

**MOCOPA**



**MANUAL FOR THE REGISTRATION  
AUTHORITY OF  
THE METER OPERATION CODE OF PRACTICE  
AGREEMENT  
(MOCOPA)**

**Version 1.0**

## AUTHORITY FOR ISSUE

This document is produced in support of Schedule 8 of the Meter Operation Code of Practice Agreement (MOCOPA).

This document is issued and amended from time to time under the authority of the MOCOPA Review Panel.

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**GLOSSARY**

<b>Term</b>	<b>Acronym</b>	<b>Definition</b>
Annual Audit		as defined in the MOCOPA
Authorised MOCOPA Delegate		The person appointed by each Party to the MOCOPA to manage all matters arising under or in connection with the MOCOPA
Budget		as defined in the MOCOPA
Change Request	CR	a formal submission for an update to this Manual; for the avoidance of doubt, an update to this Manual consequential upon an amendment to the MOCOPA shall also be set out in a CR.
Distributor		as defined in the MOCOPA
Fees		as defined in the MOCOPA
Force Majeure		as defined in the MOCOPA
Initial Audit		The audit carried out on MO acceding to MOCOPA
Meter Operation Code of Practice Agreement	MOCOPA	as defined in the MOCOPA
Meter Operator		as defined in the MOCOPA
Provisional Certificate		as defined in the MOCOPA
Registrar		As defined in Section *3 of this Manual
Registration Authority	RA	as defined in the MOCOPA
Registration Authority Manual		as defined in the MOCOPA
Registration Certificate		as defined in the MOCOPA
Registration Fee		The Fee shown in Appendix 7 and as defined in MOCOPA
Requirements of MOCOPA		as defined in the MOCOPA
Review Panel	RP	as defined in the MOCOPA
Review Panel Member		as defined under 'Member' in the MOCOPA
Updated Versions		A schedule of revisions to the Manual
Version History		A record of amendments which have been incorporated into the Manual
Version Number		A unique reference number for each version of the Manual

**1. PURPOSE AND STRUCTURE OF THIS MANUAL**

Under clause 7.2 of the Meter Operation Code of Practice Agreement (MOCOPA) the Registration Authority (Registration Authority) is required to perform the functions given to it under the Agreement in accordance with its terms. This manual sets out the functions of the Registration Authority such that:

- i) where such functions are covered by specific sections of the MOCOPA, references are provided; and

- ii) where the MOCOPA does not provide detail, then sections of this manual provide such and may be construed as supporting the terms of the Agreement.

It should be noted that, according to MOCOPA clause 12.2, the performance of the Registration Authority's rights and duties may be delegated under the conditions specified in that clause. For the avoidance of doubt, it should be noted that the requirements of this Manual should be met under any such assignment or delegation, and any failure to act in accordance with this Manual shall be the responsibility of the Registration Authority, and shall be considered accordingly by the Review Panel<sup>1</sup>.

The functions of the Registration Authority are set out in Schedule 8 of the MOCOPA, as indicated in paragraphs 1.1 to 1.12 below.

Sections of this manual refer to the sub-number (i.e. Section 1 is 'Maintenance of the MOCOPA')

- 1.1 Maintenance of the MOCOPA
- 1.2 Accession to the MOCOPA
- 1.3 Registration of Meter Operators
- 1.4 Secretariat to the Review Panel
- 1.5 General administration including website maintenance
- 1.6 Administering a Register of Sealing Plier Identification Marks
- 1.7 Management of the Auditing Process
- 1.8 Auditing Meter Operators at the Company level
- 1.9 Site Audits
- 1.10 Complaints Procedure
- 1.11 Financial Services
- 1.12 Procurement of Legal Support

## 1A SCOPE OF THIS MANUAL

This Manual is intended to provide support to the primary requirements under the MOCOPA for the functions of the Registration Authority and its interface with the Review Panel and MOCOPA Parties.

In the event of any inconsistency between this Manual and the requirements of the MOCOPA, the relevant provisions of the MOCOPA shall take precedence.

## 1B UPDATES TO THIS MANUAL

Changes to the Manual may be derived from two sources:

Consequential upon changes to the MOCOPA; or

Upon receipt of a duly completed and authorised Change Request.

In either case, the MOCOPA Review Panel will approve any update to this Manual.

Notwithstanding the above, the Review Panel shall conduct a biennial review of this Manual to ensure its accuracy and effectiveness.

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<sup>1</sup> It should be noted that circumstances of Force Majeure are not considered under the terms of this Manual, and any such case should be progressed under the relevant provisions of the MOCOPA.

## **2. AUTHORITY**

The authority of the Registration Authority is derived from its appointment by the Parties and its accession as a Party in its own right. The Registration Authority must fulfil its rights and duties as established under the MOCOPA and its functions are outlined in Schedule 8 of the Agreement. The Registration Authority acts under the direction of the MOCOPA Review Panel (MOCOPA Clause 7.3 refers) and the Panel oversee and audit the performance of the Registration Authority (paragraph 1.1.7 of Schedule 7 of the MOCOPA). For the avoidance of doubt, this objective shall include overseeing performance in relation to this Manual. The Registration Authority will provide appropriate reports on the performance of its functions to the Review Panel as required.

### **2.1 Removal or Resignation of the Registration Authority**

Parties can remove the Registration Authority by a written resolution pursuant to Clause 7.6 of the MOCOPA.

The Registration Authority can resign subject to the terms of Clause 7.5 subject to the requirements of Clause 7.8 in respect of a successor Registration Authority.

### **2.2 Successor Registration Authority**

Clause 7.6 states that the appointment of a successor Registration Authority requires a majority resolution by Distributors and MO categories, it is anticipated that the Review Panel would have been involved in the evaluation and recommendation of the successor Registration Authority prior to parties voting on such an appointment.

## **3. STRUCTURE OF THE REGISTRATION AUTHORITY**

The Registration Authority will appoint an individual [the Registrar] to be the point of contact for the Registration Authority and to oversee the proper performance of its functions and duties. The appointment of a Registrar will not confer voting rights under the constitution of the MOCOPA Review Panel for that post-holder and the Registration Authority will nominate its representative to the Review Panel, who may or may not be the Registrar.

The Registration Authority will make available to the Review Panel a record of its structure, to include details of companies and/or individuals to whom specific functions that might otherwise be performed by the Registration Authority under the MOCOPA or this Manual, may have been contracted out, through contract, agreement or arrangement, and will maintain this as an accurate record.

## **4. REFERENCES**

Reference may be made in subsequent Sections of this Manual to the following:-

- 4.1 The Electricity Act 1989 (as amended)
- 4.2 SI 1998: 1566 The Meters (Certification) Regulations 1998;
- 4.3 MOCOPA, [8 September 1998];
- 4.4 Code of Practice 1 through 7 (England and Wales)
- 4.5 Code of Practice 1 through 7 (Scotland)
- 4.6 Health and Safety at Work Act 1974;
- 4.7 SI 1988/1222 Health & Safety (Training for Employment) Regulations;

- 4.8 SI 1989/635 Electricity at Work Regulations;
- 4.9 SI 1992/2057 The Management of Health and Safety at Work Regulations.

## **SECTION 1: MAINTENANCE OF THE MOCOPA**

### 1.1 Registration Authority role in the Maintenance of the MOCOPA

Maintenance of the MOCOPA is a function of the Registration Authority under Schedule 8 of the Agreement. For the purposes of this Manual, maintenance shall primarily support the requirements under MOCOPA Clauses 2.2 and 4.1 to 4.4 inclusive, and shall comprise the following services:

- provision of copies of a current version of the MOCOPA to authorised organisations or persons, which shall include publishing revised versions of the MOCOPA to Parties, the Panel and the Website at the agreed release dates;
- the preparation of amendments to the MOCOPA as directed by the Review Panel;
- the issue of those amendments to the Panel and/or Parties as appropriate, for approval under the relevant voting mechanism (MOCOPA Clauses 4.3 and 4.4 refer);
- recording the decision of the Panel or the outcome of voting by the Parties as appropriate to each amendment;
- incorporating the duly approved amendments into revised versions of the MOCOPA; and
- the management of the procedures for change co-ordination as set out in this section of the Manual.

### 1.2 Change Co-ordination procedures for the amendment of the MOCOPA

In order to ensure the integrity of the MOCOPA through amendment, it is necessary to manage the drafting of amendments, approval of those amendments and the update of the Agreement to incorporate approved amendments. The following principles shall constitute the objectives of the management of amendments to the MOCOPA:

- the Review Panel will direct the Registration Authority as to the amendments proposed, notwithstanding that any Voting member of the Panel may propose an amendment to be referred to the Parties;
- the proposed amendment will be progressed through the appropriate route in accordance with the requirements of Clauses 4.3 or 4.4;
- each proposed amendment will incorporate the key requirements listed below as mandatory
  - the objective of the amendment
  - the proposed date that the amendment would come into effect; and
  - the proposed drafting for incorporation into the Agreement
- and the Registration Authority shall ensure a template form is available for this purpose (Appendix 4);
- the appropriate approval for the proposed amendment ( i.e. Review Panel approval or Party vote);
- the logging of all proposals for amendment to the MOCOPA; and
- incremental Version numbering for updated versions of the MOCOPA, as set out in paragraph 1.6 of this section of this Manual

### 1.3 Application of the Change Co-ordination procedures for the MOCOPA

For the avoidance of doubt, the scope of the change co-ordination procedures, as noted in section 1.2 above, shall be applicable to the Agreement as follows:

amendments to the main body of the MOCOPA, Schedules 3 to 8 inclusive and any Appendices supporting those Schedules;

amendments to this Manual in accordance with paragraph 1.8 of this section of the Manual; and

Schedules 1 and 2 of the MOCOPA shall be excluded as the information contained therein is derived from Party details as registered at Companies House.

#### 1.4 Approval of proposed amendments to the MOCOPA

Approval of a proposed amendment shall be the responsibility of the Review Panel or Parties, as appropriate. However, a function of the Registration Authority shall be to ensure that approval is in accordance with the majority requirements appropriate to the approval body, as set out in the MOCOPA<sup>2</sup>.

To ensure the efficiency of the MOCOPA change co-ordination process:

the Registration Authority shall maintain a list of specific contacts for Parties entitled to vote on a change issued under MOCOPA Clause 4.4; and

voting Parties shall provide a dedicated contact to the Registration Authority for the purposes of change management, and shall advise any updates to those contact details as they arise.

#### 1.5 Logging Amendments to the MOCOPA

From the date of the incorporation of this Manual as Version 1.0, the Registration Authority shall keep a log of all proposed amendments to the MOCOPA which shall include, but not be limited to:

a unique reference number for the proposal;

the title and description and effective date of the amendment;

its authority for approval, i.e. Review Panel or Party Vote;

the decision in respect of that proposal; and

if the proposed amendment is approved, the Version of the MOCOPA which incorporated the amendment.

