Code of Practice 510

Issue 2 **October 2016**

Commissioning of Measurement Transformers connected to Tariff Metering Equipment

Contents

Approved for issue by the Technical Policy Panel

Issue and Amendment Summary

Issue No. Date	Brief Description and Amending Action
27/05/15	Issue 1 First Issue Prepared by: Paul Whittaker & Simon Brooke Approved by the Technical Policy Panel and signed on its behalf by Dan Randles
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COMMISSIONING OF MEASUREMENT TRANSFORMERS CONNECTED TO TARIFF METERING EQUIPMENT

1. INTRODUCTION

This Code of Practice provides information regarding the Balancing and Settlement Code (BSC) requirements for the commissioning of Half Hourly Metering Equipment in accordance with Code of Practice 4 (CP4) 'The calibration, testing and commissioning requirements of Metering Equipment for Settlement Purposes' and in particular those measurement transformers which are provided and owned by Electricity North West Limited (hereafter Electricity North West).

Electricity North West is a Party to the BSC, in compliance with Distribution Licence Condition 26, and failure to comply with our BSC obligations is a breach of the BSC and the Distribution Licence.

CP4 sets out the requirement for commissioning, testing and the calibration of all Metering Equipment for Settlement purposes. The tests are required to confirm that the Metering Systems are accurately recording the flow of electricity at each Defined Metering Point. Without commissioning there can be no certainty and where there are underlying errors these may go undetected for years. To reduce the occurrence of such errors the approved modification P283 'Reinforcing the Commissioning of Metering Equipment Processes' made changes to the BSC and its Code Subsidiary Documents on 6 November 2014 with respect to the responsibilities for the commissioning and testing of Half Hourly Metering Equipment.

2. SCOPE

This Code of Practice sets out the testing, commissioning and recording process to be carried out by Electricity North West on all new measurement transformers which it owns and operates and which are connected to Metering Equipment for Settlement purposes.

This testing shall also be carried out on any piece of equipment within a metering set which is replaced during the life of the installation.

Where measurement transformers are not and will not be owned by Electricity North West then, the Meter Operator Agent (MOA) shall carry out all the commissioning procedures associated with the measurement transformers.

It will remain the responsibility of the Meter Registrant to ensure that the requirements of CP4 are met irrespective of the owner of certain Metering Equipment.

3. DEFINITIONS

BSC	Balancing and Settlement Code
BSC Party	A signatory to the Balancing and Settlements Code
Code Subsidiary Documents	Supporting documents of the BSC; for example BSC Procedures, Code of Practice, Service Descriptions, Party Service Line, Data Catalogues etc
CP4	Balancing and Settlement Code, Code of Practice Four: Code of Practice for the Calibration, Testing and Commissioning Requirements Of Metering Equipment For Settlement Purposes
CP10	Balancing And Settlement Code, Code of Practice 10: Code of Practice For Metering of Energy via Low Voltage Circuits for Settlement Purposes
CT	Current Transformer
DMP	Defined Meter Point, as defined in various BSC Metering Codes of Practice
DNO	Distribution Network Operator
ELEXON	The organisation which acts as the administrator of the Balancing and Settlement Code
HV	High Voltage, meaning a voltage of 1 000 volts and above
ICP	Independent Connections Provider
LV	Low Voltage, meaning a voltage of less than 1 000 volts
Meter	means a device for measuring Active Energy or Reactive Energy
MOA	Meter Operator Agent
P283	Modification 283 to the Balancing and Settlement Code
Registrant	means the Party to the BSC who registers the Metering System in either Supplier or Central Meter Registration Systems and is responsible for it
Settlement	means the determination and settlement of amounts payable in respect of Trading Charges in accordance with the [Balancing & Settlements] Code
TNO	Transmission Network Operator
VT	Voltage Transformer

4. GENERAL REQUIREMENTS

Under the roles and responsibilities for all commissioning and calibration requirements, as set out in the BSC and CP4, the overall responsibility rests with the Registrant. Commissioning under CP4 is required when new equipment is installed.

