

# Electricity Specification 220

Issue 8      March 2025

## Pre-commissioning Requirements for Independent Connection Providers Requiring New Assets to be Connected to the 11/6.6kV Network



## Amendment Summary

ISSUE NO. DATE	DESCRIPTION
<b>Issue 5</b> <b>May 2021</b>	Document Re-formatted into the new Template and new relay test sheets inserted into Appendix B for the Schneider RN2D. Metering test sheet page number updated as a result. EFI definition added and CDM regulations updated.  Prepared by: Matthew Kayes Approved by: Policy Approval Panel and signed on its behalf by Steve Cox, Engineering and Technical Director
<b>Issue 6</b> <b>September 2021</b>	New relay test sheets inserted into Appendix B for the Schneider RN6D, CE2 and CE6. RN2D test sheet updated. MU Test sheet number updated to sheet 8. A note has been added to Appendix B regarding the MICOM P116 relay SET files and where to locate them.  Prepared by: Matthew Kayes Approved by: Policy Approval Panel and signed on its behalf by Steve Cox, Engineering and Technical Director
<b>Issue 7</b> <b>September 2022</b>	New relay test sheets inserted into Appendix B for the Lucy Sabre VRN2a with Siemens 7SR45 relay. Earth Mat has had test sheet heading added. Test sheets renumbered accordingly and increased to count of 12 in total.  Prepared by: Matthew Kayes Approved by: Policy Approval Panel and signed on its behalf by Steve Cox, DSO Director
<b>Issue 8</b> <b>March 2025</b>	HV Pressure test values given in Appendix B updated to reflect the changes approved in CP319 - Applied HV test requirements.  Prepared by: Simon Rushton Approved by: Policy Approval Panel (PAP) and signed on its behalf by Paul Turner, PAP Chairperson

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## 1 Introduction

Before an Independent Connection Provider (ICP) can have its newly installed assets connected to a public distribution network it is necessary for certain pre-commissioning procedures and checks to be undertaken in order to ensure satisfactory and compliant connection. This document sets out the pre-commissioning requirements of Electricity North West Limited (Electricity North West).

## 2 Scope

This Electricity Specification (ES) is for use by ICPs to request electrical connection of all newly installed assets to the 11/6.6kV electricity network belonging to Electricity North West.

## 3 Commissioning Process

Soon after signing the adoption agreement Electricity North West shall notify the ICP of any special circumstances that may be applicable to the commissioning of the works. Special circumstances would include such things as long notice periods to arrange a shutdown of the network, restrictions under the New Roads and Street Works Act (NRSWA) such as working in shopping areas at Christmas time, constraints in releasing network at certain times due to known restrictions, long 'lead in' times to obtain planning and legal consents.

The ICP shall then produce a programme showing the required timescales for the commissioning of the works indicating the approximate date for commissioning the HV works. The approximate date for commissioning of the HV works shall be at least 60 calendar days from the date of submission of this programme to Electricity North West.

**NOTE:** The ICP shall prepare and, where appropriate, assemble the substation plant items in accordance with the requirements of ES320 - Preparation and Assembly of Substation Plant (11/6.6kV and LV).

The ICP shall give at least 20 working days (Monday to Friday inclusive) notice to Electricity North West of the actual date on which the commissioning of the new asset is required and provide the following information:

- Dates on which it proposed to carry out the pre-commissioning tests.
- A geographic diagram showing the network (HV and any associated LV) to be commissioned.

The ICP shall complete the appendices in ES320 and return them to Electricity North West before any further work can be arranged.

Electricity North West shall then schedule the commissioning work in the programme and make any "shutdown" arrangements.

The ICP shall complete the items marked with an asterisk\* on the Pre-Commissioning Form (see [Appendix A](#)) and the appropriate Data Forms for the network that is required to be commissioned. In addition, the appropriate Test Result Sheets (see [Appendix B](#)) shall be completed. All the completed forms/sheets shall be submitted to Electricity North West at least 10 working days prior to the commissioning date. Should the required data not be received on time, the commissioning work will be removed from the programme pending further notice from the ICP in accordance with this clause.

**NOTE:** The Electricity Safety, Quality and Continuity Regulations 2002 (ESQCR) require that all substations and overhead lines are assessed to establish the foreseeable risk of danger from interference, vandalism or unauthorised access. Guidance on the assessment and classification of sites is provided in [Appendix A](#) of Electricity Policy Document (EPD) 301. A Background Risk Classification for the new site shall be determined by the ICP and recorded on the appropriate Data Form.

Prior to commissioning, the Electricity North West commissioning engineer shall meet the ICP's representative on site and inspect the assets to be commissioned and where appropriate install the operational locks. The assets shall be confirmed by the ICP as ESQCR compliant.

