EIRGRID_2015 Functional Document Template (21

RfG

PPM Active Power Control Test Procedure

[Insert Power Park Module Name]

Version 0.1

Contents

[1 Document Version History 3](#_Toc39221816)

[2 Introduction 3](#_Toc39221817)

[3 Abbreviations 4](#_Toc39221818)

[4 PPM Data 5](#_Toc39221819)

[5 Grid Code References 6](#_Toc39221820)

[6 Site Safety requirements 7](#_Toc39221821)

[7 Test description and pre conditions 8](#_Toc39221822)

[7.1 Purpose of the Test 8](#_Toc39221823)

[7.2 Pass Criteria 8](#_Toc39221824)

[7.3 Instrumentation and onsite data trending 10](#_Toc39221825)

[7.4 Initial Conditions 10](#_Toc39221826)

[7.5 Ramp Rate Calculations 11](#_Toc39221827)

[7.6 Ramp Rate Settings 11](#_Toc39221828)

[8 Test Steps 12](#_Toc39221829)

[8.1 Demonstration of Limiters 12](#_Toc39221830)

[8.2 Ramp Rate Settings 13](#_Toc39221831)

[8.3 Active Power Control 14](#_Toc39221832)

[8.4 Shutdown and Start-up 16](#_Toc39221833)

[8.5 Return to Standard Settings 17](#_Toc39221834)

[8.6 Comments & Signatures 18](#_Toc39221835)

DISCLAIMER:

This Document contains information (and/or attachments) which may be privileged or confidential. All content is intended solely for the use of the individual or entity to whom it is addressed. If you are not the intended recipient please be aware that any disclosure, copying, distribution or use of the contents of this message is prohibited. If you suspect that you have received this Document in error please notify EirGrid immediately. EirGrid does not accept liability for any loss or damage arising from the use of this document or any reliance on the information it contains or the accuracy or up to date nature thereof. Use of this document and the information it contains is at the user’s sole risk. In addition, EirGrid strongly recommends that any party wishing to make a decision based on the content of this document should not rely solely upon data and information contained herein and should consult EirGrid in advance.

Further information can be found at: http://www.eirgridgroup.com/legal/

# 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 template 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).

Where a site consists of two separate controllable PPM with a single connection point, this may impact on the test procedure outlined below.

The PPM representative shall coordinate testing. On the day of testing, suitably qualified technical personnel may be needed at the power park module to assist in undertaking the tests. Such personnel shall have the ability to fully understand the function of the power park module and its relationship to the network to which the power park module is connected. Furthermore, such personnel shall have the ability to set up the control system of the power park module so as to enable Grid Code compliance test to be correctly undertaken. In addition, the function of the technical personnel is to liaise with NCC.

The availability of personnel at NCC will be necessary in order to initiate the necessary instructions for the test. NCC shall determine if network conditions allow the testing to proceed.

All power park modules shall be available. If on the day of the testing all power park modules are not available, then the test may proceed where one power park module is unavailable for a power park module of registered capacity of up to 75 MW, if that generator makes up <20% of Registered Capacity, or two power park modules are unavailable for a power park module of registered capacity in excess of 75 MW. Resource conditions need to be sufficient and at a relatively constant level in order adequately perform the test. The required Resource capacity for this test is detailed in section 7.4.

For all of test steps, if the change in Target MW is <15 MW, the wait time shall be 1 minute. If the change in Target MW is > 15 MW, the wait time shall be at least 2 minutes. As these larger changes in MW will have bigger impact on the transmission system, the PPM may be required to wait for longer than this before carrying out a setpoint change. During the test, if the PPM output is fluctuating or has not stabilised at the “Target MW”, the wait time shall be extended as appropriate. PPM shall adjust the timing of the steps as required in order to align with this.

