

METERING CODE C

CODE OF PRACTICE FOR THE METERING  
OF ELECTRICITY TRANSFERS BETWEEN PUBLIC ELECTRICITY SUPPLIERS  
AT VOLTAGE LEVELS BELOW 132kV  
(TO APPLY AFTER THE FINAL METERING SCHEME DATE)

Superseded

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Code of Practice for the Metering of Electricity Transfers  
between Public Electricity Suppliers at Voltage levels below 132kV

**FOREWORD**

This document is one of a suite of Codes of Practice which supersedes Engineering Recommendation M24 - "Code of Practice for the Metering of Supplies from the Central Electricity Generating Board", issued in April 1973, and Metering Code A - "Code of Practice for the Metering of Electricity Transfers between the National Grid Company plc and Public Electricity Suppliers using the National Interim Metering Scheme". It does not include arrangements between National Grid Company plc ("NGC") and Public Electricity Suppliers ("PESs"), or between NGC or PESs and Generators, or the metering of customers of PESs or Generators, or the metering of Externally Interconnected Parties which are dealt with in other Codes in this suite.

For the purposes of this Code, the terms "PES", "Generator" and "Externally Interconnected Parties" shall have the definitions ascribed to them in the Pooling and Settlement Agreement, dated 30th March, 1990 (the "PSA").

NGC Settlements Limited as Settlement System Administrator (as such term is defined in the PSA) shall retain copies of, *inter alia*, all Codes of Practice in this suite together with copies of documents referred to in them, in accordance with the provisions of the PSA.

**1. SCOPE**

This Code of Practice determines the practices that shall be employed, and the facilities that shall be provided for the measurement of Electricity transfers between PESs at voltage levels below 132kV and for recording measured quantities for Settlement.

It complements and expands on the metering provisions (Clause 56) of the PSA, to which reference should be made. In particular, it complements provisions relating to accuracy of measurement and the corresponding Metering Equipment Performance Specifications set out in Schedule 15 to the PSA. It should also be read in conjunction with the relevant Agreed Procedures for, *inter alia*, the data collection systems as specified in Schedule 16 to the PSA.

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

**2. GENERAL**

The National Interim Metering Scheme ("IMS") referred to in Metering Code A had known technical limitations which were

unavoidable in order to meet the short timescales necessary for implementation at the Effective Date and proposals were therefore made for a new system which would overcome these limitations. This was initially referred to as the "Final Metering Scheme" ("FMS"), and sought to establish new metering points at the true commercial boundaries of the new companies. This new system will provide the quantitative electrical measurements necessary to support Settlement to a greater accuracy, to improved reliability and with less resort to data modification than the IMS. It covers those situations where, either at or associated with the new commercial interface, there are interconnecting supplies at 132kV between two PESs either at a Grid Supply Point ("GSP") or on circuits emanating from a GSP. These are to be separately metered to allow Settlement to net off such supplies from those attributable to the PES with the majority take from the GSP and allocate them to the second PES. However, the FMS does not address those similar supplies at voltages of 66kV, 33kV and even 11kV which previously had been automatically included in measurements due to operation of the metering at Bulk Supply Points ("BSPs") via the IMS.

These interconnections, mainly at the old BSPs, are to be incorporated into Settlement to avoid the complications which would result if contractual procedures had to be established to deal with them. As from the FMS Date, this data is to be collected by one of the PESs (acting as Second Tier Agents (as defined in the PSA)) through its data collection system established to collect data of Second Tier supplies.

Initially, the Metering Systems will be those existing at the FMS Date at the respective sites, having been subject to the IMS as specified in Metering Code A. However, it may be necessary to renew some equipment or install further equipment at particular sites. Data collection will also be required to be incorporated into the PES system. The opportunity may be taken during any renewal or new installation to upgrade to an accuracy better than that of the IMS, and this is allowed for in this Code C. However, since this metering exists solely for allocation of Pool purchase costs between two PESs, it is stressed that any decision to upgrade remains solely with the two PESs concerned, who will agree whether additional capital expenditure is worth incurring, depending upon the voltage level concerned and the value of the supply.