The modification P283 has introduced a distinction where measurement transformers (Current Transformers and Voltage Transformers (CTs and VTs)) which are under the ownership of a Party to the BSC (typically the distribution or transmission system operator), such that the Party is responsible for the commissioning and calibration requirements of its own equipment, leaving the remainder of the Metering Equipment to be completed by the Meter Operator Agent (MOA). The MOA, having been provided relevant commissioning records from the equipment owner will review these records and its own commissioning for compliance with the requirements of CP4. The MOA is then required to notify the Registrant that commissioning of the Metering System is completed and provide notification of any defects or omissions in that process. It should be noted that this process applies to all CT operated Half Hourly Metering Equipment including, for the avoidance of doubt, CP10 Metering Systems, and Metering at the boundary between a Transmission Network and a Distribution Network (ie TNO to DNO) and at a boundary between adjacent Distribution Networks (ie DNO to DNO).

Where CTs and/or VTs are not under the ownership of a BSC Party (for example a customer may own this equipment) then all of the requirements for commissioning, testing and calibrations are the responsibility of the MOA to carry out on behalf of the Registrant ie there is no responsibility placed on the DNO to undertake this testing. However in some cases, especially High Voltage Metering Systems, it may be necessary for the MOA to seek the assistance of the relevant Network Operator in carrying out these functions. As with the above process the MOA is required to inform the Registrant of the outcome of this process.

In all cases, irrespective of equipment ownership, the Registrant remains responsible for the Metering System as a whole including overall accuracy and the assessment thereof.

This Code of Practice sets out the process to be followed in order to ensure compliance with CP4 following the implementation of P283. In the event of any inconsistency between Electricity North West policy and CP4 then CP4 shall prevail.

When it is required to replace any piece of equipment within a metering set which is during the life of the installation, it is only necessary to undertake commissioning tests on that piece of equipment and not on the metering set as a whole.

5. ELECTRICITY NORTH WEST COMMISSIONING PROCESS

The process to be put in to place should cover at least the following requirements:

Where new measurement transformers are being installed and are owned by or are to be adopted by Electricity North West, then those measurement transformers and the test facilities utilised by Electricity North West, its agent or the Independent Connections Provider (ICP) installing equipment to be adopted shall:

a) Undertake commissioning of 100% of new installations, to verify through testing:

- The ratios and polarities of all measurement transformers used for Settlement purposes in accordance with CP4;
- Confirms the location of measurement transformers in relation to the Defined Metering Point;
- The relationship between voltages and currents are correct; and

- Establish the burden on measurement transformers up to and including the Test Facility.

b) Establish a process which calibrates measurement transformers and maintains records of such tests in accordance with CP4; and

c) Maintain calibration and commissioning records in a standard format for HV and LV assets, as set out in Appendix A, for provision to the relevant MOA and Supplier as required from time to time. (The forms in Appendix A are available as separate Word documents rather than copying the Appendix). All completed forms to be returned to P283commissioning@enwl.co.uk.

For the avoidance of doubt all agents, acting on our behalf, and ICPs where we intend to adopt distribution assets constructed by them must comply with this Code of Practice and the BSC and its Code Subsidiary Documents so that Electricity North West receives the necessary calibration and commissioning records should the MOA and/ or Registrant request this information. All agents, acting on our behalf, and ICPs where we intend to adopt distribution assets constructed by them must comply with the Electricity North West commissioning process and procedures including, but not limited to this Code of Practice 510, ES220 and ES320. All necessary testing, checking, documentation and records shall be provided in accordance with these documents.