Following completion of this clause, the network extension which is to become part of the public electricity distribution network shall come under the electrical control of Electricity North West and this will be notified by the issue of a "Warning to Contractors" Safety Clearance Certificate to the ICP.

Electricity North West shall commission the new network extension in accordance with its established procedures.

## 4 Pre-Commissioning Form, Data Forms and Test Result Sheets

### 4.1 Pre-Commissioning Form

A copy of the Pre-Commissioning Form (PCF) is provided in [Appendix A](#). The following numbered notes refer to the numbered items on the form.

- 1 The substation nameplate(s) shall be supplied by Electricity North West and fitted by the ICP in accordance with Electricity North West policy.
- 2 The "Danger of Death" signs shall be supplied by Electricity North West and fitted by the ICP in accordance with Electricity North West policy.
- 3 HV labels shall be permanent engraved labels, securely attached in accordance with Electricity North West Code of Practice (CP) 615 and EPD601. Dymo or other temporary labels are not acceptable. These engraved labels shall be provided by Electricity North West.
- 4 LV labels shall be permanent engraved labels, securely fixed in accordance with Electricity North West policies CP615, EPD601 and CP331.
- 5 Switchgear locks shall be fitted by Electricity North West.
- 6 Where fencing is part of the substation design, it shall be complete.
- 7 Where the substation is of the indoor type, the building shall be complete.
- 8 Where indoor substations are to be provided with lighting, power, heating and dehumidification apparatus (and alarms if appropriate), this work shall be complete.
- 9 Any paint chips on the plant items shall be made good.

- 10 Internal groundwork shall be to finished level. The work shall be of a standard that an operator can enter the substations and walk around it safely in darkness without danger from stumbling or tripping.
- 11 Gates/doors giving access to substations shall be fitted and secure or adequate access arrangements made. (Electricity North West shall provide and fit the lock)
- 12 Earthing of equipment in the substation shall be complete and the above ground connections clearly visible and labelled.
- 13 A check shall be made to ensure that the LV neutral earth link is in the correct position. It shall normally be inserted, however if separate earth mats are required it shall be removed.
- 14 Operating handles necessary for normal operation of the switchgear shall be available in the substation and appropriately fixed/mounted.
- 15 Where appropriate, test/earthing devices shall be provided on site.
- 16 The access route to the substations shall be obvious and clear of obstruction.
- 17 Exposed cables shall have cable guards fitted.
- 18 The switchgear shall be capable of being operated comfortably. This will mean ensuring that the plinth height is appropriate, and that the switchgear is positioned to give adequate clearance from other equipment, fences etc.
- 19 A copy of the Construction (Design and Management) Regulations 2015 (CDM) handover file is required. The CDM file shall be handed to the Electricity North West Asset Adoption Manager in the Connections department.
- 20 "As constructed" drawings shall consist of HV and LV geographic layouts to the standard specified in ES281 - Company specific Appendices to Energy Networks Association (ENA) Engineering Recommendation (ER) G81; also, HV and LV schematic diagrams, HV/LV earthing arrangement and substation civil drawings.
- 21 The appropriate data input documents for the types of asset to be commissioned have been completed. These documents shall be checked by Electricity North West Data Management department for accuracy.
- 22 The manufacturer's test data documents as detailed in ES320 have been provided.
- 23 The Earth Fault Indicators (EFIs), where fitted, have been tested.
- 24 HV protection is in accordance with Electricity North West CP331.
- 25 The rating of LV fuses is in accordance with Electricity North West CP331.
26. Metering CTs and VTs have been fitted, tested and commissioned in accordance with CP510, ES501, ES510 and ES320. Copies of all metering CT & VT test certificates from the manufacturer have been provided with the switchgear. The copies with the switchgear shall be photocopied or scanned and a copy shall be retained with a copy sent to [P283commissioning@enwl.co.uk](mailto:P283commissioning@enwl.co.uk) along with [Appendix B](#)

and the relevant form(s) within CP510. Any instances of missing or incorrect CT and/or VT test certificates shall be recorded on the test sheet.

ITEM	TESTS REQUIRED
<b>HV cables</b>	5kV IR test and continuity test (Confirm shorted capped ends fitted)
<b>LV cables</b>	500V IR test and continuity test
<b>Extensible HV switchgear</b>	Pressure test after assembly in accordance with Electricity North West CP319 Ductor test after assembly
<b>Non-extensible HV switchgear</b>	Pressure test in accordance with Electricity North West CP319
<b>Transformers</b>	Pressure test in accordance with Electricity North West CP319
<b>Earthing</b>	Earth resistance
<b>Protection</b>	Wiring checks & secondary injection
<b>HV Metering CTs &amp; VTs</b>	Tested in accordance with Electricity North West ES501, CP510, ES320 and ES510

**NOTE:**

- (a) An electronic copy of all test result sheets (see [section 4.3](#)) shall be sent to the Data Infrastructure Manager, Data Management Department, Electricity North West. The results documents shall be sent in an electronic folder clearly labelled with the substation name and/or address.
- (b) Copies of all primary and secondary injection test results (including CT ratio, polarity and magnetisation curve checks) shall be retained on site for inspection by the Electricity North West commissioning engineer.
- (c) Copies of all metering CT/VT tests on the appropriate forms in [Appendix B](#) and the relevant form(s) in CP510 shall be sent to Data Management by emailing them to :-  
[P283commissioning@enwl.co.uk](mailto:P283commissioning@enwl.co.uk).

