-5 Metering Installations with Partial Check Metering

11.3.1 Not applicable.

11.4 Validation of energy data from Types 1-5 Metering Installations without Check Metering

11.4.1 The following checks apply to *energy data* from all *metering installations* of types 1-5 which have no check metering:

a) Check all *interval meter* data against nominated maximum value. The value must be less than the registered maximum value of Wh, Varh or VAh for the *metering installation*. Maximum Varh checks may be performed as follows:

1. For *CT metering installations* the maximum value is to be initially defined by the applied *CT* ratio. However, the actual value may exceed the registered maximum value of the *CT* due to the ability of the *CT* to be able to accommodate loads in excess of their maximum capacity (i.e. 200%). Where this occurs, the *Network Operator* may deem the energy flow as true and correct. When determining data flows on a per installation basis, the maximum value may be increased to cater for situations where it has been confirmed that the *CT* is overloaded on a short term basis.
2. For whole current *meters* the maximum value is to be set to the maximum ampere rating of the *meter*.

b) The *Network Operator* and the *user* will agree to either:

1. Check the metered value is greater than the registered minimum value for the *metering installation*, or
2. Check that the number of intervals with zero *data* is less than a specified number over a period of time that is deemed practicable in alignment with *good electricity industry practice*.

c) If an interval has a null value then the reading for that interval will be rejected, placed into an exception for review or substituted.

d) If the *meter* has registered significant *meter* alarms over the period since the last successful read, the *energy data* will either be rejected or subject to *validation*. Significant alarms include, but need not be limited to,:

1. Power failure,

2. *VT* or phase failure
3. Pulse overflow
4. CRC error
5. Time tolerance

Energy data which requires *validation* will be placed into exception for review pending an assessment of the significance of the alarm.

e) The sum of the *interval energy data* readings must agree with the accumulated total for the meter for *active energy* and *reactive energy data streams*, i.e.

$$\frac{\left|\left(\sum_{i=1}^{n} R_i\right) - A'\right|}{\left(\frac{\sum_{i=1}^{n} R_i + A'}{2}\right)} \times 100 \leq \left|\Delta RA\right|$$

Where,

|x| means the absolute value of a quantity, x

Ri is the *data stream* reading for interval i

n is the total number of intervals in the period

A' is the reading from the associated *accumulated energy registers*, adjusted for any known systemic error

ΔRA is the maximum discrepancy between the sum of the interval readings and the *accumulation register* expressed as a percentage and with a maximum value of 1%.

f) Where *apparent*, *reactive* and *active energy* are all available, these must be checked for consistency, i.e.

$$\frac{\left|\left(A^2 + R^2\right) - W^2\right|}{\left(\frac{\left(A^2 + R^2\right) + W^2}{2}\right)} \times 100 \leq \left|\Delta ARW\right|$$

Where,

|x| means the absolute value of a quantity, x

A is the data stream reading for *active energy*

R is the data stream reading for *reactive energy*

W is the data stream reading for *apparent energy*

A' is the reading from the associated accumulated energy registers, adjusted for any known systemic error

ΔARW is the maximum discrepancy in the *apparent energy*, expressed as a percentage and with a maximum value of 1%.

12 Schedule 8 – Metering Installation Types 1-5 – Accumulation, Substitution and Estimation

12.1 Requirement to Accumulate Energy Data to Trading Intervals

12.1.1 Where *energy data* is recorded in fifteen-minute intervals this must be accumulated to half-hourly values to coincide with the *trading interval* in accordance with section 12.3.

12.2 Requirement to Produce Substituted or Estimated Energy Data

12.2.1 In accordance with section 4.4 of this *Metrology Procedure*, *energy data* for a type 1-5 *metering installation* may be required to be substituted or estimated.

12.2.2 When the *energy data* is required to be *substituted* or *estimated* the *Network Operator* may use:

a) *Substitution* Types 11, 12, 13, 14, 15, 16, 17 and 18 for *Metering installations* of Types 1-4 and

b) *Substitution* Types 51, 52, 53, 54, 55 and 56 for *Metering installations* of Type 5,

c) all *substitution* types as defined in section 12.4 of this Schedule.

12.2.3 The *Network Operator* must not perform *substitutions* or *estimations* for *generating plant* without prior consultation with the *generator* unless reliable *check metering data* is available. *SCADA data* is considered to be *check metering data* for the purpose of *data substitutions*.

