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| --- |
| Template change control details |
| Version | Date | Changes |
| 0.1 | 04/06/2014 | First Draft for industry comment |

**Test 51 Test Procedure**

**Demonstration of Ramp Rates**

**[Insert Unit Name] Unit (XX1)**



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# Document Revision History

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| --- | --- | --- | --- | --- |
| **Version** | **Date** | **Comment** | **Name** | **Company** |
| 0.1 | Xx/xx/xxxx | XX | User | User |
|  |  |  |  |  |
| 1.0 | Xx/xx/xxxx | Revised to Major version for onsite testing and signoff |  | EirGrid |

1. **Introduction**

The Unit must submit the latest version of this test procedure as published on the EirGrid or SONI website[[1]](#footnote-1).

All yellow sections must be filled in before the test procedure will be approved. All grey sections must 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.

On the day of testing, suitably qualified technical personnel are required on site to assist in undertaking the tests. The personnel shall have the ability to:

1. Set up and disconnect the control system and instrumentation as required;
2. Ability to fully understand the Unit’s function and its relationship to the System;
3. Liaise with NCC/CHCC as required;
4. Mitigate issues arising during the test and report on system incidents.

The availability of personnel at NCC/CHCC will be necessary in order to initiate the necessary instructions for the test. NCC/CHCC will determine:

1. If network conditions allow the testing to proceed.
2. Which tests will be carried out?
3. When the tests will be carried out.

On completion of this test, the following shall be submitted to 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

NCC National Control Centre

CHCC Castlereagh House Control Centre

MEC Maximum Export Capacity

MVAr Mega Volt Ampere – reactive

MW Mega Watt

TSO Transmission System Operator

EDIL Electronic Dispatch Instruction Logger

DCS Distributed Control System

# Unit DATA

|  |  |
| --- | --- |
| Unit Test Coordinator | Unit to Specify Name, Company and contact details. |
| Unit name | Unit to Specify |
| Unit connection point | Unit to Specify |
| Unit connection voltage | Unit to Specify |
| Unit Fuel Type:  | Primary Fuel / Secondary Fuel, Gas / Distillate. |
| Registered Capacity / Maximum Continuous Rating | Unit to Specify |
| Contracted MEC | Unit to Specify |
| Installed Plant | Unit to Specify |
| Minimum Load | Unit to Specify |
| Ramp Rate setting applied to the unit (per minute) | Unit to Specify |
| 1.5% Registered Capacity (Ireland)3% MCR (Northern Ireland) Delete references to Ireland or Northern Ireland as appropriate. | Unit to Specify |

# Eirgrid Grid Code References

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

CC7.3.1.1Each **Generation Unit,** shall, as a minimum, have the following capabilities:

(l) **Ramp up capability** not less than 1.5% of **Registered Capacity** per minute when the **Unit** is in the **Normal Dispatch Condition**.

(m) **Ramp down capability** not less than 1.5% of **Registered Capacity** per minute when the **Unit** is in the **Normal Dispatch Condition**.

CC7.5.1.1Each **Interconnector,** shall have the following minimum capabilities, for the avoidance of doubt, additional performance capabilities are required from **OC4-System Services**:

(m) **Interconnector Ramp-up** not less than the greater of 10% of the

 **Capacity Interconnector Registered Capacity** per minute or 50 **MW** per minute, when the **Interconnector** is in the **Normal Dispatch Condition**;

(m) **Interconnector Ramp-down** not less than the greater of 10% of the

 **Capacity Interconnector Registered Capacity** per minute or 50 **MW** per minute, when the **Interconnector** is in the **Normal Dispatch Condition**;

