

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Wind turbines –
Part 13: Measurement of mechanical loads**

**Éoliennes –
Partie 13: Mesurage des charges mécaniques**



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INTERNATIONAL
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CONTENTS

FOREWORD.....	8
INTRODUCTION.....	10
1 Scope.....	11
2 Normative references	11
3 Terms and definitions	11
4 Symbols, units and abbreviations	14
5 General	16
5.1 Document structure.....	16
5.2 Safety during testing.....	17
6 Test requirements.....	17
6.1 General.....	17
6.2 Test site requirements	17
6.3 Measurement load cases	17
6.3.1 General	17
6.3.2 MLCs during steady-state operation	18
6.3.3 MLCs during transient events	18
6.3.4 MLCs for dynamic characterization	19
6.3.5 Capture matrices	20
6.4 Quantities to be measured	23
6.4.1 General	23
6.4.2 Load quantities	23
6.4.3 Meteorological quantities	25
6.4.4 Wind turbine operation quantities.....	25
6.5 Turbine configuration changes	26
7 Instrumentation.....	27
7.1 Load quantities	27
7.1.1 Types of sensors	27
7.1.2 Choice of sensor location	27
7.1.3 Measurement of blade root bending moments.....	27
7.1.4 Blade bending moment distribution	28
7.1.5 Blade torsion frequency/damping.....	28
7.1.6 Measurement of rotor yaw and tilt moment	28
7.1.7 Measurement of the rotor torque.....	28
7.1.8 Measurement of tower base bending	28
7.1.9 Tower top bending moments.....	28
7.1.10 Tower mid bending moments	29
7.1.11 Tower torque	29
7.1.12 Tower top acceleration	29
7.1.13 Pitch actuation loads (on hub side of pitch bearing)	29
7.2 Meteorological quantities	29
7.2.1 Measurement and installation requirements.....	29
7.2.2 Icing potential.....	29
7.2.3 Atmospheric stability.....	29
7.3 Wind turbine operation quantities.....	30
7.3.1 Electrical power.....	30

7.3.2	Rotor speed or generator speed	30
7.3.3	Yaw misalignment.....	30
7.3.4	Rotor azimuth angle.....	30
7.3.5	Pitch position.....	30
7.3.6	Pitch speed	30
7.3.7	Brake moment	30
7.3.8	Wind turbine status.....	30
7.3.9	Brake status	30
7.4	Data acquisition system	31
7.4.1	General	31
7.4.2	Resolution	31
7.4.3	Anti-aliasing.....	31
8	Determination of calibration factors	31
8.1	General.....	31
8.2	Calibration of load channels.....	32
8.2.1	General	32
8.2.2	Blade bending moments	33
8.2.3	Main shaft moments	33
8.2.4	Tower bending moments.....	34
8.2.5	Tower torque	34
8.3	Calibration of non-load channels.....	35
8.3.1	Pitch angle	35
8.3.2	Rotor azimuth angle.....	35
8.3.3	Yaw angle.....	35
8.3.4	Wind direction.....	35
8.3.5	Pitch actuation loads	35
8.3.6	Brake moment	36
9	Data verification	36
9.1	General.....	36
9.2	Verification checks.....	36
9.2.1	General	36
9.2.2	Blade moments	37
9.2.3	Main shaft	38
9.2.4	Tower	38
10	Processing of measured data	39
10.1	General.....	39
10.2	Fundamental load quantities	39
10.3	Load quantities for larger turbines.....	39
10.4	Wind speed trend detection.....	39
10.5	Statistics.....	40
10.6	Rainflow counting	40
10.7	Cumulative rainflow spectrum	40
10.8	Damage equivalent load.....	40
10.9	Wind speed binning	41
10.10	Power spectral density.....	42
11	Uncertainty estimation	42
12	Reporting.....	42
Annex A (informative)	Example co-ordinate systems.....	46