12.2.4 The *Network Operator* must not perform *substitution* of type 16 without the prior agreement of the affected parties.

12.2.5 The *Network Operator* will notify affected *Code Participants* where *substituted energy data* is used.

12.2.6 The status of the *interval energy data* reported under 12.2.5 will reflect the most serious of the statuses associated with the constituent data.

12.2.7 The *Network Operator* must ensure that for all *Substitution* Types, *substituted energy data* is based on an actual *meter* reading, and is not based on *energy data* that has previously been *estimated* or *substituted*.

12.2.8 Where a substitution type requires the use of historical data, the *data* source for historical *data* shall be *data stream* specific rather than *meter* specific.

{I.e. if a meter is swapped out, the process will look at the history for the same data stream for the previous meter not just the limited data set available that is associated with the replacement meter.}

12.3 Accumulation of data to trading intervals

12.3.1 The formulae to use for converting fifteen-minute interval readings to half-hourly interval readings are listed in the following table:

Variable	***Formula***
HH (Half Hourly) Consumption	HH Consumption at interval i+1 = sum (Consumption at QH interval i, Consumption at QH interval i+1) where QH = Quarter Hour { i.e. Sum the reading values (kWh) of the two adjacent QH intervals to form the HH Consumption for the HH interval. For example, QH Consumption @ 00:15 = 20 kWh

	QH Consumption @ 00:30 = 50 kWh then HH Consumption @ 00:30 = 70 kWh}
HH Demand	HH Demand can be determined when data for HH Consumption is present HH Demand in kW at interval i+1 = (HH Consumption in kWh at interval i+1) x $\frac{\text{Number of Intervals Per Day}}{\text{48 HH Intervals Per Day}}$ Where Number of Intervals Per Day = 48 HH intervals per day
HH Reactive Energy	HH Reactive Energy at interval i+1 = sum (Reactive Energy at QH interval i, Reactive Energy at QH interval i+1) {I.e. Sum the reading values (kVArh) of the two adjacent QH intervals to form the HH Reactive Energy for the HH interval. For example , QH Reactive Energy @ 00:15 = 20 kVAh QH Reactive Energy @ 00:30 = 50 kVAh then HH Consumption @ 00:30 = 70 kVAh}
HH Apparent Energy	HH Apparent Energy at interval i+1 can only be determined when data for HH Consumption and HH Reactive Energy are present. HH Apparent Energy in kVAh at interval i+1 $= \sqrt{\left(\text{HH Consumption}^2 + \text{HH Reactive Energy}^2\right)}$ The units of Consumption = kWh The units of Reactive Energy = kVArh
Power Factor	Power Factor can only be determined when data for HH Consumption and HH Apparent Energy are present. Power Factor = $\frac{\text{HH Consumption in kWh}}{\text{HH Apparent Energy in kVAh}}$ The Power Factor should be between 0 and 1 inclusive.

12.4 Substitution and Estimation Types for Metering Installation Types 1-4

12.4.1 Substitution Method 11

Interval energy data obtained from another *meter* at the same measurement point for the same *interval data* periods as that being substituted for may be used for substitution purposes, e.g. installations where *revenue* and *check meters* are installed.

Method 11 substitutions also include the use of *data* from similar *meters* where the load profile of the second *meter* is a good match to the load profile of the *meter* for which substitutions are being made, e.g. where *meters* are installed on each end of a

transmission line where the difference due to line losses can be accurately determined; where *meters* are installed on parallel feeders where supply is 'to' and 'from' common buses and line impedances are similar.

12.4.2 Substitution Method 12

Data values may be calculated for an unknown feed to a node based on the other known *energy* flows to or from that node.

Note: For example if sub *meters* are available then a value could be determined by summing the readings from the sub *meters*.}

12.4.3 Substitution Method 13

10 *Data* from an *energy* management system or *SCADA data* may be used for substitution purposes, where the data originates from a similar measurement point as the *meter* for which substitutions are being made.

11 Data from an *energy* management system or *SCADA data* may be *data* which is inferior in accuracy or resolution and which is in a dissimilar format to the *energy data*, (e.g. 30 Min. demand values). It may be necessary to adjust the *data* in both magnitude and form in order that the substitution is of an acceptable quality.

