



G99 Connection Procedures Guidance Document

nationalgrid

Introduction

The tasks undertaken to get connected differ dependant on the size of the generating capacity. In general, the bigger the Power Generating Module, the more complex the connection requirements.

This guidance document focuses on the information exchanges that occur between the Customer, as the developer and National Grid Electricity Distribution (NGED) in relation to Engineering Recommendation G99 '*Requirements for the connection of generation equipment in parallel with public distribution networks on or after 27 April 2019*' (EREC G99).

It also provides the key actions for the Customer to undertake and complete to connect a Power Generating Module.

Definitions

For the purposes of this document, the following terms and definitions apply;

Customer	A person who is the owner or occupier of an installation or premises that are connected to the distribution network.
Connection Agreement	A contract between the Distribution Network Operator and the Generator, which includes the specific technical requirements for the Power Generating Module and the relevant requirements for the Power Generating Facility.
Connection Point(s)	The interface at which the Power Generating Module or Generator's Installation is connected to a Distribution Network, as identified in the Connection Agreement.
Distribution Network	An electrical network for the distribution of electrical power from and to a third party[s] connected to it, a transmission or another Distribution Network.
Electricity Act	The Electricity Act 1989 (as amended. including by the Utilities Act 2000 and the Energy Act 2004).
Energisation Operational Notification (EON)	A notification issued by the Distribution Network Operator (DNO) to a Generator prior to energisation of its internal network.
Final Operational Notification (FON)	A notification issued by the DNO to a Generator, who complies with the relevant specifications and requirements in this EREC G99, allowing them to operate a Power Generating Module by using the Distribution Network connection.
Generator	A person who generates electricity under licence or exemption under the Electricity Act 1989 (as amended by the Utilities Act 2000 and the Energy Act 2004) and whose Power Generating Facility is directly or indirectly connected to a Distribution Network. For the avoidance of doubt, also covers any competent person or agent working on behalf of the Generator. Often referred to as a distributed or embedded generator. Also for the avoidance of doubt, any Customer with generation connected to that Customer's Installation is a Generator.
Generating Unit	Any apparatus that produces electricity.
Installer	The person who is responsible for the installation of the Power Generating Module(s).
Integrated Micro Generation and Storage	Power Generating Modules that are Electricity Storage devices and Power Generating Modules that are not Electricity Storage devices that form part of a Generator's Installation.
Interim Operational Notification (ION)	A notification from the DNO to a Generator acknowledging that the Generator has demonstrated compliance, except for the Unresolved Issues as defined within EREC G99 or with specific items in the Connection Agreement in respect of the plant and apparatus specified in such notification.
Limited Operational Notification (LON)	A notification issued by the DNO to a Generator who had previously attained FON status but is temporarily subject to either a significant Modification or loss of capability resulting in non-compliance with the relevant specifications and requirements.
Micro-generator	A source of electrical energy and all associated interface equipment able to be connected to an electric circuit in a Low Voltage electrical installation and designed to operate in parallel with a public Low Voltage Distribution Network with nominal currents up to and including 16 A per phase.
Modification	Any actual or proposed replacement, renovation, modification, alteration or construction by a Generator to any Power Generating Module, or the manner of its operation.
Power Generating Facility (PGF)	A facility that converts primary energy into electrical energy and which consists of one or more Power Generating Module(s) connected to a network at one or more Connection Point(s).

Power Generating Module (PGM)	Any source of electrical energy, irrespective of the generation technology and Power Generating Module type including electricity storage devices when operating in export mode and includes vehicle to grid electric vehicles. A PGM can be either a Synchronous Power Generating Module or a Power Park Module.
Power Generating Module Document (PGMD)	A document provided by the Generator to the DNO for a Type B, Type C, or Type D Power Generating Module(s) which confirms the Power Generating Module's compliance with the technical criteria set out in this EREC G99 has been demonstrated and provides the necessary data and statements, including a statement of compliance.
Power Park Module (PPM)	Generating Units that are connected to the network either through power electronics (e.g. solar PV or electricity storage devices connected through an inverter) or asynchronously (e.g. some wind turbines are induction or asynchronous generation). They have a single connection point to the distribution network.
Synchronous Power Generator (SPGM)	An indivisible set of Generating Units (i.e. ones that cannot operate independently of each other) which generate electrical energy in synchronism.
Type A	A Power Generating Module with a Connection Point below 110 kV and a Registered Capacity of 0.8 kW or greater but less than 1 MW.
Type B	A Power Generating Module with a Connection Point below 110 kV and Registered Capacity of 1 MW or greater but less than 10 MW.
Type C	A Power Generating Module with a Connection Point below 110 kV and a Registered Capacity of 10 MW or greater but less than 50 MW.
Type D	A Power Generating Module with a Connection Point at or greater than 110 kV, and/or with a Registered Capacity of 50 MW or greater.
Type Tested	A product which has been tested to ensure that the design meets the relevant requirements of EREC G99, and for which the manufacturer has declared that all similar products supplied will be constructed to the same standards and will have the same performance.

