

INTERNATIONAL STANDARD

IEC 61400-2

Second edition
2006-03

Wind turbines –

**Part 2:
Design requirements for small
wind turbines**

*This **English-language** version is derived from the original **bilingual** publication by leaving out all French-language pages. Missing page numbers correspond to the French-language pages.*



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**Part 2:
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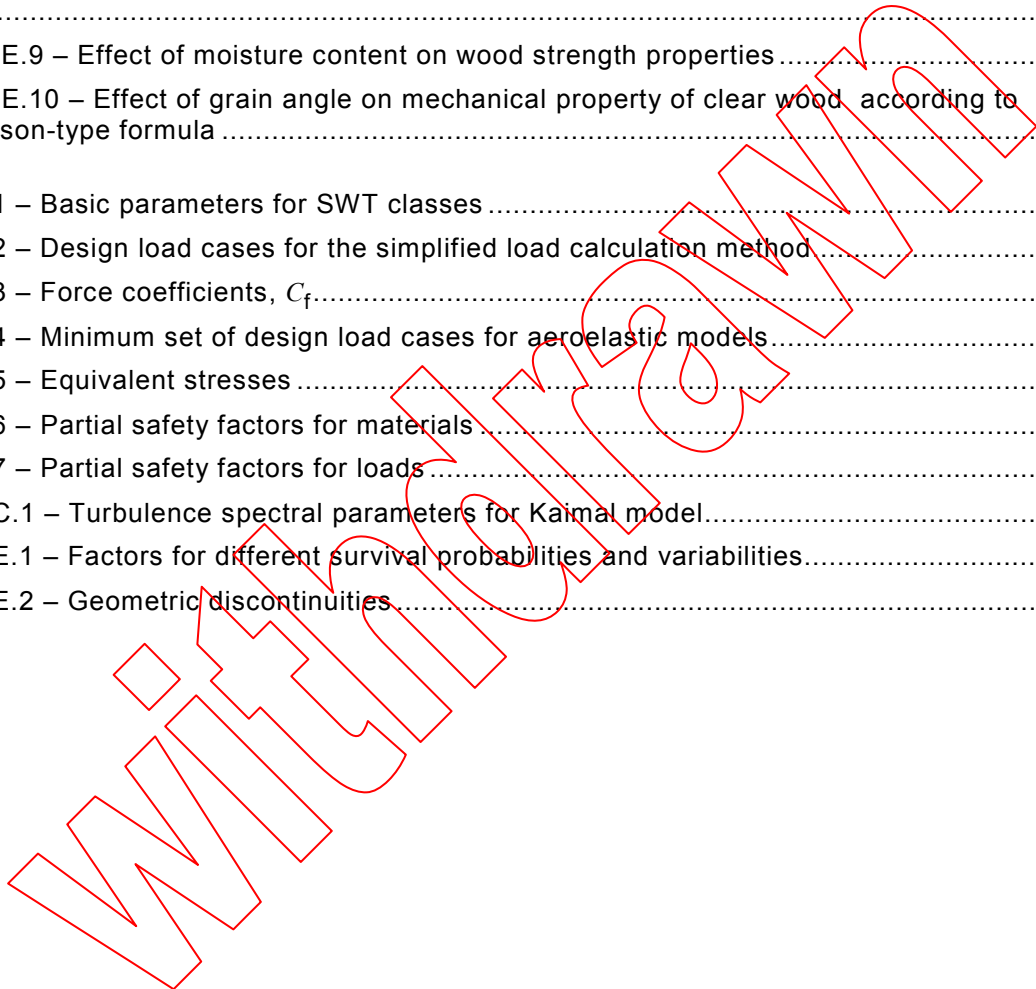
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

WIND TURBINES –

Part 2: Design requirements for small wind turbines

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 61400-2 has been prepared by IEC technical committee 88: Wind turbines.