#### 1.6 Version Numbering for the MOCOPA

The Panel shall direct the schedule for the issue of revised versions of the MOCOPA which will incorporate any amendments agreed in accordance with Clause 4 of the MOCOPA which are in effect at the time of issue ('Updated Versions').

In order to ensure the integrity of the MOCOPA, each Updated Version will be assigned a unique reference (a 'Version Number'), such that Parties can be assured which Version Number of the MOCOPA is prevalent. Version Numbers shall be assigned on the following basis;

N.0. where;

N denotes the incremental Version Number, which Version Number shall only be incremented in the event of primary or secondary legislation or in the event that issues of that version exceed 9, and

0 denotes the issue under that Version, which issue is incremented upon each release incorporating changes which were neither minor nor consequential.

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<sup>2</sup> Clause 4.4 of the MOCOPA for category majorities for Party votes and Schedule 8 Clause 10 for a Panel resolution

Where a number of minor or consequential changes have been agreed by the Panel and they determine that these should be published in a release, these will be issued under Version Number N.0.1, where 1 denotes the updated issue.

Each Version Number of the MOCOPA will incorporate a record of the amendments which have been incorporated ('Version History')

#### 1.7 Maintaining accurate records of party names and details

Party names and details shown in Schedule 1 and 2 of the MOCOPA shall be updated in accordance with changes to these official details. In addition, details for any additional parties who have acceded since the last Version Number of the MOCOPA shall be incorporated into the relevant Schedule. Version History will not indicate changes to these details, and these Schedules shall only represent a view of the Parties at the time of the implementation of that Version Number.

#### 1.8 Maintenance of the Registration Authority Manual

Since this Manual supports the performance of the Registration Authority function, updates to this Manual shall be controlled through the use of specific CRs, which shall be set before the Panel for approval as if it was a consequential change to the Agreement<sup>3</sup> and shall be decided in accordance with the requirements of Clause 10 of Schedule 7 (Panel Resolutions) of the MOCOPA.

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<sup>3</sup> See Clause 4.3 of the MOCOPA

## **SECTION 2: ACCESSION TO THE MOCOPA**

- 2.1 Clauses 10.1 to 10.5 of the MOCOPA set out the procedures for admitting new Parties by accession to the MOCOPA, and Schedule 4 provides a standard form of Accession Agreement. In the case of the accession of a successor Registration Authority, the standard form of Accession Agreement requires modification to recognise it is an accession in that capacity (MOCOPA Clause 10.5 refers).
- 2.2 Upon receipt of a signed Accession Agreement, the Registration Authority shall notify all Parties and the Panel that a New Party has been admitted. In addition, the Registration Authority shall ensure that:
  - 2.2.1 the details of the New Party's company name and address as registered at Companies House are updated in the relevant Schedule of the MOCOPA;
  - 2.2.2 each New Party has nominated their Authorised MOCOPA Delegate and provided their details;
  - 2.2.3 a New Party in the capacity of a Meter Operator shall be registered subject to the Registrar's requirements, as set out in Section 3; and
  - 2.2.4 any costs, e.g. the Initial Fee for MOs, are notified to the New Party and invoiced accordingly.
- 2.3 For the avoidance of doubt, Accession confers the relevant voting rights however, each category of Party should note:
  - 2.3.1 in the case of a Distribution Business, all rights and duties shall apply and they should be compliant with these – e.g. notify Distributor Information per A.2.1 of Appendix 2 of Schedule 5 of the MOCOPA; or
  - 2.3.2 in the case of a Meter Operator, it may not operate under the MOCOPA until it has a Provisional Certificate and has completed its Initial Audit enabling a Registration Certificate to be issued.

## **SECTION 3: ACCESSION OF METER OPERATORS**

### 1 General

The registration of Meter Operators shall be carried out by the Registrar.

### 2 Flow Chart

A flow chart giving an overview of the process for registering MOs is given in Appendix 1 and the key actions are listed in Appendix 2.

### 3 Accession Agreement

When the Accession Agreement has been signed by the applicant then the Registration Authority is also required to sign. Two copies of the Accession Agreement should be made and the original sent back to the applicant. All Parties to the MOCOPA are to be informed of a new Party entering into this Agreement per Clause 10.4 of the MOCOPA and 2.2 of Section 2 of this Manual.

### 4 Provisional Certification

When the Accession Agreement is signed, the Registrar can issue a Provisional Certificate to the applicant. This Provisional Certificate will be valid for a period not exceeding 3 months, unless otherwise agreed by the Panel. The applicant's records should be updated to indicate that the MO has been issued with a Provisional Certificate, the expiry date of that Provisional Certificate and the target date for the Initial Audit.

The Registration Authority will ensure that the Panel and Parties are apprised of the issuance of a Provisional Certificate and the period under which the MO has been granted such certificate.

### 5 Initial Fee

On being issued with a Provisional Certificate, the MO shall be invoiced for the Registration Fee shown in Appendix 7.

### 6 Initial Audits

During the validity of the Provisional Certificate, the Registration Authority will assign an auditor to carry out an audit of the MO, which shall comprise the requirements of an Annual Audit, in order to establish compliance with MOCOPA (an 'Initial Audit').

Any non-conformity found on the Initial Audit should be brought to MO's attention by the auditor, orally at the end of the audit and in writing within 10 working days after such audit. The MO should be given a reasonable time to take any corrective action and to inform the auditor when such corrective action has been taken. The auditor will carry out a follow-up review to be satisfied that corrective action in respect of the non-conformity has been taken and, if so, will close the Initial Audit.

If corrective action has not been taken because the MO refuses or is unable to take the appropriate corrective action, then the Registration Authority may revoke the MOs Provisional Certificate. The Registration Authority will inform the Review Panel and all parties to MOCOPA that the MO has not completed the MO registration process and that the MO cannot continue to be a party to the MOCOPA in accordance with Clause 10.6.2 of the MOCOPA.

### 7 Accession

When the Registrar receives a satisfactory report from the auditor then, and subject to the Registration Fee having been paid in full, a Registration Certificate will be issued.

Upon completing registration, the MO will be subject to the ongoing requirements for the Annual Audit under the MOCOPA.

## 8 Annual Audits

Ongoing MO registration is subject to the results of the Annual Audits carried out under the MOCOPA by the Registration Authority as per Sections 8 and 9 of this Manual.

Any failure to resolve non-conformities identified at an Annual Audit within either the period determined by the Registration Authority in the audit report to that MO or to the satisfaction of the auditor shall be resolved through the provisions for Breaches of the Agreement in Clause 5 of the MOCOPA.

## **SECTION 4: SECRETARIAT TO THE REVIEW PANEL**

4.1 Clause 6.1 of Schedule 7 to the MOCOPA allows the Registration Authority to appoint a Secretary to the Review Panel. The Secretary's duties are broadly set out in clause 6.2 and shall include, but not be restricted to:

- 4.1.1 convening Review Panel meetings with due notice, pursuant to paragraph 7.2 or 8.1 of Schedule 7 of the MOCOPA, as appropriate;
- 4.1.2 providing due notice of the business of the meeting convened as above in accordance with paragraph 8.2 of Schedule 7 of the MOCOPA;
- 4.1.3 monitoring quoracy requirements pursuant to paragraph 9.2 of Schedule 7 of the MOCOPA with Review Panel Members and alternates if relevant;
- 4.1.4 conducting resolutions of the Review Panel pursuant to paragraph 10 of Schedule 7 of the MOCOPA; and
- 4.1.5 the issue and approval of the minutes of each Review Panel meeting in accordance with paragraph 11 of Schedule 7 of the MOCOPA.

4.2 Each Party shall appoint an appropriate person to manage all matters arising under or in connection with the MOCOPA and shall notify the Secretary of that duly authorised person, or persons ('Authorised MOCOPA Delegate(s)'). The Secretary shall maintain a log of the MOCOPA Authorised Delegates and Parties shall ensure that this is kept up to date, by advising the Registration Authority of any changes to such contact details as and when they occur. The Authorised MOCOPA Delegate(s) shall be the primary point(s) of contact between the Review Panel and the Party, for dealing with matters arising out of and in connection with:

- 4.2.1 amendment of the MOCOPA in accordance with Clause 4.4;
- 4.2.2 the co-ordination of the Annual Audit;
- 4.2.3 the resolution of matters arising out of and in connection with the Annual Audit;
- 4.2.4 the resolution of matters referred to Parties pursuant to Paragraph 10.1 of Schedule 7 of the MOCOPA; and
- 4.2.5 the collection of any contribution to costs under the MOCOPA.

## **SECTION 5: GENERAL ADMINISTRATION**

- 5.1 Where the Registration Authority has appointed a Secretary to the Review Panel it shall establish co-ordinated processes, to ensure any administrative duties associated with the MOCOPA or this Manual and the performance of those duties is duly executed by one or the other.
- 5.2 Administration requirements associated with particular functions are as detailed within the relevant sections of this Manual.

## **SECTION 6: ADMINISTERING A REGISTER OF SEALING IDENTIFICATION MARKS**

- 6.1 Clause 1.4.3 of the MOCOPA and Appendices 8 and 9 of Schedule 5 to the MOCOPA refer to arrangements related to the sealing of metering equipment. As part of these, the Registration Authority is required to maintain a list of identification symbols for Meter Operators which must be marked on a specified seal. 'Maintain' here includes ensuring that no new symbol allocated duplicates an existing symbol.

## **SECTION 7: MANAGEMENT OF THE AUDITING PROCESS AND GENERAL AUDIT CONDITIONS**

### 1 General Principles

- 1.1 Audits on MOs are normally carried out before a MO is fully registered and then annually. Audits are carried out so as to ensure that MOs are continuing to fully meet the requirements of MOCOPA. The audits are to cover MO procedures and records and work carried out by the MO.
- 1.2 More frequent audits may be initiated if a serious non-conformity is found during an audit.

### 2 Auditors Appointment and Independence

- 2.1 The Registrar will appoint an audit manager, company auditor and site auditor(s) on behalf of the Registration Authority. All contractual matters will be dealt with between the party concerned and the Registrar, but on operational matters the company auditor and the site auditor(s) will report to the audit manager.
- 2.2 The appointed audit manager, company auditor and site auditor(s) must have a thorough knowledge of electricity supply and metering points, the metering systems likely to be worked on and the hazards which may arise carrying out tests on metering systems. Site auditors must also have the ability to recognise where a metering system is not safe to be worked on.
- 2.3 For the avoidance of doubt, the Registrar shall be free to appoint one company or individual to perform any combination or all of the specified roles.
- 2.4 All persons performing audit related roles shall be free from bias, independent of the subject matter being audited and free from influence that could affect their objectivity. All persons involved with an audit must respect and support the independence of the auditors.

### 3 Pre-Audit Activities

- 3.1 The audit manager will produce an audit programme for each MO. The actual dates of the audit will be agreed between the MO and the auditor.
- 3.2 The audit manager will ensure appropriate audits of the MOs procedures are planned and arranged. Any non-conformity against MOCOPA requirements in the Pre-Audit Return (Appendix 3) which is identified by the audit manager or any of the auditors will be entered on the non-conformity report at Appendix 10 and immediately brought to the attention of the MO.