Following testing, the following shall be submitted to [generator\_testing@eirgrid.com](mailto:generator_testing@eirgrid.com):

|  |  |
| --- | --- |
| **Submission** | **Timeline** |
| A scanned copy of the test procedure, as completed and signed on site on the day of testing | 1 working day |
| Test data in CSV or Excel format | 1 working day |
| Test report | 10 working days |

# 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

PPMCS Power Park Module Control System

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 Test Coordinator and contact number: | PPM to Specify |
| PPM Address | PPM to Specify |
| Associated 110 kV Station | PPM to Specify |
| PPM connection point | PPM to Specify  (*i.e.* T121 in XXXkV Distribution or Transmission Station) |
| PPM connection voltage | PPM to Specify |
| PPM Connection Type | PPM to Specify  (TSO, DSO Topology 1, DSO Topology 2, etc.) |
| PPM RfG Type | PPM to Specify  (TSO Type D, 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 |

|  |  |
| --- | --- |
| **Available Active Power** | The amount of **Active Power** that the **Controllable PPM** could produce based on current resource conditions. The **Available Active Power** shall only differ from the actual **Active Power** if the **Controllable PPM** has been curtailed, constrained or is operating in a restrictive **Frequency Response** mode |

**PPM 1.5.2 ACTIVE POWER MANAGEMENT**

A **PPM Control System** shall be installed by the **Controllable PPM** to allow for the provision of **Active Power Control** and **Frequency** **Response** from the **Controllable PPM**. The **PPM Control System** and **Frequency Response System** shall provide the functionality as specified in this section PPM1.5.2.

**PPM** **1.5.2.1 Active Power Control**

The **PPM Control System** shall be capable of operating each **Generation Unit** at a reduced level if the **Controllable PPM’s Active Power** output has been restricted by the **TSO**. In this **Active Power Control Mode**, the  **PPM Control System** shall be capable of receiving an on-line **Active Power Control Set-point** sent by the **TSO** and shall commence implementation of the set-point within 10 seconds of receipt of the signal from the **TSO**. The rate of change of output to achieve the **Active Power Control Set-point** should be the **Active** **Power Control Set-Point Ramp Rate** setting of the **PPM Control System**, as advised by the TSO, as per PPM1.5.4. The **TSO** acknowledges that if the **Active Power** output of the  **Controllable PPM** is initially less than the **Design Minimum Operating Level**, and if the **Controllable PPM** is expected to increase its **Active Power** output, then it may not be able to achieve the specified ramp rate at first, due to **Generation Units** going through a start-up sequence. In such a case, **Generation Units** shall start up as quickly as the technology allows, and in any case, not longer than three minutes from the time the **Active Power Control Set-point** was received.

Manual local measures shall be allowed in cases where the automatic remote control devices are out of service. The **Active Power** set point must be reached within 1 hour.

**PPM 1.5.4 RAMP RATES**

**PPM** **1.5.4.1** The **PPM** **Control System** shall be capable of controlling the ramp rate of its **Active Power** output. There shall be three ramp rate capabilities, designated **Resource Following Ramp Rate**, **Active** **Power Control Set-Point Ramp Rate**, and **Frequency Response Ramp Rate**. The **PPM** **Control System** shall operate the ramp rates with the following order of priority (high to low): **Frequency Response Ramp Rate**; **Active** **Power Control Set-Point Ramp Rate**; **Resource Following Ramp Rate**. The **Resource Following Ramp Rate** shall be used during **Start-Up**, normal operation, and **Shutdown**. The **TSO** shall specify the **Resource Following Ramp Rate** and the **Active** **Power Control Set-Point Ramp Rate** in percentage of **Registered Capacity** per minute. The **Frequency Response Ramp Rate** shall be the maximum possible ramp rate of the **Controllable PPM** agreed with the **TSO** and with the characteristics as set out in PPM 1.5.3.1**.** The **TSO** acknowledges that rapidly changing resource availability may cause temporary deviations from the ramp rate settings of the **Controllable PPM**, but. These deviations should not exceed the greater of 3% of **Registered Capacity** or +/- 0.5 MW.