This second edition cancels and replaces the first edition published in 1996. This edition constitutes a technical revision. Numerous substantive changes have been made. The most significant of these are:

- revised simplified equations based upon recent test and research results;
- several parameters in the simplified equations shall now be based upon test results;
- added option for use of aeroelastic models instead of simplified equations;
- expanded testing requirements.

The text of this standard is based on the following documents:

FDIS	Report on voting
88/254/FDIS	88/259/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

IEC 61400 consists of the following parts, under the general title *Wind turbines*:

- Part 1: Design requirements
- Part 2: Design requirements for small wind turbines
- Part 3: Design requirements for offshore wind turbines¹
- Part 11: Acoustic noise measurement techniques
- Part 12: Wind turbine power performance testing
- Part 12-1: Power performance measurements of electricity producing wind turbines
- Part 13: Measurement of mechanical loads
- Part 14: Declaration of apparent sound power level and tonality values
- Part 21: Measurement and assessment of power quality characteristics of grid connected wind turbines
- Part 23: Full-scale structural testing of rotor blades
- Part 24: Lightning protection
- Part 25-1: Communications for monitoring and control of wind power plants – Overall description of principles and models¹
- Part 25-2: Communications for monitoring and control of wind power plants – Information models¹
- Part 25-3: Communications for monitoring and control of wind power plants – Information exchange models¹
- Part 25-4: Communications for monitoring and control of wind power plants – Mapping to XML based communication profile¹
- Part 25-5: Communications for monitoring and control of wind power plants – Conformance testing¹

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

¹ Under consideration.

WIND TURBINES –

Part 2: Design requirements for small wind turbines

1 Scope

This part of IEC 61400 deals with safety philosophy, quality assurance, and engineering integrity and specifies requirements for the safety of Small Wind Turbines (SWTs) 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 part of IEC 61400 is concerned with all subsystems of SWT such as protection mechanisms, internal electrical systems, mechanical systems, support structures, foundations and the electrical interconnection with the load.

While this part of IEC 61400 is similar to IEC 61400-1, it does simplify and make significant changes in order to be applicable to small turbines.

This part of IEC 61400 applies to wind turbines with a rotor swept area smaller than 200 m², generating at a voltage below 1 000 V a.c. or 1 500 V d.c.

This part of IEC 61400 should be used together with the appropriate IEC and ISO standards (see Clause 2).

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60034-1, *Rotating electrical machines – Part 1: Rating and performance*

IEC 60034-2, *Rotating electrical machines – Part 2: Methods for determining losses and efficiency of rotating electrical machinery from tests (excluding machines for traction vehicles)*

IEC 60034-5, *Rotating electrical machines – Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) – Classification*

IEC 60034-8, *Rotating electrical machines – Part 8: Terminal markings and direction of rotation*

IEC 60038:1983, *IEC standard voltages*

Amendment 1 (1994)

Amendment 2 (1997)

IEC 60204-1, *Safety of machinery – Electrical equipment of machines – Part 1: General requirements*

IEC 60364-5-54, *Electrical installations of buildings – Part 5-54: Selection and erection of electrical equipment – Earthing arrangements, protective conductors and protective bonding conductors*

IEC 60721-2-1, *Classification of environmental conditions – Part 2-1: Environmental conditions appearing in nature – Temperature and humidity*

IEC 61400-1, *Wind turbines – Part 1: Design requirements*

IEC 61400-12-1, *Wind turbines – Part 12-1: Power performance measurements of electricity producing wind turbines*

IEC 61400-13, *Wind turbine generator systems – Part 13: Measurement of mechanical loads*

IEC 61400-23, *Wind turbine generator systems – Part 23: Full-scale structural testing of rotor blades*

IEC 61643-1, *Low-voltage surge protective devices – Part 1: Surge protective devices connected to low-voltage power distribution systems – Requirements and tests*

ISO/IEC 17025:2005, *General requirements for the competence of testing and calibration laboratories*

ISO 2394, *General principles on reliability for structures*

Withholding