CODE OF PRACTICE FOUR

CODE OF PRACTICE FOR THE CALIBRATION, TESTING AND COMMISSIONING REQUIREMENTS OF METERING EQUIPMENT FOR SETTLEMENT PURPOSES

Issue 4

Version 2.00

DATE 1 July 1995

Code of Practice Four

1. Reference is made to the Pooling and Settlement Agreement for the Electricity Industry in England and Wales dated 30th March 1990, and as amended and restated in 1st April 1995 and, in particular, to the definitions of "Code of Practice" and "Synopsis of Metering Codes" in clause 1.1 thereof.

2. This Code of Practice is to be effective from 1 July 1995

3. This Code of Practice has been approved by the Executive Committee, the Settlement System Administrator, the Grid Operator, the Ancillary Service Provider and the Suppliers in separate general meeting.

For and on behalf of the Executive Committee.

For and on behalf of the Grid Operator.

For and on behalf of Energy Settlements & Information Services Ltd as Settlement System Administrator.

For and on behalf of the Ancillary Service Provider.

AMENDMENT RECORD

ISSUE	DATE	VERSION	CHANGES	AUTHOR	APPROVED
1	3/1/92		Approved by MSC 5/3/92	CoP4 WG	19/3/92 PEC 49/3695
2	15/4/93	1.00	Endorsed by PEC	MSC	
3	26/7/94	1.11	MSC CoP Sub Group	MSC	
4	8/6/95	2.00	MDC Endorsed	MDC	

Code of Practice for the Calibration, Testing and Commissioning Requirements of Metering Equipment for Settlement Purposes

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FOREWORD

This Code of Practice relates to the requirements for the calibration, testing and commissioning for Metering Equipment and the maintaining of associated records for Metering Equipment covered by the Pooling and Settlement Agreement.

This Code of Practice defines the minimum requirements that must be met in all instances.

Energy Settlements & Information Services Limited, as Settlement System Administrator ("SSA") shall retain copies of, inter alia, the Code of Practice together with copies of all documents referred to in them, in accordance with the provisions of the Pooling and Settlement Agreement ("P&SA").

1. SCOPE

This Code of Practice states the practices that shall be employed, and the apparatus that shall be used for the calibration, testing and commissioning of Metering Equipment registered with the SSA. It shall also apply to the associated records that are to be maintained.

It is expected, save in exceptional circumstances, that dispensations shall not be granted in respect of this Code of Practice.

Meters that are certified under the Electricity Act 1989 shall have calibration and testing performed in accordance with the Electricity Act 1989 and shall be deemed to meet this Code of Practice.

The obligations of the Operator in respect of the requirements for calibration and testing under this Code of Practice, also extends to calibration and testing carried out on Metering Equipment at the manufacturer's works.

This Code of Practice specifies the frequency for both calibration and on-site accuracy tests.

The off-site and on-site facilities for calibration and testing need only satisfy the requirements for the accuracy class of Meters that are being calibrated or tested.

New Metering Systems and new Metering Equipment for existing Metering Systems shall be commissioned in accordance with this Code of Practice.

It derives force from the Metering provisions (Clause 60 & Schedule 21) of the P&SA, to which reference should be made. It should also be read in conjunction with any relevant Agreed Procedures.

In the event of an inconsistency between the provisions of this Code of Practice and the P&SA, the provisions of the P&SA shall prevail.

2. APPLICATION TO METERING CODES OF PRACTICE

This Code of Practice specifies overall accuracy limits for Meters including those in which compensations for measurement transformer errors and/or power transformer line losses have been applied. These limits are either equal to or lower than the equivalent limits applicable to the Metering Equipment, specified in the relevant Codes of Practice. Where the limits are lower the difference is a recognition that in practice the error at the Actual Metering Point or the Defined Metering Point will be greater than the error of the Meter alone.

3. REFERENCES

The following documents should be referred to:-

Pooling and Settlement Agreement ("P&SA")	Schedule 21, Synopsis of Metering Codes and Agreed Procedures.
National Measurement Accreditation Service ("NAMAS")	Directive NIS3003
Electricity Act 1989	Schedule 7 as amended by Schedule 1 to the Competition and Services (Utilities) Act 1992.

