

**NB**

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

**NB/T 31006-2011**

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**Technical code for anticorrosion of offshore wind farm steel  
structure**

海上风电场钢结构防腐蚀技术标准

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### Foreword

This document was issued on 6 August 2011 by the National Energy Administration of the PRC and takes effect on 1 November 2011.

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

### 1 Scope

NB/T 31006-2011 is the Chinese energy-sector code for protecting the steel structures of an offshore wind farm against corrosion: the monopiles, jackets and transition pieces that carry the turbines, and the steel of the offshore substation. It exists because corrosion, not fatigue, is what usually decides how long an offshore foundation lasts, and because a foundation cannot be taken out of the water to be repainted. A structure is specified for a 25-year design life in seawater, and every hour of remedial work offshore costs many times what the same work costs in a yard, so the protection has to be right when the steel leaves the fabricator. Before this code, Chinese designers borrowed from offshore oil and gas practice, which assumes a manned platform with crews aboard and regular inspection - an assumption that does not hold for an unmanned turbine visited a few times a year. The document divides the structure into the corrosion zones that behave differently - atmospheric, splash, tidal, submerged and buried - and sets, for each, the surface preparation, the coating system, the thermal sprayed metal option and the cathodic

protection design, together with the test and acceptance methods that prove the work was done. It was issued on 6 August 2011 by the National Energy Administration and took effect on 1 November 2011.

This Standard specifies the surface pretreatment and coating protection, thermal spraying metal protection, cathodic protection common anti-corrosion methods and related technical requirements of offshore wind farm steel structures (mainly including fixed steel support structures of wind turbine generator system and substations). This Standard is applicable to the anti-corrosion design, construction, acceptance and operation and maintenance of offshore wind farm steel structures.

## 2 Normative References

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this document.

GB/T 1740 Methods of Test for Resistance to Heat and Humidity of Paint Films

GB/T 1771 Paints and Varnishes?Determination of Resistance to Neutral Salt Spray

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

GB/T 4948 Sacrificial Anode of Al-Zn-In Series Alloy

GB/T 4949 Chemical Analysis Methods for Sacrificial Anodes of Al-Zn-In System Alloy

GB/T 4950 Sacrificial Anode of Zn-Al-Cd Alloy

GB/T 4951 Chemical Analysis Methods for Sacrificial Anodes of Zn-Al-Cd Alloy

GB/T 4956 Non-Magnetic Coatings on Magnetic Substrates - Measurement of Coating Thickness - Magnetic Method

GB/T 5210 Paints and Varnishes - Pull-off Test for Adhesion

GB/T 6462 Metallic and Oxide Coatings - Measurement of Coating Thickness - Microscopical Method

GB 6514 Safety Code for Painting - Safety, Ventilation and Air Clean-up for Painting Process

GB/T 7387 Requirements for Marine Reference Electrode

GB/T 7388 Requirements for Marine Auxiliary Anode

GB/T 7788 General Specification for Anodic Shield Coating of Ship and Marine Engineering

GB 8923 Rust grades and Preparation Grades of Steel Surfaces before Application

GB/T 9274 Paints and Varnishes - Determination of Resistance to Liquids

GB/T 10610 Geometrical Product Specifications (GPS) - Surface Texture: Profile Method - Rules and Procedures for the Assessment of Surface Texture

GB 11375 Metallic and Other Inorganic Coatings - Thermal Spraying - Safe Practices

GB/T 12608 Thermal Spraying - Wires, Rods and Cords for Flame and Arc Spraying - Classification and Technical Supply Condition

GB 12942 Safety Code for Painting - Technical Requirements of Safety for Working in Confined Spaces

GB/T 13288 The Assessment of Profile Grades of Steel Surface before Application of Paint and Related Products? Comparator

GB/T 13748 Chemical Analysis Methods of Magnesium and Magnesium Alloys

GB/T 17731 Magnesium Alloy Sacrificial Anode

GB/T 17848 Test Methods for Electrochemical Properties of Sacrificial Anodes

GB/T 17850.1 Preparation of Steel Substrates before Application of Paints and Related Products - Specifications for Non-Metallic Blast-Cleaning Abrasives - General Introduction and Classification

GB/T 18570.3 Preparation of Steel Substrates before Application of Paints and Related Products - Tests for the Assessment of Surface Cleanliness - Part3: Assessment of Dust on Steel Surface Prepared for Painting (Pressure-Sensitive

Tape Method)

A method of using a heat source to melt, semi-melt or soften metallic materials and spray them on the surface of the substrate at a certain speed to form a coating.

### 3 Terms and Definitions

#### 3.6 cathodic protection

Technology to control the electrochemical corrosion of metals through cathodic polarization. Cathodic protection has sacrificial anode method and impressed current method.

#### 3.7 Surface preparation

In order to improve the bonding force between the coating and the substrate and the anti-corrosion effect, the surface of the substrate is treated by mechanical or chemical methods before application to achieve measures that meet the application requirements.

#### 3.8 Adhesion

The firmness of the bond between the paint film and the coated surface (through physical and chemical action).

#### 3.9 Coat sealant

A material that is used to penetrate and seal the pores of thermal sprayed metal coatings.

#### 3.10 Flame spraying

A thermal spraying method that uses the flame to combust after mixing combustible gas and combustion-supporting gas as the heat source.

#### 3.11 Arc spraying; electric spraying

A thermal spraying method in which the arc generated between two consumable electrode wires forming coating materials is used as a heat source, and the melting consumable electrode wires is added, and sprayed onto the substrate by compressed gas to form a coating.

#### 3.12 Minimum local thickness