12.4.4 Substitution Method 14

12 Where data substitution methods 11, 12, and 13 cannot be carried out, then the *Network Operator* may *substitute* for the missing *data* using the "Nearest Equivalent Day" or "Like Day" method, as detailed in the table below.

Method 14	
Substitution Day	**"Nearest Equivalent Day" or "Like Day" (in order of availability)**
Monday	Monday ♦♦
Tuesday	Tuesday ♦♦ Wednesday♦♦ Thursday ♦♦ Wednesday ♦ Thursday ♦
Wednesday	Wednesday ♦♦Tuesday ♦ Thursday ♦♦ Thursday ♦ Tuesday ♦♦
Thursday	Thursday ♦♦ Wednesday ♦ Tuesday ♦ Wednesday ♦♦ Tuesday ♦♦
Friday	Friday ♦♦
Saturday	Saturday ♦♦
Sunday	Sun ♦♦

Substitutions for 'Like Day' to be as detailed above, unless:

1) If no readings are available on the first listed day, then the next listed preferred day is to be used.
2) The substitution day was a public holiday, in which case the most recent Sunday is to be used.
3) The substitution day was not a public holiday and the 'Like Day' is a public holiday, in which case the substitution 'Like Day' to be used must be the most recent business day.

♦♦ Occurring in the week preceding that in which the substitution day occurs.

♦ Occurring in the same week as the substitution day

12.4.5 Substitution Method 15

13 Where data substitution methods 11, 12, and 13 cannot be carried out, then the *Network Operator* may substitute for the missing *data* using the "Nearest Equivalent Day" or "Like Day" method, as detailed in the Table below.

Method 15
The intervals to be substituted will be plugged using an average of each interval from the proceeding 4 weeks, or part thereof. This averaging technique may be applied in the following ways: 1) where the averaged intervals are simply 'plugged' into the intervals requiring substitution. 2) where the averaged intervals are used to provide the profile for the ones to be 'plugged' to a predetermined number of pulses for the total substitution period. However if *data* is required to be substituted for a public holiday then the most recent available Sunday will be used.

12.4.6 Substitution Method 16

a) Where *data* substitution is required for any period greater than 7 days, consideration, consultation and agreement must take place between the affected parties to resolve any abnormal equivalent days that may be applicable.

14 In the interests of practicality, the *Network Operator* may use other substitution methods without consultation for periods greater than 7 days in alignment with *good electricity industry practice*. Where a *code participant* identifies discrepancies in the substitution method used, it may request the *Network Operator* to resolve those discrepancies or request an alternative substitution method is used.

a) Method 16 substitutions are:

1. *data* substitutions of any format for periods greater than 7 days that are based on an agreement between all the affected parties;
2. changes to existing substitutions for any period that are carried out where the affected parties have directed that as a result of site or *customer* specific information, the original substitutions are in error.

12.4.7 Substitution Method 17

Data substitutions for periods up to, but not exceeding 2 hours, may be carried out by simple linear interpolation.

12.4.8 Substitution Method 18

This substitution method covers the situation where an alternate method of substitution has been agreed with the *Code Participant*, the applicable *user* and the *Network Operator*. This may be a globally applied method or a site specific method where an adjusted profile is used to take into account local conditions which affect consumption (e.g. local holiday, not energised *connection point* or *customer* shutdown), or where alternate *data* may be able to be used for quality checks and minor adjustments of an estimated profile such as using *meter* register *data*.

12.5 Substitution and Estimation Methods for Metering Installation Type 5

12.5.1 Substitution Method 51

This method is known as the Previous Years Method. Where data substitution methods 11, 12, and 13 cannot be carried out, then the *Network Operator* may substitute for the missing *data* using the "Nearest Equivalent Day" or "Like Day" method, as detailed in the

Table below.