**PPM** **1.5.4.2** It shall be possible to vary the **Resource Following Ramp Rate** and the **Active** **Power Control Set-Point Ramp Rate** each independently over a range between 1% and 100% of **Registered Capacity** per minute.

# 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 Test

The purpose of this test is to demonstrate the Active Power Control functions of the PPMCS, including ramp rates applied during shutdown and start-up; and to demonstrate DMOL of the PPM.

## Pass Criteria

The following is the pass criteria for the test. Any subsequent report for this test shall be assessed against each of these criteria. It is accepted that adherence to ramp rates may not be possible while operating below DMOL.

| **Criteria** |
| --- |
| **Active Power Control** |
| Active Power Output is limited to the MEC of the PPM |
| PPMCS receives all online Active Power Control Set-points, commences implementation of all set-points within 10 seconds of receipt and provides the correct set-point feedback |
| When APC is ON, PPM regulates its active power output to within the greater of ±0.5 MW or ±3% of Registered Capacity of the Active Power Control Set-point |
| PPMCS operates each Generation Unit at a reduced level while operating at a reduced output, greater than DMOL |
| All Generation Units start-up in less than 3 minutes of receipt of set-point, when dispatched up from 0 MW |
| PPMCS does not respond to any set-points sent while Active Power Control is OFF |
| **Ramp Rates** |
| Rate of change of output is equal to the Active Power Control Set-point Ramp Rate when ramping to Active Power Control Set-points greater than or equal to DMOL, with temporary deviations not exceeding ±3% of Registered Capacity |
| PPM output ramps to AAP at the Resource Following Ramp Rate when Active Power Control is turned OFF (unless acting under Frequency Response Ramp Rate) |
| Rate of change of output when ramping up due to increase in resource speed is no greater than Resource Following Ramp Rate |
| Rate of change of output is equal to Resource Following Ramp Rate on shutdown and on start-up |
| Demonstration that the Resource Following Ramp Rate and Active Power Control Set-point Ramp Rate can each be set independently over a range between 1% and 100% of Registered Capacity per minute |
| **DMOL** |
| DMOL is in line with declared value and no greater than 12% of Registered Capacity |
| **Available Active Power** |
| AAP is limited to the MEC of the PPM |
| AAP signal is a measure of the active power the PPM is capable of delivering |
| AAP signal is independent of the active power output when under curtailment or dispatch |
| % Mechanical availability signals are correct under dispatch and shutdown |

## Instrumentation and onsite data trending

All of the following trends shall be recorded by the PPM during the test. Failure to provide any of these trends shall result in test cancellation.

|  |  |  |  |
| --- | --- | --- | --- |
| **No.** | **Data Trending and Recording** | **Resolution** | **Check On Day Of Test** |
| 1 | Available active power from the prevailing resource in MW, derived by algorithm in the PPMCS (*Figure PPM1.3, Point Y – preferably point Z if available*) | PPM to Specify (≥10 Hz) | Yes / No |
| 2 | Actual active power from the power park module in MW (*Figure PPM1.3, Point Y – preferably point Z if available*) | PPM to Specify (≥10 Hz) | Yes / No |
| 3 | APC ON/OFF | PPM to Specify (≥ 10 Hz) | Yes / No |
| 4 | APC set-point from NCC | PPM to Specify (≥10 Hz) | Yes / No |
| 5 | Grid Frequency | PPM to Specify (≥10 Hz) | Yes / No |
| 6 | Number of generators online | PPM to Specify (≥10 Hz) | Yes / No |
| 7 | Power park module Availability % | PPM to Specify (≥10 Hz) | Yes / No |

## Initial Conditions

If “No” is answered to any of the following, contact NCC and agree next steps in advance of making any corrective actions.