BS 5750 Part 3 (ISO 9003)

4. DEFINITIONS AND INTERPRETATIONS

Save as otherwise expressly provided herein, words and expressions used in this Code of Practice shall have the meanings attributed to them in the P&SA.

The following definitions are included for the purposes of clarification within this document.

Definitions marked with an asterisk (*) are taken from the P&SA without modification. Definitions marked with a double asterisk(**) are based on P&SA definitions with slight modification, but do not infer any change of meaning.

4.1 Accredited Laboratory

The National Physical Laboratory (NPL), or a calibration laboratory that has been accredited by the National Measurement Accreditation Service (NAMAS), or an international laboratory recognised by NPL for the measurement required, or any other laboratory approved by the Director General of Electricity Supply.

4.2 AC/DC Transfer Standard

AC/DC Transfer Standard means a standard which has been verified at an Accredited Laboratory and is used to verify AC Transfer Standards or Working Standards.

4.3 AC Transfer Standard

AC Transfer Standard means a standard which has been verified by comparison to a Reference Standard or an AC/DC Transfer Standard and is used for the calibration and testing of Meter Equipment.

4.4 Actual Metering Point

The physical location at which electricity is metered.

4.5 Blank Calibrated Meter

A Blank Calibrated Meter means a Meter which is not a Compensated Meter.

4.6 Calibration

"Calibration" means the procedure whereby the relevant percentage errors of any item of Metering Equipment are determined.

4.7 Compensated Meter

A Compensated Meter means a Meter which has compensation(s) applied in it and has been calibrated to accurately measure Active Energy or Reactive Energy in the primary circuit.

4.8 Defined Metering Point

The physical locations at which the overall accuracy requirements as stated in this Code of Practice are to be met. These locations are identified in Appendix A.

4.9 Dispensation Application

An application in the form agreed by the Executive Committee.

4.10 Electricity *

"electricity" means Active Energy and/or Reactive Energy.

4.11 Meter

A device for measuring electrical energy.

4.12 Metering Equipment **

Means Meters, measurement transformers (both voltage and current), metering protection equipment including alarms, circuitry and their associated data collection outstations and wiring which are part of the Active Energy or Reactive Energy measuring equipment at or relating to a point(s) of connection.

4.13 Meter Register

A device, normally associated with a Meter, from which it is possible to obtain the amount of Active Energy, or the amount of Reactive Energy that has been supplied by a circuit.

4.14 Metering System **

Means all the Metering Equipment linked to a single data collection outstation at, and in relation to, any point(s) of connection and includes, for the avoidance of doubt, such data collection outstation.

4.15 Mobile Standard

Mobile Standard means a Standard (i.e. AC Transfer Standard or Working Standard) which is used for on-site calibration or accuracy test purposes.

4.16 on-site accuracy test

"on-site accuracy test" means testing performed on-site to determine the relevant percentage errors of any item of Metering Equipment.

4.17 Outstation

On-site equipment which receives and stores data from a Meter(s), and may perform

some processing of the data before transmitting the metering data to the Settlement Instation on request. These functions can be facilitated in one or more separate units or be integral with the Meter.

4.18 overall accuracy

"overall accuracy" means the difference between the measured energy and the true energy after taking account of all compensations deliberately set into the Meter and is expressed as a percentage of the true energy.

4.19 Reference Standard

Reference Standard means a standard whose measurement traceability to National Standards has been verified either at an Accredited Laboratory or is directly maintained by radio communication.

4.20 Reference Temperature

Reference Temperature means a stated temperature for any apparatus at which that apparatus has a known specification. If no temperature is stated the Reference Temperature is 23°C.

4.21 Settlement Instation

A computer based system with a database of all the Outstations for which it collects or receives data on a routine basis.

4.22 Standard(s)

Means any of the following: Reference Standards; AC/DC Transfer Standards; AC Transfer Standards; and Working Standards.

4.23 Transfer Standard

Transfer Standard means AC/DC Transfer Standard and AC Transfer Standard.