**Glossary:**

|  |  |
| --- | --- |
| **Ramp Down Break Point**  | The MW level at which the **Ramp Down Rate** changes. There may be circumstances where more than one parameter applies and this is indicated by adding a number at the end of the parameter.  |
| **Ramp-down Capability**  | The rate of decrease in a **Generation Unit' Output** after the **End Of Start-up Period. Ramp-down Capabilities** apply over the output range from its **Registered Capacity** to **Minimum generation**. The rate of change is not dependent upon the initial warmth of the plant but may depend on the **MW Output.**  |
| **Ramp Down Rate**  | The maximum rate of decrease in a **Generating Unit’s Output** after the **End Of Start-up Period**. The **Ramp Down Rate** applies over the output range from its **Registered Capacity** to **Minimum Generation**. The rate of change is not dependent upon the initial **Warmth** of the plant but may depend on the **MW Output**. There may be circumstances where more than one parameter applies and this is indicated by adding a number at the end of the parameter.  |
| **Ramp Up Break Point**  | The MW level at which the **Ramp Up Rate** changes. There may be circumstances where more than one parameter applies and this is indicated by adding a number at the end of the parameter.  |
| **Ramp-up Capability**  | The rate of increase in a **Generation Unit' Output** after the **End Of Start-up Period**. This rate of increase continues until the **Generation Unit** reaches the level of output instructed by the control room operator or its **Registered Capacity.** Following the **End Of Start-up Period**, the rate of increase is not dependent upon the initial warmth of the plant but may depend on the **MW Output.**  |
| **Interconnector Ramp-down Capability**  | The rate of decrease of an **Interconnector. Ramp-down Capabilities** apply over the bi-directional range from its **Interconnector Registered Import Capacity** to its **Interconnector Registered Export Capacity.**  |
| **Interconnector Ramp-up Capability**  | The rate of increase of an **Interconnector. Ramp-up Capabilities** apply over the bi-directional range from its **Interconnector Registered Export Capacity** to its **Interconnector Registered Import Capacity.**  |
|

|  |  |
| --- | --- |
| **Interconnector Ramp Rate**  |  |

 | The maximum rate of increase or decrease of the power transferred, in either flow direction, by an **Interconnector.** |
| **Normal Dispatch Condition**  | The condition of the **Generation Unit** at the **End of the Start-up Period**.  |

Delete references to Interconnector or Generator as appropriate.

# SONI Grid Code references

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

CC.S1.1.3.7 **Start-Up** and Ramp Rates (Transmission Connected)

CC.S1.2.3.4 **Start-Up** and Ramp Rates (Distribution Connected)

(b) A **Generating Unit** which is in a hot condition must be capable of ramping up from part-load pursuant to a **Dispatch** instruction at a rate of at least 3% of MCR per minute.

(c) A **Generating Unit** must be capable of de-loading at a rate of at least 3% of MCR per minute.

**Glossary:**

|  |  |
| --- | --- |
| **Aggregate Interconnector Ramp Rate** | The maximum **Ramp Up Rate** for an **Interconnector** or maximum **Ramp Down Rate** as determined by the **TSO**. |
| **Max Ramp Down Rate** | The maximum **Ramp Down Rate** of a **Demand Side Unit**. In the case of a **Demand Side Unit** which consists of an **Aggregated Demand Site** this shall be the aggregated maximum **Ramp Down Rate** of the **Individual Demand Sites**. |
| **Max Ramp Up Rate** | The maximum **Ramp Up Rate** of a **Demand Side Unit**. In the case of a **Demand Side Unit** whichconsists of an **Aggregated Demand Site** this shallbe the aggregated maximum **Ramp** |
| **Ramp Down Break Point** | The **MW** level at which the **Ramp Down Rate** changes. There may be circumstances where morethan one parameter applies and this is indicated byadding a number at the end of the parameter. |
| **Ramp Down Rate** | The maximum rate of decrease in a **Generating Unit’**s **Output**. The **Ramp Down Rate** appliesover the output range from its **Contracted Capacity** (for **PPA CDGU**s other than **PPA Open Cycle Gas Turbines**) or **Contracted Capacity (Peak)** (for **PPA Open Cycle Gas Turbines**) or **Registered Capacity** (for non-**PPA** plant) to **Minimum Generation**. The rate of change may not depend upon the initial **Warmth** of the plant but may depend on the **MW Output**. There may be circumstances where more than one parameter applies and this is indicated by adding a number at the end of the parameter. |
| **Ramp Up Break Point** | The MW level at which the **Ramp Up Rate** changes. There may be circumstances where morethan one parameter applies and this is indicated byadding a number at the end of the parameter. **Ramp Up Rate** The maximum rate of increase in a **Generating Unit**’s **Output**. This rate of increase continuesuntil the **Generating Unit** reaches the level ofoutput instructed by the control room operator of its **Contracted Capacity** (for **PPA CDGU**s otherthan **PPA Open Cycle Gas Turbines**) or **Contracted Capacity (Peak)** (for **PPA Open** **Cycle Gas Turbines**) or **Registered Capacity** (for non-**PPA** plant). The rate of increase may not depend upon the initial **Warmth** of the plant but may depend on the **MW Output**. There may be circumstances where more than one parameter applies and this is indicated by adding a number at the end of the parameter. |

