

© Copyright SEK Svensk Elstandard. Reproduction in any form without permission is prohibited.

Vindkraftverk – Del 50: Vindmätningar – Översikt

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

Som svensk standard gäller europastandarden EN IEC 61400-50:2022. Den svenska standarden innehåller den officiella engelska språkversionen av EN IEC 61400-50:2022.

Nationellt förord

Europastandarden EN IEC 61400-50:2022

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 61400-50, First edition, 2022 - Wind energy generation systems - Part 50: Wind measurement - Overview**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 61400-12-1, utg 2:2017 och SS-EN 61400-12-2, utg 1:2014 med eventuella tillägg, ändringar och rättelser, gäller ej fr o m 2025-10-04.

ICS 27.180.00

Denna standard är fastställd av SEK Svensk Elstandard, som också kan lämna upplysningar om **sakinnehållet** i standarden.
Postadress: Box 1284, 164 29 KISTA
Telefon: 08 - 444 14 00.
E-post: sek@elstandard.se. Internet: www.elstandard.se

Standarder underlättar utvecklingen och höjer elsäkerheten

Det finns många fördelar med att ha gemensamma tekniska regler för bl a mätning, säkerhet och provning och för utförande, skötsel och dokumentation av elprodukter och elanläggningar.

Genom att utforma sådana standarder blir säkerhetsfordringar tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

SEK är Sveriges röst i standardiseringsarbetet inom elområdet

SEK Svensk Elstandard svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

Stora delar av arbetet sker internationellt

Utformningen av standarder sker i allt väsentligt i internationellt och europeiskt samarbete. SEK är svensk nationalkommitté av International Electrotechnical Commission (IEC) och Comité Européen de Normalisation Electrotechnique (CENELEC).

Standardiseringsarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

Var med och påverka!

Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtida standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

SEK Svensk Elstandard

Box 1284
164 29 Kista
Tel 08-444 14 00
www.elstandard.se

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)

This European Standard was approved by CENELEC on 2022-10-04. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.



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

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

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

IEC 61400-13 NOTE Harmonized as EN 61400-13

IEC 61400-50-2 NOTE Harmonized as EN IEC 61400-50-2

IEC 61400-50-3 NOTE Harmonized as EN IEC 61400-50-3

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**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

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 27.180

ISBN 978-2-8322-5600-8

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references	6
3 Terms and definitions	6
4 Symbols, units and abbreviated terms	7
5 Wind measurement overview	8
6 Interfaces between standards	9
Bibliography.....	12
Figure 1 – Overview of relationship between standards in the IEC 61400-12 and IEC 61400-50 series	10
Table 1 – IEC 61400 series parts which make reference to wind measurements previously defined in IEC 61400-12-1	11

INTERNATIONAL ELECTROTECHNICAL COMMISSION

WIND ENERGY GENERATION SYSTEMS –**Part 50: Wind measurement – Overview**

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.
- 2) The formal decisions or agreements of 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 IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

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.