



## Engineering Recommendation G98 Issue 1

16 May 2018

Requirements for the connection of Fully Type Tested Micro-generators (up to and including 16 A per phase) in parallel with public Low Voltage Distribution Networks on or after 17 May 2019

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**Amendments since publication**

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## Foreword

This Engineering Recommendation (EREC) G98 is published by the Energy Networks Association (ENA) and comes into effect on 17 May 2019 for **Micro-generators** commissioned on or after that date. The definition of **Micro-generators** within this document includes electricity storage devices and hence this document also applies to electricity storage devices.

**Micro-generators** that conform to this EREC G98 can be connected in advance of 17 May 2019 as they also conform to the pre-existing EREC G83 requirements.

This document has been prepared and approved under the authority of the **Great Britain Distribution Code Review Panel**. This EREC G98 has been written to take account of the EU Network Code on Requirements for Grid Connection of Generators 14 April 2016.

**Micro-generators** must meet all of the requirements set out in this document. They must have the formal status of **Fully Type Tested** and have provided proof that the requirements have been met.

In order to conform to this EREC G98, the relevant part of the **Customer Installation** shall conform to the requirements of EN 50438 together with additional requirements also detailed in this document. The purpose of this EREC G98 is to explain the technical requirements for connection of **Micro-generators** for operation in parallel with a public **Low Voltage Distribution Network**, by addressing all technical aspects of the connection process, from standards of functionality to on-site commissioning.

The procedures described are designed to facilitate the connection of **Micro-generators** whilst maintaining the integrity of the **GB public Low Voltage Distribution Network**, both in terms of safety and supply quality.

This EREC G98 provides sufficient information to allow:

- a) **Micro-generator Manufacturers** to design and market a product that is suitable for connection to the **GB public Low Voltage Distribution Network**; and
- b) **Customers, Manufacturers and Installers of Micro-generators** to be aware of the requirements of the **Distribution Network Operator (DNO)** before the **Micro-generator** installation will be accepted for connection to the **DNO's Distribution Network**.

## 1 Legal aspects

- 1.1. In accordance with the **Electricity Safety, Quality and Continuity Regulations (ESQCR)** Regulation 22(2)(c) and the exemption to **ESQCR** Regulation 22(2) (c) granted in August 2008 by the Health & Safety Executive the **Installer** is required to ensure that the **DNO** is made aware of the **Micro-generator** installation before the time of commissioning or no later than 28 days (inclusive of the day of commissioning) after commissioning.
- 1.2. The **DNO** is under a legal obligation to disallow the connection of **Micro-generating Plant** unless it complies with this EREC G98 and relevant legal requirements such as the Distribution Code and the **ESQCR**.
- 1.3. Under the terms of **ESQCR** Regulation 26 the **DNO** may require a **Micro-generator** to be disconnected if it is a source of danger or interferes with the quality of supply to other consumers.
- 1.4. In addition to the requirements specified in this document which allows connection to the **GB** public **Low Voltage Distribution Network**, the **Micro-generator** and all of its components shall conform to all relevant legal requirements including European Directives and CE marking.
- 1.5. This document does not remove any statutory rights of an individual or organisation; equally it does not remove any statutory obligation on an individual or organisation.

## 2 Scope

- 2.1 This EREC G98 provides guidance on the **GB** technical requirements for the connection of **Micro-generators** in parallel with public **Low Voltage Distribution Networks**. The requirements set out in this EREC G98 are in addition to those of European standard EN 50438 which should be complied with in full.
- 2.2 There are two connection procedures described in this document. The first connection procedure covers the connection of a single **Micro-generating Plant**. A **Micro-generating Plant** is a single electrical installation that contains one or more **Micro-generators**, either single or multi-phase, the aggregate **Registered Capacity** of which is no greater than 16 A per phase<sup>1</sup>. The second connection procedure covers the connection of multiple **Micro-generators** (other than within a single **Customer's Installation**) in a **Close Geographic Region**, under a planned programme of work.
- 2.3 This document is applicable to **Fully Type Tested Micro-generators** for which a **Micro-generator Type Test Verification Report** demonstrates that the **Micro-generator** design meets all the requirements set out in this EREC G98. For **Micro-generators** greater than 16 A per phase the procedures described in EREC G99 apply.
- 2.4 For the purposes of this EREC G98 the **Registered Capacity** of 16 A per phase, single or multi-phase, 230/400 V **AC** corresponds to 3.68 kilowatts (kW) on a single-phase supply and 11.04 kW on a three-phase supply. The kW rating shall be based on the nominal voltage (i.e. 230 V) as defined in BS EN 50160 and the **ESQCR**.
- 2.5 Where there is an existing **Micro-generator** commissioned under EREC G83, any additional **Micro-generators** will be treated separately. Only the additional **Micro-generators** need to conform to EREC G98. However, if the total aggregate capacity of the installation exceeds 16 A per phase the EREC G99 process applies and the **DNO** needs to be consulted before the installation is undertaken.
- 2.6 Where **Micro-generators** form part of a combined heat and power facility the impact on the **DNO's Distribution Network** shall be assessed on the basis of their electrical **Registered Capacity**.
- 2.7 Where the **Micro-generator** includes an **Inverter** its **Registered Capacity** is deemed to be the **Inverter's** continuous steady state rating.<sup>2</sup>
- 2.8 For the avoidance of doubt where a **Customer's Installation** comprises a single **Connection Point** and more than one **Inverter**, which have an aggregate **Registered Capacity** of less than 16 A per phase, single or multi- phase, 230/400 V **AC**; the installation shall be considered as a single **Micro-generating Plant**.

