

Wind turbine generator systems —

Part 2: Safety of small wind turbines

The European Standard EN 61400-2:1996 has the status of a
British Standard

ICS 27.180

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Committees responsible for this British Standard

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- British Wind Energy Association
- Electricity Association
- Health and Safety Executive
- Lloyds Register Engineering Services
- National Engineering Laboratory

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National foreword

This British Standard has been prepared by Technical Committee PEL/88 and is the English Language version of EN 61400-2:1996 *Wind turbine generator systems — Part 2: Safety of small wind turbines* published by the European Committee for Electrotechnical Standardization (CENELEC). It is identical with IEC 1400-2:1996, published by the International Electrotechnical Commission (IEC).

Cross-references

Publication referred to	Corresponding British Standard
EN 60529:1991 (IEC 529:1989)	BS EN 60529:1992 <i>Specification for degrees of protection provided by enclosures (IP code)</i>
IEC 1000 Series	BS EN 61000 Series <i>Electromagnetic compatibility (EMC)</i>
ENV 61400-1:1995 (IEC 1400-1 1994)	DD ENV 61400 <i>Wind turbine generator systems</i> DD ENV 61400-1:1995 <i>Safety requirements</i>
EN 55011:1991 (CISPR 11:1990)	BS EN 55011:1991 <i>Specification for limits and methods of measurement of radio disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment</i>
EN ISO 9001:1994 (ISO 9001:1994)	BS EN ISO 9001:1994 <i>Quality systems. Models for quality assurance in design, development, production, installation and servicing</i>
EN ISO 9002:1994 (ISO 9002:1994)	BS EN ISO 9002:1994 <i>Quality systems. Model for quality assurance in production, installation and servicing</i>
EN ISO 9003:1994 (ISO 9003:1994)	BS EN ISO 9003:1994 <i>Quality systems. Model for quality assurance in final inspection and test</i>

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 20, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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Descriptors: Wind generators, safety, design, computation, stresses, loads, forces, protection, protection against live parts, installation, maintenance, tests

English version

Wind turbine generator systems — Part 2: Safety of small wind turbines

(IEC 1400-2:1996)

Aérogénérateurs
Partie 2: Sécurité des petits aérogénérateurs
(CEI 1400-2:1996)

Windenergieanlagen
Teil 2: Sicherheit kleiner Windenergieanlagen
(IEC 1400-2:1996)

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

The text of document 85/53/FDIS, future edition 1 of IEC 1400-2, prepared by IEC TC 88, Wind turbine generator systems, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61400-2 on 1996-03-05.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1997-01-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1997-01-01

For products which have complied with the relevant national standard before 1997-01-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2002-01-01.

Annexes designated “normative” are part of the body of the standard.

Annexes designated “informative” are given for information only.

In this standard, annex ZA is normative and annex A is informative.

Annex ZA has been added by CENELEC.

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Introduction

This part of IEC 1400 outlines minimum safety requirements for small wind turbine generator systems, and is not intended for use as a complete design specification or instruction manual.

Compliance with this standard does not relieve any person, organization, or corporation from the responsibility of observing other applicable regulations.

1 General

1.1 Scope and object

This part of IEC 1400 deals with safety philosophy, quality assurance, engineering integrity and specifies requirements for the safety of small wind turbine generator systems (SWTGS), including design, installation, maintenance and operation under specified external conditions. Its purpose is to provide the appropriate level of protection against damage from hazards from these systems during their planned lifetime.

This standard is concerned with all subsystems of SWTGS such as protection mechanisms, internal electrical systems, mechanical systems, support structures, foundations and the electrical interconnection with the load.

This standard applies to SWTGS with swept area smaller than 40 m² and generating at a voltage below 1 000 V a.c. or 1 500 V d.c.

This standard should be used together with the appropriate IEC and ISO standards (see 1.2).

1.2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 1400. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 1400 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 364, *Electrical installations of buildings*.

IEC 529:1989, *Degrees of protection provided by enclosures (IP Code)*.

IEC 1000, *Electromagnetic compatibility (EMC)*.

IEC 1400-1:1994, *Wind turbine generator systems — Part 1: Safety requirements*.

IEC CISPR 11:1990, *Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment*.

ISO 2394:1986, *General principles on reliability for structures* Addendum 1 (1988).

ISO 9001:1994, *Quality systems — Model for quality assurance in design, development, production, installation and servicing*.

ISO 9002:1994, *Quality systems — Model for quality assurance in production, installation and servicing*.

ISO 9003:1994, *Quality systems — Model for quality assurance in final inspection and test*.

1.3 Definitions

For the purpose of this part of IEC 1400, the following definitions apply:

1.3.1

brake (wind turbines)

device capable of reducing the rotor speed or stopping rotation

1.3.2

control system (wind turbines)

subsystem that receives information about the condition of the wind turbine and/or its environment, and adjusts the wind turbine in order to maintain it within its operating limits

1.3.3

cut-in wind speed (V_{in})

lowest wind speed at hub height at which the wind turbine starts to produce useable power (see hub height)

1.3.4

cut-out wind speed (V_{out})

maximum wind speed at hub height at which the wind turbine is designed to produce useable power (see hub height)

1.3.5

design limits

maximum or minimum values used in a design

1.3.6

design situation

possible mode of wind turbine operation (for example power production, parking etc.)

1.3.7

external conditions (wind turbines)

factors affecting the operation of wind turbine, including the wind regime, other climatic factors (snow, ice, etc.)

1.3.8

fall-safe

design property of an item which prevents its failures from resulting in critical faults

1.3.9

gust

temporary change in the wind speed which may be characterized by its rise-time, its amplitude and its duration

1.3.10

horizontal axis wind turbine (HAWT)

wind turbine whose rotor axis is substantially parallel to the wind flow

1.3.11

hub

fixture for attaching the blades or blade assembly to the rotor shaft

1.3.12

hub height (wind turbines)

height of the centre of the wind turbine rotor above the terrain surface. For a vertical axis wind turbine, the hub height is the height of the equator plane

1.3.13

idling (wind turbines)

condition of a wind turbine generator that is rotating slowly and not producing power

1.3.14

limit state

state of a structure and the loads acting upon it beyond which the structure no longer satisfies the design requirements (see ISO 2394)

NOTE The purpose of design calculations (that is the design requirement for the limit state) is to keep the probability of a limit state being reached below a certain value prescribed for the type of structure in question (see ISO 2394).

1.3.15

load case

combination of a design situation and an external condition which results in a structural loading