- 27 The following items, where installed, have been tested prior to jointing and the results provided to Electricity North West:
- 28 A jointing schedule shall be provided showing the location of all joints (HV and LV) and the date they were completed.
- 29 All necessary legal and planning consents have been obtained and title transferred to Electricity North West.
- 30 For HV metered supplies a date is required when the metering is scheduled to be installed. The network will not be commissioned if the metering is not fitted.
- 31 The “No Smoking” sign shall be supplied by Electricity North West and fitted by the ICP in accordance with Electricity North West policy.
- 32 The “DNA Marking” sign shall be supplied by Electricity North West and fitted by the ICP in accordance with Electricity North West policy.



## 4.2 Data Forms

The various data forms applicable to particular situations are listed in the Table below.

	-	DOC 1	PCF	DOC 2	DOC 3	DOC 4	DOC 5	DOC 6	DOC 7	DOC 8&9	DOC 10
11KV/6.6KV ACTIVITY	SAR Distribution - Front Sheet	Diagram Amendment	Pre-Commissioning Form	Site Substation Details	Extensible or pole mounted	Non Extensible switchgear	Transformer Details	LV Equipment Details	De-commissioning	OHL and Pole data	Battery and Charger Details
Substation Commissioning	Y	Y	Y	Y	Y	Y	Y	Y	-	-	Y
GMT/PMT Commissioning	Y	Y	Y	Y	-	-	Y	Y	-	Y	-
GMT/PMT De- commissioning	Y	Y	-	-	-	-	-	-	Y	-	-
Plant changes	Y	Y	-	-	Y	Y	Y	Y	Y	-	-
Changes to Operational Status	Y	Y	-	-	-	-	-	-	-	-	-
Changes to circuits and X- jointing	Y	Y	-	Y	-	-	-	-	-	Y	-
Addition/Removal of Loads	Y	Y	-	-	-	-	-	-	-	-	-
Addition/Removal of Ops Notes	Y	Y	-	-	-	-	-	-	-	-	-
Addition/Removal of Generation	Y	Y	-	Y	Y	Y	Y	Y	Y	-	-
Diagram Correction only	Y	Y	-	-	-	-	-	-	-	-	-

Copies of the latest versions of these forms may be obtained from the Electricity North West Virtual Data Room (VDR).

### 4.3 Test Result Sheets

Test result sheets shall be completed as appropriate. The sample sheets shown in [Appendix B](#) cover cable IR tests, earth electrode resistance tests, high voltage tests on switchgear/transformers and protection test results.

Copies of blank test result sheets can be obtained from the Electricity North West VDR.

## 5 Documents Referenced

DOCUMENTS REFERENCED	
<b>NRSA</b>	New Roads and Street Works Act
<b>ESQCR</b>	Electricity Safety, Quality and Continuity Regulations 2002.
<b>CDM</b>	Construction (Design and Management) Regulations 2015.
<b>ENA ER G81</b>	Framework for design and planning, material specification and installation and record for Greenfield low voltage housing estate installations and associated, new, HV/LV distribution substations.
<b>CP319</b>	Applied High Voltage Tests.
<b>CP331</b>	Protection of LV Underground and Overhead Distributors, Distribution Transformers and HV Overhead Networks by Fuses
<b>CP615</b>	Substation, Circuit and Plant Identification.
<b>EPD301</b>	Inspection and Maintenance of Electrical Plant and Substation Security.
<b>EPD601</b>	Substation, Circuit and Plant Identification.
<b>ES320</b>	Preparation and Assembly of Substation Plant (11/6.6kV and LV).
<b>ES501</b>	Metering Current and Voltage Transformers.

<b>CP510</b>	Commissioning of Measurement Transformers connected to Tariff Metering Equipment.
<b>ES510</b>	Procedure for Commissioning Measurement Transformers Connected to Settlement Metering Equipment

## 6 Keywords

Asset; Connection; Connector; Independent Connection Provider.

