EIRGRID_2015 Functional Document Template (21

PPM Black Start Shutdown Test Procedure

[Insert Power park Module Name]

Version 0.1

Contents

[1 Document Version History 4](#_Toc39221985)

[2 Introduction 4](#_Toc39221986)

[3 Abbreviations 5](#_Toc39221987)

[4 PPM DATA 5](#_Toc39221988)

[5 Grid Code References 6](#_Toc39221989)

[6 site Safety requirements 6](#_Toc39221990)

[7 Test desciption and pre conditions 7](#_Toc39221991)

[7.1 Purpose of the Test 7](#_Toc39221992)

[7.2 Pass Criteria 7](#_Toc39221993)

[7.3 Instrumentation and onsite data trending 7](#_Toc39221994)

[7.4 Initial Conditions 7](#_Toc39221995)

[8 Test Steps 8](#_Toc39221996)

[8.1 Initiate Black Start Shutdown with RCES OFF and then ON 8](#_Toc39221997)

[8.2 Attempt to Close PPM CB with Black Start Shutdown Signal Enabled 10](#_Toc39221998)

[8.3 Remove Black Start Shutdown Signal and return PPM to Normal Operation 12](#_Toc39221999)

[8.4 Comments & Signatures 14](#_Toc39222000)

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# IPP Test Procedure Version History

EirGrid test procedure template version published August 2021.

|  |  |  |
| --- | --- | --- |
| **Document Version History** | | |
| **Version** | **Date** | **Comment** |
| 0.1 | dd/mm/yyyy | First submission for review/approval |
| 1.0 | dd/mm/yyyy |  |
|  |  |  |

# 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).

PPM shall submit a VO request form[[2]](#footnote-2) to [neartime@eirgrid.com](mailto:neartime@eirgrid.com) for the time and date of the test, giving 7 working days’ notice. VOs are issued by Near Time, EirGrid. A VO shall be issued for the PPM and grid connected transformer to be taken out of service during this test.

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.

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 report | 10 working days |

# Abbreviations

AAP Available Active Power

APC Active Power Control

CB Circuit Breaker

ESBN ESB Networks

MEC Maximum Export Capacity

MW Mega Watt

NCC National Control Centre

PPM Power Park Module

RCES Remote Control Enable Switch

TSO Transmission System Operator

VO Voluntary Outage (required to take any equipment out of service)

# PPM DATA

|  |  |
| --- | --- |
| PPM Name | PPM to Specify  (name per connection agreement) |
| PPM Test Coordinator and contact number: | PPM to Specify |
| PPM Location | PPM to Specify |
| Associated 110 kV Station | PPM to Specify |
| PPM connection point | PPM to Specify  (i.e. T121 in XXX Transmission Station) |
| PPM connection voltage | PPM to Specify |
| Installed Generator type, MW size and quantity | PPM to Specify |
| Contracted MEC | PPM to Specify |
| Registered Capacity | PPM to Specify |
| Grid Connected Transformer Tap range | PPM to Specify |
| Energisation Tap Position of the Grid Connected Transformer | PPM to Specify |

**Black Start Shutdown Functional Specification**

|  |  |
| --- | --- |
| Which CBs are tripped on receipt of Black Start Shutdown signal | PPM to Specify  (Specify all PPM and EirGrid controlled CBs, and details of slave tripping) |
| Does the RCES block Black Start Shutdown signal from tripping the ESBN 110 kV CB, when it is in the OFF (LOCAL) position | PPM to Specify |
| Does the PPM provide backup LV supplies to the ESBN control room? | PPM to Specify |

# Grid Code References

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

PPM1.7.2.5 **Black Start Shutdown**

Means shall be provided by the **Controllable PPM** to facilitate the disconnection of the **Controllable PPM** by the **TSO** and to also prevent re-connection in the event of **Black Start**. The **TSO** shall send a **Black Start Shutdown** signal and upon receipt, the **Controllable PPM** shall be required to trip the circuit-breaker(s) at the **Controllable PPM’s Connection Point** and shutdown the **Controllable PPM** in a controlled manner. The precise circuit-breakers for which this facility shall be provided shall be specified by the **TSO** at least 120 **Business Days** prior to the **Controllable PPM’s** scheduled **Operational Date.**  **Controllable PPMs** may only be reconnected (i.e. made live) when the **Network** is fully restored following instruction from the **TSO[[3]](#footnote-3)** and only earlier if the **TSO** deems it acceptable to do so.