Types of Power Generating Module, Power Park Modules and Synchronous Power Generating Modules

Power Generating Modules are categorised in EREC G99 as Power Park Modules (PPM) or Synchronous Power Generating Modules (SPGM). Both contain one or more Generating Units.

Power Park Modules are connected to the network either through power electronics (e.g. PV or electricity storage devices connected through an inverter) or asynchronously (e.g. some wind turbines are induction or asynchronous) they have a single Connection Point to the Distribution Network.

Classification of Type A to D is based on the registered capacity of the Power Generating Module (PGM), which is the total capacity of all generating units (GU) in the Power Park Module (PPM). See Figure 1.

Synchronous Power Generating Modules are one or more Generating Units which are unable to operate independently of each other, they are indivisible and therefore run in synchronism and form a Synchronous Power Generating Module.

Classification of Type A to D is based on the capacity of **each** PGM in the Power Generating facility Synchronous Power. Where Generating Units are connected via inverters, the inverter rating is deemed to be the generating unit rating. See Figure 2.

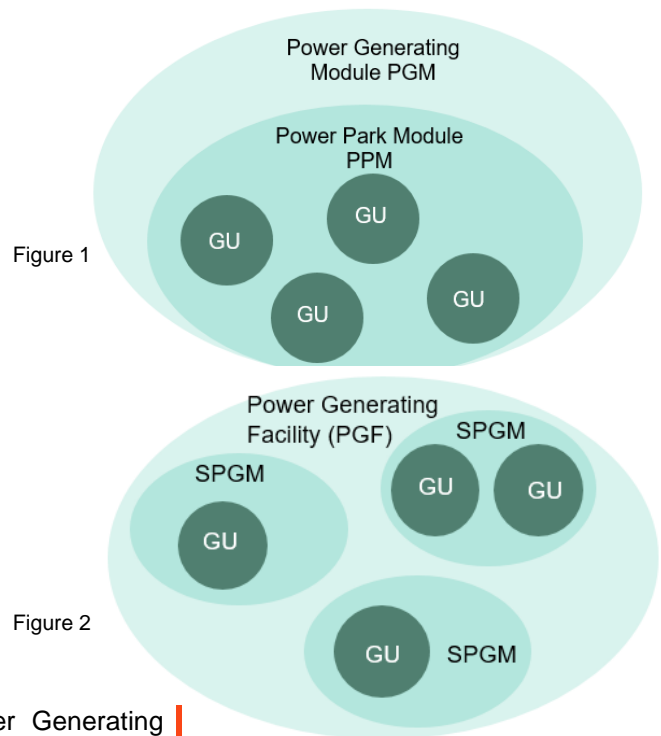


Figure 1 - Another Power Generating Facility comprising of three 500kW PV inverters form a PPM. The capacity of the PPM is the total capacity of all Generating Units, ie 1.5MW, therefore the PPM must meet the Type B requirements of EREC G99.

Figure 2 - A Power Generating Facility comprising of three 500kW SPGMs, has a total capacity of 1.5MW, the threshold for requirements is based on the capacity of each SPGM. As each SPGM is 500kW, they must meet the Type A requirements of EREC G99.

Generating Module Types (A to D)

The European Requirements for Generators (RfG) code a copy of which can be found [here](#) classifies Power Generating Modules by Type.