## Appendix A

### Pre-Commissioning Form

#### PCF Pre-Commissioning Form

Electricity North West Reference No

**To: Electricity North West Ltd**  
**Design and Construction Manager**  
**Connections Department**  
**Frederick Road**  
**Salford**  
**Manchester**  
**M6 6QH**

**From: Name**

**Company**

**Tel:**

Substation Name / Location\*

Substation / Plant File Number

Date commissioning is required \*

NO.	ITEM	(Y/N or N/A)	DATE	COMMENT
1	Nameplate fitted*			
2	Danger of Death signs fitted*			
3	HV Switchgear labels fitted*			
4	LV labels fitted*			
5	Switchgear Locks fitted			
6	Fence complete*			
7	Building Complete*			
8	Lighting Complete*			
9	Paint chips on plant made good*			
10	Trench work filled in*			
11	Gates / Locks			
12	Earthing (visible)*			
13	LV neutral earth link*			
14	Operating Handles*			
15	Test / Earth Device*			
16	Access route*			
17	Cable protection in place*			
18	Operator position*			
19	CDM Handover file provided*			
20	"As Constructed" drawings*			
21	Asset Details provided*			
22	Manufacturer's test data*			
23	EFI fitted & tested*			
24	HV protection to ENW CP331*			
25	LV fuses to ENW CP331*			
26	Test results provided*			
27	Jointing schedule provided*			

28	Legal Consents obtained*			
29	Metering arranged*			
30	No Smoking sign fitted*			
31	DNA Marking sign fitted*			

I certify that the above substation has been inspected and tested as indicated above and confirm that it complies with the current requirements and specifications of Electricity North West Ltd.

Name (PRINT)\*

Signature\*

Date\*

Being a person duly authorised by my employer to sign this form.

## Appendix B

### Test Result Sheets

**NOTE:** The appropriate MICOM P116 SET Files for Precommissioning are available from the Electricity North West Library under the files named Default 200 & 400, where they haven't been uploaded to the relay for despatch to site during Depot Testing, these SET files have minimum settings applied. The correct site settings shall be applied during the commissioning process.

The appropriate Siemens 7SR45 SET Files for Precommissioning are available from the Electricity North West Library under the files named 7SR45 Test 100 and 200. The correct site settings shall be applied during the commissioning process including the SITE SET file named 7SR45 Prot ENW.

**Pre-Commissioning Test Result Sheets for HV Installations (Sheet 1 of 12)**

Project No.\* ..... System Voltage\* .....

Substation\* ..... Location\* .....

**Description of Equipment under Test**

.....

.....

**CABLE TEST RESULTS (HV)\***

**IR TEST WITH 5kV MEGGER**

PHASES	INITIAL IR (MΩ)	FINAL IR (MΩ)
RY - B		
RB - Y		
RYB - E		

**CABLE TEST RESULTS (LV)\***

**IR TEST WITH 500V MEGGER**

	LV SINGLES		LV NETWORK	
PHASES	INITIAL IR (MΩ)	FINAL IR (MΩ)	INITIAL IR (MΩ)	FINAL IR (MΩ)
RY - B				
RB - Y				
RYB - N				
RYB - E				

Tests carried out by:

Name (Print):		Signature:	
Company:		Date:	

**Pre-Commissioning Test Result Sheet for HV Installations (Sheet 2 of 12)**

**EARTH MAT TEST RESULTS\***

	RESISTANCE VALUES ( $\Omega$ )			
TYPE 'A' EARTH MAT				
TYPE 'B' EARTH MAT	HV MAT		LV MAT	

Tests carried out by:

Name (Print):		Signature:	
Company:		Date:	



**Pre-Commissioning Test Result Sheet for HV Installations (Sheet 3 of 12)**

**SWITCHGEAR TEST RESULTS\***

**HV Pressure Test - Main contacts closed**

PHASES	VOLTAGE (SEE NOTE BELOW) APPLIED FOR 1 MINUTE	LEAKAGE CURRENT (MA)
RY - B		
RB - Y		
RYB - E		

**HV pressure Test - Main contacts open**

PHASES	VOLTAGE (SEE NOTE BELOW) APPLIED FOR 1 MINUTE	LEAKAGE CURRENT (MA)
RYB - RYB Across Open Contacts With One Side Earthed		
RYB - RYB Across Open Contacts With The Other Side Earthed		

**NOTE:**

11kV switchgear - 22kV AC or 17kV DC  
6.6kV switchgear - 16kV AC or 10kV DC

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**Extensible equipment only - Ducter test after assembly**

PHASE	RESISTANCE ( $\mu\Omega$ )
R	
Y	
B	

Tests carried out by:

Name (Print):		Signature:	
Company:		Date:	

**Pre-Commissioning Test Result Sheet for HV Installations (Sheet 4 of 12)**

**TRANSFORMER TEST RESULTS\***

**HV Pressure Test**

PHASES	TEST VOLTAGE (SEE NOTES BELOW) APPLIED FOR 1 MINUTE
PRIMARY RYB - SECONDARY ryb (CONNECTED TO THE TANK AND EARTH)	

**NOTE:**

**Ground mounted units**

11kV units - 5kV Megger or 10kV DC

6.6kV units - 5kV Megger or 6kV DC

**Pole mounted units**

All units - 1kV Megger

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Tests carried out by:

Name (Print):		Signature:	
Company:		Date:	

**Pre-Commissioning Test Result Sheet for HV Installations (Sheet 5 of 12)**

**TLF PROTECTION TEST RESULTS\***

Circuit: .....

