**Additional Compliance and Commissioning test requirements for Power Generating Modules**

|  |
| --- |
| **Form C2-2: Site Compliance and Commissioning test requirements for Type C and Type D Power Generating Modules**This form should be completed if site compliance tests are being undertaken for some or all of the **Interface Protection** where it is not **Type Tested**. |

|  |
| --- |
| **Generator Details:** |
| **Generator** (name) |  |
| **Installation details**: |
| Address |  |
| Post Code |  |
| Date of commissioning  |  |

|  |
| --- |
|  |
| Requirement | Compliance by provision of **Manufacturers’ Information** or type test reports.Reference number should be detailed and **Manufacturers’ Information** attached. | Compliance by commissioning tests Tick if true and complete relevant sections of form below |
| Over and under voltage protection **HV** –calibration test |  |  |
| Over and under voltage protection **HV** – stability test |  |  |
| Over and Under Frequency protection – calibration test |  |  |
| Over and Under Frequency protection - stability test |  |  |
| Loss of mains protection – calibration test |  |  |
| Loss of mains protection – stability test |  |  |
| Wiring functional tests:If required by para 15.2.1 |  |  |

|  |
| --- |
| **Over and Under Voltage Protection HV**Where the **Connection Point** is at **HV** the **Generator** shall demonstrate compliance with this EREC G99 in respect of Over and Under Voltage Protection by provision of **Manufacturers Information,** type test reports or by undertaking the following tests on site.Tests referenced to 110V ph-ph VT output. |
| **Calibration and Accuracy Tests** |
| Phase | Setting | Time Delay | **Pickup Voltage** | **Relay Operating Time** measured value ± 2 V |
| **Stage 1 Over Voltage** | Lower Limit | Measured Value | Upper Limit | Result | Test Value | Lower Limit | Measured Value | Upper Limit | Result |
| **L1 - L2** | **121 V** 110V VT secondary | **1.0 s** | *119.35* |  | *122.65* | Pass/ Fail | Measured value plus 2 V | *1.0**s* |  | *1.1**s* | Pass /Fail |
| **L2 - L3** |  | Pass/ Fail |  | Pass/ Fail |
| **L3 - L1** |  | Pass/ Fail |  | Pass/ Fail |
| **Stage 2 Over Voltage** | Lower Limit | Measured Value | Upper Limit | Result | Test Value | Lower Limit | Measured Value | Upper Limit | Result |
| **L1 - L2** | **124.3 V**110V VT secondary | 0.5s | *122.65* |  | *125.95* | Pass/ Fail | Measured value plus 2 V | *0.5**s* |  | *0.6**s* | Pass/ Fail |
| **L2 - L3** |  | Pass/ Fail |  | Pass/ Fail |
| **L3 - L1** |  | Pass/ Fail |  | Pass/ Fail |
| **Under Voltage** | Lower Limit | Measured Value | Upper Limit |  | Test Value | Lower Limit | Measured Value | Upper Limit | Result |
| **L1 - L2** | **88.0 V**110 V VT secondary | 2.5s | *86.35* |  | *89.65* | Pass/ Fail | Measured value minus 2 V | *2.5 s* |  | *2.6 s* | Pass/ Fail |
| **L2 - L3** |  | Pass/ Fail |  | Pass / Fail |
| **L3 - L1** |  | Pass/ Fail |  | Pass/ Fail |
| **Over and Under Voltage Protection Tests HV** **referenced to 110 V ph-ph VT output** |
| **Stability Tests** (confirm no trip of **Interface Protection**) |
| Test Description | Setting | Time Delay | est Condition(3-Phase Value) | est VoltageAll phases ph-ph | Test Duration | Confirm No Trip | Result |
| Inside Normal band | **---------** | **---------** | < OV Stage 1 | 119V | 5.00s |  | Pass/ Fail |
| **Stage 1 Over Voltage** | **121 V** | **1.0 s** | > OV Stage 1 | 122.3V | 0.95s |  | Pass/ Fail |
| **Stage 2 Over Voltage** | **124.3 V** | **0.5 s** | > OV Stage 2 | 126.3V | 0.45s |  | Pass/ Fail |
| Inside Normal band | **---------** | **---------** | > UV | 90V | 5.00s |  | Pass/ Fail |
| **Under Voltage** | **88 V** | **2.5 s** | < UV  | 86V | 2.45s |  | Pass/ Fail |
| Additional Comments / Observations: |
|  |
| **Over and Under Frequency Protection** The **Generator** shall demonstrate compliance with this EREC G99 in respect of Over and Under Frequency Protection by provision of **Manufacturers Information**, type test reports or by undertaking the following tests on site. |
|  **Calibration and Accuracy Tests** |
| Setting | Time Delay | **Pickup Frequency** | **Relay Operating Time**  |
| **Over Frequency** | Lower Limit | Measured Value | Upper Limit | Result | Freq step | Lower Limit | Measured Value | Upper Limit | Result |
| 52Hz | 0.5s | *51.90* |  | *52.10* | Pass/ Fail  | 51.7-52.3Hz | *0.50**s* |  | *0.60**s* | Pass/ Fail |
| **Stage 1 Under Frequency** | Lower Limit | Measured Value | Upper Limit | Result | Freq step | Lower Limit | Measured Value | Upper Limit | Result |
| 47.5Hz | 20  | *47.40* |  | *47.60* | Pass /Fail  | 47.8-47.2Hz | *20.0**s* |  | *20.2**s* | Pass/ Fail |
| **Stage 2 Under Frequency** | Lower Limit | Measured Value | Upper Limit | Result | Freq step | Lower Limit | Measured Value | Upper Limit | Result |
| 47Hz | 0.5s | *46.90* |  | *47.1* | Pass/ Fail  | 47.3-46.7Hz | *0.50**s* |  | *0.60**s* | Pass /Fail |
| **Stability Tests** (confirm no trip of **Interface Protection**) |
| Test Description | Setting | Time Delay | Test Condition | Test Frequency | Test Duration | Confirm No Trip | Result |
| Inside Normal band | **---------** | **---------** | < OF | 51.8Hz | 120s |  | Pass/ Fail |
| **Over Frequency** | 52Hz | 0.5s | > OF | 52.2Hz | 0.45s |  | Pass/ Fail |
| Inside Normal band | **---------** | **---------** | > UF Stage 1 | 47.7Hz | 30s |  | Pass/ Fail |
| **Stage 1 Under Frequency** | 47.5Hz | 20s | < UF Stage 1 | 47.2Hz | 19.5s |  | Pass/ Fail |
| **Stage 2 Under Frequency** | 47Hz | 0.5s | < UF Stage 2 | 46.8Hz | 0.45s |  | Pass/ Fail |
| Over frequency test - Frequency shall be stepped from 51.8Hz to the test frequency and held for the test duration and then stepped back to 51.8Hz.Under frequency test - Frequency shall be stepped from 47.7Hz to the test frequency and held for the test duration and then stepped back to 47.7Hz |
| Additional Comments / Observations: |
|  |
| **Details of Loss of Mains Protection** |
| **Manufacturer** | **Manufacturer**’s type | Date of Installation | Settings | Other information |
|  |  |  |  |  |