A.1	General.....	46
A.2	Blade co-ordinate system.....	46
A.3	Hub co-ordinate system	46
A.4	Nacelle co-ordinate system	47
A.5	Tower co-ordinate system	48
A.6	Yaw misalignment.....	49
A.7	Cone angle and tilt angle	49
A.8	Rotor azimuth angle.....	50
A.9	Blade pitch angle	50
Annex B (informative) Procedure for the evaluation of uncertainties in load measurements on wind turbines.....		51
B.1	List of symbols.....	51
B.2	General procedure	52
B.2.1	Standard uncertainty	52
B.2.2	Analytical combination of standard uncertainties.....	53
B.2.3	Total uncertainty.....	54
B.3	Uncertainties of binned averaged values.....	55
B.3.1	General	55
B.3.2	Uncertainty of calibration and signal	55
B.3.3	Uncertainty of the bin scatter	55
B.3.4	Uncertainty of the x-axis quantity.....	55
B.3.5	Uncertainty of bin averaged mean values	55
B.4	Standard uncertainty of DEL and load spectra	56
B.5	Examples of an uncertainty evaluation	56
B.5.1	Example for analytical shunt calibration of tower torque.....	56
B.6	Determination and use of calibration matrix	63
B.6.1	Determination of the calibration matrix.....	63
B.6.2	Use of the calibration matrix	64
B.6.3	Time series.....	65
Annex C (informative) Sample presentation of mechanical load measurements and analysis		67
C.1	General.....	67
Annex D (informative) Recommendations for offshore measurements.....		79
Annex E (informative) Load model validation		81
E.1	General.....	81
E.2	Method for loads comparison	82
E.2.1	Statistical binning	82
E.2.2	Spectral functions	83
E.2.3	Fatigue spectra.....	84
E.2.4	Point by point	84
Annex F (informative) Methods for identification of wind speed trends		86
F.1	List of symbols.....	86
F.2	General.....	86
F.3	Trend identification methods	87
F.4	Ongoing procedure	91
Annex G (informative) Data acquisition considerations.....		92
G.1	Data acquisition system	92
G.1.1	General	92

G.1.2	Resolution	92
G.1.3	Sampling model and filtering.....	93
G.1.4	Other considerations	95
Annex H (informative)	Load calibration	96
H.1	General.....	96
H.2	Gravity load calibration of the blade bending.....	96
H.3	Analytical calibration of the tower bending moments	97
H.4	External load calibration of the rotor torque.....	98
Annex I (informative)	Temperature drift.....	99
I.1	General.....	99
I.2	Known issues.....	100
I.3	Recommendations	100
Annex J (informative)	Mechanical load measurements on vertical axis wind turbines	101
J.1	General.....	101
J.2	Terms and definitions.....	101
J.3	Coordinate systems	101
J.4	Quantities to be measured	102
J.4.1	Fundamental loads	102
J.5	Measurements	103
J.5.1	Measurement of blade attachment bending moment.....	103
J.5.2	Blade mid-span bending moment.....	103
J.5.3	Blade modal frequency/damping	103
J.5.4	Connecting strut bending moment.....	103
J.5.5	Connecting strut axial force	104
J.5.6	Connecting strut modal frequency/damping	104
J.5.7	Rotor shaft torque.....	104
J.5.8	Tower normal bending	104
Bibliography.....		105
Figure 1 – Fundamental wind turbine loads: tower base, rotor and blade loads		24
Figure A.1 – Blade co-ordinate system.....		46
Figure A.2 – Hub co-ordinate system		47
Figure A.3 – Nacelle co-ordinate system.....		48
Figure A.4 – Tower co-ordinate system.....		48
Figure A.5 – yaw misalignment.....		49
Figure A.6 – Cone angle and tilt angle		49
Figure B.1 – Explanation of used symbols.....		61
Figure C.1 – Hub-height wind speed as a function of time.....		67
Figure C.2 – Hub-height turbulence intensity as a function of hub-height wind speed.....		68
Figure C.3 – Turbulence intensity trending as a function of hub-height wind speed.....		68
Figure C.4 – Global capture matrix with all loads channels operating.....		69
Figure C.5 – IEC example turbine at 9,1 m/s – Wind turbine operational and meteorological quantities		70
Figure C.6 – IEC example turbine at 9,1 m/s – Major load components.....		71
Figure C.7 – 10-minute statistics for blade 1 root edge bending		72
Figure C.8 – Power spectral density of blade 1 root edge bending		73

Figure C.9 – Cumulative rainflow spectrum for blade 1 root edge bending during test period	75
Figure C.10 – IEC example turbine normal shutdown at 9,5 m/s – Wind turbine operational and meteorological quantities	77
Figure C.11 – IEC example turbine normal shutdown at 9,5 m/s – Major load components	78
Figure D.1 – Example of wave spectrum and monopile response	79
Figure D.2 – Example of wave spectrum	80
Figure E.1 – Measured data	82
Figure E.2 – Simulated data	82
Figure E.3 – Comparison of wind speed binned averaged 10 min. statistics	83
Figure E.4 – Comparison of 1 Hz equivalent loads	83
Figure E.5 – Comparison of 1 Hz equivalent loads (wind speed binned)	83
Figure E.6 – Comparison of PSD functions	83
Figure E.7 – Comparison of fatigue spectra	84
Figure E.8 – Point by point comparison of wind speed time histories	85
Figure E.9 – Point by point comparison of load time histories	85
Figure F.1 – Comparison of measured wind speed (v_{meas}), smoothing filtered wind speed (v_{filt}) and resulting trend-free wind speed (v_{HP})	87
Figure F.2 – Differences of turbulence intensities calculated with un-filtered and filtered wind speed versus mean measured wind speed	89
Figure F.3 – Ratio of turbulence intensities calculated with un-filtered and filtered wind speed versus mean measured wind speed	90
Figure G.1 – Anti-aliasing check	93
Figure I.1 – Observed scatter in the original 10-min average values of the blade edge moment together with the same signal after temperature compensation in dark blue	99
Figure I.2 – Linear regression through the onsets derived from the different calibration runs	100
Figure J.1 – Darrieus style VAWT	102
Figure J.2 – Helical Darrieus style VAWT	102
Table 1 – MLCs during steady-state operation related to the DLCs defined in IEC 61400-1	18
Table 2 – Measurement of transient load cases related to the DLCs defined in IEC 61400-1	19
Table 3 – MLCs for dynamic characterization	19
Table 4 – Capture matrix for normal power production for stall controlled wind turbines	21
Table 5 – Capture matrix for normal power production for non stall controlled wind turbines	22
Table 6 – Capture matrix for parked condition	22
Table 7 – Capture matrix for normal transient events	23
Table 8 – Capture matrix for other than normal transient events	23
Table 9 – Wind turbine fundamental load quantities	24
Table 10 – Additional load quantities for turbines with a rated power output greater than 1 500 kW and rotor diameter greater than 75 m	25
Table 11 – Meteorological quantities	25