### 4 Conducting The Audit

- 4.1 The audit will cover 2 distinct areas of operation, the Head Office function and the Site function. The auditors should complete the relevant check lists at Appendix 11 to 13 during the course of the audit using guidance notes as necessary. The check lists are intended to be a tool to aid the auditors and not to restrict any part of the audit process.

### 5 Audit Reports

- 5.1 Auditors are required to complete relevant audit form(s) at Appendices 9, 10, 11, 12 and 13 during the course of the audit. These forms are considered by the Registration Authority to be confidential.
- 5.2 The MOCOPA Review Panel after consultation with the Association of Meter Operators has agreed that Part 1 of the Head Office Audit form Appendix 11 may be released if required as part of their duty of care to a Distribution Business.

- 5.3 The company auditor will show the MO Part 1 of the Head Office Audit to resolve any possible confidentiality matters. The MO can request information to be withheld. In which case the auditor will replace that information with the words “withheld at MO’s request”.
- 5.4 Except where they are marked “Confidential to Registration Authority” by the auditor, the Registrar will issue a Copy of Part 1 of all Head Office forms (Appendix 11) to all Distribution Businesses which request a copy to be used as part of their duty of care.
- 5.5 All documents relating to the audit will be held until at least the completion of the subsequent Annual Audit. (Intermediate audits undertaken at the specific request of the Registrar will not count as subsequent annual audits).
- 5.6 The auditors’ recommendations are to be forwarded to the Audit Manager. The Audit Manager will consider and comment on the auditors’ recommendations if considered necessary.

## 6 Post-Audit Activities

- 6.1 Within 10 working days of completion of the Company or Site audit, the relevant auditor will formally submit in writing to the MO, the findings of the audit and will notify the MO that a corrective action programme is required within a further 15 working days.
- 6.2 The relevant auditor will subsequently verify that all non-conformities have been satisfactorily resolved before the audit is closed out, or for minor non-conformities, at the next audit. If any non-conformity has not been completed satisfactorily the relevant auditor will advise the MO and the Audit Manager.
- 6.3 The Audit Manager will investigate the circumstances surrounding any reported non-conformity which has not been satisfactorily resolved. Any confirmed non-conformities which remain after this investigation has been completed will be reported to the Registrar together with a recommendation as to the action which the Registrar should take regarding the issue. A copy of the Audit Manager’s report will also be sent to the MO.

## 7 Reporting

- 7.1 As soon as a Company or Site audit has been completed (with or without ongoing minor non-conformities being held over to the next Annual Audit) the relevant auditor will send the original of their report to the audit manager and retain a copy to facilitate the next Annual Audit. Having recorded successful completion of the audit, the audit manager will pass all reports to the Registrar for retention. Where the Registrar has indicated to an auditor that the auditor will not be contracted to undertake audits in the following year, the auditor will forward the copy of the audit report which he would normally retain to such person as the Registrar will advise.
- 7.2 The final audit report should contain all of the information detailed in Appendices 9, 10, 11, 12 and 13 as appropriate. Where the MO requests information to be withheld, two versions of part 1 of Appendix 11 will be produced by the auditor. The version containing the information which the MO has requested to be withheld will be clearly marked “Confidential to Registration Authority” by the auditor on every page.

## 8 Annual Review

- 8.1 At least once a year the audit manager will meet each of the auditors in order to review the progress of audits, improved methods and changes in working practices. Once a year the audit manager will report on the progress of audits to the Review Panel. At the request of either the Review Panel or the audit manager, the audit manager will attend one meeting a year of the Review Panel to discuss improved methods and/or changes in working practices.

9 Safe Working Practices

- 9.1 The company auditor and site auditor(s) as employers have a general duty of care to their employees and to other persons who may be affected by their works. Duties are given in the Health & Safety at Work Act 1974 and in regulations made under that Act.
- 9.2 Site auditors are not authorised to work on equipment of the Distributor Business, they will advise appropriately qualified MO staff as their requirements. The auditor will satisfy himself that before working on metering installations the MO has direct control of the electricity supply to those metering systems.
- 9.3 Employees have a duty of care in respect of work on or with electricity supplies and these responsibilities are given in SI 1989:635 The Electricity at Work Regulations.

## **SECTION 8: AUDIT OF METER OPERATORS AT THE COMPANY LEVEL**

### **1 Purpose of Audit**

- 1.1 Audits carried out at the MOs HQ are to establish that the MO meets the Requirements of MOCOPA in the following areas:

Organisation - clear chain of responsibility.

Insurance - adequately covered for public liability.

Policy - clear statement on safe working practices, quality of work and technical competency.

Training records - documentary evidence to verify adequate training of operatives both technically and in safe working practices.

Appointment of competent persons.

Work procedures - reasonable evidence to show that work procedures are issued to all operatives, that these procedures were controlled and used by operatives.

Records of work carried out - to establish that adequate records of meter installation and commissioning were being kept and that sufficient information was being exchanged with the Distributor Business, ensuring metering systems are correctly installed.

Test equipment - to ensure that suitable test equipment is being used and that instruments are periodically re-calibrated.

Sealing - documentation to show records and control of sealing dies specified for use in MOCOPA.

- 2.1 During the company audit form Appendix 11 will be completed. See all Guidance Notes

### **2 Audit Procedure**

- 2.1 The company audit will be conducted within 3 months of initial registration and once per financial year thereafter. Intermediate audits will also be undertaken when specifically requested by the Registrar.
- 2.2 The company audit will be arranged and conducted as detailed in Sections 7 of this manual and reports submitted using the forms in Appendices 9, 10 and 11.

## **SECTION 9: SITE AUDITS**

### **1 Purpose of Audit**

- 1.1 Field service audit (Site audit) of the installation of metering systems is to establish whether or not:

Safe working practices are being used. See Guidance Notes "A".

Technically competent staff are carrying out or supervising the work. See Guidance Notes "B".

The quality of the work carried out and material used are satisfactory. See Guidance Notes "C".

Commissioning and testing of metering systems is carried out safely using appropriate test equipment. See Guidance Notes "D"& "E".

Ensure all equipment is sealed in accordance with the MOCOPA requirements. See Guidance Notes "F".

Safe working practices are being used.

Technically competent operatives are carrying out the testing.

- 1.2 During the audit form Appendix 12 or 13 will be completed as appropriate.

### **2 Audit Procedure**

- 2.1 The site audit will be conducted within 3 months of initial registration and once per financial year thereafter. Intermediate audits will also be undertaken when specifically requested by the Registrar.
- 2.2 The site audit will be arranged and conducted as detailed in Sections 7 of this manual and reports submitted using the forms in Appendices 9 and 10 and either Appendix 12 or Appendix 13 as appropriate.

## **SECTION 10: THE COMPLAINTS PROCEDURE**

### 1 Introduction

- 1.1 This section outlines the Procedure to be followed where a MOCOPA Party has a complaint against an MO Party to the MOCOPA which they believe have not complied with the requirements of the MOCOPA.

### 2 Recording of Complaint.

- 2.1 Any complaint against an MO must be sent in writing to the Registration Authority. The complainant should be advised that their name and affiliation must be clearly shown and the following details also included:

The MO against whom the complaint is directed;

The issue or incident, which should include site details if appropriate; and

The nature of the complaint should be fully described.

- 2.2 On receipt of a written complaint against an MO, the Registration Authority should establish that the complainant's name and affiliation are clearly shown; that the MO against whom the complaint is directed has been identified and, if the complaint relates to the work of the MO, details of the site(s) or circumstances in which the work was undertaken have been provided. The submission should also contain full details of the nature of the complaint and whether the complaint is concerned with the workmanship, materials, technical, competency or safety issues.

### 3 Registration Authority Investigation.

- 3.1 On receipt of a complaint complying with the above requirements, the Registration Authority will advise the Review Panel that a complaint has been lodged and the proposed actions which may include:

contacting the MO to obtain their response and intended remedy (if any); and/or

appoint an auditor to investigate the complaint against the MO by reviewing any evidence, including photographic evidence, or by visiting the site(s).

- 3.2 The auditor should complete form Appendix 8 'Complaint Against Meter Operator Report'. The auditor is to ascertain whether the complaint, on the evidence available, appears to be justified. The auditor should also report on whether the meter installation(s) in all other respects is satisfactory. The auditor's report should be sent to the Registration Authority, and should clearly state whether the complaint is upheld on the basis of the evidence and whether the Registration Authority need to take any action against the MO, in which case an update and recommendation will be provided to the Review Panel.

- 3.2 After receiving the auditor's report (if any), the Registration Authority, should ensure that the following actions are taken:

- 3.2.1 If a complaint is justified, then the Registration Authority should write to the MO, giving precise details of the unsatisfactory nature of the work at the site(s) under investigation, and instruct the MO that such unsatisfactory work must be remedied within a reasonable period, but in any case, within 15 working days. The Registration Authority may also write to the MO giving details of any appropriate action required to prevent further complaints. The MO should be required to inform the Registration Authority in writing that appropriate action has been taken. The complainant should be advised that the Registration Authority has required the MO to remedy the unsatisfactory work and/or take any appropriate action to prevent further complaints.

- 3.2.2 If after 15 working days, no response has been received from the MO, the Registration Authority will inform the MO, in writing, that failure to remedy the unsatisfactory work and/or take appropriate action could result in the MOs registration being revoked.
- 3.3 When a MO advises the Registration Authority that the unsatisfactory work has been remedied and/or appropriate action been taken, the auditor may again visit the site(s) concerned and advise the Registration Authority in a written report whether the remedial work has been undertaken and whether the metering installation(s) is now satisfactory. On the basis of this report, the Registration Authority will decide whether further action needs to be taken.
- 3.4 When a complaint is not upheld, the Registration Authority will advise the complainant of its findings. The complainant will also be advised that if they are not satisfied with the Registration Authority's decision, then they may refer the matter to the Review Panel.
- 3.5 Records of complaints will not normally be held for more than 3 year after the last recorded action.

#### 4 Appeal Procedures for Complaints

- 4.1 All parties agree to abide by any decision of the Registration Authority save that any directly affected party have the right to escalate the matter to the Review Panel, in which case both the complaint and the auditor's report (if any) shall be available for inspection by the Review Panel. The decisions taken by the Registration Authority will be submitted to the Review Panel, together with any other relevant information deemed to be necessary.
- 4.2 The Review panel shall discuss and decide whether the decision taken by the Registration Authority was reasonable or whether further action needs to be taken.
- 4.3 Where further action needs to be taken the Review Panel should also decide whether any changes are necessary to the MOCOPA. The Registration Authority will consider if any changes are required to their procedures.

