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NSAI Standards

Irish Standard
I.S. EN IEC 61400-3-1:2019

Wind energy generation systems - Part 3-1: Design requirements for fixed offshore wind turbines

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I.S. EN IEC 61400-3-1:2019 is the adopted Irish version of the European Document EN IEC 61400-3-1:2019, Wind energy generation systems - Part 3-1: Design requirements for fixed offshore wind turbines

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NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 61400-3-1

September 2019

ICS 27.180

English Version

Wind energy generation systems - Part 3-1: Design requirements for fixed offshore wind turbines (IEC 61400-3-1:2019)

Systèmes de génération d'énergie éolienne – Partie 3-1 : Exigences de conception des éoliennes fixes en pleine mer (IEC 61400-3-1:2019)

Windenergieanlagen - Teil 3-1: Auslegungsanforderungen für Windenergieanlagen auf offener See (IEC 61400-3-1:2019)

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European foreword

The text of document 88/708/FDIS, future edition 1 of IEC 61400-3-1, prepared by IEC/TC 88 "Wind energy generation systems" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61400-3-1:2019.

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) 2020-03-20
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2022-09-20

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IEC 60034 (series)	NOTE	Harmonized as EN 60034-9:2005/A1 (series)
IEC 60038	NOTE	Harmonized as EN 60038
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IEC 60204-1	NOTE	Harmonized as EN 60204-1
IEC 60204-11:2000	NOTE	Harmonized as EN 60204-11:2000 (not modified)
IEC 60269 (series)	NOTE	Harmonized as EN 60269 (series)
IEC 60364 (series)	NOTE	Harmonized as HD 60364 (series) (modified)
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IEC 60755:2008	NOTE	Harmonized as EN 60755:—[1]
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IEC 61000-6-4	NOTE	Harmonized as EN 61000-6-4
IEC 61310-1:2007	NOTE	Harmonized as EN 61310-1:2008 (not modified)
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IEC 61400-13	NOTE	Harmonized as EN 61400-13
IEC 61400-21	NOTE	Harmonized as EN 61400-21
IEC 61400-24	NOTE	Harmonized as EN 61400-24

[1] Under preparation. Stage at the time of publication: prEN 60755:2016.

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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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 60721	series	Classification of environmental conditions	EN IEC 60721	series
IEC 61400-1	2019	Wind energy generation systems - Part 1: Design requirements	EN IEC 61400-1	2019
ISO 2394	1998	General principles on reliability for structures	-	-
ISO 2533	1975	Standard Atmosphere	-	-
ISO 19900	2002	Petroleum and natural gas industries - General requirements for offshore structures	-	-
ISO 19901-1	2015	Petroleum and natural gas industries - Specific requirements for offshore structures - Part 1: Metocean design and operating conditions	EN ISO 19901-1	2015
ISO 19901-4	2003	Petroleum and natural gas industries - Specific requirements for offshore structures - Part 4: Geotechnical and foundation design considerations	-	-
ISO 19902	2007	Petroleum and natural gas industries - Fixed steel offshore structures	EN ISO 19902	2007
ISO 19903	2006	Petroleum and natural gas industries - Fixed concrete offshore structures	EN ISO 19903	2006

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IEC 61400-3-1

Edition 1.0 2019-04

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Wind energy generation systems –
Part 3-1: Design requirements for fixed offshore wind turbines

IEC 61400-3-1:2019-04(en)

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IEC 61400-3-1

Edition 1.0 2019-04

INTERNATIONAL STANDARD

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Wind energy generation systems –
Part 3-1: Design requirements for fixed offshore wind turbines

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WIND ENERGY GENERATION SYSTEMS –

Part 3-1: Design requirements for fixed offshore wind turbines

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 61400-3-1 has been prepared by IEC technical committee 88: Wind energy generation systems.

This edition cancels and replaces the first edition of IEC 61400-3 published in 2009. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the first edition of IEC 61400-3:

a) Clause 12 has been merged with Clause 6 in order to acknowledge that the design of the wind turbine support structure is generally site specific for offshore projects;
b) The design load table has been revised to simplify the approach to waves, both for several gust cases with the Normal Sea State, and for a number of cases with the Extreme Sea State. The guidance for load calculations has been altered accordingly;
c) For load safety factors reference is now made directly to IEC 61400-1;
d) Clause 8 on the control system has been aligned with the latest updates in IEC 61400-1;

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e) Annex B to edition one on wave spectra has been replaced by a reference to ISO 19901-1;

f) The annex on ice loading has been revised and updated (now Annex D);

g) Two informative annexes concerning tropical cyclones have been introduced: Annex H on wave height assessment and Annex I on safety level;

h) Other parts of the text have been aligned with IEC 61400-1.

This part is to be read in conjunction with IEC 61400-1, *Wind turbines – Part 1: Design requirements*[1].

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

FDIS	Report on voting
88/708/FDIS	88/712/RVD

Full information on the voting for the approval of this International 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 of the IEC 61400 series, published under the general title *Wind energy generation systems*, can be found on the IEC website.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

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

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://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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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.

[1] Under preparation. Stage at the time of publication: IEC/RFDIS 61400-1:2018.

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INTRODUCTION

This part of IEC 61400 outlines the minimum design requirements for fixed 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 document are met. The division of responsibility between these parties is a contractual matter and is outside the scope of this document.

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

The document is not intended to give requirements for floating offshore wind turbines. For floating installations, reference is made to IEC 61400-3-2.

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WIND ENERGY GENERATION SYSTEMS –

Part 3-1: Design requirements for fixed 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 specifies essential design requirements to ensure the engineering integrity of fixed offshore wind turbines. Its purpose is to provide an appropriate level of protection against damage from all hazards during the planned lifetime.

This document 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 a fixed offshore wind turbine if the support structure is subject to hydrodynamic loading and it is founded on the seabed. The design requirements specified in this document are not sufficient to ensure the engineering integrity of floating offshore wind turbines. For floating installations, reference is made to IEC 61400-3-2. In the remainder of this document, the term “offshore wind turbine” is assumed to refer to those that are fixed to the seabed.

This document should be used together with the appropriate IEC and ISO standards mentioned in Clause 2. In particular, this document is fully consistent with the requirements of IEC 61400-1. The safety level of the offshore wind turbine designed according to this document 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 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.

IEC 60721 (all parts), *Classification of environmental conditions*

IEC 61400-1:2018, *Wind energy generation systems – Part 1: Design requirements*[2]

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

ISO 2533:1975, *Standard Atmosphere*

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

ISO 19901-1:2015, *Petroleum and natural gas industries – Specific requirements for offshore structures – Part 1: Metocean design and operating conditions*

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2 Under preparation. Stage at the time of publication: IEC/RFDIS 61400-1:2018.

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