It is not envisaged that any new interconnection points at these voltage levels will be constructed, but there may be commercial reasons for so doing. In this event, the above comments regarding agreement to the required standards will apply.

Notwithstanding these considerations, the PESs have agreed to enter these standards for incorporation into the PSA.



### 3. REFERENCES

The following documents may be referred to in the text:-

IEC Specification 687	Precision Watthour Meters of Class 0.2S and 0.5S
British Standard BS 5685: 1989	Watthour Meters of Class 0.5, 1 and 2
British Standard BS 3938: 1973	Current Transformers
British Standard BS 3941: 1975	Voltage Transformers
CEGB Standard 993619 (TPS 6/19) 1985	Application of Metering to Tariff Circuits
CEGB Standard 993908 (TPS 9/14) 1983	Test Facilities for Current and Voltage Transformer Secondary Circuits
CEGB Specification EM21 (1982)	Electricity Meters, Induction Type
CEGB Specification EM24 (1980)	Cubicle for Accommodating Metering Equipment and Transducers
CEGB Specification EM27 (1986)	Static Energy Meters
CEGB Design Memorandum 099/101 (TDM 6/5) 1979	Definitions of Import and Export in Relation to Instrumentation and Metering
ESI Standard 50-18	Design and Application of Ancillary Electrical Equipment
Engineering Recommendation M24	Code of Practice for the Metering of Supplies from the CEBG
PTS 261	The technical content of Primary Transmission Scheme 261, which sets out the IMS
PTS 271	The technical content of Primary Transmission Scheme 271, which sets out the FMS
Metering Code A	Code of Practice for the Metering of Electricity Transfers between the National Grid Company plc and Public Electricity Suppliers using the National Interim Metering Scheme



Note: All references to Standards given in the text are to current versions. Where equipment is in use which was designed and built to earlier versions of these Standards, there is no implied requirement to update this equipment.

#### 4. DEFINITIONS

Except where otherwise specified herein the definitions in British Standards 205, 1991 and 4727 Part 1, and British Standards for equipment shall apply as appropriate. The following definitions, which also apply, supplement or complement those in the PSA, and are included for the purposes of clarification.

##### 4.1 *Electricity*

Active Energy and/or Reactive Energy.

##### 4.2 *Active Energy*

Active Energy is that part of the electricity supply capable of performing work. Unless otherwise stated it includes energy flows in both directions.

##### 4.3 *Reactive Energy*

Reactive Energy is that part of the electricity supply which cannot perform work (the reactive voltampere hours). Unless otherwise stated it includes reactive energy flows in both directions.

##### 4.4 *Active Power*

Active Power is the rate at which Active Energy is supplied.

##### 4.5 *Reactive Power*

Reactive Power is the rate at which Reactive Energy is supplied.

##### 4.6 *Demand Period/Integrating Period*

The period over which Active Energy and Reactive Energy are integrated to provide Demand Values. For Settlement purposes as at the Effective Date, the demand period shall be 30 minutes.

##### 4.7 *Demand Values*

Average values of Active Power and Reactive Power over a Demand Period. The Demand Values are half hour demands and these are identified by the time of the end of the demand period.

#### 4.8 *Meter Demand*

A demand registered by a single Meter.

#### 4.9 *Total Demand*

A demand derived either from the Summation of one or more Meter Demands of similar quantities or from other total demands.

#### 4.10 *Import*

An Electricity flow from the PES being metered to the PES which is Registrant of the Metering System. (See also Appendix A.) The verb "Import" and its respective tenses shall be construed accordingly.

#### 4.11 *Export*

An Electricity flow to the PES being metered from the PES which is Registrant of the Metering System. (See also Appendix A.) The verb "Export" and its respective tenses shall be construed accordingly.

#### 4.12 *Summation*

Summation means the algebraic addition of two or more flows of Electricity, either simultaneously, or for impulse Summation, within the minimum number of impulses for correct operation.

For the purpose of addition, Import flows are termed positive and Export flows are termed negative.

#### 4.13 *Commercial Interface*

For the purposes of this Code C, the relevant physical locations at which commercial interfaces occur are at circuits (system links) between two PESs at voltage levels below 132kV.

