
Sistemi za proizvodnjo energije na veter - 12. del: Preskušanje zmogljivosti vetrnih turbin za proizvodnjo električne energije - Pregled (IEC 61400-12:2022)

Wind energy generation systems - Part 12: Power performance measurements of electricity producing wind turbines - Overview (IEC 61400-12:2022)

Windenergieanlagen - Teil 12: Messung des Leistungsverhaltens von Windenergieanlagen - Überblick (IEC 61400-12:2022)

Systèmes de génération d'énergie éolienne - Partie 12: Mesurages de performance de puissance des éoliennes de production d'électricité - Vue d'ensemble (IEC 61400-12:2022)

Ta slovenski standard je istoveten z: EN IEC 61400-12:2022

ICS:

27.180

Vetrne elektrarne

Wind turbine energy systems

SIST EN IEC 61400-12:2022

en

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN IEC 61400-12

October 2022

ICS 27.180

English Version

**Wind energy generation systems - Part 12: Power performance
measurements of electricity producing wind turbines - Overview
(IEC 61400-12:2022)**

Systèmes de génération d'énergie éolienne - Partie 12:
Mesurages de performance de puissance des éoliennes de
production d'électricité - Vue d'ensemble
(IEC 61400-12:2022)

Windenergieanlagen - Teil 12: Messung des
Leistungsverhaltens von Windenergieanlagen - Überblick
(IEC 61400-12:2022)

This European Standard was approved by CENELEC on 2022-10-10. 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

EN IEC 61400-12:2022 (E)**European foreword**

The text of document 88/830/CDV, future edition 1 of IEC 61400-12, prepared by IEC/TC 88 "Wind energy generation systems" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61400-12:2022.

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) 2023-07-10
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2025-10-10

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 61400-12:2022 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 61400-2 NOTE Harmonized as EN 61400-2

Annex ZA

(normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61400-12-1	-	Wind energy generation systems - Part 12- EN IEC 61400-12-1 - 1: Power performance measurement of electricity producing wind turbines	-	-
IEC 61400-12-2	-	Wind energy generation systems - Part 12- EN IEC 61400-12-2 - 2: Power performance of electricity producing wind turbines based on nacelle anemometry	-	-
IEC 61400-12-3	-	Wind energy generation systems - Part 12- EN IEC 61400-12-3 - 3: Power performance - Measurement based site calibration	-	-
IEC 61400-12-5	-	Wind energy generation systems - Part 12- EN IEC 61400-12-5 - 5: Power performance - Assessment of obstacles and terrain	-	-
IEC 61400-12-6	-	Wind energy generation systems - Part 12- EN IEC 61400-12-6 - 6: Measurement based nacelle transfer function of electricity producing wind turbines	-	-
IEC 61400-50	-	Wind energy generation systems - Part 50: EN IEC 61400-50 - Wind measurement - Overview	-	-
IEC 61400-50-1	-	Wind energy generation systems - Part 50- EN IEC 61400-50-1 ¹ - 1: Wind Measurement - Application of Meteorological Mast, Nacelle and Spinner Mounted Instruments	-	-
IEC 61400-50-2	-	Wind energy generation systems - Part 50- EN IEC 61400-50-2 - 2: Wind measurement - Application of ground-mounted remote sensing technology	-	-
IEC 61400-50-3	-	Wind energy generation systems - Part 50- EN IEC 61400-50-3 - 3: Use of nacelle-mounted lidars for wind measurements	-	-

¹ Under preparation. Stage at the time of publication: FprEN IEC 61400-50-1:2022.



IEC 61400-12

Edition 1.0 2022-09

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Wind energy generation systems –
Part 12: Power performance measurements of electricity producing wind
turbines – Overview**

**Systèmes de génération d'énergie éolienne –
Partie 12: Mesurages de performance de puissance des éoliennes de production
d'électricité – Vue d'ensemble**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 27.180

ISBN 978-2-8322-5620-6

**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

INTRODUCTION.....	5
1 Scope.....	6
2 Normative references	6
3 Terms and definitions	7
4 Symbols, units and abbreviated terms	8
5 Power performance method overview	9
6 Interfaces between International Standards	12
Bibliography.....	14
Figure 1 – Overview of relationship between standards in the IEC 61400-12 and IEC 61400-50 series	13
Table 1 – Overview of wind measurement configurations for power curve measurements that meet the requirements of this document.....	12

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN IEC 61400-12:2022

<https://standards.iteh.ai/catalog/standards/sist/e16e1395-1f3b-47ee-a3f9-7295c885ddae/sist-en-iec-61400-12-2022>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

WIND ENERGY GENERATION SYSTEMS –**Part 12: Power performance measurements
of electricity producing wind turbines – 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 61400-12 has been prepared by IEC technical committee 88: Wind energy generation systems. It is an International Standard.

This first edition of IEC 61400-12 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
88/830/CDV	88/866/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.

SIST EN IEC 61400-12:2022

<https://standards.iteh.ai/catalog/standards/sist/c16c1395-1d36-47cc-a319-1f3e23323032/iec-61400-12-2022>

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 IEC 61400-12 series comprises a sub-set of standards which are for use in the evaluation and measurement of the power performance characteristics of wind turbines. The power performance characterization of wind turbines of all types and sizes is covered.

IEC TC 88 has made this revision to reduce the complexity and to improve the maintainability of the previous version. Wind measurement procedures have been extracted from the performance standard, recognizing that wind measurements need to be referenced from other standards, such as in loads, noise and resource assessment measurements. IEC TC 88 recommends that the restructured standards gradually take over the previous standards before Maintenance Cycle Reports are written on the restructured standards introducing new technical requirements. Revision of the restructured documents should be proposed at the same time to incorporate such technical changes, recommendations, clarifications and simplifications.

The purpose of the IEC 61400-12 series is to provide a uniform methodology that will ensure consistency, accuracy and reproducibility in the measurement and analysis of power performance by wind turbines. These International Standards have been prepared with the anticipation that they would be applied by:

- a) a wind turbine manufacturer striving to meet well-defined power performance requirements and/or a possible declaration system;
- b) a wind turbine purchaser in specifying such performance requirements;
- c) a wind turbine operator who can be required to verify that stated, or required, power performance specifications are met for new or refurbished units;
- d) a wind turbine planner or regulator who needs to be able to accurately and fairly define power performance characteristics of wind turbines in response to regulations or permit requirements for new or modified installations.

The IEC 61400-12 series provides guidance in the measurement, analysis, and reporting of power performance testing for wind turbines. These International Standards will benefit those parties involved in the manufacture, installation planning and permitting, operation, utilization, and regulation of wind turbines. The technically accurate measurement and analysis 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 turbine performance. These standards present measurement and reporting procedures expected to provide accurate results that can be replicated by others. Meanwhile, a user of these standards should be aware of differences in performance or the measurement of performance that arise from large variations in wind shear and turbulence. Not all of the test methods specified in the IEC 61400-12 series enable quantification of the impact of shear and turbulence. Therefore, a user should consider the influence of these differences, the most appropriate test method/standard and the data selection criteria in relation to the purpose of the test before contracting the power performance measurements.

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