6. METER OPERATOR AGENT TESTING AND DUTIES OF THE METER REGISTRANT

The MOA shall:

- Receive commissioning and calibration records of measurement transformers and Test Facilities;
- Ensure that these records meet the requirements of CP4;
- Confirm that Meters are set to actual ratios of the installed measurement transformers;
- Confirm that all voltages and currents are of the correct relationship and that standard phase rotation exists at the Meter terminals;
- Confirm that the overall burden on measurement transformers are within limits;
- Where compensations are to be applied that they are correct;
- Any phase failure alarms operate correctly;
- The output of the Metering System correctly records the energy in the primary circuit at the Defined Metering Point;
- Establish a commissioning process which verifies through testing the correct operation of the Meters in accordance with CP4;
- Assess the overall accuracy of the Metering System for compliance with the relevant CP;
- Provide notification to the Supplier that the commissioning process is successfully completed in accordance with CP4 or that commissioning is not successful or complete together with notification of any defects or omissions in that process.

The Registrant shall:

- Receive the commissioning information from the MOA;
- Assess the notification from the MOA and determine whether they believe that there is a risk to Settlement;
- Where there is deemed to be a risk to Settlement, consult with the relevant Network Operator and agree the appropriate steps to be taken to minimise such risk.

7. AUDITING BY ELEXON

The rules for the operation of the wholesale electricity market are set out in the Balancing and Settlement Code. ELEXON administers the Code and provide and procure the services needed to implement it. This entails carrying out the work to compare how much electricity Generators and Suppliers said they would produce or consume with actual volumes as determined by Metering Systems. This includes determining the level of any financial adjustments which are required.

The impartiality of the system is underpinned by ELEXON's annual audit which includes within its scope the provision of Meter Technical details, to establish that the accuracy of all the constituent components of a metering set (Meters, CTs, VTs and lead burdens) are with prescribed limits.

ELEXON undertakes an annual audit of Electricity North West to confirm compliance with our BSC obligations and as such we must accommodate any such audit request covering activities within this Code of Practice, including any activity performed by an agent acting on our behalf.

8. RECORD KEEPING & RECORD PROVISION

It is a requirement of CP4 that all calibration and commissioning records shall be retained and available for use by the other parties for the life of the metering installation.

The complete and accurate calibration and commissioning records of measurement transformers owned by Electricity North West shall be stored, maintained and made available to the appointed MOA and/ or Registrant in accordance with the commissioning process and/ or on request.

9. DOCUMENTS REFERENCED

CP4	Balancing and Settlement Code, Code of Practice Four: Code of Practice for the Calibration, Testing and Commissioning Requirements Of Metering Equipment For Settlement Purposes
CP10	Balancing And Settlement Code ,Code of Practice 10 Code of Practice For Metering of Energy via Low Voltage Circuits for Settlement Purposes
P283	Modification 283 to the Balancing and Settlement Code
ES220	Pre-Commissioning Requirements for Independent Connections Providers Requiring New Assets to be Connected to the 11/6.6kV Network
ES320	Preparation and Assembly of Sub-Station Plant (11/6.6kV and LV)

APPENDIX A

A1 - HV Metering Equipment Commissioning Record

Part 1 (Measurement Transformers) to fulfil the requirements of BSC CoP4 and P283

CUSTOMER INFORMATION	
Customer Name	
Property Address	
MPAN	
Substation Name	
Switch Panel Circuit Name	
Switchgear Serial Number(s)	
Structure Plant Number (SPN)	

Current Transformers	**L1**	**L3**
Location of CTs (with respect to the **Defined Metering Point)**		
CT Serial Number		
Burden (i.e.VA Rating)	VA	VA
Accuracy Class	%	%
Make		
Type		
Available Ratios (in Amps)	Amps	Amps
Ratio Selected (in Amps)	Amps	Amps

Voltage Transformers	**L1**	**L2**	**L3**
Location of VTs (with respect to the **Defined Metering Point)**			
VT Serial Number			
Burden (i.e.VA Rating)	VA	VA	VA
Accuracy Class	%	%	%
Make			
Type			
Available Ratios (in Volts)	Volts	Volts	Volts
Ratio Selected (in Volts)	Volts	Volts	Volts

