SLOVENSKI STANDARD
SIST EN IEC 61400-50-3:2022

01-april-2022

Sistemi za proizvodnjo energije na veter - 50-3. del: Uporaba na gondolo pritrjenih merilnikov LiDAR za meritve vetra (IEC 61400-50-3:2022)

Wind energy generation systems - Part 50-3: Use of nacelle mounted lidars for wind measurements (IEC 61400-50-3:2022)

Windenergieanlagen - Teil 50-3: Verwendung von auf der Gondel montierten LiDARs für Windmessungen (IEC 61400-50-3:2022)

Systèmes de génération d'énergie éolienne - Partie 50-3: Utilisation de lidars montés sur nacelle pour le mesurage du vent (IEC 61400-50-3:2022)

Ta slovenski standard je istoveten z: **EN IEC 61400-50-3:2022**

ICS:

27.180	Vetrne elektrarne	Wind turbine energy systems

SIST EN IEC 61400-50-3:2022 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 61400-50-3

February 2022

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English Version

Wind energy generation systems - Part 50-3: Use of nacelle-mounted lidars for wind measurements (IEC 61400-50-3:2022)

Systèmes de génération d'énergie éolienne - Partie 50-3: Utilisation de lidars montés sur nacelle pour le mesurage du vent
(IEC 61400-50-3:2022)

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(IEC 61400-50-3:2022)

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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

Ref. No. EN IEC 61400-50-3:2022 E

European foreword

The text of document 88/845/FDIS, future edition 1 of IEC 61400-50-3, prepared by IEC/TC 88 "Wind energy generation systems" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61400-50-3:2022.

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) 2022-11-11
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2025-02-11

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The text of the International Standard IEC 61400-50-3:2022 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 61400-1:2019 NOTE Harmonized as EN IEC 61400-1:2019 (not modified)

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.

Publication	Year	Title	EN/HD	Year
IEC 61400-12-1	2017	Wind turbines - Part 12-1: Power performance measurements of electricity producing wind turbines	EN 61400-12-1	2017
IEC 61400-12-2	2013	Wind turbines - Part 12-2: Power performance of electricity-producing wind turbines based on nacelle anemometry	EN 61400-12-2	2013

IEC 61400-50-3

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Wind energy generation systems –
Part 50-3: Use of nacelle-mounted lidars for wind measurements

Systèmes de génération d'énergie éolienne –
Partie 50-3: Utilisation de lidars montés sur nacelle pour le mesurage du vent

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

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International Standard IEC 61400-50-3 has been prepared by IEC technical committee TC 88: Wind energy generation systems.

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

Draft	Report on voting
88/845/FDIS	88/853/RVD

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.

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 publication 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.

WIND ENERGY GENERATION SYSTEMS –

Part 50-3: Use of nacelle-mounted lidars for wind measurements

1 Scope

The purpose of this part of IEC 61400 is to describe procedures and methods that ensure that wind measurements using nacelle-mounted wind lidars are carried out and reported consistently and according to best practice. This document does not prescribe the purpose or use case of the wind measurements. However, as this document forms part of the IEC 61400 series of standards, it is anticipated that the wind measurements will be used in relation to some form of wind energy test or resource assessment.

The scope of this document is limited to forward-looking nacelle-mounted wind lidars (i.e. the measurement volume is located upstream of the turbine rotor).

This document aims to be applicable to any type and make of nacelle-mounted wind lidar. The method and requirements provided in this document are independent of the model and type of instrument, and also of the measurement principle and should allow application to new types of nacelle-mounted lidar.

This document aims to describe wind measurements using nacelle-mounted wind lidar with sufficient quality for the use case of power performance testing (according to IEC 61400-12-1:2017). Readers of this document should consider that other use cases may have other specific requirements.

This document only provides guidance for measurements in flat terrain and offshore as defined in IEC 61400-12-1:2017, Annex B. Application to complex terrain has been excluded from the scope due to limited experience at the time of writing this document.

Corrections for induction zone or blockage effects are not included in the scope of this document. However, such correction or uncertainty estimation due to blockage effects may be applied if required by the use case, under the responsibility of the user.

The purpose of this document is to provide guidance for wind measurements. HSE requirements (e.g. laser operation) are out of the scope of this document although they are important.

2 Normative references

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.

ISO/IEC 61400-12-1:2017, *Wind energy generation systems – Part 12-1: Power performance measurements of electricity producing wind turbines*

ISO/IEC 61400-12-2:2013, *Wind energy generation systems – Part 12-2: Power performance of electricity-producing wind turbines based on nacelle anemometry*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61400-12-1:2017 and the following apply. ISO and IEC maintain terminological databases for use in standardization at the following addresses:

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

3.1
carrier-to-noise ratio
CNR
measure of signal quality for a pulsed lidar defined as the ratio between the heterodyne current power and the total noise power in the detection bandwidth

Note 1 to entry: By default, CNR is CNR wide band (CNR_{wb}). We can also define CNR narrow band (CNR_{nb}) as the ratio between the heterodyne current power and the noise power in the Doppler peak bandwidth. This does not depend on spectral signal processing. CNR is different from Signal-to-Noise Ratio (SNR). SNR is the ratio between the Doppler peak power and the noise power standard deviation.

Note 2 to entry: $SNR = CNR_{\mathrm{nb}}\sqrt{n}$, with n: number of averaged pulses.

3.2
continuous wave lidar
CW lidar
a lidar transmitting a laser signal of constant amplitude and frequency and receiving backscattered light at the same time

3.3
correlated uncertainties
a pair of uncertainty components in which an unknown error on one of the components is correlated to some degree to the error on the other component

Note 1 to entry: The value of the correlation coefficient can vary between -1 and 1.

[SOURCE: JCGM 100:2008; 5.2]

3.4
data availability
ratio between the number of measurement points accepted on the basis of a predefined data quality and the maximum number of measurement points that can be acquired during a given measurement period

3.5
final values
values provided by the nacelle lidar system for use in wind energy assessment applications such as WTG power performance testing

Note 1 to entry: Therefore, the accuracy of the final value is the key consideration when using nacelle lidar in wind energy applications. Examples of final values include (but are not limited to) horizontal wind speed and wind direction.

3.6
free wind speed
wind speed that would be present at the turbine location if the turbine was not there