AC Wiring Insulation Resistance	Ω
CT Wiring Continuity Tests completed (tick)	
CT Star Point Earth Link Resistance	Ω
CT Ratio in use (tick)	100/5 50/5

**SECONDARY INJECTION**

SECONDARY INJECTION	CURRENT TO TRIP (A)
R-Y	
Y-B	
Y-E	

**TLF VOLT DROP**

SECONDARY INJECTION AT 80% OF CURRENT TO TRIP	CURRENT INJECTED (A)	VOLT DROP TLFS OUT (V)		VOLT DROP TLFS IN (V)	
		R	B	R	B
R-B					

TLF rating fitted: \_\_\_\_\_ A

**CHECKS (tick):**

CT terminal block connections checked	
CT Shorting Links disconnected	
Ratio Changeover Link fitted securely	
Earth Link and Test Link fitted securely	
TLFs fitted in Overcurrent elements	
No TLF in Earth Fault element	

Tests carried out by:

Name (Print):		Signature:	
Company:		Date:	

**Pre-Commissioning Test Result Sheet for HV Installations (Sheet 5 of 12)**

**RELAY PROTECTION TEST RESULTS (excluding RN2D and RN6D with MICOM P116 and Lucy Sabre VRN2a with 7SR45 – See separate sheets)\***

Circuit:.....

AC Wiring Insulation Resistance		Ω
CT Wiring Continuity Tests completed (tick)		
CT Star Point Earth Link Resistance		Ω
CT Ratio in use (tick)	100/5 50/5	200/1 100/1 600/1 800/1

**SECONDARY INJECTION – minimum current operation**

ELEMENT	MINIMUM CURRENT TO TRIP (A)
Overcurrent R-Y	
Overcurrent Y-B	
Earth Fault Y-E	

**SECONDARY INJECTION – timing test**

ELEMENT	CURRENT MULTIPLIER	TIME MULTIPLIER	INJECTED CURRENT (A)	OPERATING TIME (S)
Overcurrent R-Y	4x			
Overcurrent R-Y	High Set			
Earth Fault Y-E	4x			
Earth Fault Y-E	High Set			

**RELAY LEFT SET AT:**

ELEMENT	NORMAL SETTING			HIGH SET SETTINGS	
	Current	Curve	Time Multiplier	Current Multiple	Time Multiplier
Overcurrent					
Earth Fault					

**CHECKS (tick):**

CT terminal block connections checked	
CT Shorting Links disconnected	
Earth Link and Test Link fitted securely	

Tests carried out by:

Name (Print):		Signature:	
Company:		Date:	

**Site Commissioning Test Sheet (Sheet 7 of 12)**

**RELAY PROTECTION TEST RESULTS – RN2D with MICOM P116\***

<b>Site</b>	-	<b>Circuit</b>	-
<b>Unit Type</b>	Schneider RN2D-M-N4/21	<b>Relay Type</b>	Micom P116A1N2N14111111N
<b>Unit Serial No.</b>		<b>Relay Serial No.</b>	-
<b>CT Ratio</b>	200/1	<b>Prot CT Serial No.</b>	<b>L1.</b>
			<b>L2.</b>
<b>Confirm depot commissioning completed and test sheet available as per ES320 (tick)</b>			<b>L3.</b>

**Insulation Resistance Test @1kV**

Prot CTs C70		Ω
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**DC Resistance Tests**

	MEASURED VALUE Ω	MEASURING CIRCUIT Ω	TRUE VALUE Ω
Prot CT Earth Link			
Inst CT Earth Link			
L1 CT C11-C70			
L2 CT C31-C70			
L3 CT C51-C70			



### Settings Applied

Overcurrent	I>Threshold		Curve (Delay Type)		I>TMS	
Earth Fault	IN_1Threshold		Curve (Delay Type)		IN_1TMS	
High Set OC	I>>Threshold		Curve (Delay Type)	DMT	TI>>time delay	

### Phase Overcurrent Element Tests

MINIMUM OPERATION				TIMING TEST AT 2 X I>			TIMING TEST AT 4 X I>		
Element	Injection Point	Expected Current (A)	Actual Current (A)	Current Inj (A)	Expected Time (S)	Actual Time (S)	Current Inj (A)	Expected Time (S)	Actual Time (S)
I>IA-IB	C12-C32								
I>IB-IC	C32-C52								
I>IC-IA	C52-C12								

