Minimum Load / Generation

[Insert Unit Name]

[Insert Three Letter Code]

Version 0.1



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# Document VERSION History

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Document Revsion History** | | | | |
| **Revision** | **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 |  | SONI |

1. **Introduction**

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

Minimum load testing can be carried out at the same time as start-up tests for Cold, Warm, Hot states. A separate test procedure shall be agreed for a start-up test.

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@soni.ltd.uk](mailto:Generator_Testing@soni.ltd.uk)

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

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

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

On completion of this test, the following shall be submitted to [Generator\_Testing@soni.ltd.uk](mailto:Generator_Testing@soni.ltd.uk)

|  |  |
| --- | --- |
| **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 |

# 

**Note:**

**The NI Power System is a live, dynamic, constantly changing system on which major changes or disturbances can occur without warning. All testing has the potential to impact the NI Power System and must be treated as such.**

**Prior to testing taking place SONI Control Room must be informed as soon as practically possible. SONI Control Room Staff reserve the right to suspend any testing if it may have a detrimental impact on the NI Power System and/or prevailing system conditions call for it.**

**Tests must be undertaken in accordance with this procedure however should a test in the procedure:**

* **have potential for a detrimental impact on the NI Power System,**
* **result in damage to the Generator’s and/or TO’s Plant and Apparatus,**
* **does not adequately demonstrate Generator Plant performance,**

**an equivalent test procedure or demonstration of Generating Unit capability[[2]](#footnote-2) agreed between SONI and the Generator may be undertaken to validate Grid Code compliance.**

# Abbreviations

CHCC Castlereagh House Control Centre

HV High Voltage

MEC Maximum Export Capacity

MVAr Mega Volt Ampere – reactive

MW Mega Watt

MCR Maximum Continuous Rating / Registered Capacity

TSO Transmission System Operator

EDIL Electronic Dispatch Instruction Logger

RPM Revolutions per minute

# Unit DATA

|  |  |
| --- | --- |
| Unit Test Coordinator | Unit to Specify Name, Company and contact details. |
| Unit name | Unit to Specify |
| Associated Station | Unit to Specify |
| Unit connection point | Unit to Specify |
| Unit connection voltage | Unit to Specify |
| Unit Fuel Type: | Primary Fuel / Secondary Fuel |
| Registered Capacity / Maximum Continuous Rating | Unit to Specify |
| Contracted MEC | Unit to Specify |
| 50% of Registered Capacity  35% of Registered Capacity  40% of Maximum Continuous Rating  Select and delete other % calculations as appropriate. | Unit to Specify |
| Minimum Load | Unit to Specify |
| Minimum Generation | 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 |

# SONI Grid Code references

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

CC.S1.1.3.8 A Generating Unit must be capable of remaining Synchronised to the NI System at an Output which is no greater than the lower of 80 MW or 40% of maximum continuous rating.

**Glossary:**

|  |  |
| --- | --- |
| **Minimum Generation** | The minimum **MW Output** which a **Generating Unit** can generate continuously, registered with the **TSO** under SDC1 as a **Technical Parameter.** |
| **Registered Capacity** | The normal **Full Load** capacity of a **Generating Unit** in **MW** measured as at the **Connection Point** and in relation to a **Power Park Module,** the normal **Full Load** capacity of the collection of one or more **Generating Unit (s)** taken together in aggregate**,** in **MW** measured as at the **Connection Point** of the **Power Park Module**. |

# site Safety requirements

The following is required for the SONI 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 | 1. Yes / No 2. Yes / No 3. Yes / No 4. Yes / No 5. Yes / No 6. 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 minimum MW output which the Unit can produce on a sustained basis. Sustained is the absolute maximum value achieved over the duration of the test.

## Pass Criteria

1. The unit operates at Minimum Load/Generation in accordance with normal operating conditions for a period of **[insert no of hours as agreed with TSO but shall be** **no less than 12 hours]** and cover a timeframe in which the unit may be subject to differing power system conditions to monitor performance for example the test should not be undertaken entirely over night time hours. .
2. During operation at Minimum Load/Generation, the unit will maintain stable operation within the emissions, vibration and oil temperature limits. The unit should have frequency response mode On.

**Northern Ireland**

1. Output which is no greater than the lower of 80 MW or 40% of maximum continuous rating.

## 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@soni.ltd.uk](mailto:Generator_Testing@soni.ltd.uk) | 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@soni.ltd.uk](mailto:Generator_Testing@soni.ltd.uk) 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@soni.ltd.uk](mailto:neartime@soni.ltd.uk). | Yes/No |
| 2 | Unit Fuel Type: Primary Fuel / Secondary Fuel | Yes/No |
| 3 | Correction curves (Temperature, humidity, atmospheric pressure) have been provided to [Generator\_Testing@soni.ltd.uk](mailto:Generator_Testing@soni.ltd.uk) | Yes/No |
| 4 | Frequency Response mode On | Yes/No  **Note:** If frequency response mode is **Off** the Unit Operator should switch it to **On** before continuing the test |
| 5 | Unit is on load and stable in agreement with CHCC. | 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 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 following a period of **XX minutes** where the unit has stabilised, the Unit operator records the Minimum load value. |  | Minimum Load \_\_\_\_\_MW.  Corrected Minimum Load: \_\_\_\_MW. |
| 5 | The Unit Operator monitors that the unit remains at Minimum Load for a minimum of [insert no of hours as agreed with TSO **but shall be no less than 12 hours**] hours. |  |  |
| 6 | **XX minutes** after Minimum Load was achieved the Unit Operator records the maximum value sustained over this period. This is recorded as the Minimum Load. |  | Minimum Load \_\_\_\_\_MW.  Corrected Minimum Load: \_\_\_\_MW. |
| 7 | **XX minutes** after Minimum Load was achieved the Unit Operator records the maximum value sustained over this period. This is recorded as the Minimum Load. |  | Minimum Load \_\_\_\_\_MW.  Corrected Minimum Load: \_\_\_\_MW. |
| 8 | **XX minutes** after Minimum Load was achieved the Unit Operator records the maximum value sustained over this period. This is recorded as the Minimum Load. |  | Minimum Load \_\_\_\_\_MW.  Corrected Minimum Load: \_\_\_\_MW. |
| 9 | **XX minutes** after Minimum Load was achieved the Unit Operator records the maximum value sustained over this period. This is recorded as the Minimum Load. |  | Minimum Load \_\_\_\_\_MW.  Corrected Minimum Load: \_\_\_\_MW.. |
| 10 | Following **XX hours**, the Unit operator contacts CHCC and notifies them that the specified time period has completed. |  |  |
| 11 | Unit operator follows CHCC instruction for **30 minutes** following time period at Minimum Load (Instruction may be Shutdown, Ramp up or maintain output). |  | Instruction from CHCC\_\_\_\_\_\_\_\_\_\_\_ |
| 12 | Unit operator ends data recording for all trends noted in Section 7.3. |  |  |

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

1. <https://www.soni.ltd.uk/how-the-grid-works/grid-codes/conventional-generator-co/index.xml> [↑](#footnote-ref-1)
2. For example simulation of the Generator performance characteristics under the test procedure [↑](#footnote-ref-2)