#### 5 Cost Recovery

- 5.1 Where receipt of a complaint will cause additional costs for the Registration Authority, for example commissioning an audit specifically in regard to the complaint, these costs will be presented to the Review Panel for approval, having in mind its contingency allowance within the budget and its right to request reimbursement of excess costs under clause 2.5 of the MOCOPA.

## **SECTION 11: FINANCIAL SERVICES**

- 11.1 Each year the Registration Authority shall provide a draft budget for the approval of the Review Panel, pursuant to Clause 7.11 of the MOCOPA. The budget will allow for any surplus or deficit in funds from the previous financial year.
- 11.2 Clause 2.3 of the MOCOPA obligates Parties to settle the Invoice in respect of the Fees agreed in the Budget. The Registration Authority shall provide the invoicing and collection services associated with this obligation, and such invoices shall be raised to each party in accordance with the contribution formula set out in Clause 2.4 of the MOCOPA.
- 11.3 The Registration Authority shall provide the Review Panel with a financial report at each duly convened meeting.
- 11.4 The Registration Authority shall invoice the party concerned in relation to any Registration Fee levied in accordance with Clause 2.6 of the MOCOPA or any excessive costs approved by the Review Panel pursuant to Clause 2.5 of the MOCOPA.
- 11.5 The Registration Authority shall manage any dispute raised by a Party in respect of sums set out in a statement issued pursuant to Clause 2.7. Any resolution of such a dispute shall be resolved in accordance with Clauses 2.9 and 2.10.

## **SECTION 12: LEGAL SUPPORT**

12.1 The procurement of legal support shall be at the direction of the Review Panel in accordance with the following principles;

legal advice on matters related to the MOCOPA, e.g. legal review of amendments to the MOCOPA, matters of breach under the MOCOPA.

participation, which may be by teleconference, of a legal adviser at the Review Panel meetings on an 'as required' basis.

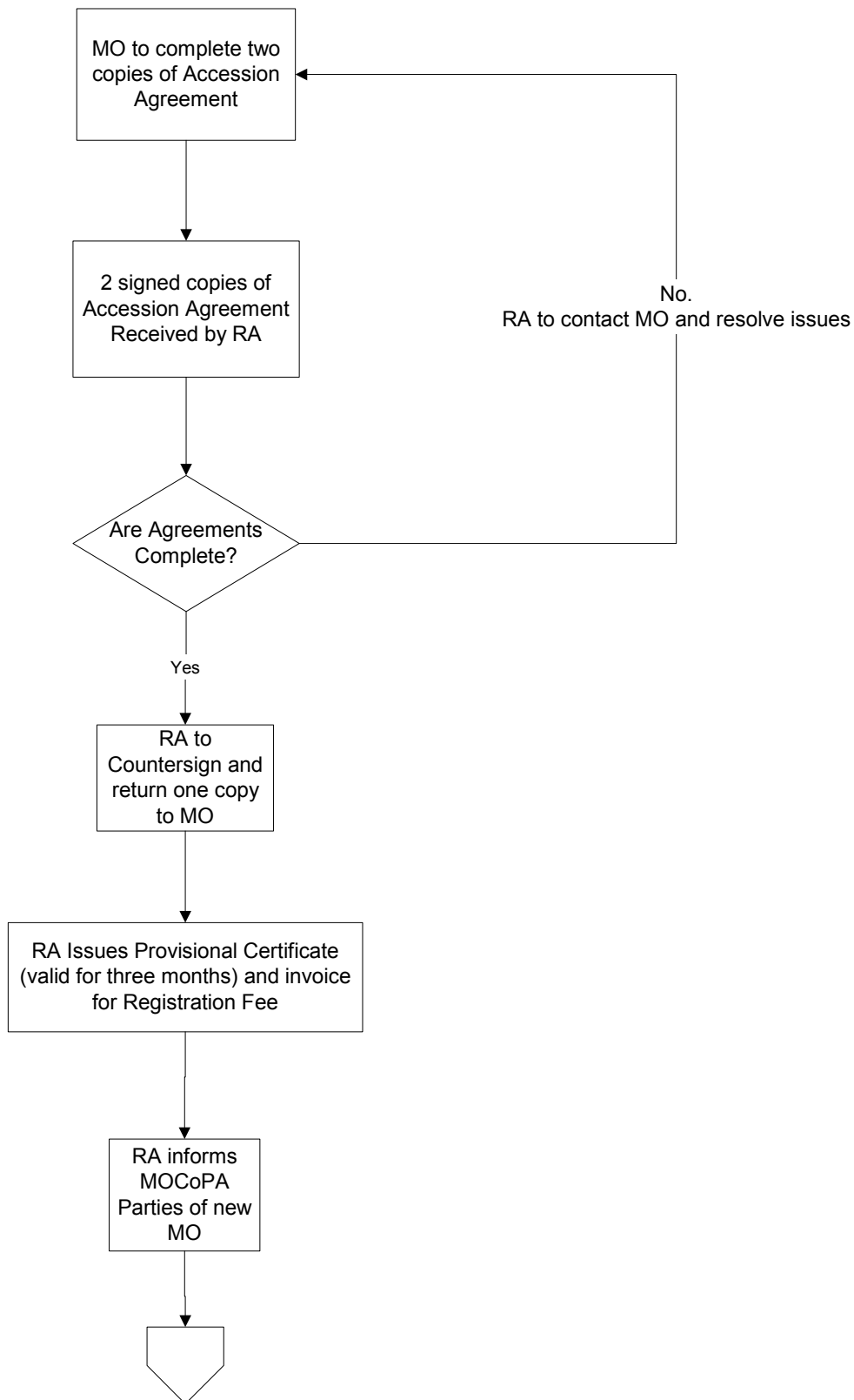
drafting for amendments to the MOCOPA, or this Manual, should be provided for legal assessment, rather than commissioning legal drafting at the outset.

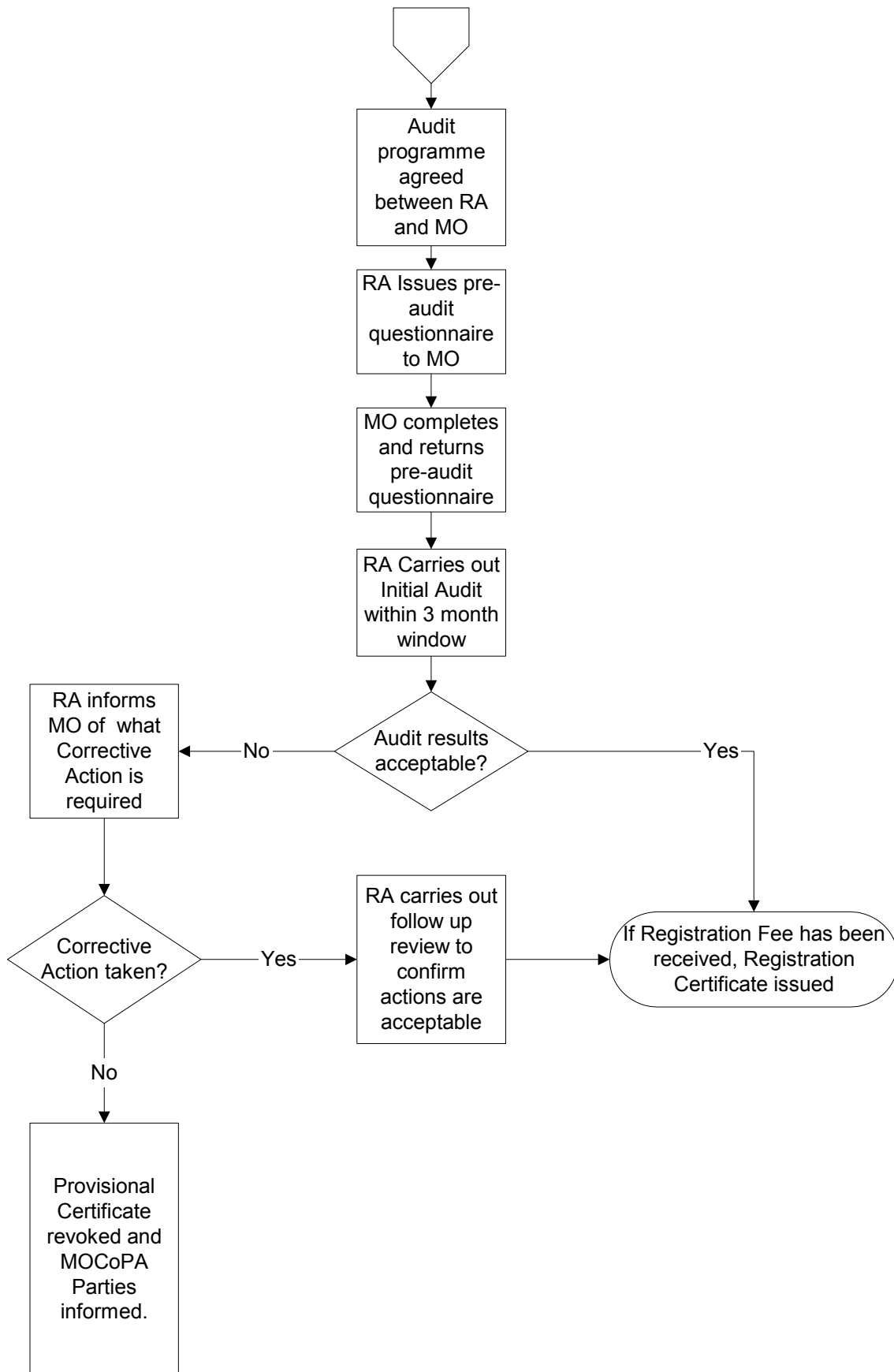
quotes for legal work/review should be obtained in advance of any such work or review being commissioned and the legal fees agreed by the Review Panel.

invoices in respect of any legal services authorised by the Review Panel should be submitted in a timely fashion upon completion of such legal services and invoices for legal services provided throughout a financial year, as opposed to commissioned at the end of a financial year, shall be invoiced within four weeks of the end of that financial year.

# Appendices

### APPENDIX 1 – ACCESSION OF METER OPERATOR





## **APPENDIX 2 – MO REQUEST TO ACCEDE TO THE MOCOPA**

### **1 Request for Accession to MOCOPA**

- 1.1 Meter Operator to complete two copies of the Accession Agreement (MOCOPA Schedule 4) and send to Registration Authority.

### **2 Registration Authority, on receipt of Accession Agreement**

- 2.1 Ensure that Accession Agreement is completed.
- 2.2 Accession Agreement to be signed on behalf of the Registration Authority and the following action to be taken:
- Send one duly signed AA to applicant;
  - File one duly signed AA in Accessions file;
  - Inform all Parties to the Agreement of new party.
  - Provisional certificate issued and signed. 2 copies taken;
  - Certificate with standard letter sent to newly registered MO;
  - Update records to show MO is under a Provisional Certificate and copy of certificate is filed;
  - MO should be invoiced for registration fee;

### **3 Audits**

- 3.1 On receipt of information on work to be undertaken by MOs, the Registration Authority will appoint an auditor. Auditors will use forms Appendix 3, 9, 10, 11, 12 and 13, MOCOPA and Health & Safety legislation as a basis for their audits on MOs.

