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**Vetrne turbine - 4. del: Konstrukcijske zahteve za menjalnike vetrnih turbin**

Wind turbines - Part 4: Design requirements for wind turbine gearboxes

Windenergieanlagen - Teil 4: Auslegungsanforderungen für Getriebe von Windenergieanlagen

Eoliennes - Partie 4: Exigences de conception des boîtes de vitesses pour éoliennes

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

# EN 61400-4

March 2013

ICS 27.180

English version

## Wind turbines - Part 4: Design requirements for wind turbine gearboxes (IEC 61400-4:2012)

Eoliennes -  
Partie 4: Exigences de conception des  
boîtes de vitesses pour éoliennes  
(CEI 61400-4:2012)

Windenergieanlagen -  
Teil 4: Auslegungsanforderungen für  
Getriebe von Windenergieanlagen  
(IEC 61400-4:2012)

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

**Management Centre: Avenue Marnix 17, B - 1000 Brussels**

## Foreword

The text of document 88/438/FDIS, future edition 1 of IEC 61400-4, prepared by IEC/TC 88 "Wind turbines" and ISO/TC 60 "Gears" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61400-4:2013.

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) 2013-10-08
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2016-01-08

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SIST EN 61400-4:2013

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

ISO/IEC 17025	NOTE Harmonized as EN ISO/IEC 17025.
ISO 2160	NOTE Harmonized as EN ISO 2160.

## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

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.

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 60050	series	International electrotechnical vocabulary	-	-
IEC 61400-1	2005	Wind turbines - Part 1: Design requirements	EN 61400-1	2005
IEC 61400-3	-	Wind turbines - Part 3: Design requirements for offshore wind turbines	EN 61400-3	-
IEC/TS 61400-13	2001	Wind turbine generator systems - Part 13: Measurement of mechanical loads	-	-
IEC 61400-22	2010	Wind turbines - Part 22: Conformity testing and certification	EN 61400-22	2011
ISO 76	-	Rolling bearings - Static load ratings	-	-
ISO 281	2007	Rolling bearings - Dynamic load ratings and rating life	-	-
ISO 683	series	Heat-treatable steels, alloy steels and free-cutting steels	-	-
ISO 1328-1	-	Cylindrical gears - ISO system of accuracy - Part 1: Definitions and allowable values of deviations relevant to corresponding flanks of gear teeth	-	-
ISO 4287	-	Geometrical Product Specifications (GPS) - Surface texture: Profile method - Terms, definitions and surface texture parameters	EN ISO 4287	-
ISO 4288	-	Geometrical Product Specifications (GPS) - Surface texture: Profile method - Rules and procedures for the assessment of surface texture	EN ISO 4288	-
ISO 4406	-	Hydraulic fluid power - Fluids - Method for coding the level of contamination by solid particles	-	-
ISO 5725-2	-	Accuracy (trueness and precision) of measurement methods and results - Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method	-	-
ISO 6336	series	Calculation of load capacity of spur and helical-gears	-	-
ISO 6336-1	2006	Calculation of load capacity of spur and helical-gears - Part 1: Basic principles, introduction and general influence factors	-	-

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
ISO 6336-2	2006	Calculation of load capacity of spur and helical-gears - Part 2: Calculation of surface durability (pitting)		-
ISO 6336-3	2006	Calculation of load capacity of spur and helical-gears - Part 3: Calculation of tooth bending strength		-
ISO 6336-5	2003	Calculation of load capacity of spur and helical-gears - Part 5: Strength and quality of materials		-
ISO 6336-6	2006	Calculation of load capacity of spur and helical-gears - Part 6: Calculation of service life under variable load		-
ISO/TR 10064-3	-	Code of inspection practice - Part 3: Recommendations relative to gear blanks, shaft centre distance and parallelism of axes	-	-
ISO 12925-1	-	Lubricants, industrial oils and related products - (class L) - Family C (Gears) - Part 1: Specifications for lubricants for enclosed gear systems		-
ISO/TR 13593	-	Enclosed gear drives for industrial applications	-	-
ISO/TR 13989-1	-	Calculation of scuffing load capacity of cylindrical, bevel and hypoid gears - Part 1: Flash temperature method	-	-
ISO/TR 13989-2	-	Calculation of scuffing load capacity of cylindrical, bevel and hypoid gears - Part 2: Integral temperature method	-	-
ISO 14104	-	Gears - Surface temper etch inspection after grinding	-	-
ISO 14635-1	2000	Gears - FZG test procedures - Part 1: FZG test method A/8,3/90 for relative scuffing load-carrying capacity of oils	-	-
ISO 15243	2004	Rolling bearings - Damage and failures - Terms, characteristics and causes	-	-
ISO/TS 16281	2008	Rolling bearings - Methods for calculating the modified reference rating life for universally loaded bearings	-	-
AGMA 9005	-	Industrial Gear Lubrication	-	-
ANSI/AGMA 925-A02	-	Effect of lubrication on gear surface distress	-	-
ANSI/AGMA 6001-E10	-	Design and selection of components for enclosed gear drives	-	-
ANSI/AGMA 6123	-	Design manual for enclosed epicyclic gear drives	-	-
ASTM E1049-85	-	Standard practices for cycle counting in fatigue analysis	-	-
DIN 471	-	Circlips (retaining rings) for shafts: Normal type and heavy type	-	-

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
DIN 472	-	Circlips (retaining rings) for bores: Normal type and heavy type	-	-
DIN 743	2000	Shafts and axles, calculations of load capacity, Parts 1,2, 3	-	-
DIN 3990-4	-	Calculation of load capacity of cylindrical gears: calculation of scuffing load capacity	-	-
DIN 6885-2	-	Parallel Key Geometries	-	-
DIN 6892	-	Mitnehmervverbindungen ohne Anzug – Passfedern – Berechnung und Gestaltung	-	-
DIN 7190	-	Interference fits – Calculation and design rules-	-	-
DIN 51517-3	-	Lubricants: Lubricating oils – Part 3: Lubricating oils CLP; Minimum requirements	-	-
-	-	Founding - Ultrasonic examination - Part 3: Spheroidal graphite cast iron castings	EN 12680-3	2003

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# INTERNATIONAL STANDARD



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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## WIND TURBINES –

## Part 4: Design requirements for wind turbine gearboxes

## 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 61400-4 has been prepared by IEC technical committee 88: Wind turbines, in co-operation with ISO technical committee 60: Gears.

It is published as a double logo standard.

This first edition cancels and replaces ISO 81400-4 published in 2005. It constitutes a technical revision of ISO 81400-4 with extended content and changes in all pertinent sections.

This edition includes the following significant technical changes with respect to the previous edition:

- a) extension of the scope to wind turbines above 2 MW rated power;
- b) considerations for converging differing approaches to reliability in gear, bearing and wind turbine standards;
- c) a new clause on wind turbine loads specific to drivetrains;
- d) new clause on testing and validation of new gearbox designs;