**Earth Fault Element Tests**

MINIMUM OPERATION				TIMING TEST AT 2 X IN_1			TIMING TEST AT 4 X UN_1		
Element	Injection Point	Expected Current (A)	Actual Current (A)	Current Inj (A)	Expected Tie (S)	Actual Time (S)	Current Inj (A)	Expected Time (S)	Actual Time (S)
IN_1 IA-E	C12-C70								
IN_1 IB-E	C32-C70								
IN_1 IC-E	C52-C70								

**High Set Tests (if required)**

TIMING TESTS					
Element	Injection Point	Current Inj (A) 90% I>>	Actual Time (s)	Current Inj (A) 110% I>>	Actual Time (s)
I>>IA-IB	C12-C32				
I>>IB-IC	C32-C52				
I>>IC-IA	C52-C12				

Tests carried out by:

Name (Print):		Signature:	
Company:		Date:	

**Site Commissioning Test Sheet (Sheet 8 of 12)**

**Schneider RN6d with Micom P116 Commissioning**

<b>Site</b>			<b>Circuit</b>		
<b>Unit Type</b>	Schneider RN6d-M-N4/21			<b>Relay Type</b>	Micom P116A1N2N14111111 N
<b>Unit Serial No.</b>				<b>Relay Serial No.</b>	
<b>CT Ratio</b>	800/400/1			<b>Prot CT Serial No.</b>	L1.
					L2.
<b>Confirm depot commissioning completed and test sheet available as per ES320 (tick)</b>					L3.

CT Ratio Required (tick)	400/1	
	800/1	

CT Ratio selection bar set correctly (tick)	
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**Insulation Resistance Tests @1kV**

Prot CTs C70		Ω
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**DC Resistance Tests**

	MEASURED VALUE Ω	MEASURING CIRCUIT Ω	TRUE VALUE Ω
Prot CT Earth Link			
L1 CT C11-C70			
L2 CT C31-C70			
L3 CT C51-C70			

### Settings Applied

Overcurrent	I>Threshold		Curve (Delay Type)		I>TMS	
Earth Fault	IN_1Threshold		Curve (Delay Type)		IN_1TMS	
High Set OC	I>>Threshold		Curve (Delay Type)	DMT	TI>>time delay	

### Metering Tests

ELEMENT	INJECTION	CURRENT	RELAY DISPLAY			
	Point	Injected (A)	IA	IB	IC	IN
IA-IB	C12-C32	0.1				
IA-IC	C12-C52	0.1				
IA-E	C12-C70	0.1				

### Phase Overcurrent Element Tests

MINIMUM OPERATION				TIMING TEST AT 2 X I>			TIMING TEST AT 4 X I>		
Element	Injection	Expected	Actual	Current	Expected	Actual	Current	Expected	Actual
	Point	Current (A)	Current (A)	Inj (A)	Time (s)	Time (s)	Inj (A)	Time (s)	Time (s)
I> IA-IB	C12-C32								
I> IB-IC	C32-C52								
I> IC-IA	C52-C12								

### Earth Fault Element Tests

MINIMUM OPERATION				TIMING TEST AT 2 X IN_1			TIMING TEST AT 4 X IN_1		
Element	Injection	Expected	Actual	Current	Expected	Actual	Current	Expected	Actual
	Point	Current (A)	Current (A)	Inj (A)	Time (s)	Time (s)	Inj (A)	Time (s)	Time (s)
IN_1 IA-E	C12-C70								
IN_1 IB-E	C32-C70								
IN_1 IC-E	C52-C70								

### High Set Tests (if required)

TIMING TESTS					
Element	Injection	Current	Actual	Current	Actual
	Point	Inj (A)	Time (s)	Inj (A)	Time (s)
		90% I>>		110% I>>	
I>> IA-IB	C12-C32				
I>> IB-IC	C32-C52				
I>> IC-IA	C52-C12				

Tests carried out by:

Name (Print):		Signature:	
Company:		Date:	

**Pre-Commissioning Test Result Sheet for HV Installations (Sheet 9 of 12)**

**RELAY PROTECTION TEST RESULTS – VRN2a with Siemens 7SR45\***

<b>Site</b>	-		<b>Circuit</b>	-	
<b>Unit Type</b>	Lucy Sabre VRN2a		<b>Relay Type</b>	Siemens 7SR4504-1HB20-1AA0/HH	
<b>Unit Serial No.</b>			<b>Relay Serial No.</b>	-	
<b>CT Ratio</b>	<u>200/100/1</u>				
<b>Confirm depot commissioning completed and test sheet available as per ES320 (tick)</b>					

<b>CT Ratio Required (tick)</b>	<u>100/1</u>	
	<u>200/1</u>	
<b>CT Ratio selection bar set correctly (tick)</b>		

**Insulation Resistance Test @1kV**

Prot CTs C70		Ω
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**DC Resistance Tests**

