

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



Wind energy generation systems –  
Part 6: Tower and foundation design requirements

ITeH STANDARD PREVIEW  
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Systèmes de génération d'énergie éolienne –  
Partie 6: Exigences en matière de conception du mât et de la fondation

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## WIND ENERGY GENERATION SYSTEMS –

## Part 6: Tower and foundation design requirements

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## INTRODUCTION

This document has been developed for the design of onshore wind turbine towers and foundations that will build on and complement the IEC 61400-1 relating to design criteria and provide a complete set of technical requirements for the structural and geotechnical design. The requirements are also applicable to wind turbines covered by IEC 61400-2. It is envisaged that the proposed work will be followed by the development of another part, directed towards the design of offshore support structures, thus also complementing IEC 61400-3-1.

Civil engineering practices associated with the scope of the standard have regional variations. It is not the intention of this document to conflict with those practices but to supplement them particularly in ensuring that all important features of typical wind turbine towers and foundations are fully and correctly considered. To this end, the relevant parts in existing standards for design of steel and concrete structures and for geotechnical design have been identified for participating countries and regions.

The principles included in this document apply to the sections of the tower of an offshore fixed structure above the splash zone if the loading has been calculated according to IEC 61400-3-1.

This document will include the evaluation and calibration of partial safety factors for material strengths to be used together with the safety elements in IEC 61400-1 and IEC 61400-2 for loads and for verification of static equilibrium.

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## WIND ENERGY GENERATION SYSTEMS –

### Part 6: Tower and foundation design requirements

#### 1 Scope

This part of IEC 61400 specifies requirements and general principles to be used in assessing the structural integrity of onshore wind turbine support structures (including foundations). The scope includes the geotechnical assessment of the soil for generic or site specific purposes. The strength of any flange and connection system connected to the rotor nacelle assembly (including connection to the yaw bearing) are designed and documented according to this document or according to IEC 61400-1. The scope includes all life cycle issues that may affect the structural integrity such as assembly and maintenance.

The assessment assumes that load data has been derived as defined in IEC 61400-1 or IEC 61400-2 and using the implicit reliability level and partial safety factors for loads.

#### 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 61400-1:2019, *Wind energy generation systems – Part 1: Design requirements*

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

IEC 61400-3-1:2019, *Wind energy generation systems – Part 3-1: Design requirements for fixed offshore wind turbines*

ISO 2394:2015, *General principles on reliability for structures*

ISO 22965-1, *Concrete – Part 1: Methods of specifying and guidance for the specifier*

ISO 22965-2, *Concrete – Part 2: Specification of constituent materials, production of concrete and compliance of concrete*

ISO 22966, *Execution of concrete structures*

ISO 6934 (all parts), *Steel for the prestressing of concrete*

ISO 6935 (all parts), *Steel for the reinforcement of concrete*

ISO 9016:2012, *Destructive tests on welds in metallic materials – Impact tests – Test specimen location, notch orientation and examination*

ISO 12944 (all parts), *Paints and varnishes – Corrosion protection of steel structures by protective paint systems*

EN 1993-1-9:2005, *Eurocode 3: Design of steel structures – Part 1-9: Fatigue*

EN 1993-3-2:2006, *Eurocode 3: Design of steel structures – Part 3-2: Towers, masts and chimneys – Chimneys*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61400-1, IEC 61400-2 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

#### 3.1

##### **assessment**

total set of activities performed in order to find out if the reliability of a structure is acceptable or not

#### 3.2

##### **characteristic load**

load accounting for required exceedance probability level and without partial safety factor for loads

#### 3.3

##### **characteristic buckling resistance**

load associated with buckling in the presence of inelastic material behaviour, the geometrical and structural imperfections that are inevitable in practical construction, and follower load effects

<https://standards.iteh.ai/catalog/standards/sist/050ab47a-4f85-4dcc-8c21-34a3f61e2ca6/iec-61400-6-2020>

#### 3.4

##### **component class**

classification of the wind turbine structural components according to redundancy and safety requirements

Note 1 to entry: Refer to IEC 61400-1.

#### 3.5

##### **component temperature**

local temperature which will affect the material properties of a component

Note 1 to entry: The temperature shall be taken to be the ambient temperature unless protective or active means are provided to change the temperature.

#### 3.6

##### **design lifetime**

complete period of time for which the wind turbine will be designed to resist the specified loading including maintenance, idling, power production, starting and stopping

#### 3.7

##### **design load**

##### **design force**

load (force) used in the action vs resistance equation for a limit state accounting for the required exceedance probability level and partial safety factor for loads

#### 3.8

##### **design resistance**

resistance used in the action vs resistance equation for a limit state accounting for the required exceedance probability level and partial safety factor for materials