EIRGRID_2015 Functional Document Template (21

PPM Site Survey Procedure

[Insert Power Park Module Name]

Version 0.1

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# IPP Test Procedure Version History

|  |  |  |
| --- | --- | --- |
| **Document Version History** | | |
| **Version** | **Date** | **Comment** |
| 0.1 | dd/mm/yyyy | First submission for review/approval |
|  |  |  |
|  |  |  |

# Introduction

**PPM shall highlight any changes made to this document or approval will be void.**

The PPM shall submit the latest version of this test procedure as published on the EirGrid website[[1]](#footnote-1).

All yellow sections shall be filled in before the test procedure shall be approved. All grey sections shall be filled in during testing. If any test requirements or steps are unclear, or if there is an issue with meeting any requirements or carrying out any steps, please contact [generator\_testing@eirgrid.com](mailto:generator_testing@eirgrid.com).

On the day of testing, suitably qualified technical personnel shall be needed at the power park module to demonstrate all the requirements in section 8.2.

All power park modules shall be constructed. There is no required resource capacity for this test.

# Abbreviations

AAP Available Active Power

APC Active Power Control

DMOL Designed Minimum Operating Level

HV High Voltage

MEC Maximum Export Capacity

MW Mega Watt

NCC National Control Centre

PPM Power Park Module

SLD Single Line Diagram

TSO Transmission System Operator

WFCS Wind Farm Control System

WFPS Wind Farm Power Station

WTG Wind Turbine Generator

# PPM Data

|  |  |
| --- | --- |
| PPM Name | PPM to Specify  (name per connection agreement) |
| PPM Site Contact | PPM to Specify |
| PPM Location | PPM to Specify |
| PPM GPS Coordinate of Site Entrance | PPM to Specify |
| Associated 110 kV Station | PPM to Specify |
| PPM connection point | PPM to Specify  (*i.e.* T121 in XXX Transmission or XXX Distribution Station) |
| PPM connection voltage | PPM to Specify |
| PPM Connection Type | PPM to Specify  (TSO, DSO Type A, DSO Type B, etc.) |
| Installed Generator type, MW size and quantity | PPM to Specify |
| Contracted MEC | PPM to Specify |
| Registered Capacity | PPM to Specify |
| Limiter applied to Exported MW | PPM to Specify |
| Limiter applied to AAP | PPM to Specify |
| DMOL | PPM to Specify |
| RoCoF Capability | PPM to Specify |

# Grid Code References

|  |  |
| --- | --- |
| Grid Code Version: | PPM to specify |

CC.7.2.5.1 **Generators** shall provide on-load tap-changing (OLTC) facilities for all **Generator Transformers**. **Demand Customers** are advised to provide on-load tap-changing (OLTC) facilities for all **Grid Connected Transformers**. All **Users** shall liaise with the **TSO** on the design specification for the performance of the tap-changing facility on **Grid Connected Transformers**.

**PPM1.5.1 Controllable PPMs** shall have the capability to:

a) operate continuously at normal rated output at **Transmission System Frequencies** in the range 49.5 Hz to 50.5 Hz;

b) remain connected to the **Transmission System** at **Transmission System Frequencies** within the range 47.5 Hz to 52.0 Hz for a duration of 60 minutes;

c) remain connected to the **Transmission System** at **Transmission System Frequencies** within the range 47.0 Hz to 47.5 Hz for a duration of 20 seconds required each time the **Transmission System Frequency** is below 47.5 Hz;

d) remain connected to the **Transmission System** during rate of change of **Transmission System Frequency** of values up to and including 0.5 Hz per second.

**ROCOF Decision Paper (14081)[[2]](#footnote-2) Section 3.3**

5. New units: new units will be required to declare compliance (with the 1 Hz per second ROCOF measured over 500 ms) during the commissioning process.

**PPM1.6.1 TRANSMISSION SYSTEM VOLTAGE RANGE**

**Controllable PPMs**  shall remain continuously connected to the **Transmission System** at maximum **Available Active Power** or **Controlled Active Power** output for normal and disturbed system conditions and for step changes in **Transmission System Voltage** of up to 10 %. The following are the ranges which may arise during **Transmission System** disturbances or following transmission faults:

(a) 400 kV system: 350 kV to 420 kV;

(b) 220 kV system: 200 kV to 245 kV;

(c) 110 kV system: 99 kV to 123 kV.