	MEASURED VALUE Ω	MEASURING CIRCUIT Ω	TRUE VALUE Ω
Prot CT Earth Link			
L1 CT C11-C110 or C210			
L2 CT C31-C130 or C230			
L3 CT C51-C150 or C250			

### Settings Applied

Overcurrent	51-1 Setting		51-1 Char		51-1 Time Mult	
Earth Fault	51G-1 Setting		51G-1 Char		51G-1 Time Mult	
High Set OC	50-1 Setting				50-1 Delay	

Phase CT Ratio selection in relay menu set correctly (tick)

Earth CT Ratio selection in relay menu set correctly (tick)

### Ammeter Tests

Element	Injection Point	Current Injected (A)	Relay Display				
			Ia	Ib	Ic	Ig	In
IL1-IL2	C11-C31	1					
IL1-IL3	C11-C51	1					
IL1-IE	C11-C70	1					

### Phase Overcurrent Element Tests

MINIMUM OPERATION				TIMING TEST AT 2 x 51-1 SETTING			TIMING TEST AT 4 x 51-1 SETTING		
Element	Injection Point	Expected Current (A)	Actual Current (A)	Current Inj (A)	Expected Time (S)	Actual Time (S)	Current Inj (A)	Expected Time (S)	Actual Time (S)
51-1 IL1-IL2	C11-C31								
51-1 IL2-IL3	C31-C51								
51-1 IL3-IL1	C51-C11								

**Earth Fault Element Tests**

MINIMUM OPERATION				TIMING TEST AT 2 x 51G-1 SETTING			TIMING TEST AT 4 x 51G-1 SETTING		
Element	Injection Point	Expected Current (A)	Actual Current (A)	Current Inj (A)	Expected Tie (S)	Actual Time (S)	Current Inj (A)	Expected Time (S)	Actual Time (S)
51G-1 IL1-IE	C11-C70								
51G-1 IL2-IE	C31-C70								
51G-1 IL3-IE	C51-C70								

**High Set Tests (if required)**

TIMING TESTS					
Element	Injection Point	Current Inj (A) 90% 50-1	Actual Time (s)	Current Inj (A) 110% 50-1	Actual Time (s)
50-1 IL1-IL2	C11-C31				
50-1 IL2-IL3	C31-C51				
50-1 IL3-IL1	C51-C11				

Tests carried out by:

Name (Print):		Signature:	
Company:		Date:	



**Pre-Commissioning Test Result Sheet for HV Installations (Sheet 10 of 12)**

**HV/LV METERING CT/VT & MULTICORE TEST RESULTS\***

**Circuit:**.....

AC Wiring Insulation Resistance	Ω
CT & VT Wiring Continuity Tests Completed (Tick)	
CT Star Point Earth Link Resistance	Ω
VT Yellow Phase Earth Link Resistance	Ω
CT Ratio In Use	
VT Ratio In Use	

**CHECKS (tick):**

CT & VT Terminal Block Connections Checked	
Multicore Ferruling Correct At Both Ends	
Confirm Correct Cores Doubled Up On Multicore As Appropriate (HV)	
CT Shorting Links Disconnected	
Test Terminal Block Connections Checked	
Earth Link(S) Securely Fitted To Correct Ratio	
Confirm VT Star Point NOT Connected To Earth (I.E. Shorting Out VT Yellow Phase)	

**CT/VT Commissioning Forms from CP510 (tick):**

<b>Confirm Appropriate HV/LV Commissioning Form Completed</b>	
<b>Confirm Completed Form Attached</b>	
<b>Confirm Completed Form Sent To Data Management (Per CP510)</b>	

**Tests carried out by:**

<b>Name (Print):</b>		<b>Signature:</b>	
<b>Company:</b>		<b>Date:</b>	

## Site Commissioning Test Sheet (Sheet 11 of 12)

### Schneider CE2 with Micom P116 Commissioning

<b>Site</b>	-		<b>Circuit</b>	-	
<b>Unit Type</b>	Schneider CE2-N121/21		<b>Relay Type</b>	Micom P116A1N2N14111111N	
<b>Unit Serial No.</b>			<b>Relay Serial No.</b>	-	
<b>CT Ratio</b>	200/1		<b>Prot CT Serial No.</b>	<b>L1.</b>	
			<b>L2.</b>		
<b>Confirm depot commissioning completed and test sheet available as per ES320 (tick)</b>				<b>L3.</b>	

### Insulation Resistance Tests @1kV

Prot CTs C70		Ω
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### DC Resistance Tests

	MEASURED VALUE Ω	MEASURING CIRCUIT Ω	TRUE VALUE Ω
Prot CT Earth Link			
L1 CT C11-C70			
L2 CT C31-C70			
L3 CT C51-C70			

### Settings Applied

Overcurrent	I>Threshold		Curve (Delay Type)		I>TMS	
Earth Fault	IN_1Threshold		Curve (Delay Type)		IN_1TMS	
High Set OC	I>>Threshold		Curve (Delay Type)	DMT	TI>>time delay	