|  |  |
| --- | --- |
| **Conditions** | **Check on day of test** |
| All Generation Units are available, in line with requirements set out in section 2. | # Generators Installed: \_\_\_\_  # Generators Generating: \_\_\_\_  Power park module Availability signal in NCC \_\_\_\_\_% |
| Generated MW > 60% of Registered Capacity | Generated MW: \_\_\_\_ |
| Active Power Control Set-point Ramp Rate of 20% of Registered Capacity per minute is applied in the PPMCS | Yes / No |
| Resource Following Ramp Rate of 20% of Registered Capacity per minute is applied in the PPMCS | Yes / No |
| Where NCC has control of the reactive power, ensure PPM is exporting close to 0 Mvar at the connection point by bringing kV set-point = system voltage in 1 kV steps. | Yes / No / N/A |
| If the PPM has Emulated Inertia, note Emulated Inertia Status  Turn Emulated Inertia OFF | Pre-test status: ON / OFF / N/A  Emulated Inertia Status: \_\_\_\_ |

## Ramp Rate Calculations

|  |  |
| --- | --- |
| **Calculation** | **Value** |
| Active Power Control Set-point Ramp Rate of 20% of Registered Capacity per minute | \_\_\_\_ MW/min  (PPM to specify calculation and formula used) |
| Resource Following Ramp Rate of 20% of Registered Capacity per minute | \_\_\_\_ MW/min  (PPM to specify calculation and formula used) |
| If Generation Units are out of service, will the PPM ramp at a reduced ramp rate? | \_\_\_\_ MW/min  (PPM to specify calculation and formula used) |

## Ramp Rate Settings

|  |  |  |
| --- | --- | --- |
| **Mode** | **Rate** | **Priority** |
| Frequency Response | As fast as technically possible. 60% of its expected Active Power response within 5 seconds 100% of its expected Active Power response within 15 seconds. | 1 |
| Active Power Dispatch | 20% of Registered Capacity per Minute | 2 |
| Resource Following | 20% of Registered Capacity per Minute | 3 |

# Test Steps

## Demonstration of Limiters

The ability of the PPMCS to limit the output of the PPM (and the AAP) to MEC is demonstrated by temporarily setting the limit to a lower value so that its operation can be seen.

|  |  |  |  |
| --- | --- | --- | --- |
| **Step No.** | **Action** | **Time** | **Comments** |
| 1 | PPM begins data recording for all trends noted in Section 7.3, above |  | Operator Name \_\_\_\_\_\_\_\_\_\_\_\_  Date \_\_\_\_\_\_\_\_\_\_\_\_ |
| 2 | PPM requests permission from NCC to proceed with the Ramp Rate Settings test and confirms the following with NCC:   1. AAP of the PPM 2. MW output of the PPM 3. APC is OFF 4. Frequency Response is OFF 5. Frequency Response is in Curve 1 |  | 1. \_\_\_\_ MW 2. \_\_\_\_ MW 3. Status \_\_\_\_ 4. Status \_\_\_\_ 5. Curve \_\_\_\_ |
| 3 | PPM sets the Exported MW limiter to [insert 40% of Registered Capacity] MW and waits until the limit has been achieved |  | \_\_\_\_ MW |
| 4 | PPM restores the limit to that noted in section 4, above. |  | \_\_\_\_ MW |
| 5 | PPM sets the AAP limit to [insert 40% of Registered Capacity] MW and waits until the limit has been achieved |  | \_\_\_\_ MW |
| 6 | PPM restores the AAP limit to that noted in section 4, above. |  | \_\_\_\_ MW |
| 7 | PPM informs NCC that the Demonstration of Limiters test is complete. If further testing is not being completed, go to Section 8.5 Return to Standard Settings |  |  |
| Note any issues or deviations from test procedure  For example changes in step size, duration, test operators, parameter changes on site  Mark as “No Comment” if test proceeded as per procedure. | |  | |

## Ramp Rate Settings

Both Active Power Control Set-point Ramp Rate and Resource Following Ramp Rate are adjusted between 1% and 100% of Registered Capacity per minute, with ramps carried out at each ramp rate.

