Vindenergisystemer – Del 6: Krav til design af tårne og fundamenter

Wind energy generation systems – Part 6: Tower and foundation design requirements

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DS projekt: M384738
ICS: 27.180

Første del af denne publikations betegnelse er:
DS/EN IEC, hvilket betyder, at det er en international standard, der har status som europæisk og dansk standard.

Denne publikations overensstemmelse er:
IDT med: IEC 61400-6:2020/AMD1:2025 ED1
IDT med: EN IEC 61400-6:2020/A1:2025

DS-publikationen er på engelsk.

EUROPEAN STANDARD **EN IEC 61400-6:2020/A1**

EUROPÄISCHE NORM

August 2025

ICS 27.180

English Version

Wind energy generation systems - Part 6: Tower and foundation design requirements (IEC 61400-6:2020/AMD1:2025)

Systèmes de génération d'énergie éolienne - Partie 6: Exigences en matière de conception du mât et de la fondation (IEC 61400-6:2020/AMD1:2025)

Windenergieanlagen - Teil 6: Auslegungsanforderungen an Türme und Fundamente (IEC 61400-6:2020/AMD1:2025)

This amendment A1 modifies the European Standard EN IEC 61400-6:2020; it was approved by CENELEC on 2025-07-18. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment the status of a national standard without any alteration.

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Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN IEC 61400-6:2020/A1:2025 E

European foreword

The text of document 88/1088/FDIS, future edition 1 of IEC 61400-6/AMD1, prepared by TC 88 "Wind energy generation systems" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61400-6:2020/A1:2025.

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) 2026-08-31
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2028-08-31

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Endorsement notice

The text of the International Standard IEC 61400-6:2020/AMD1:2025 was approved by CENELEC as a European Standard without any modification.

(normative)

Normative references to international publications with their corresponding European publications

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.

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.cencenelec.eu.

Add the following references:

Publication	Year	Title	EN/HD	Year
IEC 61400-1	2019	Wind energy generation systems - Part 1: Design requirements	EN IEC 61400-1	2019
+A1	2024		+A1	—[1]
ISO 898-1	-	Mechanical properties of fasteners made of carbon steel and alloy steel - Part 1: Bolts, screws and studs with specified property classes - Coarse thread and fine pitch thread	EN ISO 898-1	-
ISO 898-2	-	Fasteners - Mechanical properties of fasteners made of carbon steel and alloy steel - Part 2: Nuts with specified property classes	EN ISO 898-2	-
ISO 898-3	-	Mechanical properties of fasteners made of carbon steel and alloy steel - Part 3: Flat washers with specified property classes	EN ISO 898-3	-
ISO 965-2	-	ISO general purpose metric screw threads - Tolerances – Part 2: Limits of sizes for general purpose external and internal screw threads - Medium quality	-	-
ISO 965-5	-	ISO general purpose metric screw threads - Tolerances - Part 5: Limits of sizes for internal screw threads to mate with hot-dip galvanized external screw threads with maximum size of tolerance position h before galvanizing	-	-
ISO 4759-1	-	Tolerances for fasteners - Part 1: Bolts, screws, studs and nuts - Product grades A, B and C	EN ISO 4759-1	-
ISO 4759-3	-	Tolerances for fasteners - Part 3: Washers for bolts, screws and nuts - Product grades A, C and F	EN ISO 4759-3	-

[1] Under preparation. Stage at the time of publication: EN IEC 61400-1/prA1:2023.

Edition 1.0 2025-06

INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 1
AMENDEMENT 1

Wind energy generation systems –
Part 6: Tower and foundation design requirements

Systèmes de génération d'énergie éolienne –
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ICS 27.180

ISBN 978-2-8327-0435-6

IEC 61400-6:2020-04/AMD1:2025-06(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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WIND ENERGY GENERATION SYSTEMS –

Part 6: Tower and foundation design requirements

AMENDMENT 1

FOREWORD

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Amendment 1 to IEC 61400-6:2020 has been prepared by IEC technical committee TC 88: Wind energy generation systems.

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

Draft	Report on voting
88/1088/FDIS	88/1096/RVD

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/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

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- withdrawn, or
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INTRODUCTION

Clauses and subclauses as given in this document are replacing or amending the respective clauses and subclauses of IEC 61400-6:2020. The main part of this amendment concerns updated knowledge for the design of L-flanges and modifications required due to changes to IEC 61400-1.

The previous method of fatigue assessment using the Schmidt/Neuper trilinear bolt force curve approximation has been removed as the default method from the document. It has been replaced with a physically more accurate method.

The updated methodology for fatigue assessment of L-flanges has been calibrated so that the target failure probability defined in IEC 61400-1 is achieved. Where existing flange designs are checked with the updated method, over-utilization can be found, which in some cases can show an order of magnitude higher than nominally acceptable damage.

This does not impose an immediate risk for the turbines affected, though, due to the following factors:

a) in most cases, such designs have significant conservatism in the fatigue loads assumed, e.g. due to the assumption of uni-directional wind combined with type class turbulence conditions,
b) experience shows that broken bolts are almost always found and replaced before a turbine collapses.

It is not necessary to re-assess existing flange designs using the new method. In cases where broken bolts are found in operating turbines, the affected flange should be checked with the new methodology. Based on the assessment results and the root causes analysis for the failure, further measures should be defined (e.g. shorter inspection intervals).

2 Normative references

Add the following new references to the existing list:

IEC 61400-1:2019/AMD1:2024

ISO 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel – Part 1: Bolts, screws and studs with specified property classes – Coarse thread and fine pitch thread*

ISO 898-2, *Fasteners – Mechanical properties of fasteners made of carbon steel and alloy steel – Part 2: Nuts with specified property classes*

ISO 898-3, *Mechanical properties of fasteners made of carbon steel and alloy steel – Part 3: Flat washers with specified property classes*

ISO 965-2, *ISO general purpose metric screw threads – Tolerances – Part 2: Limits of sizes for general purpose external and internal threads – Medium tolerance quality*

ISO 965-5, *ISO general purpose metric screw threads –Tolerances – Part 5: Limits of sizes for internal screw threads to mate with hot-dip galvanized external screw threads with maximum size of tolerance position h before galvanizing*

ISO 4759-1, *Tolerances for fasteners – Part 1: Bolts, screws, studs and nuts – Product grades A, B and C*

ISO 4759-3, *Tolerances for fasteners – Part 3: Washers for bolts, screws and nuts – Product grades A, C and F*