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**BS EN 61400-11:2013**



BSI Standards Publication

# Wind turbines

Part 11: Acoustic noise  
measurement techniques

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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 secretary.

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Part 11: Acoustic noise measurement techniques  
(IEC 61400-11:2012)**

Eoliennes -  
Partie 11: Techniques de mesure  
du bruit acoustique  
(CEI 61400-11:2012)

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(IEC 61400-11:2012)

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This document supersedes EN 61400-11:2003 + A1:2006.

EN 61400-11:2013 includes the following significant technical changes with respect to EN 61400-11:2003 + A1:2006:

The technical change is introducing new principles for data reduction procedures.

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(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 60688          | -               | Electrical measuring transducers for converting A.C. and D.C. electrical quantities to analogue or digital signals | EN 60688      | -           |
| IEC 60942          | 2003            | Electroacoustics - Sound calibrators   | EN 60942      | 2003        |
| IEC 61260          | 1995            | Electroacoustics - Octave-band and fractional-octave-band filters  | EN 61260      | 1995        |
| IEC 61400-12-1     | 2005            | Wind turbines -<br>Part 12-1: Power performance measurements of electricity producing wind turbines                | EN 61400-12-1 | 2006        |
| IEC 61400-12-2     | - <sup>1)</sup> | Wind turbines -<br>Part 12-2: Power performance of electricity producing wind turbines based on nacelle anemometry | EN 61400-12-2 | -           |
| IEC 61672          | Series          | Electroacoustics - Sound level meters  | EN 61672      | Series      |
|                    | -               | Uncertainty of measurement -<br>Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)           | -             | -           |

<sup>1)</sup> To be published.

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## INTRODUCTION

The purpose of this part of IEC 61400 is to provide a uniform methodology that will ensure consistency and accuracy in the measurement and analysis of acoustical emissions by wind turbine generator systems. This International Standard has been prepared with the anticipation that it would be applied by:

- wind turbine manufacturers striving to meet well defined acoustic emission performance requirements and/or a possible declaration system (e.g. IEC/TS 61400-14);
- wind turbine purchasers for specifying performance requirements;
- wind turbine operators who may be required to verify that stated, or required, acoustic performance specifications are met for new or refurbished units;
- wind turbine planners or regulators who must be able to accurately and fairly define acoustical emission characteristics of a wind turbine in response to environmental regulations or permit requirements for new or modified installations.

This standard provides guidance in the measurement, analysis and reporting of complex acoustic emissions from wind turbine generator systems. The standard will benefit those parties involved in the manufacture, installation, planning and permitting, operation, utilization, and regulation of wind turbines. The measurement and analysis techniques recommended in this document 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.

## WIND TURBINES –

### Part 11: Acoustic noise measurement techniques

#### 1 Scope

This part of IEC 61400 presents measurement procedures that enable noise emissions of a wind turbine to be characterised. This involves using measurement methods appropriate to noise emission assessment at locations close to the machine, in order to avoid errors due to sound propagation, but far away enough to allow for the finite source size. The procedures described are different in some respects from those that would be adopted for noise assessment in community noise studies. They are intended to facilitate characterisation of wind turbine noise with respect to a range of wind speeds and directions. Standardisation of measurement procedures will also facilitate comparisons between different wind turbines.

The procedures present methodologies that will enable the noise emissions of a single wind turbine to be characterised in a consistent and accurate manner. These procedures include the following:

- location of acoustic measurement positions;
- requirements for the acquisition of acoustic, meteorological, and associated wind turbine operational data;
- analysis of the data obtained and the content for the data report; and
- definition of specific acoustic emission parameters, and associated descriptors which are used for making environmental assessments.

This International Standard is not restricted to wind turbines of a particular size or type. The procedures described in this standard allow for the thorough description of the noise emission from a wind turbine. A method for small wind turbines is described in Annex F.

#### 2 Normative references

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.

IEC 60688, *Electrical measuring transducers for converting a.c. electrical quantities to analogue or digital signals*

IEC 60942:2003, *Electroacoustics – Sound calibrators*

IEC 61260:1995, *Electroacoustics – Octave-band and fractional-octave-band filters*

IEC 61400-12-1:2005, *Wind turbines – Part 12-1: Power performance measurements of electricity producing wind turbines*

IEC 61400-12-2, *Wind turbines – Part 12-2: Power performance verification of electricity producing wind turbines*<sup>1</sup>

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<sup>1</sup> To be published.