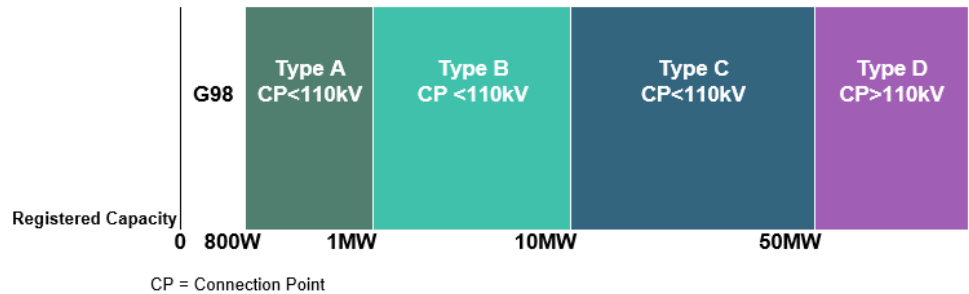
There are four types, A–D. Each type relates to the registered capacity and Connection Point of the Power Generating Module;

Type A: Greater than 800W & less than 1MW

Type B: 1MW to less than 10MW

Type C: 10MW to < 50MW

Type D: Greater than or equal to 50MW or where CP is >110kV



G99 Fast Track

SGI-1

All Generation/storage devices are each rated* at no more than 16A and the total of all the ratings* is also no more than 16A.**

To apply for this fast track process the following must be met:

- All of the generation and/or storage equipment is located in a single installation.
- All existing and new generation and/or storage equipment is type tested to G83, G59, G98, and G99.
- The basic design capacity of each piece of equipment is 32A or less.
- Any equipment that has a basic design capacity greater than 16A is making use of the manufacturer's facility to limit its output to 16A.
- The sum of all the ratings of all the equipment is no more than 16A per phase.

This is a fit and inform process. Provided all the points above have been met then an installer can fit the equipment and notify the DNO using an A3-3 form.

SGI-2

All Generation/storage devices are each rated* at no more than 16A and the total of all the ratings* is no more than 32A.

A G100 scheme limits the export to the distribution network to no more than 16A.

To apply for this fast track process the following must be met:

- All of the generation and/or storage equipment is located in a single installation.
- All existing and new generation and/or storage equipment is type tested to G83, G59, G98, and G99.
- The basic design capacity of each piece of equipment is 32A or less.
- The sum of all the ratings of all the equipment is no more than 32A per phase.
- A G100 export limitation scheme limits the export to the distribution network to be no more than 16A.

This is an application before installation process. Provided all the points above have been met then an installer can submit an A1-2 Form along with all other required information. Once submitted the installer will have an acceptance to proceed within 10 working days.

The installer will then have up to 3 months to install and commission the generation. Once this has been done Form A3-2 must be sent to the DNO within 28 days of commissioning.

SGI-3

All Generation/storage devices are each rated* at no more than 32A and the total of all the ratings* is no more than 60A.

A G100 scheme limits the export to the distribution network to no more than 32A.

To apply for this fast track process the following must be met:

- All of the generation and/or storage equipment is located in a single installation.
- All existing and new generation and/or storage equipment is type tested to G83, G59, G98, and G99.
- The basic design capacity of each piece of equipment is 32A or less.
- The sum of all the ratings of all the equipment is no more than 60A per phase.
- A G100 export limitation scheme limits the export to the distribution network to be no more than 32A.

This is an application before installation process. Provided all the points above have been met then an installer can submit an A1-2 Form along with all other required information. Once submitted the installer will have the outcome of the network study*** within 10 working days.

