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**ENERGY INDUSTRY STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

NB/T 11727-2024

**Technical specification for grouted connection of foundation
structure for offshore wind power project**

海上风电场工程基础结构灌浆连接技术规程

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Foreword

This document was issued on 25 December 2024 by the National Energy Administration of the PRC and takes effect on 25 June 2025.

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 specification was 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 formulation and revision of industry standards in the energy field and the plan for the translation of foreign language versions, document Guo Neng Zong Tong Ke Ji [2020] No.

106. The drafting group carried out extensive investigation and research, carefully summarised practical experience, and prepared this specification on the basis of wide consultation.

The main technical content of this specification is: general provisions; terms; basic requirements; design of the grouted connection; and construction of the grouted connection.

This specification is administered by the National Energy Administration, was proposed by and is under the routine administration of the General Institute of Hydropower and Water Resources Planning and Design, and the Sub-committee on Wind Farm Engineering Construction and Installation of the Wind Power Standardization Technical Committee of the Energy Industry (NEA/TC 1/SC 2) is responsible for the interpretation of the specific technical content.

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1 Scope

NB/T 11727-2024 is the Chinese specification for designing and building the grouted connection in the foundation of an offshore wind turbine. The grouted connection is the joint where the transition piece or the jacket sleeve slides over the driven steel pile and the annulus between them is filled with high strength grout; it is what transfers the whole overturning moment of a turbine, tower and rotor into the seabed, and it is a joint that cannot be inspected, retightened or replaced once the vessel leaves. The industry learned what that means the hard way: across the North Sea in the late 2000s a large number of monopile connections settled, the transition pieces slipping down the piles, because the design had assumed a friction bond that the reversing loads of wind and wave progressively destroyed. The fix was to stop relying on adhesion and start relying on mechanical interlock, and this specification is written around that lesson - it recommends a cylindrical grouted connection provided with shear keys, and it requires fatigue to be calculated by the safe life method rather than treated as a static problem. The document sets out the basic requirements for safety, durability and functionality in the marine environment, including the training of the grouting crews under NB/T 10393 and the environmental management plan and pollution handling facilities the construction vessels must carry. It then covers the design: the data to be collected on tides, waves, silt, temperature and humidity; the selection of the steel and the grouting material; the grouting material and the grouted body;

the load actions; the calculation of the connection; and the detailing requirements, with the factors that govern it named explicitly - the strength, elastic modulus, abrasion resistance and shrinkage or expansion of the grout, the sleeve and pile dimensions, the length to diameter ratio, the interface conditions, the size and arrangement of the shear keys, the stress levels, and the manufacturing and installation tolerances, fatigue damage and local buckling of the tube. The construction clause follows the operation in sequence: preparation, the grouting works themselves with the preassembled pipeline, pipe lubrication, the standing period after grout overflows and the additional low-speed grouting that follows it, and the quality inspection. Two annexes give the grouting construction record form and the site test record form for the grout body. It was issued on 25 December 2024 by the National Energy Administration and takes effect on 25 June 2025.

1.0.1 This specification is formulated in order to standardise the design and construction of grouted connections in the foundation structures of offshore wind farm projects, and to achieve technical advancement, safety and reliability, economic reasonableness and environmental protection.

1.0.2 This specification applies to the design and construction of grouted connections in the foundation structures of offshore wind farm projects. It does not apply to the rock-socketed grouting of pile foundations.

1.0.3 In addition to complying with this specification, the design and construction of grouted connections in the foundation structures of offshore wind farm projects shall also comply with the provisions of the relevant current national standards.

2 Terms

2.0.1 grouted connection

The composite structure formed by connecting different structures into one whole by means of grouting, comprising the grouted body and the inner and outer structural members that are connected.

2.0.2 grouted body

The structural body formed after the grout, prepared from the grouting material, has been placed in the grouted connection space and has set and hardened.

2.0.3 shear key

A component placed on the inner or outer wall of the steel sleeve and of the steel pipe pile, which increases the connecting capacity of the grouting material between the steel pipe pile and the steel sleeve.

2.0.4 grout sealing

A device that prevents the grout from leaking during the grouting works.

2.0.5 preassembled pipeline for grouting

The pipeline preassembled on the foundation structure of an offshore wind farm project and used to convey the grout.

2.0.6 pipe lubricating

The lubrication of the grouting hose and of the preassembled grouting pipeline with a dedicated pipe lubricating grout before the grout proper is pumped during the grouting works.

2.0.7 standing

The process, during the grouting works, of stopping pumping once grout overflows from the overflow port so that the grout placed in the grouting space becomes dense.

2.0.8 additional grouting

The process, during the grouting works, of continuing to pump grout at low speed after the standing period has ended.

3 Basic requirements

3.0.1 The grouted connection of the foundation structure of an offshore wind farm project shall satisfy the requirements of safety, durability and functionality under marine environmental conditions.

3.0.2 The grouted connection of the foundation structure of an offshore wind farm project shall satisfy the functional requirements placed by the upper structure on the connection to the foundation structure. The design of the grouted connection shall take comprehensive account of the environmental conditions, the structural form and the construction conditions, and shall be determined after a technical and economic comparison.

3.0.3 The construction of the grouted connection of the foundation structure of an offshore wind farm project shall actively promote the use of reliable new technologies, new processes, new materials and new equipment.

3.0.4 The personnel carrying out the grouting works on the foundation structure of an offshore wind farm project shall have received safety and professional technical training, and shall comply with the relevant provisions of the current industry standard NB/T 10393 Technical code for construction safety of offshore wind farm projects.

3.0.5 An environmental management system shall be established for the foundation grouting works, with dedicated personnel responsible for environmental management. Before the operation, a construction environmental management plan shall be prepared. During the operation, anti-pollution equipment and materials shall be provided. The construction vessels supporting the grouting operation shall be equipped with the