Delete references to Interconnector or Generator as appropriate.

# site Safety requirements

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

|  |  |
| --- | --- |
| Personal Protective Equipment Requirements1. 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, Unit to specify how and when the induction must carried out) |
| Any further information | Unit to specify |

# Test Description and Pre Conditions

## Purpose

The purpose of the test is to demonstrate the Capability of the Unit to ramp up and down between defined load points at a specified rate.

## Pass Criteria

**Ireland:**

1. The ramp up capability is not less than 1.5% of Registered Capacity per minute when the unit is in normal dispatch condition.
2. The ramp down capability is not less than 1.5% of Registered Capacity per minute when the unit is in normal dispatch condition.

**Northern Ireland:**

1. The ramp up capability is not less than 3% of MCR per minute when the unit is in normal dispatch condition.
2. The ramp down capability is not less than 3% of MCR per minute when the unit is in normal dispatch condition.

Delete references to Ireland or Northern Ireland as appropriate.

## Instrumentation and Onsite Data Trending

All of the following trends and screenshots must be recorded by the Unit during the test. Failure to provide any of these trends will result in test cancellation.

|  |  |  |  |
| --- | --- | --- | --- |
| **No.** | **Data Trending and Recording** | **Resolution** | **Source** |
| 1 | Active Power at Connection Point (MW)  | Unit to specify, 100ms or as agreed with TSO | Unit to specify |
| 2 | Reactive Power at Connection Point (Mvar) | Unit to specify, 100ms or as agreed with TSO | Unit to specify |
| 3 | Active Power at Generator (MW) | Unit to specify, 100ms or as agreed with TSO | Unit to specify |
| 4 | Reactive Power at Generator (Mvar) | Unit to specify, 100ms or as agreed with TSO | Unit to specify |
| 5 | Generator Voltage (kV) | Unit to specify, 100ms or as agreed with TSO | Unit to specify |
| 6. | Other signals as required by the unit or by generator\_testing@eirgrid.com.  | Unit to specify, 100ms or as agreed with TSO | Unit to specify |
| 7 | Alarm/Event page | Print out alarms / events for duration of the test.  |
| 8 | Generator Overview Screen | Print out at appropriate milestones during the test i.e. Before, during at regular intervals and after test from generator overview page on DCS |
| 8 | EDIL instructions | Print out as logged during the test. |

## Initial Conditions and Calculations

Should “No” be answered to any of the following, contact generator\_testing@eirgrid.com and agree next steps in advance of making any corrective actions.