#### 4.14 *Metering point*

The physical location at which Electricity is metered.

#### 4.15 *Meter*

A device for measuring Electricity.

#### 4.16 *Meter Register*

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

#### 4.17 *PARh Meter*

A phase advanced reactive Meter used instead of Import and Export reactive Meters (VARh). Reactive Power/Reactive Energy is calculated by the following:-

$$VAr = (\sqrt{3} \times \text{Watts} - 2 \text{ PAr})$$

#### 4.18 *Raw Data*

Demand Values collected from the outstations and which have not been altered by either manual or automatic means.

The values may have had automatic checks applied to them and be marked with flags describing their status relative to the checks.

#### 4.19 *Processed Data*

Demand Values which have been amended by basic mathematical processes according to agreed algorithms.

#### 4.20 *Verified Data*

Demand Values which, having been automatically checked, are considered satisfactory for commercial use.

#### 4.21 *Modified Data*

Demand Values which are edited or substituted values where the raw data has been established as incorrect or missing.

#### 4.22 *Reconciled Data*

Demand Values upon which monthly Settlement will be made, and which may include validated data where Meter reading is carried out monthly.

#### 4.23 *Validated Data*

Demand Values which are ultimately regarded as being correct on the basis of aligning with the Meter Register advances.

#### 4.24 *Outstation*

The site equipment which receives and stores pulses from the individual Meters, may perform some processing of the data and transmits the metering data to the collector station on request.

#### 4.25 *Interfacing Unit*

A unit which interfaces between the Meter output and the Outstation to provide two (or more) outputs (e.g. to provide an additional output from a Meter with only one set of output contacts).



#### 4.26 *Collector Station*

The computer based equipment located at a central site which dials up and collects data from the Outstations.

#### 4.27 *Bulk Supply Point (BSP)*

An historical term for a Metering Point, normally at 66kV or below, which formed the boundary between CEGB and Area Electricity Boards prior to the handover of 132kV Assets and prior to the Effective Date.

#### 4.28 *PSTN/CTN*

The Public Switched Telephone Network/The ESI Corporate Telephone Network.

#### 4.29 *The National Interim Metering Scheme (IMS)*

The National Metering Scheme, as set out in PTS 261, in effect as at the Effective Date and continuing until the FMS Date (as defined in the PSA).

#### 4.30 *The National Metering Scheme at Commercial Boundaries (or Final Metering Scheme - FMS)*

The National Metering Scheme, as set out in PTS 271, coming into effect at the FMS Date.

### 5. MEASUREMENT CRITERIA

#### 5.1 **Quantities to be Measured**

The outputs from current and voltage transformers shall provide, for the majority of circuits:-

- (i) Import kWh
- (ii) Export kWh
- (iii) Import kVArh
- (iv) Export kVArh

In certain cases (iii) and (iv) may be combined by using a Parhour Meter, or (ii) and (iv) may be omitted.

In addition, integration of the measured values over the Demand Period shall provide, for each circuit:-

- (a) average value of kW
- (b) average value of kVAr or kPAr.



## 5.2 Accuracy

### 5.2.1 Overall Accuracy of Equipment

Meters shall be so calibrated, taking account of errors due to measuring transformers, as to achieve overall accuracy of equipment (comprising Meters and measuring transformers) at the point of measurement within the limits of error as below:-

#### (a) Existing Metering

##### (i) Active Energy Meters

Conditions of Test	Limits of Error at Stated Power Factor	
<i>Current expressed as a percentage of the rated measuring current</i>	<i>Power Factor</i>	<i>Limit of Error</i>
125% to 20% inclusive	1.0	+/- 1.0%
Below 20% to 10% inclusive	1.0	+/- 1.5%
Below 10% to 5% inclusive	1.0	+/- 2.0%
125% to 20% inclusive	0.5 lag and lead	+/- 2.0%
Below 20% to 10% inclusive	0.5 lag and lead	+/- 2.5%