### **4 Fees**

- 4.1 Applicants are to be invoiced for the fees given in Appendix 7.



## Business Details and Coverage

	Detail	Your Response
1.1	On which Distribution Business's networks does your organisation operate?	
1.2	Which types of metering systems is your organisation responsible for installing and maintaining (eg Half-Hourly, Non Half Hourly)?	
1.3	Are you aware of your organisational and technical responsibilities under the Meter Operator Code of Practice Agreement (MOCOPA)?	
1.4	Are you in possession of a full MOCOPA Certificate of Registration including current company details?	
1.5	Are you aware of any issues carried forward from the previous audit which may require clarification and/or closure during the forthcoming audit? (If so, please give brief details)	
1.6	Ideally, all communication should be to one nominated point of contact but, if for some reason this is impractical, or if other contacts are necessary, please give details as appropriate.	

	Detail	Your Response
1.7	Is the address given on the details page the address at which you expect the MOCOPA Headquarters audit to take place? If 'no' then please give the correct address.	
1.8	Is the address given on the details page the address from which the site-based technical audits will be co-ordinated? If 'no' then please give the correct address.	
1.9	Are you aware of how to contact the MOCOPA Registration Authority (Registration Authority) in the event of queries, clarifications, company detail changes, or other issues?	

Approved by :

-----

Print Name    Signature    Position    Date

#### **APPENDIX 4 – CHANGE PROPOSAL FOR AGREEMENT BY PARTIES**

The MOCOPA Review Panel has considered and endorsed changes to the MOCOPA, which require to be adopted through majority agreement of 65% or more of the holders of each of the Distributors' and Meter Operators' votes pursuant to Clause 4.4 in order for these changes to be incorporated into the MOCOPA.

#### **TITLE**

Objectives

Proposal

Additional Information

DRAFTING FOR THIS CHANGE PROPOSAL IS APPENDED TO THIS CP COVER NOTE

Response Date

Parties are requested to return their vote by

Parties may submit their vote in the first instance under cover of an email to [mocopa@gemserv.co.uk](mailto:mocopa@gemserv.co.uk)

Signed voting forms should be posted to the MOCOPA Secretariat, at the following address;

Gemserv  
7th Floor Centurion House  
24 Monument Street  
London  
EC3R 8AJ

PROPOSED DRAFTING FOR AMENDMENT TO THE MOCOPA

[Legal drafting to be included]

**APPENDIX 5**

Not Used

**APPENDIX 6**

Not Used

## **APPENDIX 7 – REGISTRATION AUTHORITY FEES**

### **1 Recovery of Costs**

- 1.1 The allocation of budget costs are decided by the Review Panel in accordance with MOCOPA clause 7.11.
- 1.2 The method of allocation of Fees between Meter Operators and Distribution Businesses are set out in MOCOPA Clause 2.4.

### **2. Initial Fee**

- 2.1 The initial Fee for admission to the MOCOPA, under clause 2.6, as a new MO will be the same as the annual Fee paid by a MO in the year in which the new MO is admitted.
- 2.2 Provided the MO becomes registered the initial Fee counts as the first annual Fee.

### **3. Annual Fee**

- 3.1 The annual fee is the sum paid by each MO in respect of their contribution to the Budget.

**APPENDIX 8 – REPORT FORM FOR COMPLAINT AGAINST METER OPERATOR**

1 COMPLAINT DETAILS

1.1 Name of person making complaint: -----  
Affiliation of person making complaint -----  
(i.e. company name):  
1.3 Company address: -----  
-----  
-----  
-----  
-----  
Tel No -----

1.4 Date complainants letter received -----

Name of MO against whom the -----  
complaint is directed Tel No-----

The name and address of the customers -----  
premises/site where the complaint arose: -----  
-----  
-----  
-----  
Tel No-----

Describe the nature of the complaint (copy of complainants letter should also be attached).  
Please include any supporting evidence::

-----  
-----  
-----  
-----  
-----

2 ACTION BY THE REGISTRATION AUTHORITY

On the basis of the letter received, does  
the complaint require an auditor to visit  
the site referred to in the complainants letter? YES / NO

2.2 If answer to 2.1 is YES, then advise the Review Panel and appoint an auditor:

2.2.1 auditor appointed: \_\_\_\_\_

2.2.2 Date appointed: \_\_\_\_\_

2.2.3 Date of letter to complainant stating action taken: \_\_\_\_\_

2.2.4 Date MO informed of complaint and action taken: \_\_\_\_\_

2.3 If answer to 2.1 is NO, date of letter to complainant \_\_\_\_\_

Registration Authority signature:  
\_\_\_\_\_

Name: \_\_\_\_\_ Date completed: \_\_\_\_\_

3 AUDITOR'S REPORT

3.1 Date received notification of appointment: \_\_\_\_\_

Date first made contact with customer

and / or MO to arrange site visit \_\_\_\_\_

3.3 If permission to visit site cannot be obtained, auditor is to refer this matter to the Registration Authority giving full details.

Date referred back to Registration Authority:

\_\_\_\_\_

Details: \_\_\_\_\_

3.4 Date of site visit: \_\_\_\_\_

Against each separate complaint made, state whether complaint was justified:

\_\_\_\_\_

3.6 Were all other aspects of the metering installation satisfactory? YES / NO

3.7 Give any further relevant comments below including any mitigating or other circumstances that may have caused this complaint to arise:

\_\_\_\_\_

3.8 Is corrective action need to be taken by the MO on this site? YES / NO

3.9 Does the MO need to amend or add to his work procedures? YES / NO

If answer to 3.8 or 3.9 is YES, please detail your recommendations:

3.11 On the basis of the site visit and any other relevant evidence, was the complaint against the MO justified?

Fully  Partially  Not at all

Please comment:

Does the Registration Authority need to take any action against the MO? YES / NO

If answer to 3.12 is YES, describe what action is necessary:

auditor's signature: \_\_\_\_\_

Date returned to Registration Authority: \_\_\_\_\_

4 ACTION TAKEN BY THE REGISTRATION AUTHORITY

4.1 Was the complaint justified? YES / NO

If answer to 4.1 is YES, what action against the MO is to be taken:

---

---

Date letter sent to MO advising of Registration Authority's findings

---

and specifying any action to be taken:

Date letter sent to complainant advising of \_\_\_\_\_  
Registration Authority's findings and copy of MO letter:

4.5 If required, date of MOs response: \_\_\_\_\_

4.5.1 If required was it received by required date? YES / NO

4.5.2 If answer to 4.5.1 is NO, action taken: \_\_\_\_\_

4.5.3 Did the MO confirm that they had taken the required action? YES / NO

If answer to 4.5.3 is NO, what action is to be taken by the Registration Authority?

---

---

---

4.6 Date referred back to the Review Panel and auditor:

---

4.7 Registration Authority signature:

---

Name: \_\_\_\_\_ Date completed: \_\_\_\_\_

5 FOLLOW-UP AUDIT

5.1 Date of follow-up site visit: \_\_\_\_\_

5.2 Has corrective action been taken?

Completely  Partially  None

5.3 If answer to 5.2 is not completely, please give details of actions still outstanding:

\_\_\_\_\_  
\_\_\_\_\_

If answer to 5.2 is "completely", does the MOs work fully conform to the MOCOPA? YES / NO

5.5 If answer to 5.4 is NO, please give full details of non-conforming work:

\_\_\_\_\_  
\_\_\_\_\_

5.6 auditor's signature: \_\_\_\_\_

auditors Name: \_\_\_\_\_

Date returned to Registration Authority: \_\_\_\_\_

6 SUMMARY OF REGISTRATION AUTHORITY'S ACTIONS

6.1 On the basis of the complainants letter, was an auditor appointed? YES / NO

6.2 Did the auditor confirm that any of the complaints made were justified? YES / NO

6.3 Did the MO carry out the required work/actions satisfactorily? YES / NO

Is further action against the MO necessary YES / NO

(e.g. severe warning or removal of registration)?

If answer to 6.4 is YES, what action is to be taken?

---

---

Were both parties advised that if they did not agree with the decision of the Registration Authority, they could refer the matter to the MOCOPA Review Panel? YES / NO

6.7 Registration Authority signature: \_\_\_\_\_

Name: \_\_\_\_\_ Date completed: \_\_\_\_\_

7 MOCOPA REVIEW PANEL

7.1 Date of meeting this case was discussed at the review Panel:

\_\_\_\_\_

Did any party complain to the Review Panel about the Registration Authority's decision? YES / NO

7.3 If answer to 7.2 is YES, then:

Date complaint received:

\_\_\_\_\_

7.3.2 Name and affiliation of complainant:

\_\_\_\_\_

7.3.3 Nature of complaint:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Was the complaint upheld by the Review Panel?

Fully  Partially  Not at all

Did the Review Panel recommend any further action to be taken by the Registration Authority? YES / NO

7.3.6 If answer to 7.3.5 is YES, what action was recommended?

\_\_\_\_\_  
\_\_\_\_\_

Were any other comments or recommendations made by the Review Panel? YES / NO

If answer to 7.4 is YES, what comments or recommendation were made?

\_\_\_\_\_  
\_\_\_\_\_

8 FOLLOW-UP ACTION

8.1 Give details of any changes made to Registration Authority's procedures as a result of any recommendations made by the Review Panel:

\_\_\_\_\_

\_\_\_\_\_

8.2 Registration Authority signature: \_\_\_\_\_ Date:

\_\_\_\_\_

**APPENDIX 9 – METER OPERATOR FINAL REPORT**

1.0 AUDIT REPORT FOR PERIOD:

2.0 Meter Operator Name:

3.0 Address of Meter Operator:

4.0 List of Documents used:

MOCOPA

Registration Authority manual Operators Manual of Working procedures Ref No

Operators Manual of Safe working Practices Ref No

Other:

5.0 Audit Programme: Attached

6.0 Personnel attending post audit meeting:

7.0 Summary of Results: Non Conformity  Observations

8.0 Detailed Non Conformity: Attached

9.0 Closed out Corrective Actions: Attached

10. Recommendation:

11.0 Auditor Name:

12.0 Signed:

Dated:



COMMENTS OF AUDITOR

Signed for Registration Authority: \_\_\_\_\_ Dated: \_\_\_\_\_

## APPENDIX 11 – AUDIT OF METER OPERATOR HEADQUARTERS ACTIVITIES

Meter Operator Name and Address:

Auditor Name:

Date of Audit:

### Contents

PART 1	Section 1	Management Organisation
	Section 2	Safety Requirements
	Section 3	Training of Operatives
	Section 4	Distribution Network Operator Requirements
	Section 5	Appointment and Registration of Competent Persons
	Section 6	Appointment of Subcontractors

Note: PART 1 of this report will be circulated to each Distribution Network Operator in accordance with the arrangements of the MOCOPA Review Panel.

