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| Template change control details |
| Version | Date | Changes |
| 0.1 | 05/06/2014 | First Draft for industry comment |

**Test 69 Test Procedure**

**Demonstration of Registered Capacity**

**[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 website[[1]](#footnote-1).

Registered Capacity of a unit is an important baseline figure which is determined from this test. It is a figure expressed in nearest whole MW rounded in favour of the Generator. Should the Registered Capacity of a unit be influenced by Temperature, Humidity and Atmospheric Pressure then correction adjustments shall be made to Grid Code requirements (not IEC standards). Degrading factors of a Unit may require regular testing and adjustments of Registered Capacity. Changes to Registered capacity of a unit will subsequently trigger further testing to determine performance capabilities of a unit i.e. Block load, Ramping, Operating Reserve, Minimum Load requirements and Reactive Power Capability.

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 as required;
4. Mitigate issues arising during the test and report on system incidents.

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

HV High Voltage

LV Low Voltage

MEC Maximum Export Capacity

MVAr Mega Volt Ampere – reactive

MW Mega Watt

TSO Transmission System Operator

RPM Revolutions per minute

EDIL Electronic Dispatch Instruction Logger

# 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  | Unit to Specify |
| Contracted MEC | Unit to Specify |
| Installed Plant | Unit to Specify |

**Emission Limit details**

|  |  |  |  |
| --- | --- | --- | --- |
| **Description** | **Min Value** | **Max Value** | **Licence Limit** |
| CO2 | XX mg/m3 | xxx mg/m3 | As applicable |
| O2 | XX % | xxx % | As applicable |
| CO | xxx mg/m3 | xxx mg/m3 | As applicable |
| SO2 | xxx mg/m3 | xxx mg/m3 | xxxx mg/m3 |
| NOx | xxxx mg/m3 | xxxx mg/m3 | xxxx mg/m3 |

# Eirgrid Grid Code References

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

**Glossary:**

|  |  |
| --- | --- |
| **Registered Capacity** | The maximum **Capacity**, expressed in whole MW that a **Generation Unit** can deliver on a sustained basis, without accelerated loss of equipment life, at the **Connection Point** which is under the dispatch (or control of a **Controllable WFPS**) of the **TSO**. This shall be the value at 10ºC, 70% relative humidity and 1013 hPa. The values of an **Interconnector’s Operating Characteristics** for operation of the **Interconnector** pursuant to the **Grid Code** registered under the **Connection Conditions.** |
| **Capacity** | The rated continuous load-carrying ability, expressed in megawatts (MW) or megavolt-amperes (MVA) of generation, transmission, or other electrical equipment. |
| **Interconnector Registered Capacity**  | The maximum **Capacity**, in either flow direction, expressed in whole **MW**, that an **Interconnector** can deliver on a sustained basis, without accelerated loss of equipment life, at the **Connection Point**. This figure shall include transmission power losses for the **Interconnector**.  |
| **Interconnector Registered Export Capacity**  | The maximum **Capacity**, expressed in whole **MW** that an **Interconnector** may export (transfer energy from the **Power System** to a remote network) on a sustained basis, without accelerated loss of equipment life, as registered with the **TSO**.  |
| **Interconnector Registered Import Capacity**  | The maximum **Capacity**, expressed in whole **MW** that an **Interconnector** may import (transfer energy from a remote network into the **Power System**) on a sustained basis, without accelerated loss of equipment life, as registered with the **TSO**.  |

Delete references to Interconnector as appropriate.

# site Safety requirements

The following is required for the EirGrid 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 this test is to determine the Registered Capacity output at 0.85 power factor lagging for which the Unit can produce on a sustained basis. Sustained is the absolute minimum value achieved over the duration of the test.

## Pass Criteria

1. The unit operates at its Registered Capacity and power factor of 0.85 lagging for a period of **[insert no of hours as agreed with TSO]** hours.
2. During operation at Registered Capacity, the unit will maintain stable operation within the emissions, vibration and oil temperature limits.
3. Secondary Fuel Registered Capacity testing must achieve a minimum of 90% of primary fuel Registered Capacity.

