Steady-State Reactive Power (SSRP)

System Services

 Test Report

Interconnector

Unit Name

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# Document Version History

Revision 3.0 published 12th November 2019

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Version** | **Date** | **Comment** | **Name** | **Company** |
| 0.1 | Insert date | Minor version (v0.1) - First submission for review and approval | Insert name | Insert company |
| 1.0 | Insert Date | Revised to version 1.0 following approval by EirGrid, SONI.  | Insert Name | Unit Company Name |

# Introduction

The Unit shall submit the latest version of this test report template as published on the EirGrid or SONI websites[[1]](#footnote-2).

The report shall be developed for technical and non-technical readers and shall follow the agreed test programme. The report is submitted to generator\_testing@eirgrid.com or  generator\_testing @soni.ltd.uk as appropriate. This template is based on the published test procedure templates[[2]](#footnote-3).

Submission of this document is required if a Unit does not have and existing SSRP DS3 System Services Contract or is making changes or updates to any of the effected parameters.

To complete the report, the Unit shall have the following:

1. Recorded active and reactive power data as per the test procedure agreed with EirGrid, SONI; or
2. Performance Data showing full reactive power capability.

Any issue with meeting any requirements or completing this report, please contact generator\_testing@eirgrid.com or generation\_testing @soni.ltd.uk as appropriate

# Abbreviations

NCC National Control Centre

CHCC Castlereagh House Control Centre

SSRP Steady-State Reactive Power

MVAr Mega Volt Ampere – reactive

MW Mega Watt

TSO Transmission System Operator

MEC Maximum Export Capacity

MIC Maximum Import Capacity

kV kilovolt

Hz Hertz – unit of frequency

SVC Static Var compensator

Qrange, Import  Maximum MVAr range (leading and lagging) at the connection point when importing.

Qrange, Export  Maximum MVAr range (leading and lagging) at the connection point when exporting.

Prange, Import Active power range (from Registered MW Minimum to Registered MW Maximum) at the connection point when exporting.

Prange, Export Active power range (from Registered MW Minimum to Registered MW Maximum) at the connection point when exporting.

PMax Export Registered Export Capacity (MW) at connection point.

PMin Export Minimum Export Load (MW) at connection point.

PMax Import Registered Import Capacity (MW) at connection point.

PMin Import Minimum Import Load (MW) at connection point.

QMax, Import Maximum Lagging MVAr achieved at the connection point when importing.

QMax, Export Maximum Lagging MVAr achieved at the connection point when exporting.

QMin, Import Minimum Leading MVAr achieved at the connection point when importing.

QMin, Export Minimum Leading MVAr achieved at the connection point when exporting.

# Unit Data

|  |  |
| --- | --- |
| Unit test coordinator | Unit to Specify Name, Company and contact details. |
| Unit name | Name:\_\_\_\_\_\_\_\_\_ |
| Unit connection point | HV Bushings of T101 in XX 110kV station |
| Unit connection voltage | \_\_\_\_\_\_\_\_kV |
| Interconnector registered import capacity | \_\_\_\_\_\_\_\_\_\_\_MW |
| Interconnector registered export capacity | \_\_\_\_\_\_\_\_\_\_\_MW |
| Interconnector minimum import load | \_\_\_\_\_\_\_\_\_\_\_MW |
| Interconnector minimum export load | \_\_\_\_\_\_\_\_\_\_\_MW |
| Contracted MEC | \_\_\_\_\_\_\_\_\_\_\_MW |
| Contracted MIC | \_\_\_\_\_\_\_\_\_\_\_MW |
| Installed plant | Name: \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_MVA Name: \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_MW |
| Mode of operation  | Import / ExportSVC |

# System Services

The definitions referenced in this document are for indicative purposes only. In the event of inconsistency between the definitions in this document and those in the DS3 System Services Agreement, the definitions in the DS3 System Services Agreement shall prevail.

## Steady-State Reactive Power

SSRP is defined as the dispatchable reactive power range (QRange) in MVAr that can be provided across the full range of active power output (PRange)

## Reactive Power Factor calculation

$$RP Factor= \frac{Active Power Range across which reactive power can be provided \left(P\_{Range}\right)}{Registered Capacity}$$

$$SSRP Volume= Q\_{Range} x RP Factor$$

**Figure 1: Example graph showing the P and Q ranges. Min Load is shown as the bottom blue line (Pmin).**

# Results

## Report Summary

Testing was completed on [DATE].