|  |
| --- |
| **Loss-of-Mains (LOM) Protection Tests**The **Generator** shall demonstrate compliance with this EREC G99 in respect of LOM Protection by either providing the **DNO** with appropriate **Manufacturers’ Information,** type test reports or by undertaking the following tests on site. |
| **Calibration and Accuracy Tests** |
| Ramp in range 49.0-51.0Hz |
|  | **Pickup (**±0.025Hzs-1) | **Relay Operating Time** RoCoF= +**0.10 Hzs-1** above setting |
| **Setting = 1.0 Hzs-1** | Lower Limit | Measured Value | Upper Limit | Result | Test Condition | Lower Limit | Measured Value | Upper Limit | Result |
| Increasing Frequency | *0.975* |  | *1.025* | Pass/Fail | 1.10 Hzs-1 | *>0.5 s* |  | *<1.0**s* | Pass/Fail |
| Reducing Frequency | *0.975* |  | *1.025* | Pass/Fail | 11.10 Hzs-1 | *>0.5 s* |  | *<1.0**s* | Pass/Fail |
| Ramp in range 48.5-51.5Hz |
| Increasing Frequency | *0.975* |  | *1.025* | Pass/Fail | 3.00 Hzs-1 | *>0.5 s* |  | *<1.0**s* | Pass/Fail |
| Reducing Frequency | *0.975* |  | *1.025* | Pass/Fail | 3.00 Hzs-1 | *>0.5 s* |  | *<1.0**s* | Pass/Fail |
| **Stability Tests** (confirm no trip of **Interface Protection**) |
| Ramp in range 49.0-51.0Hz |
|  | Test Condition | Test frequency ramp | Test Duration | Confirm No Trip | Result |
| Inside Normal band | > RoCoF setting(increasing f) | +0.95 Hzs-1 | 2.1s |  | Pass/Fail |
| Inside Normal band | < RoCoF setting(reducing f) | -0.95 Hzs-1 | 2.1s |  | Pass/Fail |
| Ramp as shown |
| Inside Normal band | > RoCoF setting(increasing f) | +1.20 Hzs-1 (ramp between 49.80 and 50.34 Hz) | 0.45 s |  | Pass/Fail |
| Inside Normal band | > RoCoF setting(reducing f) | - -1.20 Hzs-1(ramp between 50.30 and 49.76 Hz | 0.45 s |  | Pass/Fail |
| Additional Comments / Observations: |
|  |

|  |
| --- |
| **LoM Protection - Stability test** (confirm no trip of **Interface Protection**) |
|  | Start Frequency  | Change |  | Confirm no trip  |
| Positive Vector Shift | 49.5Hz | +50 degrees |  |  |
| Negative Vector Shift | 50.5Hz | - 50 degrees |  |  |
| **Wiring functional tests** |
| If required by para 15.2.1, confirm that wiring functional tests have been carried out in accordance with the instructions below. | Yes/ NA |
| Where components of a **Power Generating Module** are separately **Type Tested** and assembled into a **Power Generating Module**, if the connections are made via loose wiring, rather than specifically designed error-proof connectors, then it will be necessary to prove the functionality of the components that rely on the connections that have been made by the loose wiring.As an example, consider a **Type Tested** alternator complete with its control systems etc. It needs to be connected to a **Type Tested** **Interface Protection** unit. In this case there are only three voltage connections to make, and one tripping circuit. The on-site checks need to confirm that the **Interface Protection** sees the correct three phase voltages and that the tripping circuit is operative. It is not necessary to inject the **Interface Protection** etc to prove this. Simple functional checks are all that are required.Test schedule:With **Generating Unit** running and energised, confirm L1, L2, L3 voltages on **Generating Unit** and on **Interface Protection**. Disconnect one phase of the control wiring at the **Generating Unit**. Confirm received voltages at the **Interface Protection** have one phase missing.Repeat for other phases.Confirm a trip on the **Interface Protection** trips the appropriate circuit breaker.Interface ProtectionL1L2L3 |
| Any other comments or notes: |