Method 51	
Substitution Day	**"Nearest Equivalent Day" or "Like Day" (in order of availability)**
Monday	Monday ♦♦ Monday ♦
Tuesday	Tuesday ♦♦ Wednesday ♦♦ Tuesday ♦ Wednesday ♦
Wednesday	Wednesday ♦♦ Tuesday ♦♦ Thursday ♦♦ Wednesday ♦ Thursday ♦ Tuesday ♦
Thursday	Thursday ♦♦ Wednesday ♦♦ Tuesday ♦♦ Thursday ♦ Wednesday ♦ Tuesday ♦
Friday	Friday ♦♦ Friday ♦
Saturday	Saturday ♦♦ Saturday ♦
Sunday	Sunday ♦♦ Sunday ♦
Substitutions for 'Like Day' to be as detailed above, unless: 1) If no readings are available on the first listed day, then the next listed preferred day is to be used. 2) The substitution day was a public holiday, in which case the most recent Sunday is to be used. 3) The substitution day was not a public holiday and the 'Like Day' is a public holiday, in which case the substitution 'Like Day' to be used must be the most recent business day. ♦♦ Occurring in the same week as the substitution day in the previous year. ♦ Occurring in the week preceding that in which the substitution day occurs in the previous year.	

12.5.2 Substitution Method 52

This method is known as the Previous Meter Reading Method. Where *data* substitution methods 11, 12, and 13 cannot be carried out, then the *Network Operator* may substitute for the missing *data* using the "Nearest Equivalent Day" or "Like Day" method, as detailed in the Table below.

Method 52	
Substitution Day	**"Nearest Equivalent Day" or "Like Day" (in order of availability)**
Monday	Monday ♦♦ Monday ♦
Tuesday	Tuesday ♦♦ Wednesday♦♦ Tuesday ♦ Wednesday ♦

Wednesday	Wednesday ♦♦ Tuesday ♦♦ Thursday ♦♦ Wednesday ♦ Thursday ♦ Tuesday ♦
Thursday	Thursday ♦♦ Wednesday ♦♦ Tuesday ♦♦ Thursday ♦ Wednesday ♦ Tuesday ♦
Friday	Friday ♦♦ Friday ♦
Saturday	Saturday ♦♦ Saturday ♦
Sunday	Sunday ♦♦ Sunday ♦

Substitutions for 'Like Day' to be as detailed above, unless:

1) If no readings are available on the first listed day, then the next listed preferred day is to be used.

2) The substitution day was a public holiday, in which case the most recent Sunday is to be used.

3) The substitution day was not a public holiday and the 'Like Day' is a public holiday, in which case the substitution 'Like Day' to be used must be the most recent business day.

♦♦ Occurring in the last whole week of the previous *meter* reading period.

♦ Occurring in the week preceding the last whole week of the previous *meter* reading period.

12.5.3 Substitution Method 53

a) Where *data* substitution is required for any period greater than 7 days, consideration, consultation and agreement must take place between the affected parties to resolve any abnormal equivalent days that may be applicable.

In the interests of practicality, the *Network Operator* may use other substitution methods without consultation for periods greater than 7 days in alignment with *good electricity industry practice*. Where a *code participant* identifies discrepancies in the substitution method used, it may request the *Network Operator* to resolve those discrepancies or request an alternative substitution method is used.

b) Method 53 substitutions are:

1. *data* substitutions of any format for periods greater than 7 days that are based on an agreement between all the affected parties;

2. changes to existing substitutions for any period that are carried out where the affected parties have directed that as a result of site or *customer* specific information, the original substitutions are in error.

12.5.4 Substitution Method 54

Data substitutions for periods up to, but not exceeding 2 hours, may be carried out by simple linear interpolation.

12.5.5 Substitution Method 55

This substitution method covers the situation where an alternate method of substitution has been agreed with the *Code Participant*, the applicable *user* and the *Network Operator*. This may be a globally applied method or a site specific method where an adjusted profile is used to take into account local conditions which affect consumption (e.g. local holiday or customer shutdown), or where alternate *data* may be able to be used for quality checks and minor adjustments of an estimated profile such as using *meter* register *data*.

For metering points that are active but in the status of “Not Energised”, the *Network Operator* will apply a substitute reading of zero for any day(s) the metering point has ”Not Energised” status. Substitution method 55, in conjunction with the appropriate reason code will be provided by the *Network Operator*.

12.5.6 Substitution Method 56

This substitution method covers the situation where a substitution for *interval energy data* is required for a period prior to the first *meter* read. The *data* substitution must be done by a method agreed to by the *Network Operator* and the affected *Code Participant*.

