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Wind turbine generator systems –

Part 11:
Acoustic noise measurement techniques

Aérogénérateurs –

Partie 11:
Techniques de mesure du bruit acoustique

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CONTENTS

Page

FOREWORD 4

INTRODUCTION 5

Clause

1 General 6
- 1.1 Scope and object 6
- 1.2 Normative references 6
- 1.3 Definitions 7
- 1.4 Symbols and units 8
- 1.5 Abbreviations 9

2 Outline of method 9

3 Instrumentation 9
- 3.1 Acoustic instruments 9
- 3.2 Non-acoustic instruments 10
- 3.3 Traceable calibration 11

4 Measurements and measurement procedures 11
- 4.1 Measurement positions 11
- 4.2 Acoustic measurements 12
- 4.3 Non-acoustic measurements 15

5 Data reduction procedures 17
- 5.1 Wind speed 17
- 5.2 Correction for background noise 18
- 5.3 Apparent sound power level 18
- 5.4 Wind speed dependence 19
- 5.5 Directivity 20
- 5.6 Octave- or third-octave band levels 20
- 5.7 Tonality 20

6 Information to be reported 22
- 6.1 Characterization of the wind turbine 22
- 6.2 Physical environment 23
- 6.3 Instrumentation 23
- 6.4 Acoustic data 23
- 6.5 Non-acoustic data 24
- 6.6 Uncertainty 24

Page

Tables

1 Effective noise bandwidth 14
2 Roughness length 18
3 Bandwidth of critical bands 21
D.1 Examples of possible values of type B uncertainty components relevant for apparent sound power level 37

Figures

1 Mounting of the microphone – plan view 25
2 Mounting of the microphone – vertical cross-section 26
3 Standard pattern for microphone measurement positions 27
4 Illustration of the definitions of R_0 and slant distance R_1 28
5 Allowable region for meteorological mast position as a function of β – plan view 29
6 Allowable range for meteorological mast position – cross-section 30
B.1 Tolerances for frequency characteristics 33

Annexes

A Other characteristics of WTGS noise emission and their quantification 31
B Criteria for recording/playback equipment 33
C Assessment of turbulence 35
D Assessment of measurement uncertainty 36
E Bibliography 39

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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WIND TURBINE GENERATOR SYSTEMS –

Part 11: Acoustic noise measurement techniques

FOREWORD

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International Standard IEC 61400-11 has been prepared by IEC technical committee 88: Wind turbine systems.

The text of this standard is based on the following documents:

FDIS	Report on voting
88/96/FDIS	88/97/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

Annexes A, B, C, D and E are for information only.

A bilingual version of this standard may be issued at a later date.

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 (WTGS). This standard has been prepared with the anticipation that it would be applied by:

– the WTGS manufacturer striving to meet well defined acoustic emission performance requirements and/or a possible declaration system;

– the WTGS purchaser in specifying such performance requirements;

– the WTGS operator who may be required to verify that stated, or required, acoustic performance specifications are met for new or refurbished units;

– the WTGS planner or regulator who must be able to accurately and fairly define acoustical emission characteristics of WTGS 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 (WTGS). The standard will benefit those parties involved in the manufacture, installation planning and permitting, operation, utilization, and regulation of WTGS. The technically accurate measurement and analysis techniques recommended in this document should be applied by all parties to ensure that continuing development and operation of WTGS 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.

The consistency of results using the method for measurement of tonality will be assessed, and future revisions will address any identified shortcomings.

WIND TURBINE GENERATOR SYSTEMS –

Part 11: Acoustic noise measurement techniques

1 General

1.1 Scope and object

This part of IEC 61400 presents sound measurement procedures that enable noise emissions of a wind turbine to be characterized. 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 enough away 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 characterization of wind turbine noise with respect to a range of wind speeds and directions. Standardization of measurement procedures will also facilitate comparisons between different wind turbines.

The procedures present methodologies that will enable the noise emissions of a single WTGS to be characterized 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 WTGS 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.

The standard is not restricted to WTGS of a particular size or type. The procedures described in this standard allow for the thorough description of the noise emission from a WTGS. If, in some cases, less comprehensive measurements are needed, such measurements are made according to the relevant parts of this standard.

1.2 Normative references

The following normative documents contain provisions that, through reference in this text, constitute provisions of this part of IEC 61400. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 61400 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60386:1972, *Method of measurement of speed fluctuations in sound recording and reproducing equipment*

IEC 60651:1979, *Sound level meters*

IEC 60688:1997, *Electrical measuring transducers for converting a.c. electrical quantities to analogue or digital signals*

IEC 60804:1985, *Integrating-averaging sound level meters*

IEC 60942:1997, *Electroacoustics – Sound calibrators*

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

IEC 61400-12:1998, *Wind turbine generator systems – Part 12: Wind turbine power performance testing*