# Appendix A

Pre-Commissioning Form

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **PCF Pre-Commissioning Form** | Electricity North West Reference No | | |  | | |
| **To: Electricity North West Ltd** | | **From:** | **Name** | | |
| **Design and Construction Manager** | |  |  | | |
| **Connections Department** | |  | **Company** | | |
| **Frederick Road** | |  |  | | |
| **Salford** | |  |  | | |
| **Manchester** | | **Tel:** |  | | |
| **M6 6QH** | |  |  | | |
| 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.**

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

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

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**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)**

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**EARTH MAT TEST RESULTS\***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | RESISTANCE VALUES (Ω) | | | |
| 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\***

Sept 2022

**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 - 28kV AC or 32.5kV DC

6.6kV switchgear - 20kV AC or 19.5kV DC

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

|  |  |
| --- | --- |
| PHASE | RESISTANCE (µΩ) |
| 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\***

Sept 2022

**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 - 21kV AC or 30kV DC**

**6.6kV units - 15kV AC or 21kV DC**

**Pole mounted units**

**All units - 1kV Megger**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **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\***

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**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)**

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**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) | 100/5 200/1 600/1  50/5 100/1 800/1 |

**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\***

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

**Insulation Resistance Test @1kV**

|  |  |  |
| --- | --- | --- |
| Prot CTs C70 |  | Ω |

**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 | Tl>>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**

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|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Site |  | | | Circuit |  | | | | |
| **Unit Type** | **Schneider RN6d-M-N4/21** | |  |  | | **Relay Type** | | **Micom P116A1N2N14111111N** | |
| **Unit Serial No.** |  | |  | | **Relay Serial No.** | |  | |
| **CT Ratio** | **800/400/1** | |  | | **Prot CT Serial No.** | | **L1.** |  |
|  | |  | | | | | | **L2.** |  |
| **Confirm depot commissioning completed and test sheet available as per ES320 (tick)** | | | | |  | |  | **L3.** |  |

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

|  |  |
| --- | --- |
| CT Ratio selection bar set correctly (tick) |  |

**Insulation Resistance Tests @1kV**

|  |  |  |
| --- | --- | --- |
| Prot CTs C70 |  | Ω |

**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 | Tl>>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\***

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CT Ratio Required (tick) | | 100/1 | |  |
| 200/1 | |  |
| CT Ratio selection bar set correctly (tick) | |  | | |

**Insulation Resistance Test @1kV**

|  |  |  |
| --- | --- | --- |
| Prot CTs C70 |  | Ω |

**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)**

Sept 2022

**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):**

|  |  |
| --- | --- |
| Confirm Appropriate HV/LV Commissioning Form Completed |  |
| Confirm Completed Form Attached |  |
| Confirm Completed Form Sent To Data Management (Per CP510) |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tests carried out by:** | **Name (Print):** |  | **Signature:** |  |
|  | **Company:** |  | **Date:** |  |

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

**Schneider CE2 with Micom P116 Commissioning**

Sept 2022

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

**Insulation Resistance Tests @1kV**

|  |  |  |
| --- | --- | --- |
| Prot CTs C70 |  | Ω |

**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 | Tl>>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)**

Sept 2022

**Schneider CE6 with Micom P116 Commissioning**

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

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

|  |  |
| --- | --- |
| CT Ratio selection bar set correctly (tick) |  |

**Insulation Resistance Tests @1kV**

|  |  |  |
| --- | --- | --- |
| Prot CTs C70 |  | Ω |

**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 | Tl>>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:** |  |