

## G83/G59 Compliance Testing

Narec (National Renewable Energy Centre), providers of R&D, consultancy, test and demonstration facilities, is an independent centre dedicated to accelerating the deployment and grid integration of renewable energy and low carbon technologies.

Narec's Energy Link Laboratory, located in Blyth is capable of carrying out G83/1 compliance testing on equipment as well as G59/1 site testing.

Engineering Recommendations (ER) G59/1 and G83/1 are the recommendations for the connection of embedded generating plant to the District Network Organisers (DNO) distribution systems.

### G83 Testing

Engineering Recommendation G83/1 details the technical requirements for the connection of small scale embedded generators in parallel with public low voltage distribution networks. This recommendation covers small scale generator equipment rated at either 230V (1-phase) or 400V (3-phase) up to and including 16 amps per phase.

Figure 1 shows a typical schematic representation of a test set-up. Supply A is the generation equipment under test and supply B represents the distributed network supply.

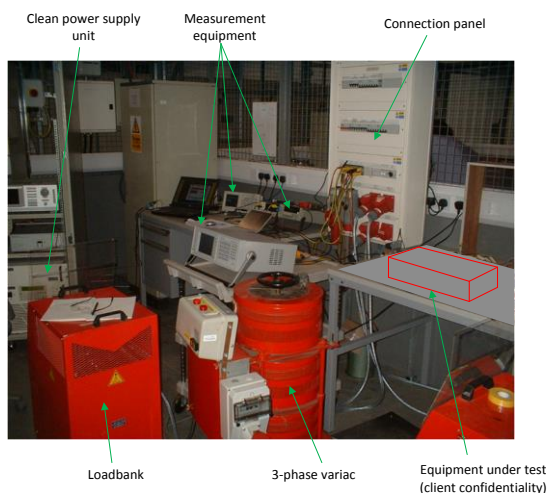


Figure 2 - Typical G83/1 test set-up in the laboratory

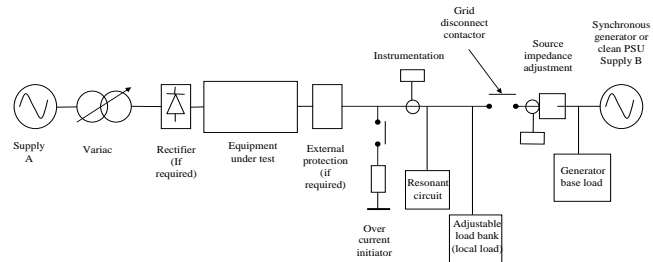


Figure 1 - Typical test arrangement

The following tests are suitable for photovoltaic (PV) and small wind turbines connected to the grid via an inverter or similar interface device:

- Over/under frequency
- Over/under voltage
- Loss of mains protection
- Harmonic emissions to BS EN 61000-3-2
- Voltage flicker to BS EN 61000-3-3
- Over current protection to BS7671
- Power factor
- Short circuit contribution
- DC injection
- Environmental testing
- Wiring regulation compliance

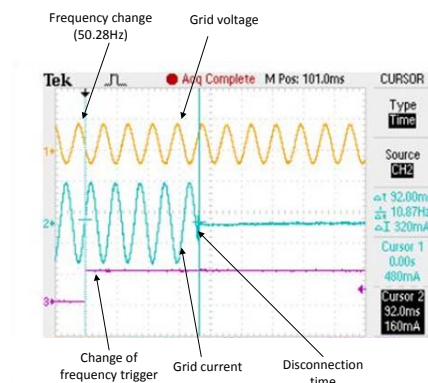


Figure 3 - Typical 'over frequency' measurement for an inverter under test validating the protective equipment

## Renewable Devices Ltd – G83/1 compliance tests

During the development of their Swift 1.5kW wind turbine, Renewables Devices Ltd approached Narec to conduct a G83/1 compliance test. Narec’s Energy Link Laboratory, Blyth was able to replicate the operation and grid connection of the machine, enabling the validation of the grid compliance elements of the inverter unit in accordance with the G83/1 standard.

Figure 4 - Swift 1.5kW wind turbine



## G59 Testing

Engineering Recommendation G59/1 relates to the connection of embedded generating plant to public electricity suppliers distribution systems for use where the connection is made to systems at, or below, 20kV and covers generators from 16 amps per phase up to 5MW.

The following set of G59 tests is suitable for validating the protective equipment:

- Over/under frequency
- Over/under voltage
- Loss of mains protection

Other protection could be required and may include the detection of:

- Neutral voltage displacement
- Over current
- Earth fault
- Reverse power

Figure 5 - Typical protection panel undergoing a G59/1 test



G59 test equipment

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## Micro and small wind turbine testing

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Narec has been independently assessed by BRE Global to conduct testing of micro and small wind turbines in accordance with the Microgeneration Certification Scheme (MCS) requirements. Narec offers a range of testing and consultancy services to assist developers and manufacturers of small wind turbine devices in accordance with industry standards.

## Micro and small wind testing services

Narec provide the following micro and small wind testing services:

- Pre-test advise and initial assessments
- Test site assessment and calibration
- Supply and installation of instrumentation
- Data collection and analysis
- On-site acoustic measurements
- Design calculation verification
- Report preparation for certification



Figure 6 - Evance Iskra R9000

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Charles Parsons Technology Centre, High Quay, Blyth, Northumberland NE24 2AZ  
Tel: +44 (0)1670 357770 | Fax: +44 (0)1670 357771 | Email: [gareth.wynne@narec.co.uk](mailto:gareth.wynne@narec.co.uk)

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