PART 2	Section 7	Technical Requirements
	Section 8	Administration and Other requirements
	Section 9	Sealing Of Equipment
	Section 10	Auditors Conclusions

Note: PART 2 of this report may contain confidential information, therefore is not available outside of the Registration Authority.

## Audit of Meter Operator Headquarters Activities-- PART 1

	Comments	Conform Yes No	
1. Management Organisation (Schedule 5 Para 1.1)			
Audit Prerequisite	Audit should not progress if any non conformity recorded		
Has the MO signed onto the MOCOPA?			
Is the MO registered with the Registration Authority?			
Has the MO paid the current registration fee?			
Has the MO Adequate Insurance Cover in place (Public Liability £1M)?			
Accession Requirements			
Is there an organisation chart giving a chain of responsibility from the head of the organisation to operative installing meters?			
Who is the MO point of contact?			
Who is the head of the Organisation?			
Has the MO appointed an Authorising representative?			
Has the MO appointed an H&S representative?			
Has the MO appointed a Training representative?			
Has the MO appointed a Technical representative?			
Has the MO appointed an Admin representative?			
Who is responsible for the appointment of sub contractors?			
Have any of the above personnel changed since the last audit?			
2.0 SAFETY REQUIREMENTS (Schedule 5 Para 1.1)			

	Comments	Conform	
		Yes	No
Name of appointed H&S representative			
Related qualifications held and brief details of appropriate experience.			
2.1 H&S Policy (Schedule 5 Para 1.1)  Does the MO have a written H&S Policy signed by the current head of the Organisation?			
2.2 Accident Investigation (Schedule 5 Para 1.1)  Does the MO have:			
A systematic means of accident investigation?			
A systematic means of recording accidents?			
A means by which accident reports are communicated to other parts of the business?			
A means by which accident reports are reviewed on a regular basis?			
Has any preventative action been taken as a result of any review of accident records?			
2.3 Safety Audits (Schedule 5 Para 1.1)			
Is there a procedure and programme for site safety audits?			
Are the auditors trained and qualified to conduct site safety audits?			
Do the auditors use checklists agreed by the H&S representative?			
Is each operative regularly audited over a specified time period?			
Are records kept of site safety audits for a stated minimum period?			

	Comments	Conform	
		Yes	No
Are audit records reviewed and signed by the H&S Representative?			
Is there evidence of corrective and preventative action resulting from site safety audits?			
2.4 General Duty of Care (Schedule 5 Para 1.1)			
Can the MO demonstrate his discharge of general duty of care?			
Does the MO display H&S information?			
Does the MO carry out H&S induction for new staff?			
Does the MO arrange refresher H&S courses?			
Does the MO ensure all staff have basic First Aid training and access to a First Aid kit at the place of Operation?			
Does the MO have procedures for general safe working practices i.e: Abuse of alcohol and drugs;  Evacuation of buildings;  Safe driving and maintenance of transport;  Signing in and out of customer's premises etc.?			
2.5 Electricity at Work (Schedule 5 para 1.1.2)			
Has the MO a list of safe systems and working practices?			
Does the list of safe systems and working practices include a generic risk assessment of installation work, & a record to verify "not live" before working?			

	Comments	Conform Yes No	
Does the MO keep records of the operative risk assessment conducted on site?			
Has the MO a list of safety and protective equipment issued to each operative?			
Has the MO a register of checks and maintenance of the above equipment?			
Does the MO establish that the operative has sufficient knowledge and experience so as to avoid danger or injury? (Safety Knowledge and Experience 1.1.5)?			
3.0 Training of Operatives (1.4.1)	Comments	Conform Yes No	
Name of appointed Training representative			
Related qualifications held and brief details of appropriate experience.			
Does the MO have records of each operative's safety training?			
Does the MO have records of each operative's technical training?			
Does the training cover use of safety equipment, working unsupervised fuse insertion and removal, LV & HV systems, entry into fire controlled substations?			

	Comments	Conform Yes No	
<p>Was training and experience adequate and appropriate for operative to:</p> <p>Identify cable markings and colouring</p> <p>Provide accurate and legible records and reports</p> <p>Install different types and configurations of metering systems</p> <p>Decommission old metering systems</p> <p>Commission new metering systems</p> <p>Test installed metering systems?</p>			
<p>Do operatives with limited training/experience have access to supervisory staff?</p>			
<p>Do all operatives have the current issue of work procedures? (To be verified during site audits)</p>			
<p>4.0 Distribution Business Requirements Distribution Safety Rules (Schedule 5 Para 1.1.3)</p>			
<p>Has the MO a list of which operatives are authorised by which Distribution Business</p>			
<p>Operational Restrictions and Reporting 1.1.4</p>			
<p>Have the Distribution Business on whose system the Operator will work provided Distribution Network Operator Information and annually updated the same (3.5 Maintained status of information)?</p>			
<p>Has the MO annually reviewed the information provided to the Distribution Business?</p>			

	Comments	Conform	
		Yes	No
Can the MO demonstrate how operational restrictions are passed on to operatives?			
Can the MO demonstrate how defects are reported to Distribution Business?			
5.0 Appointment and Registration of Competent Persons (1.4.2)			
Name of appointed Authorising representative?			
Related qualifications held and brief details of appropriate experience.			
Does the MO have register of competent persons and a procedural means of completing and maintaining the register?			
Does this include the selection of suitably qualified assessors?			
Is there a record of the interviews and assessing of competent persons?			
Are these records signed and dated by the assessing officer?			
Are the records reviewed and competency reassessed at set intervals?			
Is the register updated to reflect any changes in training and personnel?			
Does the register include all operatives currently engaged on MOCOPA work?			
Are all operatives issued with legible identification?			
Are all operatives issued with competency certificates?			
Do competency certificates identify the level of the operative's authorisation?			

	Comments	Conform	
		Yes	No
Do competency certificates include the signature and identification of the Authorising representative?			
Do competency certificates include a unique number and expiry date?			
6.0 Appointment of Subcontractors			
Name of the person responsible for the appointment of sub contractors?			
Is the person qualified to carry out these duties?			
Is there a register of subcontractors?			
Are all subcontractors' operatives either Registered with the Registration Authority or fully trained by the MO?			
Was the Registration Authority informed within 15 Business Day of the appointment any new subcontractor?			

## Audit of Meter Operator Headquarters Activities-- PART 2

	Comments	Conform Yes No	
7.0 Technical Requirements (Schedule 5 para 1.2)			
Name of appointed Technical Representative			
Related qualifications held and brief details of appropriate experience.			
General 1.2.1			
Can the MO demonstrate that they are working to the current version of:  Electricity Act, Schedule 7  Meter (Certification) Regulations SI 1566 1998 (as amended)  Electricity Supply Regulations 1988 (as amended)  Codes of Practice 1-7  Balancing and Settlement Code – Procedures  Scottish Electricity Settlements Ltd – Market Procedures?			
Metering Equipment Specification 1.2.3  Has the MO a list of meter types available that comply with Schedule 7?			
Has the MO a list of Code of Practice compliant meters?			
Has the MO a list of dispensations or exemptions?			
Metering Equipment Calibration, Testing and Maintenance 1.2.4			
Has the MO a list of all meters installed?			

	Comments	Conform	
		Yes	No
Are all meters tested in accordance with the appropriate requirements?			
Has the MO test certificates for all the above meters (1.4.4 (d))?			
Can the MO identify the period of service of each meter (1.4.4 (d))?			
Are any Code 1 & 2 meters on site requiring calibration or change (see Code 4)?			
Is there a calibration program in place for Code 3 & 5 meters (see Code 4)?			
Testing Instruments (1.2.5)			
Has the MO a complete list of all test instruments?			
Are there records to show calibration was conducted at least annually (1.4.4 (e))?			
Are results traceable (1.4.4 (e))?			
8.0 Administration and Other Requirements (1.4)			
Name of appointed Administration representative			
Related qualifications held and brief details of appropriate experience.			
Is there evidence that the MO informs the Distribution Business of its appointment at specific sites?			
Is there evidence that the MO requests site specific information?			
Are there records of commissioning information and certificates of completion?			
Are there records of site work carried out and identification of the operative?			

	Comments	Conform	
		Yes	No
Are records legible?			
Is there evidence that commissioning data is verified for accuracy?			
Is there evidence that the operatives are reporting:  Commissioning (Code 4 Appendix A)  ½ hour reconciliation readings (Code 4 Appendix A)  VT & CT ratio and class			
9.0 Sealing of Equipment (1.4.3)			
Does the MO have a Register of Sealing Die?			
Is the Register up to date?			
Does the MO have a unique ID?			
Does each operative have a unique ID number?			
Is there evidence that redundant die are destroyed?			
Are there any checks for wear on die in use?			
Does the Register include all operatives involved with MOCOPA work?			

10.0 auditors Conclusions	
Total number of Non Conformity	<input type="text"/>
Total number of Observations	<input type="text"/>

<p>Comments</p> <p>Can the MO continue to operate effectively while corrective action is taken?</p> <p>Should the next annual audit be brought forward?</p> <p>Is the Non Conformity of a nature so as to require an immediate close out?</p> <p>Can the audit be closed out at the time of the next annual audit?</p> <p>Should the MO remain registered with the Registration Authority?</p>	
--	--

Any other comments

Auditors Signature:

Date:

**APPENDIX 12 – AUDIT REPORT ON TESTING OF CT OPERATED METERING SYSTEMS**

Name of Meter Operator

Name of sub contractor if used:

Customer Name and Address

Name of Auditor:

Date of Audit:

Clause		Comments	Conform Yes No	
	1.0 PREREQUISITE			
1.4.4(c)	Are there any site specific restrictions or precautions necessary			
1.4.4(c)	Can the MO provide the site commissioning data			
1.4.4(c)	Can the MO provide a Completion Certificate for the site			
1.2.4	Can the MO provide a copy of the meter test record			
Code 4	Are meter test results inside COP requirements			
1.2.4	Has the MO any record of the VT & CT error (where applicable) or generic values			
1.4.4(c)	Does commissioning data equate to confirm the metering system is installed correctly			
1.4.4(f)	Does commissioning data equate to confirm the metering system is installed correctly			
1.4.3	Is the commissioning data traceable to the operative			
	Are sealing die numbers applied on site identified on the data			
	SAFETY REQUIREMENTS (2.2) (Schedule 5 para 2.2)			