# 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 desciption and pre conditions

## Purpose of the Test

The purpose of this test is to confirm correct operation of the Black Start Shutdown scheme at the controllable 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.

| **Criteria** |
| --- |
| **Black Start Shutdown** |
| PPM opens the main incomer CB upon receipt of the Black Start Shutdown signal |
| The blue alert lamp shall light upon receipt of the Black Start Shutdown signal |
| The main incomer CB is inhibited from closing while the Black Start Shutdown signal is ON |

## Instrumentation and onsite data trending

No instrumentation and onsite data trending is necessary for this test. All required information is recorded manually in this test procedure.

## Initial Conditions

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

|  |  |
| --- | --- |
| **Conditions** | **Check on day of test** |
| VO is in place for all equipment to be switched out (to be confirmed with NCC Grid Controller) | Yes / No |
| Operators available for switching of all required CBs | Yes / No |
| Diesel Generator is Available | Yes / No / Not Applicable |

# Test Steps

## Initiate Black Start Shutdown with RCES OFF and then ON

The PPM demonstrates the functioning of the Black Start Shutdown command and that the RCES blocks the trip command to the PPM main incomer CB. (Note. slave tripping may cause the main incomer to open)

| **Step No.** | **Action** | **Time** | **Comments** |
| --- | --- | --- | --- |
| 1 | PPM to ensure LV supply (backup generator or rural supply) is ready |  |  |
| 2 | Following receipt of permission from NCC, PPM shuts down the PPM locally |  | MW output ramps at Resource Following Ramp Rate |
| 3 | Confirm with NCC Grid Controller that any relevant Special Protection Schemes are turned off, as required. |  |  |
| 4 | PPM requests permission from NCC to proceed with the Black Start Shutdown test and confirms the following with NCC:   1. AAP = 0 MW 2. MW output = 0 MW 3. ESBN 110 kV CB is CLOSED 4. PPM main incomer CB is CLOSED 5. PPM RCES is in the ON (REMOTE) position 6. Black Start Shutdown is OFF 7. Blue lamp is OFF in PPM control room 8. Grid Connected Transformer on load tap changer is in automatic mode 9. Grid Connected Transformer Tap range and Tap Position |  | 1. \_\_\_\_ MW 2. \_\_\_\_ MW 3. 110 kV CB \_\_\_\_ 4. PPM CB \_\_\_\_ 5. RCES status: \_\_\_\_ 6. ON / OFF 7. ON / OFF 8. Automatic / Manual 9. \_\_\_\_ to \_\_\_\_ ; Tap \_\_\_\_ |
| 5 | PPM puts the RCES into the OFF (LOCAL) position |  | RCES status: \_\_\_\_ |
| 6 | PPM requests NCC to replace the RCES signal in NCC to ON |  |  |
| 7 | PPM & ESBN Operator both confirm that all personnel are clear of PPM and ESBN switchgear.  PPM requests NCC Grid Controller to turn Black Start Shutdown ON (which will open the 110 kV CB and may cause the IPP main incomer CB to open). |  | Blue Lamp Status: \_\_\_\_  110 kV CB: \_\_\_\_  PPM CB: \_\_\_\_ |
| 8 | If the 110 kV CB is open, PPM puts the Grid Connected Transformer on load tap changer into manual mode and taps to Energisation Tap Position.  Wait 15 minutes before re-energising the Grid Connected Transformer.  Note. it may be necessary to open the IPP main incomer CB in order to close the 110 kV CB. |  | This step is carried out to minimise inrush current when transformer is re-energised  Automatic / Manual  Tap \_\_\_\_ |
| 9 | PPM confirms the following with NCC: (Note. These are initial conditions for next step. Actions may be required to achieve the following conditions)   1. ESBN 110 kV CB is CLOSED 2. PPM main incomer CB is CLOSED 3. RCES is in the OFF (LOCAL) position 4. Black Start Shutdown is OFF 5. Blue lamp is OFF in PPM control room |  | 1. 110 kV CB \_\_\_\_ 2. PPM CB \_\_\_\_ 3. RCES status: \_\_\_\_ 4. ON / OFF 5. ON / OFF |
| 10 | PPM puts the RCES into the ON (REMOTE) position |  | RCES status: \_\_\_\_ |
| 11 | PPM requests NCC to remove the replaced RCES signal in NCC |  |  |
| 12 | PPM & ESBN Operator both confirm that all personnel are clear of PPM and ESBN switchgear.  PPM requests NCC Grid Controller to turn Black Start Shutdown ON (which will open the 110 kV CB and IPP main incomer CB). |  | Blue Lamp Status: \_\_\_\_  110 kV CB: \_\_\_\_  PPM CB: \_\_\_\_ |