## 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 (MW) | Unit to specify, 100ms or as agreed with TSO | Unit to specify |
| 2 | Reactive power at Connection point (MW) | Unit to specify, 100ms or as agreed with TSO | Unit to specify |
| 3 | Active Power at Generator Terminals (MW) | Unit to specify, 100ms or as agreed with TSO | Unit to specify |
| 4 | Reactive Power at Generator Terminals (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 | Turbine Speed (RPM) | Unit to specify, 100ms or as agreed with TSO | Unit to specify |
| 7 | Generator Transformer Tap setting | Unit to specify, 100ms or as agreed with TSO | Unit to specify |
| 8 | System Voltage  | Unit to specify, 100ms or as agreed with TSO | Unit to specify |
| 9 | System Frequency | Unit to specify, 100ms or as agreed with TSO | Unit to specify |
| 10 | Ambient Conditions:1. Temperature (ºC)
2. Pressure (mbar)
3. Humidity (%)
 | Unit to specify, 100ms or as agreed with TSO | Unit to specify |
| 11 | Emissions Measurements:1. NOX (mg/Nm3)
2. SO2 (mg/Nm3)
3. CO2 (%)
4. O2 (mg/m3)
5. CO (mg/m3)
 | Unit to specify, 100ms or as agreed with TSO | Unit to specify |
| 12 | Other signals as required by the unit or by generator\_testing@eirgrid.com. | Unit to specify | Unit to specify |
| 13 | Alarm/Event page | Print out alarms / events for duration of the test.  |
| 14 | 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 |
| 15 | 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 | Frequency Response mode On / Off. | Yes/No |
| 5 | Unit is on load and stable in agreement with NCC. | Yes/No |
| 6 | Normal start up support auxiliary systems are aligned and in service. | Yes/No |
| 7 | Required signals, as described in section 7.3 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 |

# Test Steps

|  |  |  |  |
| --- | --- | --- | --- |
| **Step No.** | **Action** | **Time** | **Comment** |
| 1 | Unit operator begins data recording for all trends noted in Section 7.3. |  |  |
| 2 | Unit operator contacts NCC and requests permission to begin test and a dispatch instruction to **XX MW** (maximum declared availability on day of test) via EDIL. |  |  |
| 3 | Unit operator receives EDIL instruction and dispatches the Unit with a ramp rate at **XX MW** **per minute**. |  |  |
| 4 | After reaching **XX MW** (maximum declared availability on day of test) and following a period of **XX minutes** where the unit has stabilised, the Unit operator records the achieved MW value. |  | Achieved MW Output: \_\_\_\_\_MW.Corrected Registered Capacity: \_\_\_MW. |
| 5 | The Unit Operator monitors that the unit remains at **XX MW** for a minimum of [insert no of hours as agreed with TSO] hours. |  | Expected time of test completion: \_\_:\_\_.  |
| 6 | **XX minutes** after XX **MW** was achieved the Unit Operator records the minimum value sustained over this period. |  | Minimum MW value achieved over period: \_\_\_\_\_MW.Corrected Registered Capacity: \_\_\_\_MW.  |
| 7 | **XX minutes** after XX **MW** was achieved the Unit Operator records the minimum value sustained over this period. |  | Minimum MW value achieved over period: \_\_\_\_\_MW.Corrected Registered Capacity: \_\_\_\_MW. |
| 8 | **XX minutes** after XX **MW** was achieved the Unit Operator records the minimum value sustained over this period. |  | Minimum MW value achieved over period: \_\_\_\_\_MW.Corrected Registered Capacity: \_\_\_\_MW.. |
| 9 | **XX minutes** after XX **MW** was achieved the Unit Operator records the minimum value sustained over this period. |  | Minimum MW value achieved over period: \_\_\_\_\_MW.Corrected Registered Capacity: \_\_\_\_MW. |
| 10 | Following **XX hours**, the Unit operator contacts NCC and notifies them that the specified time period has completed.  |  |  |
| 11 | Unit operator follows NCC instruction for **30 minutes** following time period at max declared availability. (Instruction may be Shutdown, Ramp up or maintain output). |  | Instruction from NCC\_\_\_\_\_\_\_\_\_\_\_ |
| 12 | 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 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)