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Wind turbine generator systems –

Part 13: Measurement of mechanical loads

Aérogénérateurs –

Partie 13: Mesure des charges mécaniques

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

WIND TURBINE GENERATOR SYSTEMS –**Part 13: Measurement of mechanical loads**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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The main task of IEC technical committees is to prepare International Standards. In exceptional circumstances, a technical committee may propose the publication of a technical specification when

- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC 61400-13, which is a technical specification, has been prepared by IEC technical committee 88: Wind turbine systems.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
88/120/CDV	88/132/RVC

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

The committee has decided that the contents of this publication will remain unchanged until 2004. At this date, the publication will be

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- withdrawn;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

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

INTRODUCTION

In the process of structural design of a wind turbine, thorough understanding about, and accurate quantification of, the loading is of utmost importance.

In the design stage, loads can be predicted with aeroelastic models and codes. However, such models have their shortcomings and uncertainties, and they always need to be validated by measurement. Furthermore, measurements can be used for the direct determination of structural loads in specific conditions.

Mechanical load measurements can be used both as the basis for design and as the basis for certification. Design aspects for wind turbines are covered by IEC 61400-1 whilst certification procedures are described in IEC WT 01*. This technical specification is aimed at the test engineer who will design and implement the test programme to meet the specific design or certification needs. The specification provides specific guidance on load measurements on key structural components and load paths. Data analysis procedures are also outlined. The specification describes how to collect various types of time-series or statistical load information. Two types of situation are considered – steady-state operation and transient operation. The prescribed measurement load cases mirror the design load cases within IEC 61400-1, the wind turbine safety standard.

* IEC WT 01:2001, IEC System for Conformity Testing and Certification of Wind Turbines – Rules and procedures

WIND TURBINE GENERATOR SYSTEMS –

Part 13: Measurement of mechanical loads

1 General

1.1 Scope and object

This part of IEC 61400 deals with mechanical load measurements on wind turbines. It mainly focuses on large (>40 m²) electricity generating horizontal axis wind turbines. However, the methods described might be applicable to other wind turbines as well (for example, mechanical water pumpers, vertical axis turbines).

The object of this specification is to describe the methodology and corresponding techniques for the experimental determination of the mechanical loading on wind turbines. This technical specification is intended to act as a guide for carrying out measurements used for verification of codes and/or for direct determination of the structural loading. This specification is not only intended as one coherent measurement specification but can also be used for more limited measurement campaigns.

1.2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 61400. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, 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. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60050(415):1999, *International Electrotechnical Vocabulary (IEV) – Part 415: Wind turbine generator systems*

IEC 61400-1:1999, *Wind turbine generator systems – Part 1: Safety requirements*

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

ISO 1995, *Guide to the expression of uncertainty in measurement*

ISO 2394:1998, *General principles on reliability for structures*