##### (ii) Reactive Energy Meters

Conditions of Test	Limits of Error at Stated Power Factor	
<i>Current expressed as a percentage of the rated measuring current</i>	<i>Power Factor</i>	<i>Limit of Error</i>
125% to 5% inclusive	Zero	+/- 4%
125% to 20% inclusive	0.866 lag and lead	+/- 4%
Below 20% to 10% inclusive	0.866 lag and lead	+/- 5%

(b) **New or Upgraded Metering**(i) **Active Energy Measurement**

Conditions of Test	Limits of error at Stated Power Factor	
<i>Current expressed as percentage of rated measuring current</i>	<i>Power Factor</i>	<i>Limits of Error</i>
125% to 10% inclusive	1.0	+/- 0.5%
Below 10% to 5% inclusive	1.0	+/- 0.7%
125% to 10% inclusive	0.5 lag and lead	+/- 1.0%

(ii) **Reactive Energy Measurement**

Conditions of Test	Limits of error at Stated Power Factor under primary system balanced conditions	
<i>Current expressed as percentage of rated measuring current</i>	<i>Power Factor</i>	<i>Limits of Error</i>
125% to 10% inclusive	Zero	+/- 1.0%
125% to 10% inclusive	0.866 lag and lead	+/- 1.5%

These limits shall be maintained for the prescribed calibration period of the Meter, as set out in section 7.1.3.

5.2.2 **Accuracy at the Commercial Interface**

In the majority of cases, the point of measurement coincides with the Commercial Interface. Where it does not, loss adjustments shall be made and an uncertainty between adjusted and "true" values will result, which will effectively widen the error in the Tables above. (See section 5.4)

5.2.3 **Accuracy of Records**

The amount of Active Energy or Reactive Energy supplied during each declared Demand Period obtained from recorded readings shall be within +/- 1.0% (at full load) of the amount obtained by reading the appropriate Register or Registers at the beginning and end of the Demand Period.

5.2.4 **Accuracy of Time Keeping**

The long term time keeping accuracy shall be based upon

the Outstation receiving a timing signal from the Collector Station which is synchronised to true time by using a Rugby (Warwickshire) radio clock.

The overall limits of error for the time keeping which must allow for failure to communicate with the Outstation for an extended period of 10 days shall be:-

- 5.2.4.1 the commencement of each Demand Period shall be at a time which is within +/- 10 seconds of the true time;
- 5.2.4.2 the duration of each Demand Period shall be within +/- 0.03% of the true duration.

### 5.3 Compensation for Measuring Transformer Errors

Compensation shall be made for the errors of current and voltage transformers in the Meter calibration in order to achieve required system accuracy.

Values of the compensation criteria shall be recorded in the details submitted upon registration of the Metering System pursuant to the PSA and in relevant Connection and Use of System Agreements.

### 5.4 Compensation for Primary Transformer and Line Losses

Compensation shall be made for losses between the point of measurement and the commercial boundary, where these do not coincide, as follows:-

- (i) where applicable, calibration of the Meter shall take account of Primary Transformer losses
- (ii) (a) fixed line loss factor(s) shall be adjusted by the Second Tier Software (as defined in the PSA) applied in software to the adjusted values as in (i) above. These (This) factor(s) shall be as agreed between the PESs concerned.

Values of compensations made shall be recorded in the details submitted upon registration of the Metering System pursuant to the PSA and in relevant Connection and Use of System Agreements.

## 6. FACILITIES TO BE PROVIDED

### 6.1 Meters

#### 6.1.1 Existing

Meters shall be in accordance with BS 5685 and with



Specification CEGB-EM21 or EM27. Watthour Meters shall be to a minimum of Class 0.5 and Reactive (VAR-hour) Meters shall be to a minimum of Class 3.

On each circuit Main and Check Meters will generally be provided for both Import and Export of Active Energy and one metering set shall be provided for Import and Export of Reactive Energy. This comprises measurement of 6 quantities per circuit unless conditions are such as to reduce the need for these requirements.

#### 6.1.2 **New or Upgraded**

Meters shall be to IEC 687, and to CEGB EM27. Watthour Meters shall be to Class 0.2S. Reactive (VAR-hour) Meters shall be to Class 0.5S (as defined for kWh Meters) with appropriate adjustments to power factor.