4.24 Working Standard

Working Standard means a standard, including a complete Meter testing system, which has been verified by comparison to either a Reference Standard or a Transfer Standard, and is used for the calibration and testing of Metering Equipment.

5. REFERENCE STANDARDS

5.1 Temperature tolerance

5.1.1 Reference Standards, shall be maintained at the appropriate Reference Temperature within a tolerance of ±2°C.

5.1.2 Save in so far as it is necessary to comply with the accuracy requirements of this Code of Practice, Reference Standard CTs and VTs need not be maintained at a Reference Temperature in accordance with 5.1.1 where it is impracticable.

5.2 Calibration intervals

5.2.1 Reference Standard(s), other than Reference Standard CTs and VTs, shall, unless its measurement traceability is maintained by radio communication, be verified at an Accredited Laboratory at intervals dependent on the specification(s) but in no case less frequently than at intervals of 24 months.

5.2.2 Reference Standard CTs and VTs shall be calibrated by an Accredited Laboratory at intervals not exceeding 5 years. Where records are made available to the SSA or its agent, which show either a negligible or predictable deviation from previous calibrations, the SSA may in such a case permit the interval between such calibrations to be increased.

5.3 Use

5.3.1 During periods of use of a Reference Standard (i.e. between calibrations at Accredited Laboratories) satisfactory evidence shall be produced and made available to the SSA or its agent to substantiate the stability of that Reference Standard.

In the absence of such evidence

6. AC/DC TRANSFER STANDARDS

6.1 Temperature tolerance

6.1.1 AC/DC Transfer Standards shall be maintained at the appropriate Reference Temperature within a tolerance of ±2°C.

6.2 Calibration intervals

6.2.1 AC/DC Transfer Standards shall be verified at an Accredited Laboratory at intervals dependent on their specifications but in no case less frequently than at intervals of 24 months.

6.2.2 Where records are made available to the SSA or its agent, which show either negligible or predictable deviation from previous calibrations, the SSA may in such a case permit the interval between such calibrations to be increased up to an interval of 5 years.

6.3 Use

6.3.1 Prior to use of a AC/DC Transfer Standard (i.e. between calibrations at an Accredited Laboratory) the AC/DC Transfer Standard shall be calibrated against Reference Standard(s).

6.3.2 An AC/DC Transfer Standard need not be calibrated against a Reference Standard prior to use, where records are made available to the SSA or its agent, which show either negligible or predictable deviation from previous calibrations, the SSA may in such a case permit an interval between such calibrations of up to 6 months.

7. AC TRANSFER STANDARDS

7.1 Temperature tolerance

7.1.1 Save in so far as it is necessary to comply with the accuracy requirements of this Code of Practice, AC Transfer Standards need not be maintained at a given temperature.

7.2 Calibration intervals

7.2.1 AC Transfer Standards need not be verified at an Accredited Laboratory provided that they have been calibrated in accordance with 7.2.2 or 7.2.3.

7.2.2 AC Transfer Standards shall be calibrated against Reference Standards or AC/DC Transfer Standards at monthly intervals.

7.2.3 Where records are made available to the SSA or its agent, which show either a negligible or predictable deviation from previous calibrations, the SSA may in such a case permit the interval between such calibrations to be increased up to an interval of 6 months.

7.3 Use

7.3.1 Where any AC Transfer Standard is used for on-site calibration or testing it should be calibrated before and after use. Neither the period from calibration to use nor the period from use to next calibration shall exceed one week.

7.4 Outside specification

7.4.1 When an AC Transfer Standard is calibrated and is found to be outside its specification, the reason shall be investigated and the occurrence reported to the SSA within 3 working days of its discovery. Notification shall be given to the SSA of the details and results of the investigation. The results of the investigation shall, inter alia, show:-

(i) whether Metering Equipment calibrated or tested using that Standard since its last satisfactory calibration complies with the relevant Code of Practice;

(ii) the reason why that Standard is outside its specification.

? rectification & situation

8. WORKING STANDARDS

8.1 Temperature tolerance

8.1.1 Save in so far as it is necessary to comply with the accuracy requirements of this Code of Practice, Working Standards need not be maintained at a given temperature.

