SLOVENSKI STANDARD
SIST EN 61400-13:2016/A1:2022

01-marec-2022

Vetrne turbine - 13. del: Meritve mehanskih obremenitev - Dopolnilo A1 (IEC 61400-13:2015/AMD1:2021)

Wind turbines - Part 13: Measurement of mechanical loads (IEC 61400-13:2015/AMD1:2021)

Windenergieanlagen - Teil 13: Messung von mechanischen Lasten (IEC 61400-13:2015/AMD1:2021)

Éoliennes - Partie 13: Mesurage des charges mécaniques (IEC 61400-13:2015/AMD1:2021)

Ta slovenski standard je istoveten z: EN 61400-13:2016/A1:2022

ICS:

27.180	Vetrne elektrarne	Wind turbine energy systems

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61400-13:2016/A1

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English Version

Wind turbines - Part 13: Measurement of mechanical loads (IEC 61400-13:2015/AMD1:2021)

Éoliennes - Partie 13: Mesurage des charges mécaniques (IEC 61400-13:2015/AMD1:2021)

Windenergieanlagen - Teil 13: Messung von mechanischen Lasten (IEC 61400-13:2015/AMD1:2021)

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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 88/795/CDV, future IEC 61400-13/AMD1, prepared by IEC/TC 88 "Wind energy generation systems" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61400-13:2016/A1:2022.

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) 2022-10-07
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2025-01-07

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Endorsement notice

The text of the International Standard IEC 61400-13:2015/AMD1:2021 was approved by CENELEC as a European Standard without any modification.

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 1
AMENDEMENT 1

Wind turbines –
Part 13: Measurement of mechanical loads

Éoliennes –
Partie 13: Mesurage des charges mécaniques

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WIND TURBINES –

Part 13: Measurement of mechanical loads

AMENDMENT 1

FOREWORD

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This amendment has been prepared by IEC technical committee 88: Wind energy generation systems.

The text of this amendment is based on the following documents:

Draft	Report on voting
88/795/CDV	88/821/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 Amendment 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.

INTRODUCTION

This amendment to IEC 61400-13:2015 addresses the errors found in Annex B which impact a significant portion of that annex.

Annex B
(informative)

Procedure for the evaluation of uncertainties in load measurements on wind turbines

B.2.3 Total uncertainty

B.2.3.3 Total uncertainty

Replace Equation (B.7) with the following new equation:

$$u_{\mathrm{t}} = \sqrt{u_{\mathrm{cal}}^2 + u_{\mathrm{sig}}^2} \tag{B.7}$$

B.3 Uncertainties of binned averaged values

B.3.3 Uncertainty of the bin scatter

Replace Equation (B.8) with the following new equation:

$$u_{\mathrm{scat}} = stdev_{\mathrm{sig}} / \sqrt{N} \tag{B.8}$$

B.3.4 Uncertainty of the x-axis quantity

Replace Equation (B.9) with the following new equation:

$$u_x = u_{x,i} \times \frac{y_i - y_{i-1}}{x_i - x_{i-1}} \tag{B.9}$$

B.3.5 Uncertainty of bin averaged mean values

Replace Equation (B.10) with the following new equation:

$$U_{\mathrm{mean}} = \sqrt{u_{\mathrm{t}}^2 + u_{\mathrm{scat}}^2 + u_x^2} \tag{B.10}$$

B.5 Examples of an uncertainty evaluation

B.5.1 Example for analytical shunt calibration of tower torque

B.5.1.1 Uncertainty components

Replace Table B.1 with the following table:

Table B.1 – Uncertainty components

Quantity	Symbol	Uncertainty	Unit	Source of information	Category	Distribution	Comment
Material parameters, cross section geometry and gauges factor in an installation							
Gauges factor	u_k	1	%	Datasheet	B	Gaussian	–
Misalignment	$u_{F_{sens}}$	3	°	Estimation	B	Rectangular	–
Diameter at cross section	u_{D_i}	2,5	mm	Estimation	B	Gaussian	–
Wall thickness at cross section	u_{T_w}	0,1	mm	Estimation	B	Gaussian	–
Young modulus	u_E	5	%	Estimation	B	Gaussian	–
Poisson ratio	u_v	5	%	Estimation	B	Gaussian	–
Amplifier calibration							
Amplifier and measurement uncertainty concerning gain	$u_{sig_{gain}}$	0,1	%	Datasheet / Calibration certificate	B	Gaussian	Measurement value
Amplifier and measurement uncertainty concerning offset	$u_{sig_{offset}}$	0,1	%	Datasheet / Calibration certificate	B	Rectangular	Upper value of the measurement range 10 V
Quantization resolution (Offset)	u_Q	≈0,3	mV	Datasheet	B	Rectangular	16 Bit A/D converter, measurement range ±10 V
Calibration device	$u_{R_{SH}}$	0,1	%	Datasheet / Calibration certificate	B	Gaussian	Value shunt resistant
Gauges resistance	$u_{R_{SG}}$	1	%	Datasheet	B	Gaussian	
Signal uncertainty							
Signal uncertainty	s_i			Tests, statistics, estimations	A	Gaussian	Evaluation according to B.2.3.2

B.5.1.2 Calibration uncertainty of an analytical calibration

Replace Equation (B.11) with the following new equation:

$$M = G \times SM_t \times \varepsilon \times 2 \tag{B.11}$$

Replace Equation (B.13) with the following new equation:

$$M = G \times SM_t \times \frac{2}{k} \times \frac{U_o}{U_i} \tag{B.13}$$