|  |  |  |
| --- | --- | --- |
| **No.** | **Conditions** | **Check on day of test** |
| 1 | Test Profiles have been submitted and approved by neartime@eirgrid.com. | Yes/No |
| 2 | Unit Fuel Type: Primary Fuel / Secondary Fuel, Gas / Distillate.Interconnector operation direction: Import / Export.Delete references to Interconnector or Generator as appropriate. | Yes/No |
| 3 | Correction curves (Temperature, humidity, atmospheric pressure) have been provided to generator\_testing@eirgrid.com. | Yes/No |
| 4 | Normal start up support auxiliary systems are aligned and in service. | Yes/No |
| 5 | Required signals, as described in section 8.3 are available | Yes/No |

|  |  |  |
| --- | --- | --- |
| **No.** | **Calculation** | **Calculated on day of test** |
| 1 | Declared availability on day of test | \_\_\_MW |
| 2 | Corrected Registered Capacity | \_\_\_MW |
| 3 | Corrected Minimum load | \_\_\_MW |

Delete if not applicable.

# Test Steps

|  |  |  |  |
| --- | --- | --- | --- |
| **Step No.** | **Action** | **Time** | **Comment** |
| 1 | Unit operator begins data recording for all trends noted in Section 8.3. |  |  |
| 2 | Unit operator contacts NCC/CHCC and requests permission to begin test and a dispatch instruction to minimum load via EDIL.  |  |  |
| 3 | Unit operator receives EDIL instruction and dispatches the Unit with a ramp rate at XX MW per minute. |  |  |
| 4 | After reaching minimum load and after **XX minutes** where the unit has stabilised, the Unit operator notes Minimum load value.This value shall be the maximum sustained value of minimum load achieved over the stabilised period.  |  | Minimum Load \_\_\_\_\_MW.  |
| 5 | Unit operator requests a dispatch instruction to **XX MW** (95% load) via EDIL from NCC/CHCC.  |  |  |
| 6 | Unit operator receives EDIL instruction and dispatches the Unit with a ramp rate at **XX MW** per minute.  |  | Time of instruction: \_\_:\_\_. Ramp up Rate of Unit: \_\_\_\_. Expected time to achieve 95% load: \_\_:\_\_. Is the ramp rate linear: Yes / No |
| 7 | Unit operator notes the time when **XX MW** (95% load) was achieved.The Unit remains at **XX MW** for a period of **XX minutes** until the unit has stabilised. |  | Time 95% load was achieved: \_\_:\_\_. |
| 8 | Unit operator contacts NCC/CHCC and requests a dispatch instruction to **XX MW** (base load) via EDIL. |  |  |
| 9 | Unit operator receives EDIL instruction and dispatches the Unit with a ramp rate **at XX MW** **per minute**. |  | Time of instruction: \_\_:\_\_. Ramp up Rate of Unit: \_\_\_\_. Expected time to achieve base load: \_\_:\_\_. Is the ramp rate linear: Yes / No |
| 10 | Unit operator notes the time when **XX MW** (base load) was achieved.The Unit remains at **XX MW** for a period of **XX minutes** until the unit has stabilised. |  | Time base load was achieved: \_\_:\_\_. |
| 11 | Unit operator contacts NCC/CHCC and requests DeSync instruction via EDIL. |  |  |
| 12 | Unit operator receives EDIL instruction and dispatches the Unit with a ramp rate at **XX MW per minute**. |  | Time of instruction: \_\_:\_\_. Ramp up Rate of Unit: \_\_\_\_. Expected time to DeSync: \_\_:\_\_. Is the ramp down rate linear: Yes / No |
| 13 | Unit operator notes actual time of DeSync. |  | DeSync Time: \_\_:\_\_ |
| 14 | Unit operator contacts NCC/CHCC and informs them that the test is complete. |  |  |
| 15 | Unit operator ends data recording for all trends noted in Section 8.3. |  |  |

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

1. <http://www.eirgrid.com/operations/gridcode/compliancetesting/cdgutestprocedures/#d.en.17699> [↑](#footnote-ref-1)