On each circuit main and check Active Energy and Reactive Energy Meters for both Import and Export will be installed. This will be achieved by bi-directional Meters (four in all).

### 6.2 **Current Transformers**

#### 6.2.1 **Existing**

Current transformers shall preferably be to BS 3938, Class 0.2 and have a rating of not less than 15VA. The secondary current shall be either 1 or 5 amps.

#### 6.2.2 **New or Upgraded**

Current transformers shall be to BS 3938, Class 0.1 and have a rating of 7.5VA. The secondary current shall be 1 amp.

### 6.3 **Voltage Transformers**

#### 6.3.1 **Existing**

Voltage transformers shall be to BS 3941, Class 1.0 and have a rating of not less than 100VA.

#### 6.3.2 **New or Upgraded**

Voltage transformers shall be to BS 3941, Class 0.2 and have a rating of 15VA.

### 6.4 **Instrument Transformers - General**

In the case of upgraded systems, installations using existing instrument transformers may be retained subject to the requirements for upgraded system accuracy being met.



Metering current transformers shall be used solely for supplying Meters.

Common return leads for two or more current transformer secondary circuits shall not be permitted.

The total burden shall not exceed the rating of the current transformers.

Metering voltage transformers may be shared with other duties in so far as this does not affect achievement of system accuracy.

The metering suite shall be fed by a separate, fused set of leads from the voltage transformer.

#### 6.5 Interfacing Units

Interfacing units shall be designed and supplied according to relevant requirements. An indication of impulsing state shall be available on each unit.

#### 6.6 Outstations

Outstations shall be to the requirements of the relevant PES data collection system, either directly or to such intermediate systems as may be utilised or established. Further details will be given in Metering Code G.

#### 6.7 Communication/transmission medium

Communications from a Metering Point to a Collector Station shall be via PSTN, or, occasionally, via CTN or via other communications systems to an equivalent standard.

#### 6.8 Ownership

Metering Equipment shall normally be owned according to the ownership of the primary equipment to which it is connected.

All metering, metering ancillary equipment, instrument transformers, interfacing and control equipment will be registered into Settlement as required by the PSA. Each Metering System must have a Registrant and an Operator as required by the provisions of Clause 56 of the PSA. For the purposes of this Code, the terms "Registrant" and "Operator" shall have the definitions ascribed to them in the PSA.

### 7. CALIBRATION AND TESTING OF EQUIPMENT

#### 7.1 Meters

##### 7.1.1 Initial (Commissioning) Calibration

Meters will have been supplied calibrated according to

the requirements of Specification CEGB - EM21 or EM27 as to accuracy, to the relevant requirements of such Specifications and with errors biased to take account of voltage and current transformer errors and, where applicable, primary transformer losses.

Where available, the results of Routine Tests carried out as per relevant sections of the Specifications will be made available in accordance with Clause 56.9.3 of the PSA with other records as in section 7.1.2 below.

#### 7.1.2 **Pre-Periodic Checking and Re-Calibration prior to the FMS Date**

Metering Equipment will have been subject to routine inspection and recalibration under procedures established under the IMS. These procedures, and the periods attributable to particular Meter types for recalibration are specified in Metering Code A.

Records relating to these periodic checks or recalibrations will be transferred before the FMS Date to any new Operator of the Metering Equipment who will make them available to the Registrant and/or the Settlement System Administrator as required by the provisions of the PSA.

#### 7.1.3 **Subsequent Checking and Recalibration**

7.1.3.1 Systems shall be established for periodic checking and recalibration, as agreed between the relevant parties. Guidelines are given in Appendix B.

7.1.3.2 In respect of Static Meters, there is currently no experience of the periods after which they should be replaced. The Operator will take a test sample of 20% of each type of Meter on a rolling schedule during each period of 10 years and then the Settlement System Administrator will from the results of the periodic calibration sample tests agree the period for recalibration for each type of Meter with the Registrant. For methods of test, see Appendix B.