13 Schedule 9 – Metering Installation Type 6 – Validation, Substitution and Estimation

13.1 Requirement to Validate Meter Readings for Metering Installation Type 6

13.1.1 *Actual meter* readings will be required to be validated in accordance with section 4.4 of this *Metrology Procedure*. The *validation* rules that may be applied to the *energy data* read from the *meter* of a type 6 *metering installation* are:

a) *energy data* value is numeric, and

b) *energy data* value is greater than or equal to the minimum value specified for that meter; and

c) *energy data* value is less than or equal to the maximum value specified for that meter; and

d) *meter* read date > previous meter read date; and

e) *meter* read value is not missing (null) for any type 6 meter; and

f) Dial capacity, rollover and decimal point check. A register will be deemed to have failed a rollover check where the calculated value from a rollover exceeds 50% of the register capacity.

{These checks mainly apply to older styles of mechanical *meters*. For example:

1. A dial capacity check means ensuring that if a *meter* dial has 5 digits then the maximum value recorded against that dial should be 99999 – a larger number should be flagged.

2. A roll over check is required where upon successive reads a *meter* is showing a lower reading. For example consider a hypothetical mechanical *meter* with four digits. If on the last reading the value was 9995 and on the next reading it is 0010 then the dial is deemed to have “rolled over”. The correct interpretation is that consumption is 10 + 10000 – 9995, or 15, units. On the other hand if the last reading was 0010 and this reading is 0009 then something is wrong since it is highly unlikely that the *connection point* consumed 9999 units since it was last read. It is more likely that the a reading was wrong (perhaps the last two digits were swapped around when it was recorded) or the *meter* is faulty.

3. A decimal point check means checking that the reading has the correct number of digits after the decimal point for the dial. For example if a dial has 4 digits and the last digit denotes tenths of a unit then the reading should be in the range 000.0 to 999.9. If the reading is recorded as 12.34 then it needs to be flagged up and checked –(e.g. should it really be 123.4).}

13.2 Requirement to Produce Substituted or Estimated Energy Data for Metering Installation Type 6

13.2.1 In accordance with clauses 4.4.6 and 4.4.7 of this *Metrology Procedure*, *energy data* for a type 6 *metering installation* may be required to be *substituted* or *estimated*.

{Note – substitution generally occurs in response to a failure or problem with the *metering*

installation or in response to *data* quality issues whereas estimation generally occurs when there is no physical or *data* problem but it has not been possible to take a reading for any reason.}

13.3 Network Operator Obligations for Metering Installation Type 6

13.3.1 When the *energy data* is required to be *substituted* or *estimated* the *Network Operator* may use Substitution Methods 61, 62, 63, 64 or 65, as defined in clause 12.4 of this Schedule 9.

13.3.2 The *Network Operator* will notify affected *Code Participants* where *substituted energy data* is used.

13.3.3 The *Network Operator* must ensure that, as far as reasonably practicable, for all Substitution Methods, *substituted energy data* is based on an *actual meter* reading, and is not based on *energy data* that has previously been *estimated* or *substituted*.

13.3.4 Where a substitution method requires the use of historical *data*, the *data* source for historical *data* shall be *data* stream specific rather than *meter* specific.

{I.e. if a *meter* is swapped out the process will look at the history for the same *data stream* for the previous *meter* not just the limited *data* set available that is associated with the replacement *meter*.}

13.3.5 The *Network Operator* may *substitute* or *estimate meter* readings in conjunction with an *actual meter* reading to enable the calculation of the average daily consumption for a new substitution value. The *Network Operator* may apply an *actual meter* reading as a reference point for substitution to ensure any substitution applied is not based on prior *substituted* or *estimated* readings.

13.4 Substitution and Estimation Methods for Metering Installation Type 6

13.4.1 Substitution/Estimation Method 61 – Previous Year Method

a) Value = Average daily consumption from same, or similar, *meter* read period last year x Number of days required to be *substituted*

The *Network Operator* may define additional internal procedures to reflect a more accurate assessment of the *customer's* consumption.

13.4.2 Substitution/Estimation Method 62 – Previous Meter Reading Method

a) Value = Average daily consumption from previous *meter* read period x Number of days required to be *substituted*

b) Where the scheduled *meter* reading frequency is less frequent than monthly, Substitution Method 62 is to be used only when the consumption *data* from the same, or similar, *meter* read period last year is not available.

c) The *Network Operator* may define additional internal procedures to reflect a more accurate assessment of the *customer's* consumption.

