Site Compliance and Commissioning test requirements

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| **Form A2-4: Site Compliance and Commissioning test requirements for Type A 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** and* For other compliance tests that have been identified in Form A2-1, Form A2-2 or Form A2-3 as being undertaken on site (details shall be provided in the “Other onsite tests” part at the end of this form).
 |
| **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 testsTick if true and complete relevant sections of form below |
| Over and under voltage protection **LV** –calibration test |  |  |
| Over and under voltage protection **LV** –stability test |  |  |
| 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 |  |  |

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| 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 Tests LV**Where the **Connection Point** is at **LV** 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. |
| **Calibration and Accuracy Tests** |
| Phase | Setting | Time Delay | **Pickup Voltage** | **Relay Operating Time - step from 230 V to test value** |
| **Stage 1 Over Voltage** | Lower Limit | Measured Value | Upper Limit | Result | Test Value | Lower Limit | Measured Value | Upper Limit | Result |
| **L1 - N** | **262.2 V**230 Vsystem | **1.0 s** | *258.75* |  | *265.65* | Pass/ Fail | 266.2 | *1.0 s* |  | *1.1 s* | Pass/ Fail |
| **L2 - N** |  | Pass/ Fail |  | Pass/ Fail |
| **L3 - N** |  | 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 - N** | **273.7 V**230 Vsystem | 0.5s | *270.25* |  | *277.15* | Pass/ Fail | 277.7 | *0.5 s* |  | *0.6 s* | Pass/ Fail |
| **L2 - N** |  | Pass/ Fail |  | Pass/ Fail |
| **L3 - N** |  | Pass/ Fail |  | Pass/ Fail |
| **Under Voltage** | Lower Limit | Measured Value | Upper Limit |  | Test Value | Lower Limit | Measured Value | Upper Limit | Result |
| **L1 - N** | **184.0 V**230 Vsystem | 2.5 s | *180.55* |  | *187.45* | Pass/ Fail | 180 | *2.5 s* |  | *2.6 s* | Pass/ Fail |
| **L2 - N** |  | Pass/ Fail |  | Pass/ Fail |
| **L3 - N** |  | Pass/ Fail |  | Pass/ Fail |
| **Over and Under Voltage Protection Tests LV** |
| **Stability Tests** (confirm no trip of **Interface Protection**) |

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| Test Description | Setting | Time Delay | Test Condition(3-Phase Value ) | Test Voltage all phasesph-n | Test Duration | Confirm No Trip | Result |
| Inside Normal band | **---------** | **---------** | < OV Stage 1 | 258.2 V | 5.00 s |  | Pass/ Fail |
| **Stage 1 Over Voltage** | **262.2 V** | **1.0 s** | > OV Stage 1 | 269.7 V | 0.95 s |  | Pass/ Fail |
| **Stage 2 Over Voltage** | **273.7 V** | **0.5 s** | > OV Stage 2 | 277.7 V | 0.45 s |  | Pass/ Fail |
| Inside Normal band | **---------** | **---------** | > UV | 188 V | 5.00 s |  | Pass/ Fail |
| **Under Voltage** | **184.0 V** | **2.5 s** | < UV | 180 V | 2.45 s |  | Pass/ Fail |
| Over voltage test - Voltage shall be stepped from 258 V to the test voltage and held for the test duration and then stepped back to 258 V.Under voltage test – Voltage shall be stepped from 188 V to the test voltage and held for the test duration and then stepped back to 188 V |
| **Additional Comments / Observations:** |
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| **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 110 V 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**110 V VTsecondary | **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 |

