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Vindkraftverk – Del 12-1: Bestämning av prestanda för anläggningar för elproduktion

Wind turbines –

Part 12-1: Power performance measurements of electricity producing wind turbines

Som svensk standard gäller europastandarden EN 61400-12-1:2006. Den svenska standarden innehåller den officiella engelska språkversionen av EN 61400-12-1:2006.

Nationellt förord

Europastandarden EN 61400-12-1:2006^{*)}

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^{*)} EN 61400-12-1:2006 ikraftsattes 2006-09-25 som SS-EN 61400-12-1 genom offentliggörande, d v s utan utgivning av något svenskt dokument.

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English version

Wind turbines
Part 12-1: Power performance measurements of
electricity producing wind turbines
(IEC 61400-12-1:2005)

Eoliennes
Partie 12-1: Mesures des performances
de puissance des éoliennes
de production d'électricité
(CEI 61400-12-1:2005)

Windenergieanlagen
Teil 12-1: Messung des
Leistungsverhaltens einer
Windenergieanlage
(IEC 61400-12-1:2005)

This European Standard was approved by CENELEC on 2006-05-01. 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, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the 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

Foreword

The text of document 88/244/FDIS, future edition 1 of IEC 61400-12-1, prepared by IEC TC 88, Wind turbines, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61400-12-1 on 2006-05-01.

This European Standard supersedes EN 61400-12:1998.

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) 2007-02-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2009-05-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61400-12-1:2005 was approved by CENELEC as a European Standard without any modification.

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

- | | |
|-------------|--|
| IEC 60044-2 | NOTE Harmonized as EN 60044-2:1999 +A1:2000 +A2:2003 (not modified). |
| IEC 61400-1 | NOTE Harmonized as EN 61400-1:2005 (not modified). |

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

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 60044-1 (mod) + A1 + A2	1996 2000 2002	Instrument transformers - Part 1: Current transformers	EN 60044-1 + A1 + A2	1999 2000 2003
IEC 60688 + A1 (mod) + A2	1992 1997 2001	Electrical measuring transducers for converting a.c. electrical quantities to analogue or digital signals	EN 60688 + A1 + A2	1992 1999 2001
IEC 61400-2	1996	Wind turbine generator systems - Part 2: Safety of small wind turbines	EN 61400-2	1996
ISO 2533	1975	Standard atmosphere	-	-
ISO/IEC Guide Expres	1995	Guide to the expression of uncertainty in measurement (GUM)	-	-

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INTRODUCTION

The purpose of this part of IEC 61400 is to provide a uniform methodology that will ensure consistency, accuracy and reproducibility in the measurement and analysis of power performance by wind turbines. The standard has been prepared with the anticipation that it would be applied by:

- a wind turbine manufacturer striving to meet well-defined power performance requirements and/or a possible declaration system;
- a wind turbine purchaser in specifying such performance requirements;
- a wind turbine operator who may be required to verify that stated, or required, power performance specifications are met for new or refurbished units;
- a wind turbine planner or regulator who must be able to accurately and fairly define power performance characteristics of wind turbines in response to regulations or permit requirements for new or modified installations.

This standard provides guidance in the measurement, analysis, and reporting of power performance testing for wind turbines. The standard will benefit those parties involved in the manufacture, installation planning and permitting, operation, utilization, and regulation of wind turbines. The technically accurate measurement and analysis techniques recommended in this standard should be applied by all parties to ensure that continuing development and operation of wind turbines is carried out in an atmosphere of consistent and accurate communication relative to environmental concerns. This standard presents measurement and reporting procedures expected to provide accurate results that can be replicated by others. Meanwhile, a user of the standard should be aware of differences that arise from large variations in wind shear and turbulence, and from the chosen criteria for data selection. Therefore, a user should consider the influence of these differences and the data selection criteria in relation to the purpose of the test before contracting the power performance measurements.

A key element of power performance testing is the measurement of wind speed. This standard prescribes the use of cup anemometers to measure the wind speed. This instrument is robust and has long been regarded as suitable for this kind of test. Even though suitable wind tunnel calibration procedures are adhered to, the field flow conditions associated with the fluctuating wind vector, both in magnitude and direction, will cause different instruments to potentially perform differently.

Tools and procedures to classify cup anemometers are given in Annexes I and J. However there will always be a possibility that the result of the test can be influenced by the selection of the wind speed instrument. Special care should therefore be taken in the selection of the instruments chosen to measure the wind speed.

WIND TURBINES –

Part 12-1: Power performance measurements of electricity producing wind turbines

1 Scope

This part of IEC 61400 specifies a procedure for measuring the power performance characteristics of a single wind turbine and applies to the testing of wind turbines of all types and sizes connected to the electrical power network. In addition, this standard describes a procedure to be used to determine the power performance characteristics of small wind turbines (as defined in IEC 61400-2) when connected to either the electric power network or a battery bank. The procedure can be used for performance evaluation of specific turbines at specific locations, but equally the methodology can be used to make generic comparisons between different turbine models or different turbine settings.

The wind turbine power performance characteristics are determined by the measured power curve and the estimated annual energy production (*AEP*). The measured power curve is determined by collecting simultaneous measurements of wind speed and power output at the test site for a period that is long enough to establish a statistically significant database over a range of wind speeds and under varying wind and atmospheric conditions. The *AEP* is calculated by applying the measured power curve to reference wind speed frequency distributions, assuming 100 % availability.

The standard describes a measurement methodology that requires the measured power curve and derived energy production figures to be supplemented by an assessment of uncertainty sources and their combined effects.

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.

IEC 60044-1:1996, *Instrument transformers – Part 1: Current transformers*
Amendment 1 (2000)
Amendment 2 (2002)¹

IEC 60688:1992, *Electrical measuring transducers for converting a.c. electrical quantities to analogue or digital signals*
Amendment 1 (1997)
Amendment 2 (2001)²

IEC 61400-2:1996, *Wind turbine generator systems – Part 1: Safety of small wind turbines*

ISO 2533:1975, *Standard atmosphere*

ISO Guide to the expression of uncertainty in measurement, 1995, ISBN 92-67-10188-9

¹ There exists a consolidated edition 1.2 (2003) that includes edition 1 and its amendments 1 and 2.