13.4.3 Substitution/Estimation Method 63 – Customer Class Method

a) Value = Average daily consumption for this same *customer* class with the same type of usage x Number of days required to be *substituted*

b) Substitution Method 63 is to be used only when the consumption *data* from the same, or similar, *meter* read period last year and the consumption *data* from the previous *meter* read period are not available.

c) *Customer* classes for Substitution Method 63 are

1. Residential,
2. Non-Residential, and
3. Public Lighting.

d) The usage types for Substitution Method 63 are:

1. peak, or
2. off-peak, or
3. as appropriate to the metering configuration.

e) The *Network Operator* may define additional internal procedures to reflect a more accurate assessment of the *customer's* consumption.

13.4.4 Substitution/Estimation Method 64 – Agreed Method

a) The *Code Participant*, the applicable *user* and the *Network Operator* may agree to use another method of substitution (which may be a modification of an existing Substitution Method) where none of the existing Substitution Methods is applicable.

b) The specifics of this Substitution Method may involve a globally applied method or a site-specific method.

c) The *Code Participant*, applicable *user* and *Network Operator* may agree to use a globally applied substitution method in advance of its application.

d) The *Code Participant*, applicable *user* and the *Network Operator* may agree to amend a site-specific substitution method upon receipt of more accurate information relating to the site.

e) For *metering points* that are active but in the status of "Not Energised", the *Network Operator* will apply a *substituted* reading that will equal zero consumption for any day(s) the *metering point* has "Not Energised" status. Substitution method 64, in conjunction with the appropriate reason code will be provided by the *Network Operator*.

f) For *metering points* that contain bi-directional flows, the *Network Operator* will apply a *substitute* reading that will equal zero *generation* over the schedule reading period for the import channels. Export channels will be substituted in accordance with section 13.4 the *Metrology Procedure*. The *Network Operator*, under clause 5.24(4) of the *Code*, must consider a reasonable request from a *user* or a *customer* to replace a *substituted* value for bi-directional flows for an import channel, as outlined in clauses 5.22(5)(a) and (c) of the *Code*.

13.4.5 Substitution/Estimation Method 65 – Estimation by Average Daily Consumption

a) Value = Average daily consumption x Number of days required to be *substituted*

b) Substitution Method 65 is to be used only when the consumption from the same, or similar, *meter* read period last year and the consumption from the previous *meter* read period are not available.

c) The average daily consumption is a configurable attribute of the load, as agreed with the *user* or the *customer*.

14 Schedule 10 – Metering Installation Type 7 – Energy Calculation

14.1 Requirement to Produce Energy Data for Metering Installation Type 7

14.1.1 Agreed market loads

a) Type 7 *meters* are associated with un-metered *loads*, as defined in article 3.9(2) of the *Code*.

b) The *Network Operator* may, from time to time, agree to classify other types of *load* as unmetered, where, in its opinion, the load is similar in nature to the existing unmetered loads.

c) As a guide, *loads* of a similar nature, as defined in clause 3.9.2(e) of the *Code*, are likely to be ones that are uneconomic to *meter* individually

{e.g. the cost of type 6 *metering* is not much less than the likely cost of *electricity* consumed over the *meter* lifetime}

and where it is not practical to *meter* the consumption points at an economically viable aggregate level.

{e.g. it is not possible to connect all consumption points in the *load* behind a single *meter* to give a larger aggregate reading at an economical level}.

14.1.2 Application to device types

a) The agreed *load* that is published by the *Network Operator* will be generic in nature (for example, street lighting). For each agreed *load* there may be one or more *device* types which are listed in the *Load* Table developed in accordance with clause 14.1.6 of this Schedule.

14.1.3 Application of NMI

Not used

14.1.4 Inventory Table

Not included in this section, refer to section 17.1, Inventory table, covers all types of *loads* and *connection points*, so it is not appropriate to include it in a section dealing only with Type 7 *Metering Installations*.

14.1.5 Time code table

Not included in this section, refer to section 17.2, Time code table, covers all types of *loads* and *connection points*, so it is not appropriate to include it in a section dealing only with Type 7 *Metering Installations*.

14.1.6 Load Table

Not included in this section, refer to section 17.3, Load code table, covers all types of *loads* and *connection points*, so it is not appropriate to include it in a section dealing only with Type 7 *Metering Installations*.