| **Step No.** | **Action** | **Time** | **Comments** |
| --- | --- | --- | --- |
| 1 | PPM begins data recording for all trends noted in Section 7.3, above |  | Operator Name \_\_\_\_\_\_\_\_\_\_\_\_  Date \_\_\_\_\_\_\_\_\_\_\_\_ |
| 2 | PPM requests permission from NCC to proceed with the Ramp Rate Settings test and confirms the following with NCC:   1. AAP of the PPM 2. MW output of the PPM 3. APC is OFF 4. Frequency Response is OFF 5. Frequency Response is in Curve 1 |  | 1. \_\_\_\_ MW 2. \_\_\_\_ MW 3. Status \_\_\_\_ 4. Status \_\_\_\_ 5. Curve \_\_\_\_ |
| 4 | PPM requests NCC to turn APC ON and issue a set-point of [insert 30% of Registered Capacity] MW and waits until 3 minutes after the set-point has been achieved |  | AAP =\_\_\_\_ MW  MW Output =\_\_\_\_ MW |
| 5 | PPM sets the Active Power Control Set-point Ramp Rate to 1% of Registered Capacity per minute confirms the following to NCC:   1. Active Power Control Set-point Ramp Rate is now 1% of Registered Capacity per minute |  | \_\_\_\_ MW/min |
| 6 | PPM requests NCC to issue a set-point of [insert 35% of Registered Capacity] MW and waits until 3 minutes after the set-point has been achieved |  | PPM shall ramp to the new set-point over 5 minutes  AAP =\_\_\_\_ MW  MW Output =\_\_\_\_ MW |
| 7 | PPM sets the Active Power Control Set-point Ramp Rate to 100% of Registered Capacity per minute confirms the following to NCC:   1. Active Power Control Set-point Ramp Rate is now 100% of Registered Capacity per minute |  | \_\_\_\_ MW/min |
| 8 | PPM requests NCC to issue a set-point of [insert 20% of Registered Capacity] MW and waits until 3 minutes after the set-point has been achieved |  | PPM shall ramp to the new set-point over 9 seconds  AAP =\_\_\_\_ MW  MW Output =\_\_\_\_ MW |
| 9 | PPM sets the Active Power Control Set-point Ramp Rate to 20% of Registered Capacity per minute confirms the following to NCC:   1. Active Power Control Set-point Ramp Rate is now 20% of Registered Capacity per minute |  | \_\_\_\_ MW/min |
| 10 | PPM requests NCC to issue a set-point of [insert 35% of Registered Capacity] MW and waits until 3 minutes after the set-point has been achieved |  | AAP =\_\_\_\_ MW  MW Output =\_\_\_\_ MW |
| 11 | PPM sets the Resource Following Ramp Rate to 40% of Registered Capacity per minute confirms the following to NCC:   1. Resource Following Ramp Rate is now 40% of Registered Capacity per minute |  | \_\_\_\_ MW/min |
| 12 | PPM requests NCC to turn APC OFF **(via SLD)** and waits until 3 minutes after the MW output has reached AAP |  | PPM shall ramp at Resource Following Ramp Rate  AAP =\_\_\_\_ MW  MW Output =\_\_\_\_ MW |
| 13 | PPM requests NCC to turn APC ON **(via SLD)** and waits until 3 minutes after the MW set-point has been achieved |  | PPM shall ramp at Active Power Control Set-point Ramp Rate  AAP =\_\_\_\_ MW  MW Output =\_\_\_\_ MW |
| 14 | PPM requests NCC to issue a set-point of [insert 100% of Registered Capacity] MW then turn APC OFF and waits until 3 minutes after the MW output has reached AAP |  | AAP =\_\_\_\_ MW  MW Output =\_\_\_\_ MW |
| 15 | PPM sets the Resource Following Ramp Rate to 20% of Registered Capacity per minute confirms the following to NCC:   1. Resource Following Ramp Rate is now 20% of Registered Capacity per minute |  | \_\_\_\_ MW/min |
| 16 | PPM ends data recording |  |  |
| 17 | PPM informs NCC that the Ramp Rate Settings test is complete. If further testing is not being completed, go to Section 8.5 Return to Standard Settings |  |  |
| Note any issues or deviations from test procedure  For example changes in step size, duration, test operators, parameter changes on site  Mark as “No Comment” if test proceeded as per procedure. | |  | |

