

Wind turbines — Protective measures — Requirements for design, operation and maintenance

The European Standard EN 50308:2004 has the status of a
British Standard

ICS 27.180

National foreword

This British Standard is the official English language version of EN 50308:2004, including Corrigendum September 2005.

The UK participation in its preparation was entrusted to Technical Committee PEL/88, Wind turbine systems, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 25 and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

Amendments issued since publication

Amd. No.	Date	Comments
15706 Corrigendum No. 1	12 December 2005	Corrections to EN Foreword and Introduction

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 22 September 2004

© BSI 12 December 2005

ISBN 0 580 44506 2

EUROPEAN STANDARD

EN 50308

NORME EUROPÉENNE

EUROPÄISCHE NORM

July 2004

ICS 27.180

Incorporates Corrigendum February 2005

English version

**Wind turbines –
Protective measures –
Requirements for design, operation and maintenance**

Aérogénérateurs –
Mesures de protection –
Exigences pour la conception,
le fonctionnement et la maintenance

Windenergieanlagen –
Schutzmaßnahmen –
Anforderungen für Konstruktion,
Betrieb und Wartung

This European Standard was approved by CENELEC on 2004-03-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

© 2004 CENELEC - All rights of exploitation in any form and by any means reserved worldwide for CENELEC members.

Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 88, Wind turbine systems. This standard concerning protective measures stands in conjunction with the set of European standards for wind turbines (EN 61400 series).

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50308 on 2004-03-01.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2005-03-01

NOTE Revision of this standard will be undertaken as soon as possible.

Contents

Introduction.....	4
1 Scope.....	5
2 Normative references.....	5
3 Definitions - Terminology	6
4 Safety requirements and protective measures	7
4.1 General requirements	7
4.2 Passages	7
4.3 Rooms / working areas	9
4.4 Floors, platforms, standing-, working places.....	9
4.5 Climbing facilities	10
4.6 Moving parts, guards and blocking devices	13
4.7 Lighting	13
4.8 Noise.....	14
4.9 Emergency stop.....	15
4.10 Power disconnection.....	15
4.11 Fire protection	16
4.12 Warning signs	16
4.13 Offshore installation.....	16
4.14 Requirements for manuals and warnings.....	17
4.15 Requirements for operation and maintenance (Information for use)	19
 Annex A (informative) National informative annexes	21
A.0 Introduction.....	21
A.1 Germany (DE).....	21
A.2 Denmark (DK).....	22
A.3 Spain (ES)	22
A.4 France (FR)	23
A.5 United Kingdom (GB)	24
A.6 Greece (GR)	24
A.7 Ireland (IE).....	24
A.8 Italy (IT).....	24
A.9 The Netherlands (NL).....	25

Introduction

For the determination of the hazards described in this standard EN 1050 should be applied.

The machinery concerned and the extent to which hazards, hazardous situations and events are covered is indicated in Clause 1 (Scope).

This standard is a product (family) standard (according to EN 292-1) giving common requirements for the wind turbines mentioned in Clause 1 (Scope).

The document contains a standard part and an informative annex.

Annex A consists of national normative documents and/or regulations that specify either the present safety requirements for personnel or give the national supplements to these minimum requirements at the time this standard was prepared (January 2000).

The format of the standard is based, where possible, on a practical approach for

- manufacturers and designers who have to meet the requirements,
- authorities who have to check the design,
- owners who have legal responsibilities.

1 Scope

This European Standard specifies requirements for protective measures relating to the health and safety of personnel, relevant to commissioning, operation and maintenance of wind turbines.

It does not describe instructions and provisions for safe working during manufacture, transport, assembly and installation of the wind turbine.

Requirements are specified regarding

- hardware provisions being a part of the turbine such as platforms, ladders, lighting,
- manuals and warning signs to accommodate safe and quick operation, inspection and maintenance.

The requirements and/or measures specified account for the hazards

- of mechanical origin such as falling, slipping, locking in,
- of thermal origin (fire) such as burns by flames or explosions,
- of electricity such as contact with live parts,
- generated by noise such as stress and loss of hearing,
- generated by neglecting ergonomic principles in machine design such as unhealthy postures or human errors.

This standard is prepared for horizontal axis, grid connected wind turbines. For other concepts (e.g. vertical axis turbines) the principles are still valid, but the specific rules or requirements have to be adjusted to the actual concept.

Additional provisions and procedures are necessary for turbines installed in water or offshore. The present document only draws attention to these.

Provisions and procedures for lifts and Suspended Access Equipment (SAE) in the turbine tower are not included in this standard.

This standard is not applicable to wind turbines manufactured before the date of its publication by CENELEC.

2 Normative references

The following referenced documents are indispensable for the application 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.