8.2 Calibration intervals

8.2.1 Working Standards need not be verified at an Accredited Laboratory provided that they have been calibrated in accordance with 8.2.2 or 8.2.3.

8.2.2 Working Standards shall be calibrated against Reference Standards or Transfer Standards at monthly intervals.

8.2.3 Where records are made available to the SSA or its agent, which show either a negligible or predictable deviation from previous calibrations, the SSA may in such a case permit the interval between such calibrations to be increased up to an interval of 6 months.

8.3 Outside specification

8.3.1 When a Working Standard is calibrated and is found to be outside its specification, the reason shall be investigated and the occurrence reported to the SSA within 3 working days of its discovery. Notification shall be given to the SSA of the details and results of the investigation. The results of the investigation shall, inter alia, show:-

(i) whether Metering Equipment calibrated or tested using that Standard since its last satisfactory calibration complies with the relevant Code of Practice;

(ii) the reason why that Standard is outside its specification.

9. LOCATION AND MOBILITY OF STANDARDS

9.1 Location

9.1.1 This Code of Practice does not require the Standards of any Operator to be maintained or used at any one location.

9.2 Mobility

9.2.1 Reference standards and AC/DC Transfer Standards shall not be Mobile Standards and shall remain in one location as far as possible and only be moved for verification at an Accredited Laboratory.

9.2.2 AC Transfer Standards and Working Standards may be Mobile Standards.

10. Accuracy Requirements for the Calibration and On Site Testing of Electricity Meters

10.1 Meters shall be calibrated and tested using standards complying with this Code of Practice to demonstrate compliance of such Meters with the accuracy requirements of the P&SA.

Whenever a Meter is calibrated or tested the relationship between the test output(s) of that Meter and the Meter Register shall be shown to comply with the marking on the Meter nameplate.

10.2 Overall uncertainty

The overall uncertainty of measurement during a calibration or on-site accuracy test shall be calculated in accordance with the NAMAS Directive NIS3003 allowing for all uncertainties in the chain of measurement from true value to the Meter under test. The confidence level in the determination of the overall uncertainty shall be 95% or greater.

10.3 Calibration

10.3.1 Meters shall be calibrated such that the overall accuracy is within the percentage error limits as defined in Table 1 (for Active Energy Meters) or as appropriate Table 3 (for Reactive Energy Meters). The overall uncertainty of measurement of the calibration shall not exceed the limits specified in Tables 1 or 3 as appropriate.

10.3.2 All initial calibrations of Meters shall be performed in a laboratory or test house (including any Meter manufacturer's works).

(a) Periodic calibrations of all Meters other than Active Energy class 0.2S may be performed on-site provided that the percentage error limits and overall uncertainty requirements as in Tables 1 and 3 are met.

(b) Periodic calibration of class 0.2S Active Energy Meters shall be performed in a laboratory or test house (including any Meter

manufacturer's works).

10.3.3 The reference conditions for influence quantities and voltage and current balance shall be as in the appropriate Meter specification or for Class 2.0 Active Energy Meters as are set out under the Electricity Act 1989.

In the case of on-site calibration adequate evidence of the influence quantity conditions applying shall be available to substantiate the calibration.

10.4 On-site accuracy tests

10.4.1 Meters shall be on-site accuracy tested to demonstrate that the overall accuracy is within the percentage error limit defined in Table 2 (for Active Energy Meters), or Table 4 (for Reactive Energy Meters). The overall uncertainty of measurement of the on-site accuracy test shall not exceed the limits specified in Table 2 or 4 as appropriate.

10.4.2 For any Active Energy Meter an on-site accuracy test may performed by an injection test or at a prevailing load.

Where a prevailing load test is performed, the load used shall be between 10% and 120% (for whole current Metering percentage relates to I_{max} and shall not exceed 100%) of Meter rated current, at a power factor between 0.8 lead and 0.5 lag. Injection tests shall be performed between 5% and 120% (for whole current Metering percentage relates to I_{max} and shall not exceed 100%) of Meter rated current, at unity power factor.

