

Wind turbines -- Part 3: Design requirements for offshore wind turbines

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EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 61400-3:2009 sisaldab Euroopa standardi EN 61400-3:2009 ingliskeelset teksti.

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**Wind turbines -
Part 3: Design requirements
for offshore wind turbines
(IEC 61400-3:2009)**

Eoliennes -
Partie 3: Exigences de conception
des éoliennes en pleine mer
(CEI 61400-3:2009)

Windenergieanlagen -
Teil 3: Auslegungsanforderungen
für Windenergieanlagen auf offener See
(IEC 61400-3:2009)

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 88/329/FDIS, future edition 1 of IEC 61400-3, prepared by IEC TC 88, Wind turbines, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61400-3 on 2009-04-01.

This European Standard is to be read in conjunction with EN 61400-1:2005.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2010-01-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2012-04-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61400-3:2009 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60034	NOTE Harmonized in EN 60034 series (partially modified).
IEC 60038	NOTE Harmonized as HD 472 S1:1989 (modified), with the following title " <i>Nominal voltages for low-voltage public electricity supply systems</i> ".
IEC 60146	NOTE Harmonized in EN 60146 series (not modified).
IEC 60204-1	NOTE Harmonized as EN 60204-1:2006 (modified).
IEC 60204-11	NOTE Harmonized as EN 60204-11:2000 (not modified).
IEC 60227	NOTE Is related to HD 21 series (not equivalent).
IEC 60245	NOTE Is related to HD 22 series (not equivalent).
IEC 60269	NOTE Harmonized in EN 60269 series (modified).
IEC 60364	NOTE Harmonized in HD 384/HD 60364 series (modified).
IEC 60439	NOTE Harmonized in EN 60439 series (partially modified).
IEC 60446	NOTE Harmonized as EN 60446:1999 (not modified).
IEC 60529	NOTE Harmonized as EN 60529:1991 (not modified).
IEC 61000-6-1	NOTE Harmonized as EN 61000-6-1:2007 (not modified).
IEC 61000-6-2	NOTE Harmonized as EN 61000-6-2:2005 (not modified).
IEC 61000-6-4	NOTE Harmonized as EN 61000-6-4:2007 (not modified).
IEC 61310-1	NOTE Harmonized as EN 61310-1:1995 (not modified).
IEC 61310-2	NOTE Harmonized as EN 61310-2:1995 (not modified).
IEC 61400-21	NOTE Harmonized as EN 61400-21:2002 (not modified).

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application 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 When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60721-2-1 + A1	1982 1987	Classification of environmental conditions - Part 2-1: Environmental conditions appearing in nature - Temperature and humidity	HD 478.2.1 S1	1989
IEC 61400-1	2005	Wind turbines - Part 1: Design requirements	EN 61400-1	2005
IEC 62305-3 (mod)	2006	Protection against lightning - Part 3: Physical damage to structures and life hazard	EN 62305-3 + corr. September + A11	2006 2008 2009
IEC 62305-4	2006	Protection against lightning - Part 4: Electrical and electronic systems within structures	EN 62305-4 + corr. November	2006 2006
ISO 2394	1998	General principles on reliability for structures	-	-
ISO 2533	1975	Standard atmosphere	-	-
ISO 9001	2000	Quality management systems - Requirements	EN ISO 9001	2000
ISO 19900	2002	Petroleum and natural gas industries - General requirements for offshore structures	EN ISO 19900	2002
ISO 19901-1	2005	Petroleum and natural gas industries - Specific requirements for offshore structures - Part 1: Metocean design and operating considerations	EN ISO 19901-1	2005
ISO 19901-4	2003	Petroleum and natural gas industries - Specific requirements for offshore structures - Part 4: Geotechnical and foundation design considerations	EN ISO 19901-4	2003
ISO 19902	- ¹⁾	Petroleum and natural gas industries - Fixed steel offshore structures	EN ISO 19902	2007 ²⁾
ISO 19903	2006	Petroleum and natural gas industries - Fixed concrete offshore structures	EN ISO 19903	2006

¹⁾ Undated reference.

²⁾ Valid edition at date of issue.

CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references.....	8
3 Terms and definitions	9
4 Symbols and abbreviated terms	15
4.1 Symbols and units	15
4.2 Abbreviations.....	16
5 Principal elements	17
5.1 General	17
5.2 Design methods.....	17
5.3 Safety classes	19
5.4 Quality assurance.....	19
5.5 Rotor – nacelle assembly markings.....	20
6 External conditions	20
6.1 General	20
6.2 Wind turbine classes	21
6.3 Wind conditions	21
6.4 Marine conditions	22
6.5 Other environmental conditions.....	31
6.6 Electrical power network conditions.....	32
7 Structural design.....	33
7.1 General	33
7.2 Design methodology	33
7.3 Loads.....	33
7.4 Design situations and load cases	34
7.5 Load and load effect calculations	51
7.6 Ultimate limit state analysis.....	54
8 Control and protection system.....	57
9 Mechanical systems.....	57
10 Electrical system.....	58
11 Foundation design	58
12 Assessment of the external conditions at an offshore wind turbine site	59
12.1 General	59
12.2 The metocean database.....	59
12.3 Assessment of wind conditions.....	60
12.4 Assessment of waves	62
12.5 Assessment of currents.....	63
12.6 Assessment of water level, tides and storm surges.....	63
12.7 Assessment of sea ice	63
12.8 Assessment of marine growth	64
12.9 Assessment of seabed movement and scour.....	64
12.10 Assessment of wake effects from neighbouring wind turbines.....	65
12.11 Assessment of other environmental conditions	65

12.12	Assessment of earthquake conditions	65
12.13	Assessment of weather windows and weather downtime.....	65
12.14	Assessment of electrical network conditions.....	65
12.15	Assessment of soil conditions	66
13	Assembly, installation and erection	67
13.1	General	67
13.2	Planning	68
13.3	Installation conditions.....	68
13.4	Site access	68
13.5	Environmental conditions	68
13.6	Documentation.....	69
13.7	Receiving, handling and storage.....	69
13.8	Foundation/anchor systems.....	69
13.9	Assembly of offshore wind turbine.....	69
13.10	Erection of offshore wind turbine	69
13.11	Fasteners and attachments	69
13.12	Cranes, hoists and lifting equipment.....	70
14	Commissioning, operation and maintenance	70
14.1	General	70
14.2	Design requirements for safe operation, inspection and maintenance	70
14.3	Instructions concerning commissioning	71
14.4	Operator's instruction manual	72
14.5	Maintenance manual.....	74
Annex A (informative)	Key design parameters for an offshore wind turbine.....	76
Annex B (informative)	Wave spectrum formulations.....	79
Annex C (informative)	Shallow water hydrodynamics and breaking waves	84
Annex D (informative)	Guidance on calculation of hydrodynamic loads.....	92
Annex E (informative)	Recommendations for design of offshore wind turbine support structures with respect to ice loads.....	105
Annex F (informative)	Offshore wind turbine foundation design.....	116
Annex G (informative)	Statistical extrapolation of operational metocean parameters for ultimate strength analysis.....	117
Annex H (informative)	Corrosion protection	123
Bibliography	127
Figure 1	– Parts of an offshore wind turbine.....	10
Figure 2	– Design process for an offshore wind turbine.....	19
Figure 3	– Definition of water levels.....	29
Figure 4	– The two approaches to calculate the design load effect.....	55
Figure B.1	– PM spectrum	80
Figure B.2	– Jonswap and PM spectrums for typical North Sea storm sea state	81
Figure C.1	– Regular wave theory selection diagram.....	84
Figure D.1	– Breaking wave and cylinder parameters.....	96
Figure D.2	– Oblique inflow parameters	96
Figure D.3	– Distribution over height of the maximum impact line force ($\gamma=0^\circ$).....	98

Figure D.4 – Response of model and full-scale cylinder in-line and cross-flow (from reference document 4)	100
Figure E.1 – Ice force coefficients for plastic limit analysis (from reference document 6)	110
Figure E.2 – Serrated load profile ($T_{0,1} = 1/f_N$ or $1/f_b$)	113
Figure G.1 – Example of the construction of the 50-year environmental contour for a 3-hour sea state duration.	118
Table 1 – Design load cases	36
Table 2 – Design load cases for sea ice	50
Table 3 – Partial safety factors for loads γ_f	56
Table 4 – Conversion between extreme wind speeds of different averaging periods	61
Table C.1 – Constants h_1 and h_2 and normalised wave heights $h_{x\%}$ as a function of H_{tr}	87
Table C.2 – Breaking wave type	90

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INTRODUCTION

This part of IEC 61400 outlines minimum design requirements for offshore wind turbines and is not intended for use as a complete design specification or instruction manual.