## Attempt to Close PPM CB with Black Start Shutdown ON

The PPM demonstrates that the Black Start Shutdown scheme inhibits the PPM main incomer CB whether the RCES is on or off.

| **Step No.** | **Action** | **Time** | **Comments** |
| --- | --- | --- | --- |
| 1 | PPM confirms the following with NCC: (Note. These are initial conditions for next step)   1. ESBN 110 kV CB is OPEN 2. PPM main incomer CB is OPEN 3. RCES is in the ON (REMOTE) position 4. Black Start Shutdown is ON 5. Blue lamp is ON in PPM control room |  | 1. 110 kV CB \_\_\_\_ 2. PPM CB \_\_\_\_ 3. RCES status: \_\_\_\_ 4. ON / OFF 5. ON / OFF |
| 2 | Check LV supply is being provided in the PPM and ESBN control rooms, as applicable |  | PPM LV Supply: \_\_\_\_  ESBN LV Supply: \_\_\_\_ |
| 3 | PPM ensures the Grid Connected Transformer on load tap changer is in manual mode and on Energisation Tap Position.  After 15 minutes, ESBN requests permission from NCC Grid Controller and attempts to close the 110 kV CB (while Black Start Shutdown is ON) |  | This step is carried out to minimise inrush current when transformer is re-energised  Automatic / Manual  Tap \_\_\_\_  If it is not possible to close the 110 kV CB with Black Start Shutdown ON, continue to the next step  110 kV CB: \_\_\_\_ |
| 4 | PPM clears all protection alarms and attempts to close the PPM main incomer CB |  | The PPM CB shall be inhibited from closing (if the CB closes and trips immediately, this is not considered “inhibited”)  PPM CB: \_\_\_\_ |
| 5 | PPM confirms the following with NCC: (Note. These are initial conditions for next step)   1. ESBN 110 kV CB is CLOSED 2. PPM main incomer CB is OPEN 3. RCES is in the ON (REMOTE) position 4. Black Start Shutdown is ON 5. Blue lamp is ON in PPM control room |  | 1. 110 kV CB \_\_\_\_ 2. PPM CB \_\_\_\_ 3. RCES status: \_\_\_\_ 4. ON / OFF 5. ON / OFF |
| 6 | PPM puts the RCES into the OFF (LOCAL) position |  | Blue Lamp Status: \_\_\_\_  110 kV CB: \_\_\_\_  PPM CB: \_\_\_\_ |
| 7 | PPM confirms the following with NCC: (Note. These are initial conditions for next step)   1. ESBN 110 kV CB is CLOSED 2. PPM main incomer CB is OPEN 3. RCES is in the OFF (LOCAL) position 4. Black Start Shutdown is ON 5. Blue lamp is ON in PPM control room |  | 1. 110 kV CB \_\_\_\_ 2. PPM CB \_\_\_\_ 3. RCES status: \_\_\_\_ 4. ON / OFF 5. ON / OFF |
| 8 | PPM clears all protection alarms and attempts to close the PPM main incomer CB |  | The PPM CB shall be inhibited from closing (if the CB closes and trips immediately, it is not considered “inhibited”)  PPM CB: \_\_\_\_ |

