



Engineering Recommendation G59/2-1

Issue 2, Amendment 1 - April 2011

RECOMMENDATIONS FOR THE CONNECTION
OF GENERATING PLANT TO THE
DISTRIBUTION SYSTEMS OF LICENSED
DISTRIBUTION NETWORK OPERATORS

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1 PURPOSE

- 1.1 The purpose of this Engineering Recommendation is to provide guidance on the connection of **Generating Plant** to the **Distribution Systems** of licensed **Distribution Network Operators (DNOs)**. It is intended to address all aspects of the connection process from standards of functionality to site commissioning, such that **Customers, Manufacturers** and **Generators** are aware of the requirements that will be made by the local **DNO** before the **Generating Plant** will be accepted for connection to the **Distribution System**. This Engineering Recommendation replaces two previous Engineering Recommendations, ER G59/1 and its associated Engineering Technical Report ETR 113, and ER G75/1.
- 1.2 The guidance given is designed to facilitate the connection of **Generating Plant** whilst maintaining the integrity of the **Distribution System**, both in terms of safety and supply quality. It applies to all **Generating Plant** within the scope of Section 2, irrespective of the type of electrical machine and equipment used to convert any primary energy source into electrical energy.
- 1.3 This Recommendation is intended to provide guidance to **Generators** and **DNOs**. The mandatory requirements governing the connection of Distributed **Generators** are generally set out in the Distribution Planning and Connection Code 7 (DPC7) of the **Distribution Code** and in the Connection Conditions (CC) of the **Grid Code**. In the event of any conflict with this Engineering Recommendation, the provisions of the **Distribution Code** and **Grid Code** will prevail.

2 SCOPE

- 2.1 This Engineering Recommendation (ER) provides guidance on the technical requirements for the connection of **Generating Plant** to the **Distribution Systems** of licensed **DNOs**. For the purposes of this Engineering Recommendation, a **Generating Plant** is any source of electrical energy, irrespective of the prime mover and **Generating Unit** type. This ER applies to all **Generating Plant** which is not in the scope of ER G83/1-1 or is not compliant with ER G83/1-1 requirements.¹
- 2.2 This ER does not provide advice for the design, specification, protection or operation of **Generating Plant** itself. These matters are for the owners of plant to determine.

¹ Engineering Recommendation ER G83/1-1 – Recommendations for the connection of small-scale embedded generators (up to and including 16 A per phase) in parallel with public low-voltage distribution networks. This Engineering Recommendation provides guidance on the technical requirements for the connection of **Generating Units** rated up to and including 16 A per phase, single or multi-phase, 230/400 Volts AC. The recommendations cover the connection of a single **Generating Unit**, either single or multi-phase within a single Customer's installation and multiple **Generating Units** in a close geographic region, under a planned programme of work.

- 2.3 Specific separate requirements apply to **Generating Plant** comprising **Generating Units** less than or equal to 16A per phase and are covered in Engineering Recommendation G83/1-1. However, **Generating Units** $\leq 16A$ per phase that have not been type tested in accordance with ER G83/1-1 or whose technology type is not covered by one of the ER G83/1-1 annexes should comply with the requirements set in this document. Section 6 of this document provides more guidance on how to apply this document and ER G83/1-1 to **Generating Units** that are sized over the 16A threshold or are at or below the 16A threshold but do not meet the requirements of ER G83/1-1.
- 2.4 The connection of mobile generation owned by the **DNO**, G83/1-1 compliant **Generating Units** or offshore **Transmission Systems** containing generation are outside the scope of this Engineering Recommendation.
- 2.5 This document applies to systems where the **Generating Plant** can be paralleled with a **Distribution System** or where either the **Generating Plant** or a **Distribution System** with **Generating Plant** connected can be used as an alternative source of energy to supply the same electrical load.
- 2.6 The generic requirements for all types of **Generating Plant** within the scope of this document relate to the connection design requirements, connection application and notification process including confirmation of commissioning. The document does not attempt to describe in detail the overall process of connection from application, through agreement, construction and commissioning. It is recommended that the ENA publication entitled – “*Distributed Generation Connection Guide*” is consulted for more general guidance.
- 2.7 **Medium and Large Power Stations** are, in addition to the general requirements of this Engineering Recommendation, bound by the requirements of the **Grid Code**. In the case of **Large Power Stations**, the **Grid Code** will generally apply in full. For **Medium Power Stations**, only a subset of the **Grid Code** applies directly, and the relevant clauses are listed in DPC7 of the **Distribution Code**.
- 2.8 This Engineering Recommendation is written principally from the point of view of the requirements in Great Britain. There are some differences in the requirements in Great Britain and Northern Ireland, which are reflected in the separate Grid Codes for Great Britain and Northern Ireland, and the separate Distribution Code for Northern Ireland. These documents should be consulted where necessary, noting that the numbering of sections within these documents is not necessarily the same as in the **Distribution Code** for Great Britain and the **Grid Code** for Great Britain.