## Active Power Control

Various set-points are issued to the PPM to demonstrate that it ramps correctly to all set-points, maintains all set-points, and does not follow set-points when APC is off.

| **Step No.** | **Action** | **Time** | **Comments** |
| --- | --- | --- | --- |
| 1 | PPM begins data recording for all trends noted in Section 7.3, above |  | Operator Name \_\_\_\_\_\_\_\_\_\_\_\_  Date \_\_\_\_\_\_\_\_\_\_\_\_ |
| 2 | PPM requests permission from NCC to proceed with the Active Power Control test and confirms the following with NCC:   1. APC is OFF 2. AAP of the PPM 3. MW output of the PPM 4. Frequency Response is OFF 5. Frequency Response is in Curve 1 |  | 1. Status \_\_\_\_ 2. \_\_\_\_ MW 3. \_\_\_\_ MW 4. Status \_\_\_\_ 5. Curve \_\_\_\_ |
| 3 | PPM requests NCC to turn APC ON and issue a set-point of [insert 50% of Registered Capacity] MW and waits until 3 minutes after the set-point has been achieved |  | AAP =\_\_\_\_ MW  MW Output =\_\_\_\_ MW |
| 4 | PPM requests NCC to issue a set-point of [insert DMOL] MW and waits until 3 minutes after the set-point has been achieved |  | AAP =\_\_\_\_ MW  MW Output =\_\_\_\_ MW |
| 5 | PPM requests NCC to turn APC OFF **(via SLD)** and waits until 3 minutes after the MW output has reached AAP |  | PPM shall ramp at Resource Following Ramp Rate  AAP =\_\_\_\_ MW  MW Output =\_\_\_\_ MW |
| 6 | PPM requests NCC to issue a set-point of [insert 40% of Registered Capacity] MW **(via SLD)** |  | PPM shall not respond to this set-point  AAP =\_\_\_\_ MW  MW Output =\_\_\_\_ MW |
| 7 | PPM requests NCC to turn APC ON **(via SLD)** and waits until 3 minutes after the set-point has been achieved |  | PPM shall ramp to DMOL at Active Power Control Set-point Ramp Rate  AAP =\_\_\_\_ MW  MW Output =\_\_\_\_ MW |
| 8 | PPM requests NCC to issue a set-point of [insert 30% of Registered Capacity] MW and waits until 3 minutes after the set-point has been achieved |  | AAP =\_\_\_\_ MW  MW Output =\_\_\_\_ MW |
| 9 | PPM requests NCC to issue a set-point of 1 MW and waits until 3 minutes after the set-point has been achieved |  | AAP =\_\_\_\_ MW  MW Output =\_\_\_\_ MW |
| 10 | PPM requests NCC to issue a set-point of 0 MW and waits until 3 minutes after the set-point has been achieved |  | AAP =\_\_\_\_ MW  MW Output =\_\_\_\_ MW |
| 11 | PPM requests NCC to issue a set-point of [insert DMOL] MW and waits until all Generation Units have started up |  | All Generation Units shall start up for set-point ≥ DMOL.  AAP =\_\_\_\_ MW  MW Output =\_\_\_\_ MW |
| 12 | PPM requests NCC to issue a set-point of [insert 60% of Registered Capacity] MW and waits until 3 minutes after the set-point has been achieved |  | AAP =\_\_\_\_ MW  MW Output =\_\_\_\_ MW |
| 13 | PPM requests NCC to issue a set-point of [insert 100% of Registered Capacity] MW and then turn APC OFF. |  | AAP =\_\_\_\_ MW  MW Output =\_\_\_\_ MW  APC Status: \_\_\_\_ |
| 14 | PPM waits until 3 minutes after the MW output has reached AAP and then ends data recording |  |  |
| 15 | PPM informs NCC that the Active Power Control test is complete. If further testing is not being completed, go to Section 8.5 Return to Standard Settings |  |  |
| Note any issues or deviations from test procedure  For example changes in step size, duration, test operators, parameter changes on site  Mark as “No Comment” if test proceeded as per procedure. | |  | |