EN 292-1		Safety of machinery - Basic concepts, general principles for design Part 1: Basic terminology, methodology
EN 292-2	1991	Part 2: Technical principles and specifications
EN 418		Safety of machinery - Emergency stop equipment, functional aspects Principles for design
EN 457	1992	Safety of machinery - Auditory danger signals General requirements, design and testing (ISO 7731:1986, mod.)
EN 547-1		Safety of machinery - Human body dimensions Part 1: Principles for determining the dimensions required for openings for whole body access into machinery

EN 547-3		Safety of machinery - Human body dimensions Part 3: Anthropometric data for whole body access into machinery and access openings
EN 563		Safety of machinery – Temperatures of touchable surfaces Ergonomics data to establish temperature limit values for hot surfaces
EN 795		Personal protective equipment against falls from a height Anchorage devices - Requirements and testing
EN 953		Safety of machinery – Guards – General requirements for the design and construction of fixed and movable guards
EN 981		Safety of machinery – System of auditory and visual danger information signals
EN 982		Safety of machinery - Safety requirements for hydraulic and pneumatic systems and parts - Hydraulics
EN 983		Safety of machinery - Safety requirements for hydraulic and pneumatic systems and parts - Pneumatics
EN 1037		Safety of machinery – Prevention of unexpected start up
EN 1050		Safety of machinery – Principles for risk assessment
ISO 4871	1996	Acoustics – Determination of sound power levels of noise sources using sound pressure – Engineering method in an essentially free field over a reflecting plane
EN ISO 11202	1995	Acoustics – Noise emitted by machinery and equipment – Measurement of emission sound pressure levels at a work station and at other specified positions – Survey method in situ
EN ISO 11688-1	1998	Acoustics – Recommended practice for the design of low-noise machinery and equipment - Part 1: Planning
EN ISO 14122-1	¹⁾	Safety of machinery Part 1: Permanent means of access to machines and industrial plants - Choice of a fixed means of access between two levels
EN ISO 14122-2	¹⁾	Part 2: Working platforms and gangways
EN ISO 14122-3	¹⁾	Part 3: Stairways, stepladders and guard-rails
EN ISO 14122-4	¹⁾	Part 4: Fixed ladders
EN 50160		Voltage characteristics of electricity supplied by public distribution systems
EN 50172		Emergency escape lighting systems
EN 50199		Electromagnetic compatibility (EMC) - Product standard for arc welding equipment
ENV 1070		Safety of machinery – Terminology
ENV 61400-1		Wind turbine generating systems - Part 1: Safety requirements
EN 61400-11	1998	Wind turbine generator systems – Part 11: Acoustic noise measurement techniques (IEC 61400-11:1998)
HD 472		Nominal voltages for low-voltage public electricity supply systems (IEC 60038, mod.)

3 Definitions – Terminology

For the purpose of this standard the definitions given in EN 292, ENV 61400-1 and EN ISO 4871 apply.

¹⁾ At draft stage.

4 Safety requirements and protective measures

4.1 General requirements

Wind turbines shall be designed according the principles of EN 292. The general principles to avoid risks to health and safety are laid down in Clause 5 of EN 292-1 (Strategy for selecting safety measures).

The initial design of wind turbines must take account of how risks to the health and safety of persons are to be minimised. Structural provisions include e.g. door-openings, access-openings, floors, platforms and railings, ladders with fall protection equipment, passages and working spaces, anchorage points and hand grips, lighting, guarding of moving parts, protection against electrical hazards, sound barriers, noise isolation or thermal isolation. Some of these provisions have an effect on the structural integrity of the turbine e.g. door openings, doorstep height, access openings.

The design shall include provisions for permanent safe access (ladders, platforms, anchorage points, lighting, etc.) to reach the locations for inspection and maintenance activities and to perform these activities safely. All items shall be safe during the turbine lifetime (providing that they are maintained according to the operator's instruction manual and maintenance manual for the turbine).

Accessible parts of the machinery shall have no sharp edges, no sharp angles and no rough surfaces likely to cause injury.

Normal control of the wind turbine shall be possible without ascending to the turbine nacelle.

Control panels shall be placed so that unintentional or erroneous operation is prevented. If a wind turbine has more than one control panel/unit, it shall only be possible to operate it from one panel/unit at a time. Where remote operation of a wind turbine is possible (e.g. via a modem link) a local control switch shall be available to cut off the remote mode and all other control systems in the turbine with the exception of any emergency stop.

It shall be possible to block, vent, release or isolate/disconnect any stored or trapped energy that can cause risk during maintenance where parts of the turbine are powered by an energy source other than wind, such as

- electrical energy inside a capacitor bank or battery,
- mechanical energy inside a spring loaded system or brake system,
- hydraulic energy inside pressurised accumulators,
- gravity.

EN 982 shall be followed to release stored energy.

EN 1037 shall be followed to prevent unexpected start-up.

4.2 Passages

Doors, hatches, access and escape passages shall be in accordance with 6.0 of EN 292-2.

Dimensions are based on EN 547-1 and EN 547-3.

4.2.1 Access

All normal access points to wind turbines shall be equipped by the manufacturer with means to make the turbines inaccessible, so as to prevent unauthorised persons from gaining access. In particular, access to the control panel, the machinery and electrical parts of the wind turbine by unauthorised persons shall be prevented.