10.4.3 For any Reactive Energy Meter an on-site accuracy test may performed only by an injection test.

Injection tests shall be performed at between 20% and 120% (for

whole current Metering percentage relates to I_{max} and shall not exceed 100%) of Meter rated current at zero power factor.

10.4.4 If any on-site accuracy test shows that the Meter is outside the required error limits then either:

(1) the Meter shall be returned to a laboratory or test house for re-testing or re-calibration; or

(2) if it can be shown that the prevailing influence quantity conditions are sufficiently different to the reference conditions to have caused the Meter to be outside of the required error limits then the Meter may be left in operation only where these influence quantity conditions are temporary.

The permanent signed record shall contain the calculations and observations to justify this and shall state that those influence quantities were temporary.

10.5 Special conditions for Reactive Metering

(a) Reactive Meters with a declared higher accuracy than class 2.0 are only required to meet the limits for class 2.0 Meters as in Tables 3 and 4.

(b Phase-advanced Reactive hour (PARh) Meters shall be calibrated and on-site accuracy tested in their normal connection configuration. The accuracy limits in Tables 3 and 4 shall apply to PARh Meters.

10.6 Biasing

It is expected that actual Meter errors over a group of Meters will exhibit a pattern approaching a "normal distribution". An error pattern over a group of Meters showing a consistent bias towards the extremes of the error band may need to be justified to the SSA who may then refer the matter to the Executive Committee.

11. ACCURACY REQUIREMENTS FOR THE TESTING OF NEW OR REPLACEMENT MEASUREMENT TRANSFORMERS

11.1 Measurement Transformers shall be calibrated and tested using Standards complying with this Code of Practice to demonstrate compliance of such Measurement Transformer with the accuracy requirements of the P&SA.

11.2 The accuracy test results shall include a measurement uncertainty value which shall be determined to a confidence level of 95% or greater.

11.3 Test certificates for new or replacement measurement transformers shall provide full details of the test burden conditions under which the errors were measured.

12. Frequency of Calibration and Testing of Metering Equipment

12.1 METERS

12.1.1 Initial calibration

All Meters shall be calibrated prior to installation on-site in accordance with clause 10 and shall be provided with a traceable calibration record from a manufacturer or laboratory/test house.

12.1.2 Periodic testing

(a) Calibration

(i) Electromechanical Meters shall be calibrated and refurbished as necessary at intervals not exceeding 10 years. Specific maximum intervals of less than 10 years relating to particular types of Meter of accuracy class 0.5 are as below:-

Manufacturer	Meter type	Interval (years)
Ferranti	FLF	3
Ferranti	FMF	5
GEC	E72F	5
C & H	FN	3
C & H	KTA	3

(ii) For electronic meters the Operator shall implement a evenly phased calibration schedule for each type of Meter on-circuit for which it is responsible. Over a 10 year period at least 20% of the total of each such type of Meter shall be calibrated without adjustment and the results of such calibration shall be recorded.

Meters which are so calibrated shall then be adjusted and re-calibrated, where necessary, to comply with this Code of Practice.

The Operator shall as a minimum calibrate at least one Meter of each type on-

circuit for which it is responsible in accordance with this 12.1.2(a) in any 5 year period.

The result of calibration tests in accordance with this 12.1.2(a) shall be sent to the SSA for review. The SSA shall advise the Executive Committee of the need to revise any of the requirements of this 12.1.2(a).

(b) On-site accuracy tests

In addition to the requirements to calibrate in (a) above on-site accuracy tests shall be performed as follows:

For electromechanical meters the following (i) and (ii):-

(i) Active Energy Meters of accuracy class 0.5 shall have on-site accuracy tests performed at intervals not exceeding 5 years except for the particular meter types listed under paragraph 12.1.2 (a) (i) for which no on-site accuracy tests are required.

(ii) On-site accuracy tests are not required for all other types of electromechanical meters.

For electronic Meters the following (iii) to (vi):-

(iii) Where the main and check Meters (Code of Practice One, Two and Three applications) employed on a circuit are of the same manufacture and type (i.e. where the Meters are likely to have the same failure/fault characteristics), on-site accuracy tests shall be performed on such Meters at intervals not exceeding 5 years for Active Energy Meters and intervals not exceeding 10 years for Reactive Energy Meters.

