



BSI Standards Publication

Wind energy generation systems

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

National foreword

This Published Document is the UK implementation of IEC TS 61400-30:2023.

The UK participation in its preparation was entrusted to Technical Committee PEL/88, Wind turbines.

A list of organizations represented on this committee can be obtained on request to its committee manager.

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

This publication is not to be regarded as a British Standard.

© The British Standards Institution 2023
Published by BSI Standards Limited 2023

ISBN 978 0 687 97280 5

ICS 27.130

Compliance with a Published Document cannot confer immunity from legal obligations.

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 30 September 2023.

Amendments/corrigenda issued since publication

Date	Text affected
------	---------------



IEC TS 61400-30

Edition 1.0 2023-09

TECHNICAL SPECIFICATION



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

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 27.180

ISBN 978-2-8322-7439-2

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	6
1 Scope.....	8
2 Normative references	8
3 Terms and definitions	11
4 Principal elements	16
4.1 General.....	16
4.2 Significant hazards	16
4.3 Frequency of exposure	16
5 Control systems.....	17
5.1 General.....	17
5.2 Control devices	17
5.3 Operating modes	17
5.4 Safety functions	18
5.5 Emergency stop.....	18
5.6 Failure of external power supply	19
6 Isolation of energy sources.....	19
7 Electrical systems.....	20
7.1 General requirements	20
7.2 Protection provided by enclosures	21
7.3 High voltage installation.....	21
7.4 Low voltage installation.....	22
7.5 Electrostatic discharge.....	22
7.6 Batteries and UPS	22
7.7 Arc flash mitigation and modelling	22
8 Mechanical systems	23
8.1 General requirements	23
8.2 Foundations and substructures	23
8.2.1 General	23
8.2.2 Specific requirements for offshore substructures	23
8.3 Tower	24
8.3.1 Tower materials.....	24
8.3.2 Cable management.....	24
8.4 Yaw system	24
8.5 Pitch system.....	24
8.6 Hub and spinner	25
8.7 Blade	25
8.8 Hydraulic and pneumatic systems	25
8.9 Drive train	25
8.10 Braking system	26
8.11 Rotor locking system.....	26
8.12 Nacelle	26
8.13 Internal crane.....	26
9 Working environment.....	27
9.1 General requirements	27
9.2 Access.....	27
9.2.1 General	27

9.2.2	Doorways	28
9.2.3	Stairs and stepladders	31
9.2.4	Fixed ladders	31
9.2.5	Provisions for personal fall protection	34
9.2.6	Access platforms	37
9.2.7	Space in front of electrical panels	37
9.2.8	Bluntness of edges	39
9.2.9	Climbing assistance	40
9.2.10	Service lift	40
9.2.11	Helihoist and aviation aids	41
9.2.12	Offshore vessel access	44
9.3	Working conditions	45
9.3.1	Noise exposure	45
9.3.2	Vibration	45
9.3.3	Radiation	46
9.3.4	Thermal	46
9.3.5	Air quality	46
9.3.6	Restricted and confined spaces	46
9.4	Ergonomic	47
9.4.1	General	47
9.4.2	Human machine interfaces	47
10	Lighting systems	47
10.1	General	47
10.1.1	Lighting for safety in wind turbines	47
10.1.2	Internal lighting	47
10.1.3	External lighting	48
10.2	Design requirements for lighting systems	48
10.3	Design requirements for emergency lighting systems	48
10.4	Illumination levels	49
10.5	Illumination level assessment	49
10.5.1	General	49
10.5.2	Illumination level verification	50
11	Fire protection	50
11.1	General	50
11.2	Foreseeable misuses	51
11.3	Fire risk assessment	51
11.4	Fire hazards	51
11.5	Risk reduction	52
11.5.1	General	52
11.5.2	Inherently safe design measures	52
11.5.3	Safeguarding	52
11.5.4	Monitoring and warning system	53
11.5.5	Complementary protective measures	53
11.6	Information for use	54
12	Emergency, escape and evacuation	54
12.1	General requirements	54
12.1.1	General	54
12.1.2	Evacuation and escape	54
12.1.3	Routes	55

12.1.4	Equipment	55
12.1.5	Escape point(s)	56
12.1.6	Verification of evacuation and escape strategy	56
12.2	Rescue	57
12.2.1	General	57
12.2.2	Equipment	57
12.2.3	Verification of the rescue strategy.....	57
12.3	Adverse weather	57
13	Information for use	58
13.1	General.....	58
13.2	Safety signs and safety markings.....	58
13.3	Acoustic and visual alarms.....	58
13.4	Instructions	58
13.4.1	General	58
13.4.2	Instructions in case of emergency.....	59
Annex A (informative)	List of significant hazards	60
Annex B (normative)	Example of walkways with different shape than a rectangle.....	66
Annex C (normative)	Climbing assistance	67
Annex D (informative)	Lighting – Determination of the maintenance factor.....	68
Bibliography.....		69
Figure 1	– Sketch of minimum door opening size	28
Figure 2	– Transition between internal and external platform	29
Figure 3	– External platform at entrance door	30
Figure 4	– Modified size of manholes	30
Figure 5	– Example of handle	32
Figure 6	– Side-step distance	32
Figure 7	– Obstacles in ladder climbing area	33
Figure 8	– Resting platforms	34
Figure 9	– Anchor point dimensions	35
Figure 10	– Space in front of electrical panels	37
Figure 11	– Evacuation in both directions and passing width.....	38
Figure 12	– Minimum passing width, evacuation in one direction.....	38
Figure 13	– Evacuation in both directions	39
Figure 14	– Edges and corners	40
Figure 15	– Edge radius and chamfer for parts	40
Figure 16	– Minimum helicopter distance to blade.....	42
Figure 17	– Helihoist layout example	43
Figure 18	– Illuminance levels measurement on ladders	50
Figure B.1	– Relation between height and width.....	66
Figure B.2	– Examples of different shapes	66

Table 1 – Tolerance for spacing of rungs	31
Table 2 – Requirements for rest platforms and moveable rest landings	33
Table 3 – Fall protection loads	36
Table 4 – Illuminance levels	49
Table A.1 – List of significant hazards	60

Currently in preview, click buy full version

INTERNATIONAL ELECTROTECHNICAL COMMISSION

WIND ENERGY GENERATION SYSTEMS –

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

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 Publications"). 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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The "colour inside" logo on the cover page of this document 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.

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*