#### 7.1.4 **Tests following Disputes**

Where site tests are required to settle a dispute, the method (injecting into measuring circuits) as specified in Clause 56.15.2(a) of the PSA shall be adopted, where possible. See also Appendix B.

## 7.2 Measuring Transformers

### 7.2.1 Initial Calibration

Existing measuring transformer equipment will have been supplied with known characteristics within the specifications of relevant British Standards to allow calibration of meters to ensure overall system accuracy within the limits laid down in this Code of Practice.

Records of these characteristics will be included with those records referred to in sections 5.3 and 7.1.2 above.

### 7.2.2 Periodic Calibration

Calibration checks on measuring transformers are not considered practicable or necessary, provided that the requirements as in section 6.2.2 of Metering Code A have been applied.

Physical inspections of equipment and connections will be carried out as in section 7.1.3 above.

## 7.3 Test Access to Metering Equipment

Where provided, test terminal blocks in accordance with CEGB Standard 993908 (TPS 9/14) shall be used to facilitate Meter testing and voltage and current transformer monitoring on site. Otherwise, existing arrangements will continue.

## 7.4 Data Logging and Processing Equipment

### 7.4.1 Initial Tests

Equipment for data logging and processing will be supplied and tested according to specifications within the relevant PES data collection system. Access to the results of these tests will be made available in accordance with the provisions of Clause 56.9.3 of the PSA.

### 7.4.2 Periodic Tests/Maintenance

Routine maintenance will be carried out by the Operator and the Schedules used will be available for inspection in accordance with the provisions of the PSA.

## 7.5 Testing Procedures

A programme of periodic tests shall be agreed between the



Registrant and the Operator. The intention to conduct particular tests shall be notified to the Settlement System Administrator by the Operator within the requirements of the relevant Clauses of the PSA.

#### 7.6 Tests on New or Replacement Equipment

The opportunity will be given to witness comparable tests on new or replacement equipment (which replaces existing equipment) in accordance with the provisions of Clause 56.9.2(a) of the PSA.

### 8. DATA TRANSMISSION ROUTES AND PROCESSING (Diagram 1 represents the system in block form)

#### 8.1 Meter(s) to Site Outstations

Data from Meters will be fed continuously and either directly or, where necessary, via a meter interface unit, to the respective site Outstation.

The data collected is stored in memory and will remain stored on site after interrogation by the Collector Station depending upon the capacity of the equipment, for a minimum of 10 days after collection, after which it will be overwritten. During this period, it can be retrieved.

#### 8.2 Site Outstation to Collector Station

Data from Outstations will be collected by the respective collector station by daily dial up. Further data transfers may take place, initiated manually. Automatic checking procedures are carried out on the data collected from Outstations and the results are reported at the collector station.

Further details of the data processing are contained in the Code of Practice for the Metering of Second Tier Supplies (Metering Code G) and its associated Agreed Procedures (as referred to in the PSA).

### 9. ACCESS TO DATA

#### 9.1 General

Access to data and physical access to Metering Points, Data Collection Stations and the Central Data Collection System shall be in accordance with the provisions of the PSA and the Agreed Procedures.

#### 9.2 At the Metering Point

In addition to collection by automatic means, data at the Metering Point can be accessed by reading Meter Registers or may be accessed from a site Outstation or a particular Meter, by a local interrogation facility. This facility will enable the recording of readings, the examination of status information,



demand values, and other features, but values held in the Outstation units shall not be altered by the interrogation (i.e. the integrity of data stored on site shall not be affected).

Only staff both nominated by the Operator and authorised by the Settlement System Administrator may operate a local interrogation facility and interrogation of a given Outstation will require use of a unique Outstation identification number.

#### 10. MISSING OR DEFECTIVE DATA AND CONTINGENCY ARRANGEMENTS

Schedule 16 to the PSA lists Agreed Procedures which cover the following operational considerations of the Data Collection systems:-

- Sources of missing or defective data
- Detection of defects
- Defect Procedures
- Validation of Data
- Reconciliation of discrepancies
- Estimation Procedures

#### 11. NOTIFYING/SETTLING OF DISPUTES

The relevant Clauses of the PSA shall govern the procedures for notifying and settling of disputes.