CT/VT REFERENCE VOLTAGE ASSOCIATIONS	
L1 CT associated with L1 voltage? If No write explanation in Field Notes box	Yes/No
L2 CT associated with L2 voltage?	Yes/No

If No write explanation in Field Notes box			
L3 CT associated with L3 voltage? If No write explanation in Field Notes box	Yes/No		
Standard Phase sequence at Testing Facility (L1, L2, L3)? If No write explanation in Field Notes box	Yes/No		
CT shorting links left closed? If No write explanation in Field Notes box	Yes/No		
CTs and VTs calibration records attached? If No write explanation in Field Notes box	Yes/No		
CT secondary cable burden (i.e.VA Rating)	VA	VA	
Total CT burden to Testing Facility (i.e.VA Rating)	VA	VA	
VT reference voltage - secondary cable burden (i.e.VA Rating)	VA	VA	VA
Total VT burden to Testing Facilities (i.e.VA Rating)	VA	VA	VA
All connections tight?	Yes/No		
Meter potential fuse ratings	Amps		

RATIO AND POLARITY VERIFICATION CT RATIO VERIFICATION TESTS	
Description of tests performed:	
CT polarity verification tests	
Description of tests performed:	
Test equipment information	
Instruments Used: Include description and serial Nos	
Calibration expiry dates:	/ /

Current Transformers	**L1**	**L3**
Primary Current Injected	Amps	Amps
Secondary Current measured Hi Ratio	Amps	Amps
Secondary Current measured Low Ratio	Amps	Amps
Ratio Calculation High Ratio		
Ratio Calculation Low Ratio		

Voltage Transformers	L1 – L2	L2 – L3
Primary Volts injected	Volts	Volts
Secondary Volts measured	Volts	Volts
Ratio Calculation Ratio		

Field notes:

Burden Measurements

CT Equivalent Impedance =		Ω
L1		L3
V = V		V = V
I = A		I = A
Z = Ω		Z = Ω
CT Rated Amps² x Z = VA		CT Rated Amps² x Z = VA

All tests performed with correct outcomes	Yes/No
Test performed by:	
Date of Tests	

A2 - LV Metering Equipment Commissioning Record

Part 1 (Measurement Transformers) to fulfil the requirements of BSC CoP4 and P283

CUSTOMER INFORMATION	
Customer Name	
Property Address	
MPAN	
Metered Service Unit serial number	

Current Transformer	**L1**	**L2**	**L3**
Location of CTs (with respect to the **Defined Metering Point)**			
CT Serial Number			
Burden (i.e. VA Rating)	VA	VA	VA
Accuracy Class	%	%	%
Make			
Type			
Available Ratios (in Amps)	Amps	Amps	Amps
Ratio Selected (in Amps)	Amps	Amps	Amps
CT pole face P1 facing Distribution System?	Yes/No	Yes/No	Yes/No

CT REFERENCE VOLTAGE ASSOCIATIONS			
L1 CT associated with L1 voltage? If No write explanation in Field Notes box	Yes/No		
L2 CT associated with L2 voltage? If No write explanation in Field Notes box	Yes/No		
L3 CT associated with L3 voltage? If No write explanation in Field Notes box	Yes/No		
Standard Phase sequence at Testing Facility (L1, L2, L3)? If No write explanation in Field Notes box	Yes/No		
CT shorting links left closed? If No write explanation in Field Notes box	Yes/No		
CTs calibration records attached? If No write explanation in Field Notes box	Yes/No		
CT secondary cable burden (i.e. VA Rating)	VA	VA	VA
Total CT burden to testing facility (i.e. VA Rating)	VA	VA	VA
All connections tight?	Yes/No		
Meter potential fuse ratings			Amps
Local fuse rating, as informed by the MOA			Amps

RATIO AND POLARITY VERIFICATION	
CT RATIO VERIFICATION TESTS	
Description of tests performed:	
CT POLARITY VERIFICATION TESTS	
Description of tests performed:	
TEST EQUIPMENT INFORMATION	
Instruments Used: Include description and serial Nos	
Calibration expiry dates:	/ /