Clause		Comments	Conform Yes No	
1.1.2   2.2.5 2.3.2 2.3.2	Was the customer aware of the site visit  Name of operative carrying out the work:  Did the operative have:  Adequate job instructions the following  Suitable ID  Competency Certificate to cover the proposed work			
	2.0 SAFETY REQUIREMENTS (2.2) cont (Schedule 5 para 2.2)			
2.2.4  2.2.2 2.2.2 2.2.2 2.2.5 2.2.5 2.2.5 2.2.6  1.2.6	Any certificate issued by the Distribution Business, if relevant did the operative have authorisation to enter sub-stations  Copies of the MO safe working practices  Safety equipment as provided and listed by the Operator  Where appropriate was safety equipment inside "do not use after date"  Did the operative carry out site risk assessment before any work  was there sufficient access was there sufficient light was there sufficient egress  Was it reasonable for the operative to continue in accordance with job instructions  Was the operative familiar with procedures relating to reporting incidents such as damaged or defective equipment, potential hazards and interference  Had the metering equipment been safely transported so as to prevent damage and danger during installation			
	3.0 SEALING (Appendix 8)			

Clause		Comments	Conform Yes No	
1.4.3	Was access to terminal cover, test block, metering fuses sealed	Yes / No		
1.4.3	Was all distribution business equipment resealed (as applicable)	Yes / No		
1.4.3	Did sealing die, ferrules and wire rope comply with the requirements *	Yes / No		
1.4.3	Were seals satisfactorily crimped and marked with the MO and operative unique ID	Yes / No <input type="checkbox"/> Operator ID <input type="checkbox"/> Operative ID		
1.4.4(f)	Do seals correspond to recorded information on commissioning data	Yes / No		
	4.0 INSTALLED METERING EQUIPMENT			

Clause		Comments	Conform Yes No	
	Make of meter Type Serial Number Owner Total kWh register reading Total kVArh register reading GMT Time Meter Time Are all register segments in place Rating Marked ratio  Observed measurement transformer details if available	kWh kVArh hrs hrs  V:      A: VT:     CT:  VT                      CT Ratio                    ratio Class                    class VA rating                VA rating		
1.2.1 Code 4 1.4.4(c) 1.2.1 1.2.1 2.5(a) 2.3.2 2.5(a) 4.3.3	Was the meter: of an approved pattern compliant with BSC COP details the same as recorded commissioning data appropriate for the type of supply installed and connected in an approve manner correctly configured for the VT & CT ratio connections sound, correct and safe configured for the correct tariff had all redundant panel holes been blanked	Yes / No Yes / No Yes / No Yes / No Yes / No Yes / No Yes / No Yes / No Yes / No		
2.3.2	Whole Current Meters	Yes / No		
2.3.2	Were meter tails adequate for consumer load and meter rating	Yes / No		
Code 4 (App 1)	Was the service fuse appropriate for load and meter rating	Yes / No		
Code 4 (App 1)	Transformer Operated Meters  Were the transformers of the correct ratio and class for the system	Yes / No		
"	Did the connected burden exceed the rated VA burden of CT	Yes / No		
"	Did the connected burden exceed the rated VA burden of VT	Electronic 0.5 VA Ferraris 1.0 VA		
"	Note ! Assumed Burdens of current circuits; 0.5 VA meter burden plus 20mtr (40mtr F & R) of	2.5mm cable = 5.0VA 2.5mm cable = 5.0VA 2.5mm cable = 5.0VA		
"	1.0 VA meter burden plus 18mtr (36mtr F & R) of	2.5mm cable = 5.0 VA		

Clause		Comments	Conform Yes No	
	5.0 ON SITE ACCURACY TESTS			
2.5(g)	Did the MO prove the equipment was not live before carrying out any works			
2.5(g)	Was equipment used for conducting the above tests proven first			
2.3.2	Did the operative correctly short out the CT's			
2.3.2	Was operative familiar with the existing wiring arrangement			
4.3.3	Was the equipment used for the tests part of the operators calibration system and inside calibration			
2.2.2	Was the operative trained in the use of the equipment?			
2.5(g)	Did the operative take suitable precautions when working near live conductors that could not be made dead			
	6.0 SITE TEST RESULTS			
	Test Load	% Error		
	COMPLETION OF AUDIT			
	Was site left sealed	Yes / No		
	Were all redundant seals removed from site	Yes / No		
	Was site left in sound safe condition	Yes / No		
	Sealing Die applied	Operator ID <input type="text"/> Operative ID <input type="text"/>		
	5.0 AUDITORS CONCLUSIONS			

Clause		Comments	Conform Yes No	
	<p>Total Non Conformities</p> <p>Total Observations</p> <p>Comments</p> <p>Can the MO continue to operate effectively while corrective action is taken</p> <p>Should the next annual audit be brought forward</p> <p>Are non conformities of a nature so as to require an immediate close out</p> <p>Can the audit be closed out at the time of the next annual audit</p> <p>Should the MO remain registered with the Registration Authority</p>	<p><input type="text"/></p> <p><input type="text"/></p> <p>Yes / No</p> <p>Yes / No</p> <p>Yes / No</p> <p>Yes / No</p> <p>Yes / No</p>		

Any other comments

Auditors Signature:

Date:

**APPENDIX 13 – AUDIT REPORT ON INSTALLING AND COMMISSIONING WHOLE CURRENT METERING SYSTEMS**

Name of Meter Operator:  
used:

And Name of sub contractor if

Customer Name and Address:

Name of Auditor:

Date of Audit:

Clause		Comments	Conform Yes No
	1.0 SAFETY REQUIREMENTS (2.2) (Schedule 5 para 2.2)		

Clause		Comments	Conform	
			Yes	No
1.1.2	Was the customer aware of the site visit  Had the customer received 2 working days notice  Name of operative carrying out the work:  Did the operative have:			
2.2.5	Adequate job instructions			
2.3.2	Suitable ID			
2.3.2	Competency Certificate to cover the proposed work			
2.2.4	Any certificate issued by the Distribution Business, if relevant did the operative have authorisation to enter sub-stations			
2.2.2	Copies of the MO safe working practices			
2.2.2	Safety equipment as provided and listed by the MO			
2.2.2	Where appropriate was safety equipment inside "do not use after date"			
2.2.5	Did the operative carry out site risk assessment before any work			
2.2.5	was there sufficient access was there sufficient light was there sufficient egress			
2.2.5	Was it reasonable for the operative to continue in accordance with job instructions			
2.2.6	Was the operative familiar with procedures relating to reporting incidents such as damaged or defective equipment, potential hazards and interference			
1.2.6	Had the metering equipment been safely transported so as to prevent damage and danger during installation			
	2.0 TECHNICAL REQUIREMENTS (2.3) (Schedule5 para 2.3)			

Clause		Comments	Conform Yes No	
	<p>2.1 DECOMMISSIONING</p> <p>Make of existing meter Type Serial number Owner Ratings</p>			
1.2.1	<p>Did operative conduct the following checks:</p> <p>The service cut out in a safe condition</p> <p>The meter board in sound condition any indication of asbestos</p> <p>Meter tails adequate for consumer load and meter rating.</p>			
2.2.6	Interference and all seals intact			
2.2.6	Record all meter readings from redundant meters			
2.5(b)	confirm polarity of connections			
2.5(b)	confirm phase rotation ( if applicable)			
	Did the operative know the procedure in the event of a failure of any of the above			
4.3.4/5	Did the operative have any instructions as what to do with the redundant metering equipment			
4.3.3	<p>2.2 INSTALLING NEW METERING EQUIPMENT</p> <p>Did the MO prove the equipment was not live before carrying out any works</p>			
2.5(g)	Was equipment used for conducting the above tests proven first			
2.3.2	Was operative familiar with the existing wiring arrangement			
2.3.2	Did the MO treat redundant metering with due care and attention			
4.3.3	Did the operative appear to be trained in safe working practices			
2.2.2	Did the operative take suitable precautions when working near live conductors that could not be made dead			
2.5(g)	Did the operative remove all redundant			

Clause		Comments	Conform Yes No	
	2.0 TECHNICAL REQUIREMENTS (2.3) (Schedule5 para 2.3)			
2.3.2	2.3 INSTALLED METERING EQUIPMENT  Make of new meters Types Serial numbers Owners Total kWh register reading Ratings V: A:			
COP 6/7	the meter of an approved pattern			
2.5(a)	the meter installed and connected in an approve manner, connections sound, correct and safe  fixed and installed so as to prevent danger  the meter appropriate for the type of supply  compliant with the relevant BSC COP  configured for the correct tariff  was the service fuse appropriate for the load and the rating of the meter .			
	2.0 TECHNICAL REQUIREMENTS (2.3) (Schedule5 para 2.3)			
4.3.2 Code 4	2.4 COMMISSIONING AND VERIFICATION  Did the operative confirm and record: continuity of any earth connections fitted phase rotation at the meter terminal block			
	3.0 SEALING (Appendix 8)			

Clause		Comments	Conform Yes No	
1.4.3	Was access to terminal cover, test block, metering fuses sealed	Yes / No		
1.4.3	Was all distribution business equipment resealed (as applicable)	Yes / No		
1.4.3	Did sealing die, ferrules and wire rope comply with the requirements	Yes / No		
1.4.3	Were seals satisfactorily crimped and marked with the MO and operative unique ID  COMPLETION  Did the operative remove all redundant seals, wiring and debris created by his work  Was the site left in a safe condition  Was the customer given a copy of old and new meter readings	Yes / No Operator ID <input type="text"/> Operative ID <input type="text"/>  Yes / No  Yes / No  Yes / No  Yes / No		
	4.0 AUDITORS CONCLUSIONS			
	Total Non Conformity  Total Observations  Comments  Can the MO continue to operate effectively while corrective action is taken  Should the next annual audit be brought forward  Are Non Conformity of a nature so as to require an immediate close out  Can the audit be closed out at the time of the next annual audit  Should the MO remain registered with the Registration Authority	Yes / No  Yes / No  Yes / No  Yes / No  Yes / No		

## **GUIDANCE NOTES “A” – SAFE WORKING PRACTICE**

### A1 Health & Safety Regulations

A1.1 It is important that auditors understand that these guidance notes are intended to complement but not replace or override any part of legislation pertaining to Health & Safety. Auditors should be aware of and familiar with:

A1.1.1 Health & Safety at Work Act 1974;

A1.1.2 SI 1990/1380 Health & Safety (Training for Employment) Regulations;

A1.1.3 SI 1989/635 Electricity at Work Regulations;

A.1.1.4 SI 1992/2051 The Management of Health & Safety at Work Regulations.

### A2 Control of Danger

A2.1 Reference should be made to Regulation 13 of the Electricity at Work Regulations.

A2.2 Auditors should satisfy themselves that before operatives commence testing metering installations they have direct control of the electricity supply to those metering systems.

A2.3 In the case of VT/CT metering, the operative should have removed the VT secondary winding fuses from each phase and should have shorted every CT secondary winding at the test terminal block before making or breaking any connections to the metering system.

A2.4 For whole-current metering, the operative should have removed the fuse from each phase of the Distribution Company cut-out before making or breaking any connection to the metering system.

### A3 Working On or Near Live Conductors

A3.1 Reference should be made to Regulation 14 of the Electricity at Work Regulations.

A3.2 It should not be necessary for any operator to work on a metering system that has not been made 'dead'.