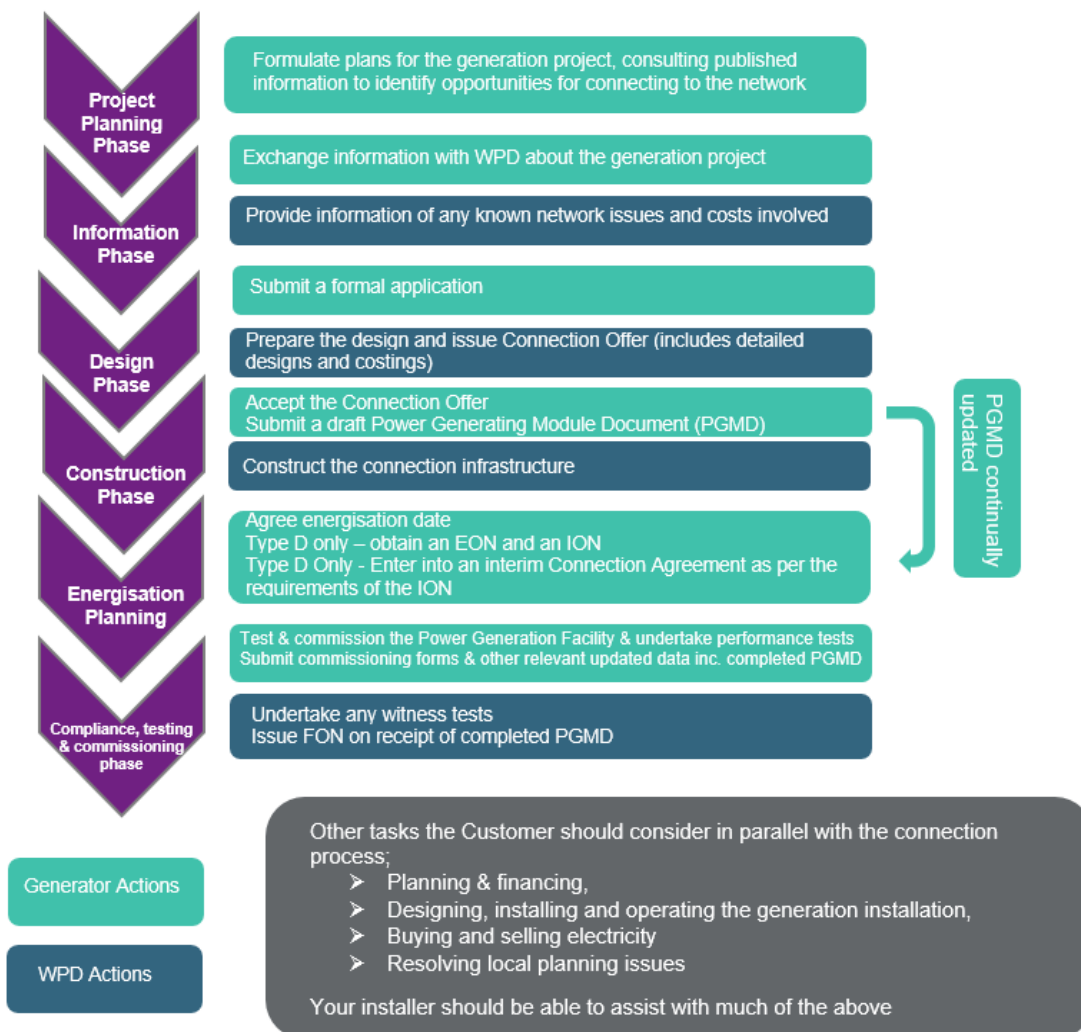
Provided the network study meets requirements the installer may proceed. If the study does not meet the requirements then the installer will be made aware the application will be processed as a G99 enquiry.

Once acceptance for the installation to proceed has been provided, the installer will then have up to 3 months to install and commission the generation. Once this has been done Form A3-2 must be sent to the DNO within 28 days of commissioning.

The technical and compliance requirements differ between Types. More detail can be found in the below table

G99 Connection Process and Responsibilities

The below diagram provides an overview of the phases structuring the standard G99 connection process for Types A-D PGMs that do not come under the scope of G98, i.e. anything that is not considered to be a Micro-generator.



Project Planning Phase

Discussing your plans with us at an early stage can help to provide a better insight to any potential network reinforcement and complexity issues that may arise and help you to establish the viability of an individual scheme before committing to a formal application and incurring associated costs (including assessment and design fees). We provide Connection Surgeries to help with your enquiries during this phase. More information can be found on our website [here](#).

Information Phase

If you are not ready to enter into a formal agreement for connection works, or you do not yet have full details of the specific conditions required, you may opt for a budget estimate to provide you with an estimate of the likely cost of the connection before you make a formal application to us. Please note, a budget estimate is a desktop exercise and will not involve a site visit, analysis of the wider network or any technical studies.

We also offer a feasibility study to establish the viability of making a connection to our network. We will carry out preliminary network analysis and provide an indicative connection assessments outlining the engineering scheme for the connection. Consideration of any reinforcement works will also be identified within the feasibility study. Feasibility Studies are chargeable service as set out in Section 7 – Part B of the Connections Charging Statement. Copies of our Connections Charging Statements for all four of our licence areas can be found on our website [here](#). The feasibility study will not provide you with a Connection Offer.