Several different parties may be responsible for undertaking the various elements of the design, manufacture, assembly, installation, erection, commissioning, operation and maintenance of an offshore wind turbine and for ensuring that the requirements of this standard are met. The division of responsibility between these parties is a contractual matter and is outside the scope of this standard.

Any of the requirements of this standard may be altered if it can be suitably demonstrated that the safety of the system is not compromised. Compliance with this standard does not relieve any person, organization, or corporation from the responsibility of observing other applicable regulations.

WIND TURBINES –

Part 3: Design requirements for offshore wind turbines

1 Scope

This part of IEC 61400 specifies additional requirements for assessment of the external conditions at an offshore wind turbine site and it specifies essential design requirements to ensure the engineering integrity of offshore wind turbines. Its purpose is to provide an appropriate level of protection against damage from all hazards during the planned lifetime.

This standard focuses on the engineering integrity of the structural components of an offshore wind turbine but is also concerned with subsystems such as control and protection mechanisms, internal electrical systems and mechanical systems.

A wind turbine shall be considered as an offshore wind turbine if the support structure is subject to hydrodynamic loading. The design requirements specified in this standard are not necessarily sufficient to ensure the engineering integrity of floating offshore wind turbines.

This standard should be used together with the appropriate IEC and ISO standards mentioned in Clause 2. In particular, this standard is fully consistent with the requirements of IEC 61400-1. The safety level of the offshore wind turbine designed according to this standard shall be at or exceed the level inherent in IEC 61400-1. In some clauses, where a comprehensive statement of requirements aids clarity, replication of text from IEC 61400-1 is included.

2 Normative references

The following referenced documents are indispensable for the application 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.

IEC 60721-2-1:1982, *Classification of environmental conditions – Part 2-1: Environmental conditions appearing in nature. Temperature and humidity*
Amendment 1:1987

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

IEC 62305-3:2006, *Protection against lightning – Part 3: Physical damage to structures and life hazard*

IEC 62305-4:2006, *Protection against lightning – Part 4: Electrical and electronic systems within structures*

ISO 2394:1998, *General principles on reliability for structures*

ISO 2533:1975, *Standard Atmosphere*

ISO 9001:2000, *Quality management systems – Requirements*

ISO 19900:2002, *Petroleum and natural gas industries – General requirements for offshore structures*

ISO 19901-1:2005, *Petroleum and natural gas industries – Specific requirements for offshore structures – Part 1: Metocean design and operating conditions*

ISO 19901-4:2003, *Petroleum and natural gas industries – Specific requirements for offshore structures – Part 4: Geotechnical and foundation design considerations*

ISO 19902, *Petroleum and natural gas industries – Fixed steel offshore structures*

ISO 19903: 2006, *Petroleum and natural gas industries – Fixed concrete offshore structures*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply in addition to those stated in IEC 61400-1.

3.1

co-directional (wind and waves)

acting in the same direction

3.2

current

flow of water past a fixed location usually described in terms of a current speed and direction

3.3

design wave

deterministic wave with a defined height, period and direction, used for the design of an offshore structure. A design wave may be accompanied by a requirement for the use of a particular periodic wave theory

3.4

designer

party or parties responsible for the design of an offshore wind turbine

3.5

environmental conditions

characteristics of the environment (wind, waves, sea currents, water level, sea ice, marine growth, scour and overall seabed movement, etc.) which may affect the wind turbine behaviour

3.6

external conditions (wind turbines)

factors affecting operation of an offshore wind turbine, including the environmental conditions, the electrical network conditions, and other climatic factors (temperature, snow, ice, etc.)

3.7

extreme significant wave height

expected value of the highest significant wave height, averaged over 3 h, with an annual probability of exceedance of $1/N$ ("recurrence period": N years)

3.8

extreme wave height

expected value of the highest individual wave height (generally the zero up-crossing wave height) with an annual probability of exceedance of $1/N$ ("recurrence period": N years)