IEC 61400-13

Edition 1.1 2021-12
CONSOLIDATED VERSION

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Wind turbines –
Part 13: Measurement of mechanical loads

Éoliennes –
Partie 13: Mesurage des charges mécaniques

IEC 61400-13:2015-12+AMD1:2021-12 CSV(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

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This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 61400-13 edition 1.1 contains the first edition (2015-12) [documents 88/511/CDV and 88/554/RVC] and its amendment 1 (2021-12) [documents 88/795/CDV and 88/821/RVC].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

This International Standard IEC 61400-13 has been prepared by IEC technical committee 88: Wind turbines.

This standard replaces IEC TS 61400-13 published in 2001. This first edition constitutes a technical revision and transition from technical specification to International Standard.

This first edition includes the following changes with respect to the technical specification:

a) scope of the document focused to load measurements for the purpose of model validation;
b) number of measurement load cases to match the new scope reduced;
c) capture matrix requirements to match the new scope reduced;
d) requirements to address the state of the art technology updated.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 61400 series, published under the general title *Wind turbines*, can be found on the IEC website.

The committee has decided that the contents of the base publication and its amendment will remain unchanged until the stability date indicated on the IEC web site under webstore.iec.ch in the data related to the specific publication. At this date, the publication will be

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- withdrawn,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

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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.

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 61400-22. This standard is aimed at the test institute, the turbine manufacturer and the certifying body and clearly defines the minimum requirements for a mechanical loads test resulting in consistent, high quality reproducible test results.

INTRODUCTION to Amendment 1

This amendment to IEC 61400-13:2015 addresses the errors found in Annex B which impact a significant portion of that annex.

WIND TURBINES –

Part 13: Measurement of mechanical loads

1 Scope

This part of the IEC 61400 describes the measurement of fundamental structural loads on wind turbines for the purpose of the load simulation model validation. The standard prescribes the requirements and recommendations for site selection, signal selection, data acquisition, calibration, data verification, measurement load cases, capture matrix, post-processing, uncertainty determination and reporting. Informative annexes are also provided to improve understanding of testing methods.

The methods described in this document can also be used for mechanical loads measurements for other purposes such as obtaining a measured statistical representation of loads, direct measurements of the design loads, safety and function testing, or measurement of component loads. If these methods are used for an alternative objective or used for an unconventional wind turbine design, the required signals, measurement load cases, capture matrix, and post processing methods should be evaluated and if needed adjusted to fit the objective.

These methods are intended for onshore electricity-generating, horizontal-axis wind turbines (HAWTs) with rotor swept areas of larger than 200 m^2. However, the methods described may be applicable to other wind turbines (for example, small wind turbines, ducted wind turbines, vertical axis wind turbines).

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 60050 (all parts), *International Electrotechnical Vocabulary* (available at <http://www.electropedia.org/>)

IEC 61400-1:2005, *Wind turbines – Part 1: Design requirements*

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

ISO/IEC Guide 98-3, *Uncertainty of measurement – Part 3: Guide to the expression of uncertainty in measurement*

3 Terms and definitions

For the purposes of this document, the terms and definitions related to wind turbine systems or wind energy in general of IEC 60050-415 as well as the following apply.

3.1
blade
rotating aerodynamically active part of the rotor