### Phase Overcurrent Element Tests

MINIMUM OPERATION				TIMING TEST AT 2 X I>			TIMING TEST AT 4 X I>		
Element	Injection	Expected	Actual	Current	Expected	Actual	Current	Expected	Actual
	Point	Current (A)	Current (A)	Inj (A)	Time (s)	Time (s)	Inj (A)	Time (s)	Time (s)
I> IA-IB	C12-C32								
I> IB-IC	C32-C52								
I> IC-IA	C52-C12								

### Earth Fault Element Tests

MINIMUM OPERATION				TIMING TEST AT 2 X IN_1			TIMING TEST AT 4 X IN_1		
Element	Injection	Expected	Actual	Current	Expected	Actual	Current	Expected	Actual
	Point	Current (A)	Current (A)	Inj (A)	Time (s)	Time (s)	Inj (A)	Time (s)	Time (s)
IN_1 IA-E	C12-C70								
IN_1 IB-E	C32-C70								
IN_1 IC-E	C52-C70								

**High Set Tests (if required)**

TIMING TESTS					
Element	Injection	Current	Actual	Current	Actual
	Point	Inj (A)	Time (s)	Inj (A)	Time (s)
		90% I>>		110% I>>	
I>> IA-IB	C12-C32				
I>> IB-IC	C32-C52				
I>> IC-IA	C52-C12				

Tests carried out by:

Name (Print):		Signature:	
Company:		Date:	

## Site Commissioning Test Sheet (Sheet 12 of 12)

### Schneider CE6 with Micom P116 Commissioning

<b>Site</b>			<b>Circuit</b>		
<b>Unit Type</b>	Schneider CE6-N213/21		<b>Relay Type</b>	Micom P116A1N2N14111111N	
<b>Unit Serial No.</b>			<b>Relay Serial No.</b>		
<b>CT Ratio</b>	800/400/1		<b>Prot CT Serial No.</b>	<b>L1.</b>	
				<b>L2.</b>	
<b>Confirm depot commissioning completed and test sheet available as per ES320 (tick)</b>				<b>L3.</b>	

CT Ratio Required (tick)	400/1	
	800/1	

CT Ratio selection bar set correctly (tick)

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### Insulation Resistance Tests @1kV

Prot CTs C70		Ω
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### DC Resistance Tests

	MEASURED VALUE Ω	MEASURING CIRCUIT Ω	TRUE VALUE Ω
Prot CT Earth Link			
L1 CT C11-C70			
L2 CT C31-C70			
L3 CT C51-C70			

### Settings Applied

Overcurrent	I>Threshold		Curve (Delay Type)		I>TMS	
Earth Fault	IN_1Threshold		Curve (Delay Type)		IN_1TMS	
High Set OC	I>>Threshold		Curve (Delay Type)	DMT	TI>>time delay	

Line CT Ratio selection in relay menu set correctly (tick)	
E/Gnd CT Ratio selection in relay menu set correctly (tick)	

### Metering Tests

ELEMENT	INJECTION	CURRENT	RELAY DISPLAY			
	Point	Injected (A)	IA	IB	IC	IN
IA-IB	C12-C32	0.1				
IA-IC	C12-C52	0.1				
IA-E	C12-C70	0.1				

### Phase Overcurrent Element Tests

MINIMUM OPERATION				TIMING TEST AT 2 X I>			TIMING TEST AT 4 X I>		
Element	Injection	Expected	Actual	Current	Expected	Actual	Current	Expected	Actual
	Point	Current (A)	Current (A)	Inj (A)	Time (s)	Time (s)	Inj (A)	Time (s)	Time (s)
I> IA-IB	C12-C32								
I> IB-IC	C32-C52								
I> IC-IA	C52-C12								

### Earth Fault Element Tests

MINIMUM OPERATION				TIMING TEST AT 2 X IN_1			TIMING TEST AT 4 X IN_1		
Element	Injection	Expected	Actual	Current	Expected	Actual	Current	Expected	Actual
	Point	Current (A)	Current (A)	Inj (A)	Time (s)	Time (s)	Inj (A)	Time (s)	Time (s)
IN_1 IA-E	C12-C70								
IN_1 IB-E	C32-C70								
IN_1 IC-E	C52-C70								

### High Set Tests (if required)

TIMING TESTS					
Element	Injection	Current	Actual	Current	Actual
	Point	Inj (A)	Time (s)	Inj (A)	Time (s)
		90% I>>		110% I>>	
I>> IA-IB	C12-C32				
I>> IB-IC	C32-C52				
I>> IC-IA	C52-C12				

Tests carried out by:

Name (Print):		Signature:	
Company:		Date:	