



SLOVENSKI STANDARD
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01-maj-2026

Sistemi za proizvodnjo energije na veter - 16. del: Standardna oblika za izmenjavo krivulj moči in pripadajočih informacij

Wind energy generation systems - Part 16: Standard format for sharing power curves and associated information

Sample Document

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88/1161/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

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IEC TC 88 : WIND ENERGY GENERATION SYSTEMS	
SECRETARIAT: Denmark	SECRETARY: Mrs Christine Weibøl Bertelsen
OF INTEREST TO THE FOLLOWING COMMITTEES:	HORIZONTAL FUNCTION(S):
ASPECTS CONCERNED:	
<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING Attention IEC-CENELEC parallel voting The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.	<input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING

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TITLE:

Wind energy generation systems – Part 16: Standard format for sharing power curves and associated information.

PROPOSED STABILITY DATE: 2028

NOTE FROM TC/SC OFFICERS:

There was a mistake on the URL in clause 5. The schema (with associated examples, tests and resources) is available on GitHub at <https://github.com/IEC-61400/power-curve-schema>

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- [OSD NC roles overview](#)
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**Wind energy generation systems –
Part 16: Standard format for sharing power curves and associated
information.**

FOREWORD

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IEC 61400-16 was prepared by IEC technical committee 88: Wind energy generation systems. It is an International Standard.

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

Draft	Report on voting

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.

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Introduction

Wind turbine [power curves and associated information \(3.1.17\)](#) (thrust curves, acoustic emissions, [turbine model characteristics \(3.1.25\)](#) , design bases and operating modes) are necessary for the accurate and efficient modelling of energy production, environmental impact, and turbine suitability. To facilitate adoption of the standard, data other than basic [power curve \(3.1.16\)](#) information is considered optional.

Prior to this standard, [power curve \(3.1.16\)](#) information was communicated in many different ways with varying degrees of completeness. Often the necessary information was spread across multiple documents requiring human interaction and error-prone manual transcription. Furthermore, power curves were becoming more complex with different operating modes, ranges of [air density \(3.1.2\)](#) and [turbulence intensity \(3.1.26\)](#) , thermal de-rates, thrust settings, and more. The growing complexity and lack of automation made data management quite challenging.

This standard is intended to enable progress toward digitalisation, especially seamless data interchange, to enable improved:

- time-to-market for new wind turbine sales (e.g. by accelerating turnaround for OEMs' local sales teams),
- time-to-financial-close for new wind farms,
- automation and workflow between internal and external teams, and
- management of technical, commercial and reputational risk (e.g. from human error in Energy Yield Analysis and other processes).

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1 Scope

The Scope of the IEC 61400-16 standard is to establish a common content, terminology and structure applicable to all wind turbine OEMs for the sharing of wind turbine [power curves and associated information \(3.1.17\)](#) (for background, see [Annex A](#)) in a machine-readable format. Throughout the remainder of this document, this common structure is defined by a Power Curve Schema. A [JSONSchema \(3.1.11\)](#) defines how to structure and populate a specific [JSON \(3.1.10\)](#) document (for more detail, see [Annex B](#)), and can be used for automated data validation.

The [power curves and associated information \(3.1.17\)](#) communicated within a [JSON \(3.1.10\)](#) document (which is compliant with the Power Curve Schema) covers:

- Document metadata
- The [turbine model characteristics \(3.1.25\)](#)
- Design basis information
- Operating mode information, where each mode contains
 - Power (as a function of wind speed and optionally other parameters)
 - Thrust (as a function of wind speed and optionally other parameters)
 - Optional acoustic emissions (as a function of wind speed and other parameters)
- Power de-rating details

JSON documents containing power curves and associated information shall be based on the JavaScript Object Notation ("JSON") format ISO/IEC 21778:2017 and shall follow the specifications in this document (i.e. conform to the Power Curve Schema).

Security, document integrity (e.g. digital signing) and distribution of data rests with the authors and users of the data and is outside the scope of the standard.