PPM1.7.1.2.1 **Controllable PPMs** with a **MEC** in excess of 10 MW shall make the following meteorological data signals available at the designated **TSO Telecommunication Interface Cabinet** for that **Controllable PPM**:

[Units, Range]

a) Wind speed (at hub height) - measurand signal; [m/s, 0-70]

b) Wind direction (at hub height) - measurand signal; [deg, 0-360]

c) Air temperature- measurand signal; [deg C, -40-70]

d) Air pressure- measurand signal. [mBar, 735-1060]

PPM1.7.1.3.1 **Controllable PPMs** with a **MEC** in excess of 10 MW shall make the following signals available at the designated **TSO Telecommunication Interface Cabinet** for that **Controllable PPM**:

a) **Controllable PPM Availability** (0-100 % signal);

b) Percentage of **WTG** shutdown due to high wind-speed conditions (0-100 %);

c) Percentage of **WTG** not generating due low wind-speed shutdown (0-100 %).

# Site Safety requirements

The following is required for the EirGrid witness to attend site:

|  |  |
| --- | --- |
| Personal Protective Equipment Requirements   1. Site Safety boots 2. Hard Hat with chin strap 3. Hi Vis 4. Arc Resistive clothing 5. Safety Glasses 6. Gloves 7. Safe Pass | 1. Yes / No 2. Yes / No 3. Yes / No 4. Yes / No 5. Yes / No 6. Yes / No 7. Yes / No |
| Site Induction requirements | Yes / No  (If Yes, PPM to specify how and when the induction shall be carried out) |
| Any further information | PPM to specify |

# Test Description and Pre Conditions

## Purpose of the Site Visit

The purpose of this site visit is to verify the installed plant and protection settings.

# Requirements

## Pre-Visit Requirements

The PPM shall confirm the following information has been provided in Section 9.1:

|  |  |
| --- | --- |
| Directions to Site | PPM to provide |
| GPS Co-ordinates of the sub-station / PPM entrance | PPM to provide |
| Site Layout diagram | PPM to provide |
| Compound and Substation Layout diagram | PPM to provide |
| As Built Single Line Diagram | PPM to provide and submit PDF to generator\_testing@eirgrid.com |
| Personnel on site will be able to demonstrate all the requirements in section 8.2. | PPM to provide details of personnel in Section 9.1 |

## On Site Requirements

The information below shall be provided by the PPM prior to the site survey, see Section 9. EirGrid representative shall confirm the information on site.

|  |  |  |
| --- | --- | --- |
| The number of generators | PPM to provide detail in Section 9.2 | EirGrid Confirmed on Site: Yes / No |
| Generator type and name plate rating of each generator | PPM to provide detail in Section 9.2 | EirGrid Confirmed on Site: Yes / No |
| Generator number and serial number of each generator | PPM to provide detail in Section 9.2 | EirGrid Confirmed on Site: Yes / No |
| Validate generator locations against IPP site layout diagram | PPM to provide site layout map in Section 9.1 | EirGrid Confirmed on Site: Yes / No |
| Generator protection settings of a sample of the generators | PPM to provide detail in Section 0 | EirGrid Confirmed on Site: Yes / No |
| Location and Height of Met Mast | PPM to provide detail in Section 9.4 | EirGrid Confirmed on Site: Yes / No |
| Data feed from Met Mast | PPM to have access to Met Mast data feed during Site Survey and confirm data in Section 9.4 | EirGrid Confirmed Data: Yes / No |
| WTG Transformer Information | PPM to provide detail in Section 0 | EirGrid Confirmed on Site: Yes / No |
| Grid Connected Transformer nameplate rating. | PPM to provide detail in Section 9.6 | EirGrid Confirmed on Site: Yes / No |
| Name plate rating of auxiliary equipment required for Grid Code compliance e.g. STATCOM, Filter, Cap Bank, Diesel Generator | PPM to provide detail in Section 9.7 | EirGrid Confirmed on Site: Yes / No |
| High and Low Wind Speed Shutdown Settings | PPM to provide detail in Section 9.8 | EirGrid Confirmed on Site: Yes / No |

EirGrid to confirm the above settings on the day of the survey and record photographic evidence where appropriate for below.

* Entrance to the Gate with any relevant details
* Landscape with generators
* Substation and the Control room - satellite, RTU, protection cabinet, batteries, lamps, MIMIC panels, Nulec, switchgear etc.
* Grid Connected Transfomer
* Reactive Power Supplementary device (as applicable) – Picture of name plate rating
  + STATCOM
  + Capacitor Bank
  + Filter
* Backup generator
* Met Mast
* Name Plate Rating for a Generator
* Transformer tap position
* Other as required

## Comments & Signatures

|  |
| --- |
| **Comments:** |
| PPM Witness signoff that this test has been carried out according to the test procedure, above.  Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| EirGrid Witness signoff that this test has been carried out according to the test procedure, above.  Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

# Appendices

## Site Information

### Directions to Site

PPM to provide directions here.

