

TECHNICAL SPECIFICATION



Wind energy generation systems –
Part 30: Safety of wind turbine generators – General principles for design

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WIND ENERGY GENERATION SYSTEMS –

Part 30: Safety of wind turbine generators – General principles for design

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IEC TS 61400-30 has been prepared by IEC technical committee 88: Wind energy generation systems. It is a Technical Specification.

The text of this Technical Specification is based on the following documents:

Draft	Report on voting
88/910/DTS	88/935A/RVDTS

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 Technical Specification 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.

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

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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WIND ENERGY GENERATION SYSTEMS –

Part 30: Safety of wind turbine generators – General principles for design

1 Scope

This part of IEC 61400, which is a Technical Specification, specifies the essential health and safety requirements related to the design of wind turbines with horizontal axes with the exception of those included in the scope of IEC 61400-2.

For other wind turbine concepts such as vertical axes, floating, or smaller turbines (see IEC 61400-2), the principles of this document are valid, however they are adjusted to the actual concept.

This document focuses on requirements for safe operation, inspection, maintenance, installation and decommissioning.

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 60073, *Basic and safety principles for man-machine interface, marking and identification – Coding principles for indicators and actuators*

IEC 60204-1:2016, *Safety of machinery - Electrical equipment of machines - Part 1: General requirements*

IEC 60204-11, *Safety of machinery – Electrical equipment of machines – Part 11: Requirements for equipment for voltages above 1 000 V AC or 1 500 V DC and not exceeding 36 kV*

IEC 60364-4-41, *Low-voltage electrical installations – Part 4-41: Protection for safety – Protection against electric shock*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60695-11-10, *Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods*

IEC 60950-1, *Information technology equipment – Safety – Part 1: General requirements*

IEC 61000-6-2, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for industrial environments*

IEC 61000-6-4, *Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments*

IEC 61310-1, *Safety of machinery – Indication, marking and actuation – Part 1: Requirements for visual, acoustic and tactile signals*

IEC 61400-1:2019, *Wind energy generation systems – Part 1: Design requirements*

IEC 61400-3-1, *Wind energy generation systems – Part 3-1: Design requirements for fixed offshore wind turbines*

IEC TS 61400-3-2, *Wind energy generation systems – Part 3-2: Design requirements for floating offshore wind turbines*

IEC 61400-24, *Wind energy generation systems – Part 24: Lightning protection*

IEC 61439-1, *Low-voltage switchgear and controlgear assemblies – Part 1: General rules*

IEC 61439-2, *Low-voltage switchgear and controlgear assemblies – Part 2: Power switchgear and controlgear assemblies*

IEC 61508 (all parts), *Functional safety of electrical/electronic/programmable electronic safety-related systems*

IEC 61936-1:2021, *Power installations exceeding 1 kV AC and 1,5 kV DC – Part 1: AC*

IEC 62040 (all parts), *Uninterruptible power systems (UPS) – Part 1: Safety requirements*

IEC 62061:2021, *Safety of machinery – Functional safety of safety-related control systems*

IEC 62271-200, *High-voltage switchgear and controlgear – Part 200: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV*

IEC 62485 (all parts), *Safety requirements for secondary batteries and battery installations*

ISO 3864 (all parts), *Graphical symbols – Safety colours and safety signs*

ISO 4413, *Hydraulic fluid power – General rules and safety requirements for systems and their components*

ISO 4414, *Pneumatic fluid power – General rules and safety requirements for systems and their components*

ISO 7010, *Graphical symbols – Safety colours and safety signs – Registered safety signs*

ISO 7250 (all parts), *Basic human body measurements for technological design*

ISO 9355 (all parts), *Ergonomic requirements for the design of displays and control actuators*

ISO 11228 (all parts), *Ergonomics – Manual handling*

ISO/TR 11688-1, *Acoustics – Recommended practice for the design of low-noise machinery and equipment – Part 1: Planning*

ISO/TR 11688-2, *Acoustics – Recommended practice for the design of low-noise machinery and equipment – Part 2: Introduction to the physics of low-noise design*

ISO 12100:2010, *Safety of machinery – General principles for design – Risk assessment and risk reduction*

ISO 13732-1, *Ergonomics of the thermal environment – Methods for the assessment of human responses to contact with surfaces – Part 1: Hot surfaces*

ISO 13732-3, *Ergonomics of the thermal environment – Methods for the assessment of human responses to contact with surfaces – Part 3: Cold surfaces*

ISO 13849-1:2015¹, *Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design*

ISO 13849 (all parts), *Safety of machinery – Safety-related parts of control systems*

ISO 13850:2015, *Safety of machinery – Emergency stop function – Principles for design*