Design Phase

When you are ready to submit a formal application for connection, we will require information from you to enable us to make a reasonable assessment of the works required to facilitate the requested connections. This will include but is not limited to:

- Name and address of the Customer
- Name and address for correspondence, including agents/contractors working on behalf of the customer with their consent
- Site address
- Site plan at an appropriate scale to indicate the site boundary the layout of buildings and roads and, where the Customer expects a substation(s) to be required, the proposed location of the substation(s).
- Proposed location of each metering point
- Required date for connection
- Maximum capacity (kVA) at each metering point to be connected
- The extent of any contestable works to be carried out by the Customer or their appointed ICP
- Technical details of any electricity generator that is required to operate in parallel with the supply. For generating units connecting under EREC G99, the standard application form and relevant associated documents. As a minimum parts 1-3 shall be completed.

Type A PGFs less than 50kW should apply using the application form [A1-1](#). G99 Fast Track applications should be submitted using form [A1-2](#)

All other PGFs connecting under EREC G99 should apply using the standard application form for generators connecting under G99. A copy can be found on our website [here](#).

A connection offer will provide a description of the non-contestable and contestable works to be carried out in order to provide the customer with their required connections and the associated charges for us to carry out those works. The connection offer will include a letter of acceptance. The signing of the letter of acceptance enters the Customer into a binding contract for the works.

Connection offers are valid for 90 days after which they automatically expire.

There are circumstances we may enable a single extension to the validity of the acceptance for a further 90 day period, provided there is no detrimental impact to other customers in the connection queue. To request an extension the Customer must submit a request, in writing, no more than 10 days prior to the original connection offer validity expiry date. Upon receipt, we will confirm the revised expiry date or issue a letter outlining the reasons for refusal of the request.

We may withdraw a connection offer if the project is not progressing at a reasonable rate.

Construction Phase

Once a connection offer has been accepted, the Power Generating Module Document (PGMD) is submitted during the construction phase. This document confirms that the Customers PGM(s) comply with EREC G99.

The PGMD includes a checklist of criteria to meet, and a pointer to associated documents that demonstrate compliance.

A draft PGMD should be submitted at least 28 days before the Customer wishes to synchronise the PGM for the first time.

One PGMD is required for each PGM.

The PGMD is a continually evolving document and is not final until the PGM has been commissioned.

A copy of the PGMD template can be found on our website [here](#).

The technical and compliance requirements differ between Types. Details of which can be found in the below table;

	Fast Track SGI 1	Fast Track SGI 2	Fast Track SGI 3	Less than 50kW	Greater than 50kW & less than 1MW (Type A)	1MW to less than 10MW (Type B)	10MW to <50MW (Type C)	Greater than or equal to 50MW or >110kV (Type D)
Applicable Standard	G99	G99	G99	G99	G99	G99	G99	G99
Application	Not Required	Form A1-2	Form A1-2	Form A1-1	Standard Application Form	Standard Application Form	Standard Application Form	Standard Application Form
Notification	Form A3-3	Form A3-2	Form A3-2	Form A3-1	Form A3-1			
Evidence	Must be Type Tested	Must be Type Tested	Must be Type Tested	If not type tested- Form A2-1 Synchronous <50kW Or Form A2-3 Inverter connected gen	If not type tested- Form A2-2 synchronous & Form A2-3 inverter connected gen	PGMD Form B2-1	PGMD Form C2-1	PGMD Form C2-1
Compliance & commissioning checks					Form A2-4 if the interface protection is not type tested or for other site compliance tests	Form B2-2 is the interface protection is not type tested or for other site compliance tests	Form C2-2 if the interface protection is not type tested or for other site compliance tests	Form C2-2 if the interface protection is not type tested or for other site compliance tests
Installation						Form B3	Form C3	Form C3
EON, ION, FON						FON Types B-D: FON obtained during Compliance testing & commissioning phase	FON Types B-D: FON obtained during Compliance testing & commissioning phase	ION, EON, FON For Type D only: ION & EON obtained during Energisation Planning phase

*Document evolves over time and will not be complete prior to witnessing

**Unless a shorter time period is agreed between parties in advance

For Types C & D PGM(s) we will require additional notifications in advance of energisation. More detail of these notifications can be found in the below section 'G99 Operational Notifications'

G99 Operational Notifications

EON – Energisation Operational Notification (applicable to Type D only):

Once all the relevant documents (as listed in the above table) have been provided to NGED to our satisfaction, we will issue an Energisation Operational Notification to the Generator in advance of an Interim Operational Notification (Type D only) and a Final Operational Notification.