Table 12 – Wind turbine operation quantities	26
Table 13 – Summary of suitable calibration methods	32
Table B.1 – Uncertainty components.....	56
Table B.2 – Values and uncertainties for the calculation	60
Table C.1 – Binned data for blade 1 root edge bending.....	74
Table C.2 – Transient capture matrix for normal start-up and shutdown	76
Table C.3 – Brief statistical description for normal shutdown for IEC example turbine at 9,5 m/s	76
Table G.1 – Wind turbine significant frequencies	94
Table G.2 – Sampling ratio	94
Table J.1 – Minimum recommendations for VAWT fundamental load quantities.....	103

INTERNATIONAL ELECTROTECHNICAL COMMISSION

WIND TURBINES –

Part 13: Measurement of mechanical loads

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This International Standard IEC 61400-13 has been prepared by IEC technical committee 88: Wind turbines.

This standard replaces IEC TS 61400-13 published in 2001. This first edition constitutes a technical revision and transition from technical specification to International Standard.

The first edition includes the following changes with respect to the technical specification:

- a) scope of the document focused to load measurements for the purpose of model validation;
- b) number of measurement load cases to match the new scope reduced;
- c) capture matrix requirements to match the new scope reduced;
- d) requirements to address the state of the art technology updated.

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

CDV	Report on voting
88/511/CDV	88/554/RVC

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 61400 series, published under the general title *Wind turbines*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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INTRODUCTION

In the process of structural design of a wind turbine, thorough understanding about, and accurate quantification of, the loading is of utmost importance.

In the design stage, loads can be predicted with aeroelastic models and codes. However, such models have their shortcomings and uncertainties, and they always need to be validated by measurement.

Mechanical load measurements can be used both as the basis for design and as the basis for certification. Design aspects for wind turbines are covered by IEC 61400-1 whilst certification procedures are described in IEC 61400-22. This standard is aimed at the test institute, the turbine manufacturer and the certifying body and clearly defines the minimum requirements for a mechanical loads test resulting in consistent, high quality reproducible test results.

WIND TURBINES –

Part 13: Measurement of mechanical loads

1 Scope

This part of the IEC 61400 describes the measurement of fundamental structural loads on wind turbines for the purpose of the load simulation model validation. The standard prescribes the requirements and recommendations for site selection, signal selection, data acquisition, calibration, data verification, measurement load cases, capture matrix, post-processing, uncertainty determination and reporting. Informative annexes are also provided to improve understanding of testing methods.

The methods described in this document can also be used for mechanical loads measurements for other purposes such as obtaining a measured statistical representation of loads, direct measurements of the design loads, safety and function testing, or measurement of component loads. If these methods are used for an alternative objective or used for an unconventional wind turbine design, the required signals, measurement load cases, capture matrix, and post processing methods should be evaluated and if needed adjusted to fit the objective.

These methods are intended for onshore electricity-generating, horizontal-axis wind turbines (HAWTs) with rotor swept areas of larger than 200 m². However, the methods described may be applicable to other wind turbines (for example, small wind turbines, ducted wind turbines, vertical axis wind turbines).

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050 (all parts), *International Electrotechnical Vocabulary* (available at <<http://www.electropedia.org/>>)

IEC 61400-1:2005, *Wind turbines – Part 1: Design requirements*

IEC 61400-12-1, *Wind turbines – Part 12-1: Power performance measurements of electricity producing wind turbines*

ISO/IEC Guide 98-3, *Uncertainty of measurement – Part 3: Guide to the expression of uncertainty in measurement*

3 Terms and definitions

For the purposes of this document, the terms and definitions related to wind turbine systems or wind energy in general of IEC 60050-415 as well as the following apply.

3.1

blade

rotating aerodynamically active part of the rotor