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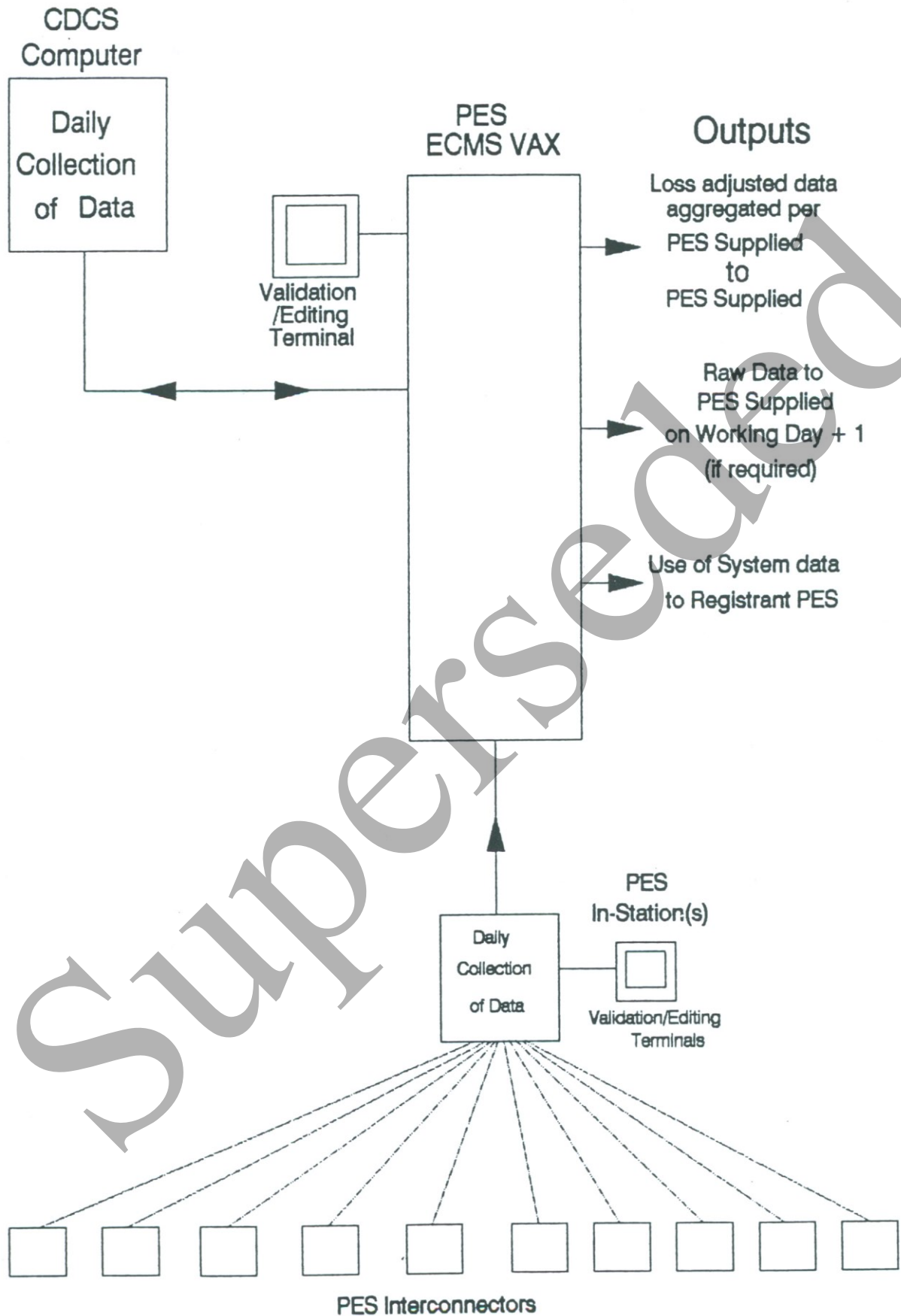


Diagram 1 PES Data Collection System.