ION– Interim Operational Notification (applicable to Type D only):

The programme of initial compliance document submission to be agreed between the Generator and NGED as soon as possible after acceptance of a connection offer (during the construction phase). The PGMD, form C2-1 shall be completed as agreed in accordance with clause 19.3.2 of EREC G99 at least 28 days before the Generator synchronising the Power Generating Module for the first time.

A Type D PGM shall not be synchronised until the date specified by us within the ION. An ION is time limited for up to a maximum period of 24months of first issue. We may issue an extension to the ION provided the Generator has applied for a derogation for any remaining unsolved issues as detailed in clause 19.7 of EREC G99.

An ION includes the following limitations;

- For PPM(s) neither of the following figures will be exceeded;
 - Registered Capacity will be restricted to 20% of that agreed
 - 50MW

until the Generator has completed the voltage control tests (detailed in Annex C.9.2 of EREC G99) to our reasonable satisfaction. Following successful completion of this test each additional Generating Unit should be included in the voltage control scheme as soon as is technically possible.

An interim Connection Agreement will be issued for the period covering the above limitations.

FON – Final Operational Notification:

The Generator shall submit post energisation verification test documents within 28 days of synchronising in accordance with clause 17.4.2 of EREC G99 for Type B, clause 18.4.2 for Type C and clause 19.4.2 for Type D to obtain Final Operational Notification from NGED.

The required test documents for each Type can be found within the table held in the 'Construction Phase' section of this document.

Submission of the appropriate forms should be within 28 days of first synchronisation or a longer time period if agreed between both parties.

For all Type A PGMs the installation document acts as the Final Operational Notification (Forms A3-1 / A3-2)

A FON will be issued once we are satisfied all documentation and appropriate tests are complete.

Testing and Commissioning Phase

The appropriate tests and checks required under EREC G99 differ dependent on the Type.

All PGM(s) require the appropriate tests and checks, before we can issue the appropriate Operational Notification.

For Type A, refer to section 16 of EREC G99.

For Type B, refer to section 17 of EREC G99.

For Type C, refer to section 18 of EREC G99.

For Type D, refer to section 19 of EREC G99.

For all Type A PGMs an installation document must be completed and provided (A3-1 and A3-2). For Type A that does not include Type Tested Protection an A2-4 form will be required.

Results of the tests are to be recorded in the appropriate installation and commissioning confirmation form (form B3 for Type B, and for C3 for Types C & D).

If the PGM is using type-tested interface protection and / or you are demonstrating compliance with any other requirements on site, you will also be required to record the results of the tests in the 'Site Compliance and Commissioning Test Requirements' form (form B2-2 for Type B and form C2-2 for Types C & D).

Before a FON is issued, a final PGMD and standard application form will be required to be submitted, for SPGM this is usually within 28 days of first synchronisation, for PPM this it is expected that compliance testing and commissioning will not take longer than 6 months (we may be able to agree a phased approach or a longer period in advance).

G99 Witnessing Tests

All new PGMs will be tested and commissioned by the installer. Where the total generating capacity at the site exceeds 50kW we will normally witness some of these commissioning tests and inspect the site to verify that the installation complies with EREC G99. In some cases we may also decide to witness tests at smaller installations. However, Small Scale Embedded Generators (less than 16A per phase) connected under the terms of EREC G98 do not require any testing to be witnessed by us.

The list of tests that we need to witness will largely depend on whether the PGM is Type Tested or not.

Where G99 witnessing is required, the installer should contact us, between 15 and 30 working days (i.e. 3 to 6 weeks) before the proposed date of testing. This allows sufficient time for us to make someone available to witness the tests and is close enough to the date to minimise the risk of the tests being cancelled / postponed.

It should be noted that in order for the commissioning tests to be carried out (and witnessed by us) the PGM must be complete and our incoming electricity supply must be available. It is the installer's responsibility to provide the test equipment and someone familiar with the requirements to undertake and record the tests. At sites with several generators the tests for different generators may be carried out, and witnessed, at different stages.

G99 Witnessing tests are chargeable. The costs can be found under 'Witness Testing' on our website [here](#)

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