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| **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**110 V VTsecondary | 0.5 s | *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 VTsecondary | 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 | Test Condition (3-Phase Value ) | Test Voltage All phases ph-ph | Test Duration | Confirm No Trip | Result |
| Inside Normal band | **---------** | **---------** | < OV Stage 1 | 119 V | 5.00 s |  | Pass/Fail |
| **Stage 1 Over Voltage** | **121 V** | **1.0 s** | > OV Stage 1 | 122.3 V | 0.95 s |  | Pass/Fail |
| **Stage 2 Over Voltage** | **124.3 V** | **0.5 s** | > OV Stage 2 | 126.3 V | 0.45 s |  | Pass/Fail |
| Inside Normal band | **---------** | **---------** | > UV | 90 V | 5.00 s |  | Pass/Fail |
| **Under Voltage** | **88 V** | **2.5 s** | < UV | 86 V | 2.45 s |  | Pass/Fail |
| Additional Comments / Observations: |
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| **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 |
| 52 Hz | 0.5 s | *51.90* |  | *52.10* | Pass/ Fail | 51.7-52.3 Hz | *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 |
| 47.5 Hz | 20 | *47.40* |  | *47.60* | Pass/Fail | 47.8-47.2 Hz | *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 |
| 47 Hz | 0.5 s | *46.90* |  | *47.1* | Pass/ Fail | 47.3-46.7 Hz | *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 | 51.8 Hz | 120 s |  | Pass/ Fail |
| **Over Frequency** | 52 Hz | 0.5 s | > OF | 52.2 Hz | 0.45 s |  | Pass/ Fail |
| Inside Normal band | **---------** | **---------** | > UF Stage 1 | 47.7 Hz | 30 s |  | Pass/ Fail |
| **Stage 1 Under Frequency** | 47.5 Hz | 20 s | < UF Stage 1 | 47.2 Hz | 19.5 s |  | Pass/ Fail |
| **Stage 2 Under Frequency** | 47 Hz | 0.5 s | < UF Stage 2 | 46.8 Hz | 0.45 s |  | Pass/ Fail |
| Over frequency test - Frequency shall be stepped from 51.8 Hz to the test frequency and held for the test duration and then stepped back to 51.8 Hz.Under frequency test - Frequency shall be stepped from 47.7 Hz to the test frequency and held for the test duration and then stepped back to 47.7 Hz. |
| Additional Comments / Observations: |
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| **Details of Loss of Mains Protection** |
| **Manufacturer** | **Manufacturer**’s type | Date of Installation | Settings | Other information |
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| **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 - 51.0 Hz |
|  | **Pickup (**± 0.025 Hzs-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 | 1.10 Hzs-1 | *>0.5 s* |  | *<1.0 s* | Pass/Fail |
| Ramp in range 48.5-51.5 Hz |
| 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 49.0-51.0 Hz |
|  | Test Condition | Test frequency ramp | Test Duratio n | Confirm No Trip | Result |
| Inside Normal band | < RoCoF setting(increasing f) | +0.95 Hzs-1 | 2.1 s |  | Pass/Fail |
| Inside Normal band | < RoCoF setting(reducing f) | -0.95 Hzs-1 | 2.1 s |  | Pass/Fail |
| Ramp as shown |
| Inside Normal band | > RoCoF setting(increasing f) | +1.20 Hzs-1(ramp between 49.80and 50.34 Hz) | 0.45 s |  | Pass/Fail |



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| Inside Normal band | > RoCoF setting(reducing f) | - -1.20 Hzs-1(ramp between 50.30and 49.76 Hz | 0.45 s |  | Pass/Fail |
| Additional Comments / Observations: |
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| **LoM Protection - Stability test** (confirm no trip of **Interface Protection**) |
|  | Start Frequency | Change | Confirm no trip |
| Positive Vector Shift | 49.5 Hz | +50 degrees |  |
| Negative Vector Shift | 50.5 Hz | - 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.

L1 L2 L3Interface Protection |

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| **Logic Interface Port** |
| Confirm that an input port is provided and can be used to shut down the module |  |
| **Other onsite tests**: Provide details here of any additional tests which have been carried out (as identified as being required by Form A2-1, A2-2 or A2-3) |
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