ISO 13854, *Safety of machinery – Minimum gaps to avoid crushing of parts of the human body*

ISO 13857, *Safety of machinery – Safety distances to prevent hazard zones being reached by upper and lower limbs*

ISO 14118, *Safety of machinery – Prevention of unexpected start-up*

ISO 14119, *Safety of machinery – Interlocking devices associated with guards – Principles for design and selection*

ISO 14120, *Safety of machinery – Guards – General requirements for the design and construction of fixed and movable guards*

ISO 14122-1, *Safety of machinery – Permanent means of access to machinery – Part 1: Choice of fixed means and general requirements of access*

ISO 14122-2, *Safety of machinery – Permanent means of access to machinery – Part 2: Working platforms and walkways*

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ISO 14122-3, *Safety of machinery – Permanent means of access to machinery – Part 3: Stairs, stepladders and guard-rails*

ISO 14122-4:2016, *Safety of machinery – Permanent means of access to machinery – Part 4: Fixed ladders*

ISO 14567, *Personal protective equipment for protection against falls from a height – Single-point anchor devices*

ISO 15534 (all parts), *Ergonomic design for the safety of machinery*

ISO 19353:2019, *Safety of machinery – Fire prevention and fire protection*

ISO 20607, *Safety of machinery – Instruction handbook – General drafting principles*

EN 353-1, *Personal fall protection equipment – Guided type fall arresters including an anchor line – Part 1: Guided type fall arresters including a rigid anchor line*

EN 353-2, *Personal protective equipment against falls from a height – Part 2: Guided type fall arresters including a flexible anchor line*

¹ Withdrawn.

EN 1005 (all parts), *Safety of machinery – Human physical performance*

EN 12198 (all parts), *Safety of machinery – Assessment and reduction of risks arising from radiation emitted by machinery*

EN 12464-1, *Light and lighting – Lighting of workplaces – Part 1: Indoor workplaces*

EN 16165:2021, *Determination of slip resistance of pedestrian surfaces – Methods of evaluation*

CIE 97:2005, *Guide on the maintenance of indoor electric lighting systems*

ICAO Annex 14. 9th Edition, July 2022

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1

hazard

potential source of harm

[SOURCE: ISO/IEC Guide 51:2014, 3.2]

3.2

significant hazard

hazard which has been identified as relevant and which requires specific action by the designer to eliminate or to reduce the risk according to the risk assessment

Note 1 to entry: A relevant hazard is identified as the result of one step of the process described in Clause 5.

[SOURCE: ISO 12100:2010, 3.8, modified – Note 1 to entry has been changed.]

3.3

risk

combination of the probability of occurrence of harm (physical injury or damage to health) and the severity of that harm

[SOURCE: ISO 12100:2010, 3.12, modified – "(physical injury or damage to health)" has been added.]

3.4

intended use

use of a machine in accordance with the information for use provided in the instructions

[SOURCE: ISO 12100:2010, 3.23]

3.5

protective measure

measure intended to achieve adequate risk reduction, implemented:

- by the designer (inherently safe design, safeguarding and complementary protective measures, information for use) and/or
- by the user (organization: safe working procedures, supervision, permit-to-work systems; provision and use of additional safeguards; use of personal protective equipment; training)

[SOURCE: ISO 12100:2010, 3.19]

3.6 environment

surroundings in which a product or system exists, including air, water, land, natural resources, flora, fauna, humans, and their interrelation

[SOURCE: IEC Guide 109:2012, 3.3]

3.7 environmental conditions

characteristics of the environment (wind, altitude, temperature, humidity, etc.) which may affect the wind turbine behaviour

[SOURCE: IEC 61400-1:2019, 3.17]

3.8 external conditions

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

[SOURCE: IEC 61400-1:2019, 3.18]

3.9 anchorage

for a personal protective equipment, structure or part of structure which can support load from fall protection or rescue systems

3.10 anchor point

component or sub-system that functions as an interface between the anchorage and a fall protection, work positioning, rope access or rescue system for the purpose of coupling the system to the anchorage

Note 1 to entry: It can be intended or not intended to be removable.

3.11 limited free fall

limited distance that can be compared with "fall on the actual level" i.e., a trip or slip where person is falling onto the surface/ground on which he or she was standing/walking ~ a fall at same level

Note 1 to entry: "Limited free fall" distance is set to maximum 0,5 m.

3.12 fall protection

system (including all components) a worker/technician uses to provide protection from falling and/or to safely arrest and mitigate the impact of a worker/technician's fall if one occurs

Note 1 to entry: Examples of personal fall protection systems include personal fall arrest systems, positioning systems and travel restraint systems.