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<sup>1</sup> The **Manufacturer** may restrict the rating of the **Micro-generator** by applying software settings provided these settings are not accessible to the **Customer**

<sup>2</sup> As footnote 1

- 2.9 This EREC G98 only specifies the requirements applicable to those **Micro-generators** that are designed to normally operate in parallel with a public **Low Voltage Distribution Network**. Those installations that are designed to operate in parallel with the **DNO's Distribution Network** for short periods (i.e. less than 5 minutes per month) or as an islanded installation should refer to EREC G99 as they are considered to be out of scope of this EREC G98, on the basis that it is not possible to devise generic rules that will ensure safe operation under all operating conditions.
- 2.10 Appendix 3 contains pro forma that relate to the connection, commissioning, testing, and decommissioning of **Micro-generators**.
- 2.11 EN 50438 Annex D together with Annexes A1 and A2 of this EREC G98 describe a methodology for testing various types of electrical interface between the **Micro-generator** and the public **Low Voltage Distribution Network**. The purpose of the type tests set out in EN 50438 Annex D is to demonstrate compliance with the requirements of EN 50438 and hence the requirements of this EREC G98. The **Micro-generator** can be considered an approved **Micro-generator** for connection to the **GB** public **Low Voltage Distribution Network** by:
- completing the **Type Test Verification Report** in Appendix 3 Form C of this EREC G98;
  - satisfying the tests in EN 50438 Annex D; and
  - satisfying the supplementary tests in Annex A1 (for **Inverter** connected **Micro-generators**) or Annex A2 (for synchronous **Micro-generators**) as appropriate of this EREC G98.
- 2.12 A **Manufacturer** of a **Fully Type Tested Micro-generator** should allocate a **Manufacturer's** reference number, which should be registered on the Energy Networks Association (ENA) **Type Test Verification Report** Register as the Product ID. It is not necessary for **Manufacturers** of **Fully Type Tested Micro-generators** to complete a **Type Test Verification Report**, Appendix 3 Form C, for each **Installation**.
- 2.13 **Connection Agreements**, energy trading and metering are considered to be out of scope. These issues are mentioned in this document only in the context of raising the reader's awareness to the fact that these matters might need to be addressed.
- 2.14 For **Micro-generators** classified as emerging technology, electricity storage devices and **Micro-generators** with a **Registered Capacity** of < 800 W, some clauses of this EREC G98 shall not apply. Details of emerging technology and their requirements are given in Appendix 1. The exclusions for electricity storage devices and **Micro-generators** with a **Registered Capacity** of < 800 W are also given in Appendix 1.
- 2.15 The structure of this document is as follows:

Section	Subject	Applicable parties
1	Foreword	All
2	Legal Aspects	All

<b>Section</b>	<b>Subject</b>	<b>Applicable parties</b>
3	Scope	All
4	References	All
5	Terms and Definitions	All
6	Connection Process and Testing Requirements	<b>Customer, Installer, Manufacturer, DNO</b>
7	Certification Requirements	<b>Manufacturer, DNO</b>
8	Operation and Safety	<b>Customer, Installer, DNO, Manufacturer</b>
9	Commissioning, Notification and Decommissioning	<b>Customer, Installer, DNO</b>
10	General Technical Requirements	<b>Manufacturer</b>
11	Interface Protection	<b>Manufacturer</b>
12	Quality of Supply	<b>Manufacturer, DNO</b>
13	Short Circuit Current Contribution	<b>Manufacturer, DNO</b>
Appendix 1	Emerging Technologies and other Exceptions	Emerging Technology Manufactures, <b>Manufacturer</b>
Appendix 2	Connection Procedure Flow Chart	<b>Customer, Installer, DNO</b>
Appendix 3	Micro-generator Documentation	All
Form A	Application for connection	<b>Customer, Installer, DNO</b>
Form B	Installation Document	<b>Customer, Installer, DNO</b>
Form C	Type Test Verification Report	<b>Customer, Installer, DNO</b>
Form D	Decommissioning Confirmation	<b>Customer, Installer, DNO</b>
Appendix 4	Certificate of Exemption	<b>Customer, Installer, DNO</b>
Annex A1	Requirements for Testing of Inverter Connected Micro-generators	<b>Manufacturer</b>
Annex A2	Requirements for Testing of Synchronous Micro-generators	<b>Manufacturer</b>