14.2 Energy Calculation for Metering Installation Type 7

14.2.1 The default method of calculation is based upon a calculation from the inventory parameters, *load* table and on-off table.

$$C_{NMI,i,\tau} = \frac{(k \times n \times h \times P \times L)}{1000}$$

and

$$C_{NMI,i,\tau} = \sum C_{NMI,i,\tau}$$

Where:

CNMI,i,τ is the consumption, in *energy* units, for an *NMI* for a *device* type, i, for a

period, τ.

CNMI — is the consumption, in *energy* units, for an *NMI* across all *device* types, for a period, □

k — is the proportion of the *device load* attributable to the *NMI*.

n — is the number of *devices* of the applicable type for the NMI.

h — is the number of hours in the period during which the *device* is switched on. For the avoidance of doubt, this does not have to be an integer number – fractions of hours are permitted.

P — is the average power consumption for the *device*, expressed in Watts.

L — is the applicable loss factor.

τ — is the applicable period, for example *trading interval*, day, peak period, off-peak period, shoulder period, etc.

14.2.2 Where half hourly consumption *data* is required, this shall be calculated as either:

a) Where no interval "on-off" *data* is available, consumption in each *interval* shall be the calculated power consumption for the day divided by the number of *trading intervals* in the day.

Or

b) Where hours on in peak/off peak/shoulder periods is available then:

1. For every *interval* in the off-peak period, the consumption shall be the power consumption for the off-peak period divided by the number of *trading intervals* in the off-peak period.
2. For every *interval* in the peak period, the consumption shall be the power consumption for the peak period divided by the number of *trading intervals* in the peak period.
3. For every *interval* in the shoulder period, the consumption shall be the power consumption for the shoulder period divided by the number of *trading intervals* in the shoulder period.

Or

c) Where *interval* "on-off" data is available:

1. For every *trading interval* marked as "off" the consumption shall be zero.
2. For every *trading interval* marked as "on" the consumption shall be the total daily consumption divided by the number of "on"-intervals in the day.

{Note: this is equivalent to calculating the *interval* consumption from first principles using the calculation method in 14.2.1 above.}

15 Schedule 11 – Metering Installation Type 7 – Validation and Substitution

15.1 Requirement to Perform Validation for Metering Installation Type 7

15.1.1 *Energy data* calculations are required to be *validated* in accordance with clause 4.4 of this *Metrology Procedure*.

a) The *Network Operator* must validate the calculated *energy data* on *registration* of all Type 7 *metered installations*. The requirement to validate *energy data* from a Type 7 *connection point* on *registration* must include:

1. a check that the Inventory tables, *Load* tables and On/Off tables are complete and correct for the Type 7 *connection point*.

2. *verification* that the *energy data* correctly pertains to the *registered metering installation*.

15.1.2 The *validation* rules that may be applied to the *energy data* calculated for a Type 7 *metering installation* are:

a) Check against nominated maximum calculated *energy data* value

The calculated value will be automatically checked after calculation and if the maximum value is exceeded substitution will be performed.

b) Check for null (missing) *energy data*

A check for null (missing) calculated *energy data* in the *metering database* will be performed for each type 7 *NMI data stream* for an individual day and, where necessary, for each *trading interval*. Any null values will be substituted.

{Note: The aim of this check is to ensure that there is a 100% calculated *metering data* set (and substitution for any missing calculated *energy data* has been undertaken).}

c) Periodic check of *standing data*

Periodically check the Inventory tables, *Load* tables and On/Off tables to ensure that the correct version of the tables are being used for the *energy data* calculations. The *Network Operator* will perform such checks periodically in accordance with *good industry practice*. The results of these audits of the tables will be circulated to the relevant parties. The interval between checks will not exceed six months. If an error is detected then substitution will be performed on all *energy data* for affected *type data* since the time of the last check.

{Note: It will be sufficient to manually calculate the *substituted* values at the aggregate level for periods for which billing has already occurred. This will then allow the error in the billing to be determined without placing an onerous burden on the *Network Operator*. E.g. if the error has been in place for six months it would be sufficient to determine the consumption for the six month period. This could then be compared to the previous calculated consumption and the necessary billing corrections performed.}

d) Check against minimum permitted value

Check against a nominated minimum value or alternatively a 'zero' check which tests for an acceptable number of zero *interval* values per day or over a period of time that is deemed practicable, in alignment with *good electricity industry practice* and this *Metrology Procedure*.

e) Check that the calculated *energy data* date is greater than the previous calculated *energy data* date. If the *energy data* date is earlier than the last received *energy data* date then the value is rejected and substitution will occur.