*Comment on the results, highlighting any issues encountered in performing the test or in analysing the results.*

*[Insert Report summary]*

*[Include any relevant test notes here, relating to how the test was carried out or to any specific conditions encountered during the test.]*

*[Abnormal behaviour in the data (spikes, dips, unusual vibrations, etc.) shall be noted and documented. The reasons behind these shall be detailed along with any corrective actions taken and what its effects are on the unit and/or the result. If possible a clear graph of the issue should also be presented].*

*[Data shall be presented as a full PQ chart with significant points highlighted and clearly labelled. A table of values and/or results shall accompany the graph].*

## Table of results

|  |  |  |
| --- | --- | --- |
| **Import Mode** | **Value** | **Comments** |
| PMin Import, QMin Leading | \_\_\_\_\_\_MW ;\_\_\_\_\_\_\_MVAr |  |
| PMax Import , QMin Leading | \_\_\_\_\_\_MW ;\_\_\_\_\_\_\_MVAr |  |
| PMax Import , QMax Lagging | \_\_\_\_\_\_MW ;\_\_\_\_\_\_\_MVAr |  |
| PMin Import, QMax Lagging | \_\_\_\_\_\_MW ;\_\_\_\_\_\_\_MVAr |  |
| **Export Mode** | **Value** | **Comments** |
| PMax Export, QMin Leading | \_\_\_\_\_\_MW ;\_\_\_\_\_\_\_MVAr |  |
| PMax Export , QMin Leading | \_\_\_\_\_\_MW ;\_\_\_\_\_\_\_MVAr |  |
| PMax Export, QMax Lagging | \_\_\_\_\_\_MW ;\_\_\_\_\_\_\_MVAr |  |
| P Max Export , QMax Lagging | \_\_\_\_\_\_MW ;\_\_\_\_\_\_\_MVAr |  |
| **SVC Mode** | **Value** | **Comments** |
| SVC mode, full leading |  \_\_\_\_\_\_\_MVAr |  |
| SVC mode, full lagging  | \_\_\_\_\_\_\_MVAr |  |

## System Service Values

|  |  |  |
| --- | --- | --- |
| **Reading** | **Value** | **Comment** |
| Registered Import Capacity | \_\_\_\_\_\_MW |  |
| P range Import | \_\_\_\_\_\_\_MW to \_\_\_\_\_MW |  |
| Q range Import | \_\_\_\_\_\_MVAr to \_\_\_\_\_\_\_MVAr |  |
| RP factor Import |  | Insert Calculation and value per Section 6.2  |
| SRP Volume Import |  | Insert Calculation and value as per Section 6.2 |
| **Reading** | **Value** | **Comment** |
| Registered Export Capacity | \_\_\_\_\_\_MW |  |
| P range Export | \_\_\_\_\_\_\_MW to \_\_\_\_\_MW |  |
| Q range Export | \_\_\_\_\_\_MVAr to \_\_\_\_\_\_\_MVAr |  |
| RP factor Export |  | Insert Calculation and value per Section 6.2  |
| SRP Volume Export |  | Insert Calculation and value as per Section 6.2 |
| **Reading** | **Value** | **Comment** |
| Q range in SVC mode | \_\_\_\_\_\_MVAr to \_\_\_\_\_\_\_MVAr |  |
| RP Factor in SVC mode |  | Insert Calculation and value per Section 6.2 |
|  |  |  |
|  |  |  |

## Graph of results

[*Insert a full graph of the results showing the full reactive power capability of the unit*, *all relevant values shall be displayed, such as the full Qrange (x-axis) and the full P range (y-axis). Each corner point shall also have its value clearly labelled; the chart shall also have the theoretical values shown, conventional PQ chart shall include the OEL and UEL limiters].*



Figure 2: Example graph of a unit’s reactive power capability

1. http://www.eirgridgroup.com / <http://www.soni.ltd.uk/> [↑](#footnote-ref-2)
2. <http://www.eirgrid.com/operations/gridcode/compliancetesting/wfpstestprocedures/#d.en.17698> [↑](#footnote-ref-3)