Measured power curves can be represented using the Power Curve Schema but details relating to the measurement configuration, statistics of the measurement results and other details specific to power performance measurements cannot be captured.

This standard does not specify document generation, display, checking or publishing processes which may be achieved using third party or custom tools (e.g. automated PDF report generation from the JSON data).

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 21778:2017, *Information technology - The JSON data interchange syntax*

EN IEC 61400-1:2019, *Wind energy generation systems - Part 1: Design requirements*

3 Terms and definitions

The Terms and definitions clause is a mandatory element of the text.

For rules on the drafting of the Terms and definitions, refer to the [ISO/IEC Directives, Part 2:2018, Clause 16](#).

To insert a new terminological entry, go to the *Structure* tab and click on *Insert Term entry* .

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

3.1 Defined terms

3.1.1

acoustic emission

sound power emitted by a wind turbine at source, described as a function of frequency and/or wind speed for a specific turbine operating mode

Note 1 to entry: Typically, the frequency data are provided as one-third octave bands.

Note 2 to entry: Typically, wind speed data are provided with respect to hub height or a 10 m reference height.

3.1.2

air density

the mass of air molecules within a given volume, measured in kilograms per cubic meter

3.1.3

application programming interface

or API, is a set of rules allowing software applications to communicate with other software applications

3.1.4

available hub heights

selection or range of hub heights at which the turbine may be constructed

3.1.5

Bulk Richardson Number (BRN)

a dimensionless ratio in meteorology related to the dissipation of turbulence divided by the shear production (the generation of turbulence kinetic energy caused by wind shear) of turbulence.

Note 1 to entry: Bulk Richardson Number is an approximation of the Gradient Richardson number.

Note 2 to entry: High values indicate unstable and/or weakly-sheared environments; low values indicate weak instability and/or strong vertical shear.

3.1.6

characteristic turbulence intensity

Value of turbulence intensity I_{15} as defined in IEC61400-1 Ed2.

Note 1 to entry: This value, I_{15} , is used in IEC61400-1 Ed 2 and should not be mistaken for the [reference turbulence intensity \(3.1.19\)](#), I_{ref} , used in IEC61400-1 Eds. 3 and 4.

3.1.7

cut

condition under which a wind turbine is switched on or off when wind speed exceeds or falls below a specified threshold, based on a specified averaging time period

3.1.7.1**low-cut-in**

type of cut representing the transition from not generating to generating, as wind speed increases from below the cut threshold

3.1.7.2**low-cut-out**

type of cut representing the transition from generating to not generating, as wind speed decreases from above the cut threshold

3.1.7.3**high-cut-out**

type of cut representing the transition from generating to not generating, as wind speed increases from below the cut threshold

3.1.7.4**high-cut-in**

type of cut representing the transition from not generating to generating, as wind speed decreases from above the cut threshold

3.1.8**design basis**

the specific criteria against which a wind turbine has been designed for safe operation, including permissible environmental conditions and operational ranges

Note 1 to entry: The plural form, design bases, is used extensively in the schema.

3.1.9**hub height**

height of the centre of the wind turbine rotor above the terrain surface

Note 1 to entry: For a vertical axis wind turbine the hub height is the height of the equator plane.

Note 2 to entry: For an offshore wind turbine hub height is referenced to mean sea level

[SOURCE: IEC60050 415-05-06, modified note 2 has been added]

3.1.10**JSON**

shorthand for JavaScript Object Notation, an open and widely used syntactic framework for data interchange and storage, as defined by ISO/IEC 21778:2017

3.1.10.1**JSON key**

string enclosed in quotation marks which is the name of the variable to which a value will then be assigned within the JSON data-interchange format

[SOURCE: ISO/IEC 21778:2017]

3.1.10.2**JSON property**

in the context of JSON, a property is a key-value pair in an object, binding the value to the key

3.1.10.3**JSON value**

string, number, boolean expression, array or object value within the JSON data-interchange format

[SOURCE: ISO/IEC 21778:2017]