(iv) Where the main and check Meters employed on a circuit are of a different manufacture or type, no on-site accuracy tests shall be required on such Meters.

(v) Where only a main Active Energy Meter is employed on a circuit

(Code of Practice Five applications), on-site accuracy tests shall be performed at intervals not exceeding 10 years on such Meter.

(vi) Where only a main Reactive Energy Meter is employed, on-site accuracy tests shall be performed at intervals not exceeding 10 years on such Meter.

12.2 MEASUREMENT TRANSFORMERS

12.2.1 Initial calibration

New measurement transformers shall be calibrated prior to initial installation on any site.

Evidence shall be made available for inspection by the SSA, in the form of a test certificate, wherever possible and economic, to show that measurement transformers comply with their accuracy class.

12.2.2 Periodic Testing

(a) Periodic testing will not normally be required except in the case of VTs which are not provided with permanently connected voltage monitoring/alarm facilities and which are on-circuit with demand metering and influence NGC Transmission System losses.

(b In the case of VTs falling in the exception to (a) above regular VT burden tests, or other tests approved by the Executive Committee, which confirm the absence of fuse faults shall be performed at 6 monthly intervals. The results of such tests shall be available for inspection by the SSA or its agent.

12.3 OUTSTATION

12.3.1 Initial testing

Evidence shall be made available for inspection by the SSA to demonstrate

that Outstations meet the functional requirements of the relevant Code of Practice.

13. MAINTENANCE

Metering Equipment shall be routinely maintained in accordance with the manufacturer's recommendations or as is otherwise necessary for the Operator to comply with its obligations under the P&SA.

14. COMMISSIONING

A commissioning programme shall be performed on all new Metering Equipment which is to provide metering data for Settlement. Where replacement Metering Equipment is fitted as part of an existing Metering System a commissioning programme covering the changes shall be conducted.

The Operator shall provide such evidence as the SSA may require to confirm that, following its commissioning, Metering Equipment shall meet the requirements of the P&SA and relevant Codes of Practice. This evidence must include a signed and dated commissioning record.

Appendix A sets out those tests and checks which are expected to be included in a commissioning programme.

14.1 Sealing

At the completion of commissioning, Metering Equipment shall be sealed in accordance with the requirements of the relevant Agreed Procedure.

14.2 Data Validation and Communication Check

Following completion of the commissioning tests as in Appendix A the Operator shall register the Metering System details into Settlement in accordance with the

relevant Agreed Procedure. The Metering System shall then have a Data Validation and Communication Check performed by the SSA/STA in accordance with the relevant Agreed Procedure. The SSA/STA will as an element of the procedure pass to the Operator a sample of the data collected from the Metering System. The Operator shall retain the data sample with the commissioning record and use as necessary to confirm that the Metering System is providing metering data that meets the prescribed limits of accuracy.

14.3 Commissioned Communication Equipment

A commissioned Communication Equipment (and any associated exchange link) is determined by the SSA/STA successfully polling and collecting metering data from the relevant Metering System using the Communication Equipment (and any associated exchange link).

15. ASSOCIATED RECORDS

15.1 Records of Standards

15.1.1 A permanent signed record of each calibration and test of Standards employed in relation to Metering Equipment under this Code of Practice shall be maintained by the Operator.

15.1.2 Such records shall include an overall accuracy and uncertainty of measurement statement for the relevant Standard. Uncertainty should be determined using the current NAMAS directive.

15.1.3 Where Standards are used on-site the overall accuracy and uncertainty measurements shall be as determined in a laboratory.

15.2 Inspection of certificates, records and testing

15.2.1 Each Operator shall ensure that the relevant laboratory or test house makes available on the request of the SSA all test reports, records and certificates which are required by this Code of Practice for inspection by the SSA or its agent.

15.2.2 The results of all calibrations and on-site accuracy tests performed on Metering Equipment shall be retained as permanent signed records. The Operator shall ensure that such records are made available on request to the SSA or its agent.

15.2.3 Each Operator shall ensure that the relevant records relating to quality assurance procedures in relation to 16 below shall be made available on request to the SSA or its agent.

