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Guide for foundation and mooring system design of floating offshore wind turbines

漂浮式海上风电机组基础及系泊系统设计导则

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Foreword

This document was issued on 28 December 2023 by the National Energy Administration of the PRC and takes effect on 28 June 2024.

It is a NB/T standard: recommended rather than compulsory, but it is the text a Chinese reviewer applies when assessing a submission.

It is classified under ICS 27.180, Chinese classification P 61.

This Guide has been prepared in accordance with the requirements of the Notice of the General Department of the National Energy Administration on Issuing the 2020 Plan for the Development and Revision of Industry Standards in the Energy Field and the Plan for the Translation of Foreign-language Versions (Guo Neng Zong Tong Ke Ji [2020] No. 106). The drafting group carried out extensive investigation and research, carefully summarized practical experience, referred to relevant domestic and international standards, and prepared this Guide on the basis of a wide solicitation of comments.

The main technical contents of this Guide are: general provisions; terms and symbols; basic requirements; materials; loads and load combinations; stability analysis; motion response analysis; structural design of the foundation; mooring system design; corrosion and dirty prevention design; accessory equipment and systems of the foundation; construction organization design; and monitoring design.

This Guide is under the administration of the National Energy Administration. China Renewable Energy Engineering Institute (Hydropower and Water Resources Planning and Design General Institute) proposed this Guide and is responsible for its routine administration. The Sub-Technical Committee on Wind Farm Planning and Design of the Technical Committee for Standardization of the Wind Power Industry in the Energy Sector (NEA/TC 1/SC 1) is responsible for the interpretation of its specific technical contents.

Comments or suggestions arising in the course of implementation should be sent to China Renewable Energy Engineering Institute (Hydropower and Water Resources Planning and Design General Institute), at No. Jia 57 and No. Yi 57, Andingmenwai Street, Dongcheng District, Beijing, postcode 100011.

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1 Scope

NB/T 11378-2023 is the Chinese design guide for the floating foundations and mooring systems of offshore wind turbines. A floating turbine is a different engineering problem from a fixed one: the platform moves in six degrees of freedom, the turbine control interacts with that motion, and the whole assembly is held on station by a mooring system whose failure mode is drift rather than collapse. The guide covers the main platform concepts - semi-submersible, spar, tension leg and barge - and sets the design basis for each: the environmental conditions of wind, wave, current, tide, sea ice and typhoon; the design load cases combining turbine operating states with sea states and with fault and parked conditions; and the coupled aero-hydro-servo-elastic analysis by which the response is determined. It then treats the platform structure - global strength, fatigue, local scantlings, watertight subdivision, stability both intact and damaged, and the ballast system - and the interface with the tower. The mooring system has its own chapters: line configuration in catenary, taut and tension leg arrangements, line components and their strength and fatigue, anchors of drag, suction and pile type with their holding capacity, and the analysis of line tension and platform offset including the one-line-failed condition. Corrosion protection, the dynamic power cable interface, marine operations for tow-out and hook-up, and the inspection and monitoring expected in service close the guide.

1.0.1 This Guide is formulated in order to standardize the design of foundations and mooring systems of floating offshore wind turbines, so that such design is safe and applicable, technically reliable and environmentally friendly.

1.0.2 This Guide is applicable to the design of foundations and mooring systems of floating offshore wind turbines.

1.0.3 In addition to complying with this Guide, the design of foundations and mooring systems of floating offshore wind turbines shall also comply with the provisions of the relevant current national standards.