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FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.

3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.

4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.

5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.

6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61400-1 has been prepared by IEC technical committee 88: Wind turbine systems.

This second edition of IEC 61400-1 cancels and replaces the first edition published in 1994.

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

<table>
<thead>
<tr>
<th>FDIS</th>
<th>Report on voting</th>
</tr>
</thead>
<tbody>
<tr>
<td>88/98/FDIS</td>
<td>88/103/RVD</td>
</tr>
</tbody>
</table>

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

Annexes A, B and C form an integral part of this standard.

Annex D is for information only.

A bilingual version of this standard may be issued at a later date.
INTRODUCTION

This International Standard outlines minimum safety requirements for wind turbine generator systems and is not intended for use as a complete design specification or instruction manual.

Any of the requirements of this standard may be waived if it can be suitably demonstrated that the safety of the system is not compromised. Nevertheless this waiver does not apply to clause 6.

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

This part of IEC 61400 deals with safety philosophy, quality assurance and engineering integrity, and specifies requirements for the safety of Wind Turbine Generator Systems (WTGS), including design, installation, maintenance, and operation under specified environmental conditions. Its purpose is to provide the appropriate level of protection against damage from all hazards from these systems during their planned lifetime.

This standard is concerned with all subsystems of WTGS such as control and protection mechanisms, internal electrical systems, mechanical systems, support structures and the electrical interconnection equipment.

This standard applies to WTGS with a swept area equal to or larger than 40 m².

This standard should be used together with the appropriate IEC/ISO standards identified in clause 2.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 61400. 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 61400 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 60364 (all parts), Electrical installations of buildings

IEC 60721-2-1:1982, Classification of environmental conditions – Part 2: Environmental conditions appearing in nature – Temperature and humidity

IEC 61000-3-2:1998, Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current \(\leq 16\) A per phase)

IEC 61000-3-3:1994, Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current \(\leq 16\) A


IEC 61000-4-3:1995, Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test
Terms and definitions

For the purpose of this International Standard, the following definitions apply:

3.1 annual average

 mean value of a set of measured data of sufficient size and duration to serve as an estimate of the expected value of the quantity. The averaging time interval shall be a whole number of years to average out non-stationary effects such as seasonality

3.2 annual average wind speed

wind speed averaged according to the definition of annual average

3.3 auto-reclosing cycle

event with a time period, varying from approximately 0.01 s to a few seconds, during which a breaker released after a grid fault is automatically reclosed and the line is reconnected to the network

3.4 blocking (wind turbines)

use of a mechanical pin or other device (other than the ordinary mechanical brake) to prevent movement, for instance of the rotor shaft or yaw mechanism

3.5 brake (wind turbines)

device capable of reducing the rotor speed or stopping rotation

3.6 catastrophic failure (wind turbines)

disintegration or collapse of a component or structure, that results in loss of vital function which impairs safety

3.7 characteristic value (of a material property)

value having a prescribed probability of not being attained in a hypothetical unlimited test series


IEC 61024-1:1990, Protection of structures against lightning – Part 1: General principles

IEC 61312-1:1995, Protection against lightning electromagnetic impulse – Part 1: General principles

ISO 2394:1986, General principles on reliability for structures