16. TECHNICAL AUDIT

The Operator shall ensure co-operation by relevant laboratories or test houses or by its representative on-site, and shall itself co-operate with the SSA or its agent during a technical audit. Such technical audit shall include such witnessing, verification and repeat tests on any Metering Equipment or Standard calibrated under this Code of Practice.

17. QUALITY ASSURANCE

17.1 A quality assurance system, preferably in accordance with Part 3 of BS 5750 or ISO 9003, shall cover the activities and equipment used for calibration and testing in the laboratory or test house and for on-site accuracy checks.

17.2 The SSA shall have the right to establish confidence in any quality assurance system which is not in accordance with BS 5750 or ISO 9003 and recover any reasonable additional cost so incurred by it from the Operator.

TABLE 1

TABLE 1: Standards of accuracy and overall uncertainty for laboratory calibration and testing of Active Energy Meters.

Class of Meter 2.0 and 2.0S

For whole current and transformer operated Meters tested with transformers connected:

VALUE OF CURRENT %	POWER FACTOR	MAXIMUM OVERALL UNCERTAINTY %	PERCENTAGE ERROR LIMITS OF METER INCLUDING UNCERTAINTY
5 to 100	1 unity	±0.4	±1.9
10 to 100	0.5 lagging	±0.6	±1.9
10 to 100	0.8 leading	±0.6	±1.9

For transformer operated Meters tested without transformers connected:

VALUE OF CURRENT %	POWER FACTOR	MAXIMUM OVERALL UNCERTAINTY %	PERCENTAGE ERROR LIMITS OF METER INCLUDING UNCERTAINTY
5 to 120	1 unity	±0.4	±1.4
10 to 120	0.5 lagging	±0.6	±1.4
10 to 120	0.8 leading	±0.6	±1.4

TABLE 1 continued

Class of Meter 0.5 and 0.5S

VALUE OF CURRENT %	POWER FACTOR	MAXIMUM OVERALL UNCERTAINTY %	PERCENTAGE ERROR LIMITS OF METER INCLUDING UNCERTAINTY
(*)1 to 5	1 unity (*)	±0.2 (*)	±1.0 (*)
5 to 120	1 unity	±0.1	±0.5
10 to 120	0.5 lagging	±0.12	±0.6
10 to 120	0.8 leading	±0.12	±0.6

(*) Only applies to 0.5S class Meters.

Class of Meter 0.2S

VALUE OF CURRENT %	POWER FACTOR	MAXIMUM OVERALL UNCERTAINTY %	PERCENTAGE ERROR LIMITS OF METER INCLUDING UNCERTAINTY	
			BLANK CALIBRATED METER	COMPENSATED METER
1 to 5	1 unity	±0.10	±0.4	±0.50
5 to 120	1 unity	±0.06	±0.2	±0.25
10 to 120	0.5 lagging	±0.09	±0.3	±0.4
10 to 120	0.8 leading	±0.09	±0.3	±0.4

TABLE 2

TABLE 2: Standards of accuracy and overall uncertainty for on-site accuracy tests of Active Energy Meters.

CLASS OF METER UNDER TEST	TEST EQUIPMENT MAXIMUM OVERALL UNCERTAINTY %	PERCENTAGE ERROR LIMITS OF METER INCLUDING UNCERTAINTY	
		BLANK CALIBRATED METER	COMPENSATED METER
0.2	±0.2	±0.4	±0.5
0.5	±0.2	±0.7	±0.7
2.0	±0.6	±2.0	±2.0

The above table assumes the Meter is working at or about reference conditions.

TABLE 3

TABLE 3: Standards of accuracy and overall uncertainty for laboratory calibration and testing of Reactive Energy Meters.

Class of Meter 2.0

VALUE OF CURRENT % *	POWER FACTOR	MAXIMUM OVERALL % UNCERTAINTY	PERCENTAGE ERROR LIMITS OF METER INCLUDING UNCERTAINTY
20 to 120	zero	± 0.5	± 2.0
20 to 120	0.866 lead	± 1.0	± 2.5
20 to 120	0.866 lag	± 1.0	± 2.5

* for whole current metering percentage relates to I_{max} and shall not exceed 100%.

