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Wind energy generation systems—Desert and gobi wind turbines

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Foreword

This document is drafted in accordance with the provisions of GB/T 1.1-2020 Directives for Standardization - Part 1: Structure and Drafting Rules for Standardization Documents.

Please note that certain contents of this document may involve patents. The issuing body of this document shall not be liable for identifying such patents.

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Wind energy generation systems—Desert and gobi wind turbines

1 Scope

This document specifies the environmental conditions, technical requirements, test methods, inspection rules, as well as requirements for transportation, installation, operation and maintenance of wind turbines (hereinafter referred to as turbines) applied in desert, gobi and wasteland areas.

This document is applicable to the design of grid-connected horizontal-axis wind turbines used in desert, gobi and wasteland areas.

2 Normative References

The contents of the following documents constitute indispensable clauses of this document through normative reference in the text. For dated referenced documents, only the edition corresponding to the specified date applies to this document; for undated referenced documents, the latest edition (including all amendments) applies to this document.

GB/T 1865 Paints and Varnishes - Artificial Weathering and Artificial Radiation Exposure - Filtered Xenon-Arc Radiation

GB/T 2423.37 Environmental Testing for Electric and Electronic Products - Part 2: Test Methods - Test L: Dust and Sand Test

GB/T 4208 Degrees of Protection Provided by Enclosures (IP Code)

GB/T 14295 Air Filters

GB/T 14522 Artificial Weathering Test Methods for Plastics, Coatings and Rubber Materials Used in Mechanical Industrial Products - Fluorescent Ultraviolet Lamp

GB/T 18451.1 Wind Turbines - Design Requirements

GB/T 19072 Wind Turbines - Towers

GB/T 19568 Wind Turbines - Assembly and Installation Specifications

GB/T 19960 Wind Energy Generation Systems - General Technical Requirements and Test Methods for Wind Turbines

GB/T 20319 Wind Turbines - Acceptance Specifications

GB/T 25383 Wind Turbines - Rotor Blades

GB/T 25385 Wind Turbines - Operation and Maintenance Requirements

GB/T 33629 Wind Turbines - Lightning Protection

GB/T 37921 High-altitude Type Wind Turbines

GB 50057 Code for Design of Lightning Protection of Buildings

3 Terms and Definitions

The following terms and definitions apply to this document.

3.1 desert

A barren area completely covered with sand, characterized by sparse vegetation, scarce precipitation and dry air.

Note: Desert is also referred to as sand curtain.

3.2 gobi

A large-scale desert and semi-desert area.

Note: Most parts of the gobi are not covered with sand but bare rock, and it is also referred to as gobi desert.

3.3 wasteland

A natural zone with arid climate, scarce and variable rainfall, sparse and low-growing vegetation, and barren soil.

Note: The annual precipitation in wasteland is less than 60 mm or the humidity is less than 0.05; it is classified into rocky desert, gravel desert, sandy desert, clay desert, saline desert, etc., according to surface materials.

3.4 desert and gobi area

A general term for desert, gobi and wasteland areas.

3.5 desert and gobi wind turbines

Wind turbines applied in desert and gobi areas.

3.6 dust concentration

The content of dust per unit volume of air.

Note: The annual average PM_{10} is used as the evaluation index, with the unit of $\mu g/m^3$.

4 Symbols

The following symbols apply to this document:

D_{ref}: Annual average dust concentration, in micrograms per cubic meter ($\mu g/m^3$)

PM_{10}: Inhalable particulate matter, generally referring to particles with a particle size of less than 10 μm

V_{ave}: Annual average wind speed, in meters per second (m/s)

V_{50}: 50-year return maximum wind speed (10-minute average), in meters per second (m/s)

5 Unit Environmental Conditions

5.1 Environmental Parameter Conditions

The environmental condition parameters for the design of the turbine's electrical system, protection system and cooling system are specified in Table 1.

Table 1 Environmental Parameters for Desert and Gobi Areas

Serial No.	Environmental Parameter		Unit	Annual Average Dust Concentration		
				(100, 150]	(150, 200]	(200, +∞)
1	Air Temperature	Extreme Maximum Air Temperature	°C	50	50	55
		Annual Maximum Air Temperature	°C	40	45	50
		Annual Minimum Air Temperature	°C	−35	−30	−30
		Extreme Minimum Air Temperature	°C	−40	−40	−40
2	Maximum Daily Temperature Difference		°C	30	30	30
3	Maximum Surface Temperature		°C	75	75	80