15.2 Requirement to Perform Substitution for Metering Installation Type 7

15.2.1 In accordance with clauses 4.4.5, 4.4.6 and 4.4.10 of this *Metrology Procedure*, *energy data* for a type 7 *metering installation* will require to be *substituted* where the *energy data* calculation fails the *validation* tests.

15.2.2 The approved substitution types are:

a) Method 71 – recalculation

The preferred substitution method consists of the recalculation of the *energy* consumption using the latest time-code, *load* and inventory tables and the formulae defined in clause 14.2, Type 7 *Energy* Calculation.

b) Method 72 – revised tables

Where the value derived in clause 14.2, Type 7 *Energy* Calculation is found to be incorrect due to an error in the inventory, time-code or *load* tables, the value will be *substituted* with the value derived as per method 71 but utilizing the most recent tables for which no error is evident.

c) Method 73 – revised algorithm

Where the error in the calculation of the *energy data* in clause 14.2, Type 7 *Energy* Calculation, is due to an error in the algorithm, the *energy data* is *substituted* with the most recent *energy data* for which there was no error.

Thus, if we are calculating the consumption for a period and it is determined that the algorithm is being applied incorrectly then the calculated value for the last undisputed period will be determined. This will then, if necessary, be pro-rated by the duration of the periods to determine the applicable *substituted* value.

d) Substitution Method 74 - Agreed Method.

The *Code Participant*, the applicable *user* and the *Network Operator* may agree to use another method of substitution (which may be a modification of an existing substitution method) where none of the existing substitution methods is applicable.

The specifics of this substitution method may involve a globally applied method or a site-specific method.

16 Schedule 12 - Metering Statuses

Not used

17 Inventory Table, Time code table, Load Table

17.1 Inventory Table

17.1.1 The *Network Operator*, *user* and c*ustomer* must agree and maintain the following inventory information for each *load* type:

a) The *device* type.

b) The start date, being the first date on which this *device* type is to be included in the *energy data* calculations.

c) The end date, being the last date upon which the *device* type is to be included in the *energy data* calculations.

d) The proportion of the *load* that is attributable to the *NMI*. The total proportion attributable to all *NMIs* must equal 100%.

e) The number of *devices* of this type. This may vary with time and a complete history of the applicable numbers must be maintained for a seven-year period.

f) The *Network Operator* must use its reasonable endeavours to update the inventory for the *NMIs* for which it is responsible and must communicate any material changes to the affected *Code Participants*.

g) The relevant time code (on-off) table.

h) The applicable loss factor, either directly or through an associated characteristic (such as the distribution zone). This defines the efficiency with which power is transported to the point of consumption.

i) The maximum daily *energy* reading for *validation* purposes.

j) The minimum daily *energy* reading for *validation* purposes (which may be zero).

k) Optionally, where *trading interval data* is required, the number of *trading intervals* in the day for which a zero value is acceptable.

17.1.2 The information must be agreed prior to the installation of any new *load* and must be regularly reviewed and maintained in line with *good industry practice*.

17.2 Time code table

17.2.1 The *Network Operator*, *user* and *Customer* must agree and maintain the on- off times for each specific *load* type.

17.2.2 These will be one of the following:

a) The number of hours in the day during which the *load* is on.

b) The number of off-peak hours in the day during which the *load* is on and the number of peak hours in the day during which the *load* is on.

c) A *load* profile indicating whether the *load* is on or off in each *trading interval*.

17.2.3 The on-off times will be allowed to vary with time. I.e. the times on for a particular period - such as day, week, month, quarter or year - may differ in succeeding periods.

17.2.4 The information must be agreed prior to the installation of any new *load* and regularly reviewed and maintained in line with *good industry practice*.

17.3 Load Table

17.3.1 The *load* table will record the calculated *device* wattage. This is the agreed average daily consumption for the *device* together with any control gear.

17.3.2 The *load* rating should represent the average anticipated power rating in the applicable time period. Where possible the *device load* should be determined from measurement

tests conducted by a suitable accredited laboratory.

17.3.3 The information must be agreed prior to the installation of any new *load* and regularly reviewed and maintained in line with *good industry practice*.