Class of Meter 3.0

VALUE OF CURRENT % *	POWER FACTOR	MAXIMUM OVERALL % UNCERTAINTY	PERCENTAGE ERROR LIMITS OF METER INCLUDING UNCERTAINTY
20 to 120	zero	± 1.0	± 3.0
20 to 120	0.866 lead	± 1.5	± 3.5
20 to 120	0.866 lag	± 1.5	± 3.5

* for whole current metering percentage relates to I_{max} and shall not exceed 100%.

TABLE 4

TABLE 4: Standards of accuracy and overall uncertainty for on-site accuracy tests of Reactive Energy Meters.

CLASS OF METER UNDER TEST	TEST EQUIPMENT MAXIMUM OVERALL UNCERTAINTY %	PERCENTAGE ERROR LIMITS OF METER INCLUDING UNCERTAINTY
2.0	±1.0	±2.5
3.0	±1.5	±3.5

The above table assumes the Meter is working at or about reference conditions.

APPENDIX A

Commissioning Tests.

This Appendix sets out those tests and checks which shall be included in the commissioning programme. Where practical site constraints prevent any of the identified tests or checks being performed then this must be recorded in the commissioning record with the actual reason detailed.

Metering Equipment shall have basic tests on earthing, insulation, continuity and other tests which would normally be conducted in accordance with 'Good Industry Practice' as well as the following :-

1. **Measurement Transformers**

For all installations the Operator shall wherever practically possible confirm and record from site tests and inspections :-

(a) The installed unit details including :- , serial numbers, rating, accuracy class, ratio(s).

(b) CT ratio and polarity for selected tap.

(c) VT ratio and phasing for each winding.

2. **Measurement Transformer Leads and Burdens**

For all installations the Operator shall wherever practically possible :-

(a) Confirm that the VT and CT connections are correct

(b) Confirm that the VT and CT burden ratings are not exceeded.

(c) Determine and record the value of any burdens (including any non-Settlement metering burdens) necessary to provide evidence of the overall metering accuracy.

3. Metering

3.1 General Tests and Checks

The following may be performed on-site or elsewhere (e.g. factory, meter test station. laboratory, etc)

(a) Record the Metering System details information required by the relevant Agreed Procedure and also that required under the EASL Code of Practice.

(b) Confirm that the meter details agree with the Measurement Transformer details .

(c) Confirm correct operation of Meter test terminal blocks where these are fitted (eg. CT/VT operated metering).

(d) Check that all cabling and wiring of the new or modified installation is correct.

(e) Confirm that Meter registers advance (and output pulses are produced for meters linked to separate outstations) for both Import and Export flow directions where appropriate. Confirm Meter operation separately for each phase current and for normal polyphase current operation.

(f) Where separate Outstations are used confirm the Meter to Outstation channel allocations and the Meter units per pulse values or equivalent data are correct.

(g) Confirm that the local interrogation facility, (Meter or Outstation) or local display etc, operate.

3.2 Site Tests

The following tests shall be performed on site.

(a) Check any site cabling, wiring, connections not previously checked.

(b) Confirm that Meter/Outstation is set to UTC (GMT) within +/- 5 seconds.

(c) Check that the voltage and the phase rotation of the measurement supply at the meter terminals is correct.

(d) Record Meter Start Readings (including date and time of readings).

(e) Wherever practically possible perform prevailing load checks, either with a portable instrument(s) for each circuit/Meter, or obtain confirmatory measurements available from other site instrumentation. Wherever possible providing clear confirmation that the Meter is measuring the correct primary values. (i.e. confirming the VT & CT ratios for HV metering).

(f) Record values of the Meter(s)/Outstation(s) stored data (at minimum one partial or complete half-hour value with the associated date and time of the reading) on the commissioning record.

(g) Confirm the operation of Metering Equipment alarms (not data alarms or flags in the transmitted data).

(h) When the Metering System Communication Link is installed and functioning the Operator shall notify the SSA/STA of the link details using the relevant procedure.

i) when not possible?
ii) what are the exceptions?