## APPENDIX A

## LABELLING OF METERS FOR IMPORT AND EXPORT

A1 The terms Import and Export are defined in sub-sections 4.10 and 4.11 and it is considered desirable to recommend a standard method of labelling Meters (or suitable labelling panels, etc.), and to establish the relationship between Import and Export Active Energy, and Import and Export Reactive Energy. Accordingly, Meters (or suitable labelling panels, etc.) shall be labelled in accordance with this Appendix A.

## A2 ACTIVE ENERGY

Active Energy is considered to be Imported when it flows to supply the distribution system of the PES which is the Registrant of the Metering System. The Meter(s) registering this energy should be labelled "Import".

Active Energy is considered to be Exported when it flows from the system of the PES which is the Registrant of the Metering System. The Meter(s) registering this energy should be labelled "Export".

## A3 REACTIVE ENERGY

Within the context of this Code the relationship between Active Energy and Reactive Energy can best be established by means of the power factor. The following table gives the relationship:-

<i>Flow of Energy</i>	<i>Power Factor</i>	<i>Flow of Reactive Energy</i>
Import	Lagging	Import
Import	Leading	Export
Import	Unity	Zero
Export	Lagging	Export
Export	Leading	Import
Export	Unity	Zero

Meters for registering Import Reactive Energy should be labelled "Import Reactive" and those for registering Export Reactive Energy should be labelled "Export Reactive".

**NOTE:** This convention is based on "Import" and "Export" being from the viewpoint of the Registrant of the Metering System.



## APPENDIX B

## RECOMMENDATIONS FOR PERIODIC TESTING AND RE-CALIBRATION OF METERS

## 1. Testing

1.1 A routine test of calibration will be carried out on all Meters registered with the Settlement System Administrator at an interval not exceeding 5 years. Specific intervals relating to particular types of electromechanical Meters are recommended in Table 3 of Metering Code A.

1.1.1 Where the test of calibration finds that a Meter is within the required system accuracy limits set out in section 5.2.1 above, but indicates that it will not be capable of remaining within those limits until the next test according to the interval stated above, then the interval of routine tests shall be reviewed.

1.1.2 Routine tests will be carried out on site either at the prevailing load or by injection into the measuring transformer secondary circuits.

## 1.2 Other calibration tests

A test of calibration will be carried out:-

- (a) When the Operator of the Meter believes that the Meter is not performing to its required accuracy.
- (b) Under the Metering provisions of the PSA (Clause 56.9.2) where either the Settlement System Administrator or a third party believes that the Meter is not performing to its required accuracy.
- (c) Following a dispute as to the values recorded by a Meter as provided for in Clause 56.15.2 of the PSA.

For those tests where the method of Clause 56.15.2.(a) (injection into the measuring circuits) is used, measurements of accuracy shall be carried out over the whole range of the Meter at the following test points:-

- |                  |   |
|------------------|---|
| Watt-hour meters | - 5%, 10%, 20%, 50%, 100% and 125% of rated measuring current at unity power factor   |
|                  | - 20%, 50%, 100% and 125% of rated measuring current at 0.5 power factor lagging; and |
| Var-hour meters  | - 10%, 20%, 50%, 100% and 125% of rated measuring current at zero power factor        |



- 20%, 50%, 100% and 125% of rated measuring current at 0.866 power factor lagging and leading.

## 2. Recalibration (refurbishment) periods

### 2.1 Electromechanical Meters

Meters shall be subject to recalibration at intervals not exceeding 10 years. Such recalibration shall usually mean removal from site, refurbishment and recalibration in a test laboratory before further use. Where it has previously been the practice to recalibrate on site, the Executive Committee shall agree to the continuation of such practice. Recommendations for calibration periods for particular types of Meter are given in Table 4 of Metering Code A.

### 2.2 Static Meters

There is insufficient experience in the operation of Static Meters currently available to enable recommendations as to specific intervals as to recalibration.

Recalibration in this context shall mean removal from site, refurbishment and recalibration in a test laboratory (where such practice is practicable or economic) before further use.

Recommendations for appropriate intervals between recalibration shall be made for each type of Meter following the results of the sampling tests, as required in section 7.1.3 above.