Current Transformers	**L1**	**L2**	**L3**
Primary Current Injected	Amps	Amps	Amps
Secondary Current measured Hi Ratio	Amps	Amps	Amps
Secondary Current measured Low Ratio	Amps	Amps	Amps
Ratio Calculation High Ratio			
Ratio Calculation Low Ratio			

Field notes:

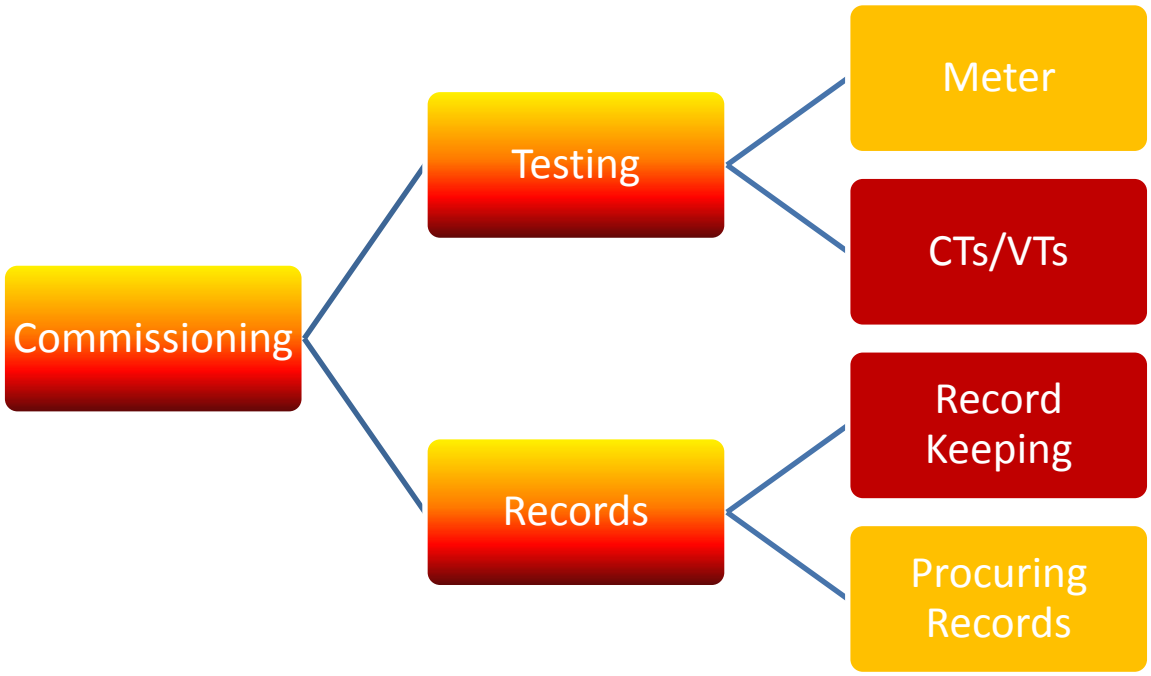
Burden Measurements

CT Equivalent Impedance =		Ω
L1	L2	L3
V = V	V = V	V = V
I = A	I = A	I = A
Z = Ω	Z = Ω	Z = Ω
CT Rated Amps² x Z = VA	CT Rated Amps² x Z = VA	CT Rated Amps² x Z = VA

All tests performed with correct outcomes	Yes/No
Test performed by	
Date of Tests	/ /

APPENDIX B

FIGURE1: OBLIGATIONS REQUIRED BY METERING CODE OF PRACTICE CP4



Note: The activities to which Electricity North West is obligated are indicated by a partially red background for those which are shared and a full red background for those which are wholly attributed.

FIGURE 2: POST P283 - TESTING PROCESS TIMELINE AND RESPONSIBILITIES