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IEEE Standard for Technology Supervision Code for Wind Turbine Rotor Systems

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IEEE Standard for Technology Supervision Code for Wind Turbine Rotor Systems

Developed by the

Corporate Advisory Group
of the
IEEE SA Board of Governors

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Abstract: As a significant part of wind turbine, the rotor system of wind turbine has the functions of transforming wind energy, and balancing power, load and noise, it is critical to the wind turbine safety and economical operation. A rotor system consists of blade, hub, pitch system and yaw system. A technical supervision code for each part of the rotor system to improve the safety and normal operation is specified in this standard.

Keywords: hub, IEEE 1834™, pitch system, technical supervision, wind turbine blade, wind turbine rotor, yaw system

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Introduction

This introduction is not part of IEEE Std 1834-2019, IEEE Standard for Technology Supervision Code for Wind Turbine Rotor Systems.

The function of the wind turbine is to transform energy from wind kinetic energy, which is the effect of aerodynamics of the rotor system. To be clear, the rotor system composites of blades, hub, pitch sub-system and yaw sub-system, which cooperate to receive and transform wind energy, and to balance power, load and noise. In order to accomplish such functions, the components endure pull, push, shear, bend, fatigue loading simultaneously, and are also eroded by the wind, sand, vapor, salt, and so on, challenging the safety and reliability of the system. Therefore, it is keen to improve the effectiveness of manufacture, quality, protection in transportation, and operating maintenance on time.

The published international standards mainly focus on specifying the manufacturing quality test, neglected the complete code for acceptance check and operating maintenance of the wind turbine rotor system. However, the rotor system works in adverse environments, so it is prone to failure, even damage to the whole wind turbine unit. There exists much demand of technical code for supervision of the wind-turbine rotor system, in order to regulate the rotor system life cycle quality supervision and operating maintains, and improve the main aerodynamical components' safety and reliability of wind turbines.

This technical supervision is proposed to regulate the technical supervision details and corresponding methods of a wind-turbine rotor system, which composites blade, hub, pitch sub-system and the yaw sub-system. It covers the technical requirements of key operating points such as products' quality test, transportation, installation, operating and maintenance.

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1. Overview

1.1 Scope

This standard covers technical requirements and practical guidelines for the supervision and test methods of wind-turbine rotor systems, which includes rotor blade, hub, pitch, and yaw system.

1.2 Purpose

Currently, several countries in the world have accumulated mature experience in wind turbine construction and have written standards and specifications. However, those standards and specifications do not address supervision of the wind turbine technology, notably after wind turbines are initially put into use. As a significant part of the wind turbine, the rotor system has a critical impact on the safe and economical operation of wind turbine. Consequently, specifying a supervision standard for the rotor system of wind turbine is urgent. Further, such a standard is also helpful for monitoring the operation status of wind turbine.

1.3 Word usage

The word *shall* indicates mandatory requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted (shall equals is required to).[1,2]

The word *should* indicates that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required (should equals is recommended that).

The word *may* is used to indicate a course of action permissible within the limits of the standard (may equals is permitted to).

The word *can* is used for statements of possibility and capability, whether material, physical, or causal (can equals is able to).

[1]The use of the word *must* is deprecated and cannot be used when stating mandatory requirements, *must* is used only to describe unavoidable situations.
[2]The use of *will* is deprecated and cannot be used when stating mandatory requirements, *will* is only used in statements of fact.