### GPS Coordinate of Site Entrance

PPM to provide GPS coordinates of Site Entrance.

### Site Layout Diagram

PPM to provide site layout diagram here.

### Compound and Substation Layout diagram

PPM to provide compound and substation layout diagram here.

### As Built Single Line Diagram

PPM to provide as built single line diagram here and as separate attachment.

### Contact details for qualified personnel on-site

PPM to provide contact details of qualified personnel involved in site survey

## Generator Information

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Generator Number** | **Generator Type** | **Generator Size** | **Serial Number** | **Hub Height** | **GPS Coordinates** |
| T1 |  |  |  |  |  |
| T2 |  |  |  |  |  |
|  |  |  |  |  |  |
| Tn-1 |  |  |  |  |  |
| Tn |  |  |  |  |  |

## Generator Protection Settings

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Generator Protection Setting** | **Recommended By EirGrid** | | **Provided by PPM** | | | | |
| T1 | T2 |  | Tn-1 | Tn |
| Underfrequency stage 1 Setpoint | f< | 47.5 Hz |  |  |  |  |  |
| Underfrequency stage 1 time delay | t< | 3600 s |  |  |  |  |  |
| Underfrequency stage 2 Setpoint | f<< | 47.4 Hz |  |  |  |  |  |
| Underfrequency stage 2 time delay | t<< | 20 s |  |  |  |  |  |
| Underfrequency stage 3 Setpoint | f<<< | 46.9 Hz |  |  |  |  |  |
| Underfrequency stage 3 time delay | t<<< | 1 s |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| Overfrequency stage 1 Setpoint | f> | 52Hz |  |  |  |  |  |
| Overfrequency stage 1 time delay | t> | 3600 s |  |  |  |  |  |
| Overfrequency stage 2 Setpoint | f>> | 52.1 Hz |  |  |  |  |  |
| Overfrequency stage 2 time delay | t>> | 1 s |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| Rate of Change of Frequency setpoint | df/dt | Max |  |  |  |  |  |
| Rate of Change of Frequency delay | t | Max |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| Undervoltage stage 1 Setpoint | U< | 0.89 pu |  |  |  |  |  |
| Undervoltage stage 1 time delay | t< | 3 s |  |  |  |  |  |
| Undervoltage stage 2 Setpoint | U<< | 0.14 pu |  |  |  |  |  |
| Undervoltage stage 2 time delay | t<< | 0.625 s |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| Overvoltage stage 1 Setpoint | U> | 1.11 pu |  |  |  |  |  |
| Overvoltage stage 1 time delay | t> | 60 s |  |  |  |  |  |
| Overvoltage stage 2 Setpoint | U>> | 1.2 pu |  |  |  |  |  |
| Overvoltage stage 2 time delay | t>> | 15 s |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| Fault Ride Through Lockout Events | N | N/A |  |  |  |  |  |
| Fault Ride Through Lockout Time Period (Specify if rolling time period) | t | N/A |  |  |  |  |  |

## Met Mast Information

|  |  |  |
| --- | --- | --- |
| **Met Mast Location** | PPM to provide location on site map | EirGrid to confirm on site: Yes / No |
| **Met Mast Height** | PPM to provide Met Mast height | EirGrid to confirm on site: Yes / No |

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Source from PPM** | **Readings in EMS (EirGrid)** | **Readings in PPM Control System** |
| Air Temperature |  |  |  |
| Air Pressure |  |  |  |
| Wind Direction |  |  |  |
| Wind Speed | Aggregated from the Nacelle and averaged. |  |  |

## WTG Transformer Information

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Generator Number** | **Tap No.** | **Tap Voltage Setting** | **No of Taps** | **PPM MV Voltage of radial Network** |
| T1 |  |  |  | \_\_\_\_kV |
| T2 |  |  |  |
|  |  |  |  |
| Tn-1 |  |  |  |
| Tn |  |  |  |

## Grid Connected Transformer Information

PPM to provide information on Grid Connected Transformer nameplate rating.

## Auxiliary Equipment required for Grid Code Compliance

PPM to provide name plate rating of auxiliary equipment required for Grid Code compliance e.g. STATCOM, Filter, Cap Bank, Diesel Generator , as applicable

## High and Low Wind Speed Shutdown Settings

PPM to provide information on High and Low Wind Speed Shutdown Settings

1. <http://www.eirgridgroup.com/library> [↑](#footnote-ref-1)
2. <http://www.cer.ie/docs/000260/CER14081%20ROCOF%20Decision%20Paper%20-%20FINAL%20FOR%20PUBLICATION.pdf> [↑](#footnote-ref-2)