SLOVENSKI STANDARD
SIST EN IEC 61400-50:2022

01-december-2022

Sistemi za proizvodnjo energije na veter - 50. del: Meritve vetra - Pregled (IEC 61400-50:2022)

Wind energy generation systems - Part 50: Wind measurement - Overview (IEC 61400-50:2022)

Windenergieanlage - Teil 50: Windmessungen (IEC 61400-50:2022)

Systèmes de génération d'énergie éolienne – Partie 50: Mesurage du vent - Vue d'ensemble (IEC 61400-50:2022)

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27.180	Vetrne elektrarne	Wind turbine energy systems

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 61400-50

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English Version

Wind energy generation systems - Part 50: Wind measurement - Overview (IEC 61400-50:2022)

Systèmes de génération d'énergie éolienne - Partie 50: Mesurage du vent - Vue d'ensemble (IEC 61400-50:2022)

Windenergieanlage - Teil 50: Windmessungen (IEC 61400-50:2022)

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

The text of document 88/827/CDV, future edition 1 of IEC 61400-50, prepared by TC 88 "Wind energy generation systems" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61400-50:2022.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2023-07-04
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2025-10-04

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Endorsement notice

The text of the International Standard IEC 61400-50:2022 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standard indicated:

IEC 61400-1:2019 NOTE Harmonized as EN IEC 61400-1:2019 (not modified)

IEC 61400-2 NOTE Harmonized as EN 61400-2

IEC 61400-11 NOTE Harmonized as EN 61400-11

IEC 61400-12-1 NOTE Harmonized as EN 61400-12-1

IEC 61400-12-2 NOTE Harmonized as EN 61400-12-2

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Wind energy generation systems – Part 50: Wind measurement – Overview

Systèmes de génération d'énergie éolienne – Partie 50: Mesurage du vent – Vue d'ensemble

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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WIND ENERGY GENERATION SYSTEMS –

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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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IEC 61400-50 has been prepared by IEC technical committee 88: Wind energy generation systems. It is an International Standard.

This first edition of IEC 61400-50 is part of a structural revision that cancels and replaces the performance standards IEC 61400-12-1:2017 and IEC 61400-12-2:2013. The structural revision contains no technical changes with respect to IEC 61400-12-1:2017 and IEC 61400-12-2:2013, but the parts that relate to wind measurements, measurement of site calibration and assessment of obstacle and terrain have been extracted into separate standards.

The purpose of the re-structure was to allow the future management and revision of the power performance standards to be carried out more efficiently in terms of time and cost and to provide a more logical division of the wind measurement requirements into a series of separate standards which could be referred to by other use-case standards in the IEC 61400 series and subsequently maintained and developed by appropriate experts.

The text of this International Standard is based on the following documents:

Draft	Report on voting
88/827/CDV	88/863/RVC

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts in the IEC 61400 series, published under the general title *Wind energy generation systems*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

The purpose of the IEC 61400-50 series of standards is to provide uniform methodologies and requirements that will ensure consistency, accuracy and reproducibility in the measurement of the wind. In creating the IEC 61400-50 series of standards, a distinction is now made between the method of measurement of the wind and the various "use-cases" in other parts of IEC 61400 in which those wind measurements are applied (e.g. power performance, noise measurement, load measurement, resource assessment). It is anticipated that the IEC 61400-50 series of standards will be applied by:

a) wind turbine manufacturers testing prototype or serial production turbines with the aim of determining or verifying aspects of the turbine specification where the measured wind is a necessary input (e.g. power performance, noise, structural loads);
b) wind measurement equipment manufacturers providing instruments, meteorological masts and mounting hardware to the wind industry;
c) organizations and laboratories providing wind measurement instrumentation calibration services;
d) technical consultants delivering wind measurement services to wind turbine manufacturers, wind farm developers and operators, etc.;
e) wind turbine operators who need to verify that stated or required specifications are met and which require wind measurements as an input;
f) other committees developing standards in the IEC 61400 series which make reference to the specification of equipment and methods to be used in the measurement of the wind.

This series of related standards provides guidance in the wind measurement methods, equipment, classification, calibration and uncertainty assessment that can be used in the delivery of various use-case tests. The standards will benefit those parties involved in the manufacture, installation planning and permitting, operation, utilization, and regulation of wind turbines. The technically accurate measurement techniques recommended in these standards should be applied by all parties to ensure that continuing development and operation of wind turbines is carried out in an atmosphere of consistent and accurate communication relative to wind measurement. These standards present measurement, classification and calibration procedures expected to provide accurate results that can be replicated by others. Meanwhile, a user of these standards needs to be aware that not all wind measurement methods specified in these standards are applicable to all use-cases. The use-case standards (e.g. power performance) define which wind measurement methods and equipment are allowable and in which circumstances. Furthermore, the use-case standards may define further restrictions on the wind measurements (e.g. height of measurement). Therefore, a user should consider the most appropriate wind measurement method and standard in relation to the use-case to which the wind measurements are to be put before procuring the wind measurements.

The separated standards in the wind measurement series comprise:

a) IEC 61400-50, *Wind energy generation systems – Part 50: Wind measurement – Overview*
b) IEC 61400-50-1, *Wind energy generation systems – Part 50-1: Wind measurement – Application of meteorological mast, nacelle and spinner mounted instruments*
c) IEC 61400-50-2, *Wind energy generation systems – Part 50-2: Wind measurement – Application of ground-mounted remote sensing technology*
d) IEC 61400-50-3, *Wind energy generation systems – Part 50-3: Use of nacelle-mounted lidars for wind measurements*

Procedures for calibration, classification, mounting and derivation of the measurement uncertainty of cup anemometers and ultrasonic anemometers are given in IEC 61400-50-1. Procedures for calibration, classification and derivation of the measurement uncertainty of remote sensing devices are given in IEC 61400-50-2. Special care should be taken in the selection of the instruments and methods chosen to measure the wind because it can influence the result of the test.

WIND ENERGY GENERATION SYSTEMS –

Part 50: Wind measurements – Overview

1 Scope

The IEC 61400 series of standards addresses wind energy generation technical requirements up to the point of interconnection with the utility grid system. The IEC 61400-50 series of standards comprises a sub-set of standards which specify the requirements for equipment and methods to be used in the measurement of the wind.

Wind measurements are required as inputs to various tests and analyses specified in other use-case standards in the IEC 61400 series (e.g. power performance, resource assessment, noise measurement). Whereas those other standards define use-cases for wind measurements, the IEC 61400-50 series sets those wind measurement requirements which are independent of the use-case. Its purpose is to ensure that wind measurements and the evaluation of uncertainties in those measurements are carried out consistently across the wind industry and that wind measurements are carried out such that the uncertainties can be quantified and that those uncertainties are within an acceptable range.

This document provides a general introduction to the options that are available for wind measurement, which are further detailed in the other parts of the IEC 61400-50 series.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
complex terrain
terrain surrounding the test site that features significant variations in topography and terrain obstacles that can cause flow distortion

3.2
cut-in wind speed
lowest wind speed at which a wind turbine will begin to produce power

3.3
cut-out wind speed
wind speed at which a wind turbine cuts out from the grid due to high wind speed

3.4
data set
collection of data sampled over a continuous period