## Shutdown and Start-up

The PPM is shut down and started up locally to demonstrate that PPM maintains the Resource Following Ramp Rate during these modes of operation.

|  |  |  |  |
| --- | --- | --- | --- |
| **Step No.** | **Action** | **Time** | **Comments** |
| 1 | PPM begins data recording for all trends noted in Section 7.3, above |  | Operator Name \_\_\_\_\_\_\_\_\_\_\_\_  Date \_\_\_\_\_\_\_\_\_\_\_\_ |
| 2 | PPM requests permission from NCC to proceed with the Shutdown and Start-up test and confirms the following with NCC:   1. AAP of the PPM 2. MW output of the PPM 3. APC is OFF 4. Frequency Response is OFF 5. Frequency Response is in Curve 1 |  | 1. \_\_\_\_ MW 2. \_\_\_\_ MW 3. Status \_\_\_\_ 4. Status \_\_\_\_ 5. Curve \_\_\_\_ |
| 3 | PPM shuts down the PPM locally, as if for an outage and waits until 2 minutes after all Generation Units are offline |  | PPM shall ramp at Resource Following Ramp Rate  AAP and MW output should reduce to zero as generators shut down  # generators online \_\_\_\_ |
| 4 | PPM starts up all Generation Units and waits until 3 minutes after MW output has reached AAP |  | PPM shall ramp at Resource Following Ramp Rate when MW > DMOL  # generators online \_\_\_\_ |
| 5 | PPM ends data recording |  |  |
| 6 | PPM informs NCC that the Shutdown and Start-up test is complete. If further testing is not being completed, go to Section 8.5 Return to Standard Settings |  |  |
|  | Note any issues or deviations from test procedure  For example changes in step size, duration, test operators, parameter changes on site  Mark as “No Comment” if test proceeded as per procedure. |  | |

## Return to Standard Settings

The PPM settings are returned to standard following completion of the Active Power Control Test.

|  |  |  |  |
| --- | --- | --- | --- |
| **Step No.** | **Action** | **Time** | **Comments** |
|  |  |  | Operator Name \_\_\_\_\_\_\_\_\_\_\_\_  Date \_\_\_\_\_\_\_\_\_\_\_\_ |
| 1 | PPM confirms the following with NCC:   1. AAP of the PPM 2. MW output of the PPM 3. APC is OFF 4. APC Set-point = [insert 100% of Registered Capacity] MW 5. Frequency Response is ON 6. Frequency Response is in Curve 1 7. Frequency Droop Setting is 4% 8. PPMCS frequency reference is system frequency 9. Emulated inertia Status is returned to pre-test status as noted in Section 6.4 |  | 1. \_\_\_\_ MW 2. \_\_\_\_ MW 3. Status \_\_\_\_ 4. \_\_\_\_ MW 5. Status \_\_\_\_ 6. Curve \_\_\_\_ 7. \_\_\_\_% 8. Frequency Reference \_\_\_\_\_\_\_\_\_\_ 9. EI Status |
| 2 | PPM informs NCC that Active Power Control testing is complete |  |  |
| Note any issues or deviations from test procedure  For example changes in step size, duration, test operators, parameter changes on site  Mark as “No Comment” if test proceeded as per procedure | |  | |

## 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: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

1. <http://www.eirgridgroup.com/library> [↑](#footnote-ref-1)