## Turn Black Start Shutdown OFF and return PPM to Normal Operation

The PPM is returned to normal operation. NCC then issue a MW set-point to the PPM to confirm this functionality has not been compromised by a loss of mains on site.

| **Step No.** | **Action** | **Time** | **Comments** |
| --- | --- | --- | --- |
| 1 | PPM confirms the following with NCC: (Note. These are initial conditions for next step)   1. ESBN 110 kV CB is CLOSED 2. PPM main incomer CB is OPEN 3. RCES is in the OFF (LOCAL) position 4. Black Start Shutdown is ON 5. Blue lamp is ON in PPM control room 6. Grid Connected Transformer on load tap changer is in manual mode 7. Grid Connected Transformer is on Energisation Tap Position |  | 1. 110 kV CB \_\_\_\_ 2. PPM CB \_\_\_\_ 3. RCES status: \_\_\_\_ 4. ON / OFF 5. ON / OFF 6. Automatic / Manual 7. Tap \_\_\_\_ |
| 2 | PPM puts the RCES into the ON (REMOTE) position |  | Blue Lamp Status: \_\_\_\_  110 kV CB: \_\_\_\_  PPM CB: \_\_\_\_ |
| 3 | PPM requests NCC turn Black Start Shutdown OFF |  | Blue Lamp Status: \_\_\_\_ |
| 4 | ESBN requests permission from NCC Grid Controller and closes the 110 kV CB if it is not already closed |  | 110 kV CB: \_\_\_\_ |
| 5 | PPM closes the PPM main incomer CB |  | PPM CB: \_\_\_\_ |
| 6 | PPM puts the Grid Connected Transformer on load tap changer into automatic mode |  |  |
| 7 | PPM requests permission from NCC and starts up all generators |  | MW output ramps at Resource Following Ramp Rate |
| 8 | PPM confirms the following with NCC: (Note. These are initial conditions for next step)   1. ESBN 110 kV CB is CLOSED 2. PPM main incomer CB is CLOSED 3. RCES is in the ON (REMOTE) position 4. Black Start Shutdown is OFF 5. Blue lamp is OFF in PPM control room 6. Grid Connected Transformer on load tap changer is in automatic mode 7. Grid Connected Transformer is in automatic mode |  | 1. 110 kV CB \_\_\_\_ 2. PPM CB \_\_\_\_ 3. RCES status: \_\_\_\_ 4. ON / OFF 5. ON / OFF 6. Automatic / Manual 7. Tap \_\_\_\_ |
| 9 | Confirm that any relevant Special Protection Schemes are returned to the correct status, as required by NCC Grid Controller. |  |  |
| 10 | With permission of NCC Grid Controller, PPM restores the PPM to normal operation |  |  |
| 11 | PPM requests NCC to turn APC ON and issue a set-point of [insert 90% of Registered Capacity] MW |  | APC: \_\_\_\_  Set-point received: \_\_\_\_ |
| 12 | PPM requests NCC to issue a set-point of [insert 100% of Registered Capacity] MW and turn APC OFF |  | Set-point received: \_\_\_\_ |
| 13 | PPM informs NCC that the Black Start Shutdown test is complete |  |  |

## 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)
2. <http://www.eirgridgroup.com/__uuid/b1d14629-fe49-41a9-ac30-c3cb14393c82/index.xml?__toolbar=1> [↑](#footnote-ref-2)
3. Typically this instruction will be in the form of a Black Start Shutdown OFF command [↑](#footnote-ref-3)