



IEC 61400-5

Edition 1.1 2025-08

# INTERNATIONAL STANDARD

CONSOLIDATED VERSION

**Wind energy generation systems -  
Part 5: Wind turbine blades**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

### **Wind energy generation systems - Part 5: Wind turbine blades**

#### FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. 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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This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 61400-5 edition 1.1 contains the first edition (2020-06) [documents 88/759/FDIS and 88/767/RVD] and its amendment 1 (2025-08) [documents 88/1086/FDIS and 88/1107/RVD].

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.

International Standard IEC 61400-5 has been prepared by IEC technical committee 88: Wind energy generation systems.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
88/759/FDIS	88/767/RVD

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

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

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

A list of all parts of the IEC 61400 series, under the general title *Wind energy generation systems*, can be found on the IEC website.

The committee has decided that the contents of this document and its amendment will remain unchanged until the stability date indicated on the IEC website under [webstore.iec.ch](http://webstore.iec.ch) in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

## INTRODUCTION

The blades of a wind turbine rotor are generally regarded as one of the most critical components of the wind turbine system. In this International Standard, a minimum set of requirements for the design and manufacturing of wind turbine blades are defined.

An approach to a structural design process for the blade is set forth in the general areas of blade characteristics, aerodynamic design, material requirements and structural design. Furthermore, in order to efficiently facilitate the transfer of a blade design to the production environment, this document includes demands for designing for manufacturing.

The requirements for structural design of the wind turbine blade have been developed in a manner to reward innovation, validation, quality and testing. Specifically, the designer will be able claim lower partial safety factors based on, among other items, the diligence of the validation of models and the correlation to testing results.

To ensure a production environment that can facilitate the manufacturing of a blade in accordance with the design, the manufacturing requirements included in this document provide a minimum basis for a quality management system and workshop requirements. In addition, requirements for blade handling, operation and maintenance are described in the close of this document.

## WIND ENERGY GENERATION SYSTEMS –

### Part 5: Wind turbine blades

#### 1 Scope

This part of IEC 61400 specifies requirements to ensure the engineering integrity of wind turbine blades as well as an appropriate level of operational safety throughout the design lifetime. It includes requirements for:

- aerodynamic and structural design,
- material selection, evaluation and testing,
- manufacture (including associated quality management),
- transportation, installation, operation and maintenance of the blades.

The purpose of this document is to provide a technical reference for designers, manufacturers, purchasers, operators, third party organizations and material suppliers, ~~as well as to define requirements for certification.~~

With respect to certification, this document provides the detailed basis for fulfilling the current requirements of the IECRE system, as well as other IEC standards relevant to wind turbine blades. When used for certification, the applicability of each portion of this document should be determined based on the extent of certification, and associated certification modules per the IECRE system.

The rotor blade is defined as all components integrated in the blade design, excluding removable bolts in the blade root connection and support structures for installation.

This document is intended to be applied to rotor blades for all wind turbines. For rotor blades used on small wind turbines according to IEC 61400-2, the requirements in that document are applicable.

At the time this document was written, most blades were produced for horizontal axis wind turbines. The blades were mostly made of fiber reinforced plastics. However, most principles given in this document would be applicable to any rotor blade configuration, size and material.

#### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60050-415, *International Electrotechnical Vocabulary (IEV) – Part 415: Wind turbine generator systems*

IEC 61400-1, *Wind energy generation systems – Part 1: Design requirements*

IEC 61400-2, *Wind turbines – Part 2: Small wind turbines*

IEC 61400-3-1, *Wind energy generation systems – Part 3-1: Design requirements for fixed offshore wind turbines*

IEC 61400-3-2, *Wind energy generation systems – Part 3-2: Design requirements for floating offshore wind turbines*

IEC 61400-23, *Wind turbines – Part 23: Full-scale structural testing of rotor blades*

IEC 61400-24, *Wind energy generation systems – Part 24: Lightning protection*

~~ISO/IEC 17021-1, *Conformity assessment – Requirements for bodies providing audit and certification of management systems – Part 1: Requirements*~~

ISO 10474, *Steel and steel products – Inspection documents*

ISO 2394, *General principles on reliability for structures*

ISO 9000, *Quality management systems – Fundamentals and vocabulary*

ISO 9001, *Quality management systems – Requirements*

EN 10204, *Metallic products – Types of inspection documents*

ISO 16269-6, *Statistical interpretation of data – Part 6: Determination of statistical tolerance intervals*



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IEC 61400-3-2, *Wind energy generation systems – Part 3-2: Design requirements for floating offshore wind turbines*

IEC 61400-23, *Wind turbines – Part 23: Full-scale structural testing of rotor blades*

IEC 61400-24, *Wind energy generation systems – Part 24: Lightning protection*

ISO 10474, *Steel and steel products – Inspection documents*

ISO 2394, *General principles on reliability for structures*

ISO 9000, *Quality management systems – Fundamentals and vocabulary*

ISO 9001, *Quality management systems – Requirements*

EN 10204, *Metallic products – Types of inspection documents*

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