A3.3 In certain circumstances, operatives may be working near live conductors that cannot be made 'dead'. In these cases operatives should take suitable precautions, such as shrouding of live conductors, so as to prevent injury.

### A4 Working Space, Access and Lighting

A4.1 Reference should be made to Regulation 15 of the Electricity at Work Regulations.

A4.2 Before commencing work on metering installations, operatives should ensure that there is sufficient access, working space and lighting for safe working and to prevent injury.

### A5 Operatives to be Competent so as to Prevent Danger

A5.1 Reference should be made to Regulation 16 of the Electricity at Work Regulations.

A5.2 Operatives should have knowledge of electricity and experience of electrical work; an adequate understanding of the metering system being tested and the hazards which may arise carrying out this work and the ability to recognise where a metering system is safe to be worked on.

## **GUIDANCE NOTES “B” – TECHNICAL COMPETENCY**

### **B1 Minimum Criteria for Technical Competency**

B1.1 The degree of technical competency of operatives employed, either directly or indirectly by MO, will depend on the type of work they are employed to carry out. However, all operatives should be adequately trained to be able to comply with the Electricity at Work Regulations.

### **B2 Technical**

B2.1 Operatives employed to supervise the work of other operatives to test metering systems should have an adequate knowledge of:-

B2.2.1 Current transformers - an understanding of:

B2.2.1.1 ratio and polarity;

B2.2.1.2 burden, ratio and phase angle errors;

B2.2.1.3 methods of connection and the effect of open circuiting a CT secondary winding.

B2.2.2 Voltage transformers - an understanding of:

B2.2.2.1 ratio and polarity;

B2.2.2.2 burden, ratio and phase angle errors;

B2.2.3 methods of connection for metering systems.

B2.2.4 Electrical installation - an understanding of:

B2.2.4.1 Insulation resistance and continuity;

B2.2.4.2 Earth leakage circuit breakers;

B2.2.4.3 Earthing and earthing system;

B2.2.4.4 Electrical wiring practice specified in British Standards insofar as they apply to work being undertaken;

B2.2.4.5 Wiring diagrams for metering systems.

B2.2.5 Meters - an understanding of:

B2.2.5.1 The measurement of active, reactive and apparent power;

B2.2.5.2 Import and export meters;

B2.2.5.3 The use of two and three-element polyphase meters;

B2.2.5.4 Single phase, 2 or 3-wire, 2-phase 3-wire, 3-phase 3 and 4-wire systems.

B2.2.6 Testing and Test Equipment - an understanding of:

B2.2.6.1 phase and line voltage measurements;

B2.2.6.2 determining phase rotation;

B2.2.6.3 methods of determining insulation resistance, earth loop impedance, voltage polarity;

B2.2.6.4 measurement of phase currents;

B2.2.6.5 methods of verifying correct connection of VTs and CTs;

B2.2.6.6 methods of carrying out on-site active energy accuracy tests;

- B2.2.6.7 use of appropriate test equipment and application of test equipment errors;
- B2.2.6.8 traceability of measurement and the need for periodic re-calibration of test equipment;
- B2.2.6.9 meter and cable burden calculations;
- B2.2.6.10 application of CT and VT errors to meter errors.

**GUIDANCE NOTES “C” – QUALITY OF WORK**

- C1 All work undertaken by operatives must be of a sufficiently high standard so as to satisfy all Health & Safety legislation and Appendix A, B and C of this manual.
- C2 Meters, meter panels or enclosures and ancillary equipment must be adequately fixed to permanent and suitable walls, frames or other constructions. Fixing devices must be suitable and adequate for the size and weight of equipment and type of wall, frame etc on which the metering system is to be fixed.
- C3 Metering equipment should be fitted, wherever reasonably practical, in a position that future reading, testing or replacement of metering equipment can be carried out safely and easily.

## **GUIDANCE NOTES “D” – INSTALLATION WORK**

### **Safe Metering Systems**

- D1 Reference should be made to Regulations 4, 5, 6, 7 and 8 of the Electricity at Work Regulations.
- D2 Metering systems shall have been installed, so far as it is reasonably practical, to prevent danger.
- D3 Installed meters shall be appropriate for the supply in terms of accuracy, tariff, type of supply and the maximum load to be measured.
- D4 After disconnection and before restoring a supply, protective devices should be checked by operatives to determine that they are suitable for any fault current likely to arise if a fault condition occurs.
- D5 Installed meter and consumer tails should be of adequate size for type of supply and load.
- D6 The metering equipment is adequately protected from mechanical danger, the effects of weather, wet or corrosive conditions and any flammable or explosive substances.
- D7 That all cables and conductors covered with insulating materials and have been placed, so far as reasonably practical, to prevent danger.
- D8 All connections should be properly made and tightly secured.

## **GUIDANCE NOTES “E” – TESTING OF METERING SYSTEMS**

- E1 Auditors must ensure that appropriate and correctly calibrated test equipment is used by the MO for any testing of metering systems.
- E2 On-site visual and electrical tests should include, if possible, the following:
- Verification of VT and CT ratios, where appropriate.
  - Voltage measurement.
  - Current measurement.
  - Energy measurement.
  - Determination of phase rotation, where appropriate.
  - Confirmation that metering connections are correct.
  - Confirmation that VT and CT burdens within rated range. (Guidance on VT and CT burdens is given in Appendix 11 and in Guidance Notes “G” – Useful Formulae)
  - Meter accuracy tests at one or more load points;
  - Downloading or displaying of meter data information and confirming, where appropriate, that SSA data is correct;
  - Insulation and Earthing
  - Appropriate equipment and software, where necessary, to programme meter to the appropriate tariff for supply.

**GUIDANCE NOTES “F” – SEALING**

- F1 After installation, commissioning or testing of metering system has been completed, all metering equipment, test terminal blocks, VT fuses and cut-outs should be sealed in accordance with the MOCOPA sealing requirements.
- F2 Seals should be marked to show meter operatives company and the identity of operative who was responsible for sealing on site.

**GUIDANCE NOTES “G” – USEFUL FORMULAE**

$$kW = \frac{\text{Total advance of kWh register} \times 60}{\text{Minutes (period of advance)}} = kW$$

or

from pulse output (Wh/imp) =

$$\frac{\text{No imp}}{\text{time(sec)}} \times \frac{3600}{1000} \times \frac{\text{Meter}}{\text{Constant}} \times \text{CT ratio} \times \text{VT ratio} = kW$$

or from pulse output (imp/Wh) =

$$\frac{\text{No imp}}{\text{time(sec)}} \times \frac{3600}{1000} \times \frac{\text{CT ratio}}{\text{Meter Constant}} \times \text{VT ratio} = kW$$

$$kVAr = \frac{\text{Total advance of kVArh register} \times \text{Minutes}}{60} = kVAr$$

or, if available from pulse output (Wh/imp) =

$$\frac{\text{No imp}}{\text{time(sec)}} \times \frac{3600}{1000} \times \frac{\text{Meter}}{\text{Constant}} \times \text{CT ratio} \times \text{VT ratio} = kVAr$$

or, if available from pulse output (imp/Wh) =

$$\frac{\text{No imp}}{\text{time(sec)}} \times \frac{3600}{1000} \times \frac{\text{CT ratio}}{\text{Meter Constant}} \times \text{VT ratio} = kVAr$$

$$kVA = \sqrt{(kW^2 + kVAr^2)} = kVA$$

or

$$LV \quad \frac{\text{Volts} \times \text{Primary} (I_r + I_y + I_b)}{1000} = kVA$$

or

$$HV \quad \sqrt{3} \times \text{line volts} \times \text{primary line current} \left( \frac{I_r + I_b}{2} \right) = kVA$$

$$pf = \frac{kW}{kVar} = \cos \theta$$

or

$$pf = \frac{1}{\sqrt{kVar^2 + 1}} = \cos \theta$$

**CT BURDENS**

Max burden assumed:-

- 1) For Ferraris 1.0VA/element
- 2) For Electronic 0.5VA/element

Examples given below based on:-

- 1) Max current of 6A
- 2) Feed and return cable for cable and total burden 0.5VA element

Example 1: 1 x 5-6A CT operated meter, max meter burden 1 x 0.5VA

Typical Meter Burden (VA)	Cable Size (sq mm)	Voltage Drop (mV/A/m)	Cable Burden Max (VA/m)	Total Burden at 15m (VA)
0.5	2.5	18	0.216	1111 3.74
0.5	4	11	0.132	2.48

Example 2: 2 x 5-6A CT Operated meter, max meter burden 2 x 0.5VA

Typical Meter Burden (VA)	Cable Size (sq mm)	Voltage Drop (mV/A/m)	Cable Burden Max (VA/m)	Total Burden at 15m (VA)
1	2.5	18	0.216	4.24
1	4	11	0.132	2.98
1	6	7.3	0.0876	2.314

Example 3: 2 x 5-6A CT Operated meter, meter burdens 0.5VA + 1VA

Typical Meter Burden (VA)	Cable Size (sq mm)	Voltage Drop (mV/A/m)	Cable Burden Max (VA/m)	Total Burden at 15m (VA)
1.5	2.5	18	0.216	4.74
1.5	4	11	0.132	3.48
1.5	6	7.3	0.0876	2.814
1.5	10	4.4	0.0528	2.292

Example 4: 2 x 5-6A CT Operated meter, max burdens 2 x 1VA

Typical Meter Burden (VA)	Cable Size (sq mm)	Voltage Drop (mV/A/m)	Cable Burden Max (VA/m)	Total Burden at 15m (VA)
2	2.5	18	0.216	5.24
2	4	11	0.132	3.98
2	6	7.3	0.0876	3.314
2	10	4.4	0.0528	2.792
2	16	2.8	0.0336	2.504

**VT BURDENS**

Max burden assumed:-

- 1) For Ferraris 10.0VA/element
- 2) For Aux apparatus assume 10.0VA/phase

Examples for cable and total burden calculated for both feed and return cables.

Example 1: 1 x 110V VT Operated meter, max meter burden 1 x 10VA

Typical Meter Burden (VA)	Cable Size (sq mm)	Voltage drop (mV/A/m)	Cable burden max (VA/m)	Total burden at 15m (VA)
10	1.5	29	0.01	10.08
10	2.5	18	0.00	10.05

Example 2: 2 x 110V VT Operated meter, max meter burden 2 x 10VA

Typical Meter Burden (VA)	Cable Size (sq mm)	Voltage drop (mV/A/m)	Cable burden max (VA/m)	Total burden at 15m (VA)
20	1.5	29	0.01	20.16
20	2.5	18	0.01	20.10
20	4	11	0.00	20.06

Example 3: 2 x 110V VT Operated meter + aux apparatus = 3 x 10VA burden

Typical Meter Burden (VA)	Cable Size (sq mm)	Voltage drop (mV/A/m)	Cable burden max (VA/m)	Total burden at 15m (VA)
30	1.5	29	0.02	30.24
30	2.5	18	0.01	30.15
30	4	11	0.01	30.09