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REFERENCES

Health and Safety at Work etc Act (HASWA): 1974

The Health and Safety at Work etc Act 1974 also referred to as HASAW or HSW, is the primary piece of legislation covering occupational health and safety in the United Kingdom. The Health and Safety Executive is responsible for enforcing the Act and a number of other Acts and Statutory Instruments relevant to the working environment.

Electricity Safety, Quality and Continuity Regulations (ESQCR): 2002

The Electricity Safety, Quality and Continuity Regulations 2002 (Amended 2006) - Statutory Instrument Number 2665 -HMSO ISBN 0-11-042920-6 abbreviated to ESQCR in this document.

Electricity at Work Regulations (EaWR): 1989

The Electricity at Work regulations 1989 abbreviated to EaWR in this document.

BS 7671: 2008 Requirements for Electrical Installations

IEE Wiring Regulations: Seventeenth Edition.

BS 7430: 1999

Code of Practice for Earthing.

BS 7354

Code of Practice for Design of Open Terminal Stations.

BS EN 61000 series*

Electromagnetic Compatibility (EMC).

BS EN 61508 series*

Functional safety of electrical/ electronic/ programmable electronic safety-related systems.

BS EN 60255 series*

Measuring relays and protection equipment.

BS EN 61810 series*

Electromechanical Elementary Relays.

BS EN 60947 series*

Low Voltage Switchgear and Controlgear.

BS EN 60044-1: 1999

Instrument Transformers. Current Transformers.

BS EN 60034-4:2008

Methods for determining synchronous machine quantities from tests.

BS EN 61400-21:2008

Wind turbines. Measurement and assessment of power quality characteristics of grid connected wind turbines.

IEC 60909 series*

Short-circuit currents in three-phase a.c. systems. Calculation of currents.

IEC TS 61000-6-5: 2001

Electromagnetic Immunity Part 6.5 Generic Standards. Immunity for Power Station and Substation Environments.

IEC 60364-7-712: 2002

Electrical installations of buildings – Special installations or locations – Solar photovoltaic (PV) power supply systems.

ENA Engineering Recommendation G5/4 -1 (2005)

Planning levels for harmonic voltage distortion and the connection of non-linear equipment to transmission and distribution networks in the United Kingdom.

ENA Engineering Recommendation G74 (1992)

Procedure to meet the requirements of IEC 909 for the calculation of short-circuit currents in three-phase AC power systems.

ENA Engineering Recommendation G83/1-1 (2008)

Recommendations for connection of small-scale embedded Generators (up to 16 A per phase) in parallel with public low voltage distribution networks.

ENA Engineering Recommendation P2/6 (2006)

Security of Supply.

ENA Engineering Recommendation P18 (1978)

Complexity of 132kV circuits.

ENA Engineering Recommendation P28 (1989)

Planning limits for voltage fluctuations caused by industrial, commercial and domestic equipment in the United Kingdom.

ENA Engineering Recommendation P29 (1990)

Planning limits for voltage unbalance in the UK for 132 kV and below.

ENA Technical Specification 41-24 (1992)

Guidelines for the design, installation, testing and maintenance of main earthing systems in substations.

ENA Engineering Technical Report ETR 124 (2004)

Guidelines for actively managing power flows associated with the connection of a single distributed generation plant.

ENA Engineering Technical report ETR 126 (2004)

Guidelines for actively managing voltage levels associated with the connection of a single distributed generation plant.

ENA Engineering Technical report ETR 130 (2006)

The application guide for assessing the capacity of networks containing distributed generation.

** Where standards have more than one part, the requirements of all such parts shall be satisfied, so far as they are applicable.*

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DEFINITIONS

For the purposes of this Engineering Recommendation the following definitions apply:

Note: Except where otherwise stated, the terms defined in this section shall have the same meaning as in the Grid Code and the Distribution Code.

Act

The Electricity Act 1989 (as amended by the Utilities Act 2000 and the Energy Act 2004).

Authority

The Gas and Electricity Markets Authority established under Section 1 of the Utilities Act 2000 The Gas and Electricity Markets Authority established under Section 1 of the Utilities Act 2000.

Connection Agreement

An agreement between the **DNO** and the **User** or any **Customer** setting out the terms relating to a connection with the **DNOs Distribution System**.