

ICS 19.020
CCS F 20

NB

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

NB/T 11658-2024

**Method for drawing environmental corrosion distribution map
of power facility**

电力设施环境腐蚀分布图绘制方法

Issued on: September 24, 2024

Implemented on: March 24, 2025

Issued by: National Energy Administration of the PRC

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Foreword

This document was issued on 24 September 2024 by the National Energy Administration of the PRC and takes effect on 24 March 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 19.020, Chinese classification F 20.

This document was drafted in accordance with the rules given in GB/T 1.1-2020 Directives for standardization - Part 1: Rules for the structure and drafting of standardizing documents.

Please note that some of the content of this document may be the subject of patent rights. The issuing body of this document assumes no responsibility for identifying patents.

This document was proposed by the China Electrical Equipment Industry Association.

This document is under the administration of the National Technical Committee on Environmental Conditions and Environmental Testing for Electrical and Electronic Products (SAC/TC 8).

Drafting organizations of this document include China National Electric Apparatus

Research Institute Co., Ltd.; the Electric Power Research Institute of Guangdong Power Grid Co., Ltd.; the Shenzhen International Graduate School of Tsinghua University; Goldwind Science and Technology Co., Ltd.; the Guangzhou Power Supply Bureau of Guangdong Power Grid Co., Ltd.; the Electric Power Research Institute of Hainan Power Grid Co., Ltd.; State Grid Fujian Electric Power Co., Ltd.; ZTE Corporation; the Fifth Electronics Research Institute of the Ministry of Industry and Information Technology; Midea Group Co., Ltd.; Guangdong Yuedian Testing Technology Co., Ltd.; the Electric Power Research Institute of State Grid Jiangxi Electric Power Co., Ltd.; the Shanghai Institute of Quality Inspection and Technical Research; and Guangzhou University.

This document is issued for the first time.

1 Scope

NB/T 11658-2024 is the Chinese method for producing corrosion maps of the environments in which power equipment operates. It exists because corrosion is the failure mode that decides how long electrical plant lasts, and because it varies enormously over short distances in ways that no single national rule can capture. A substation two kilometres from the coast in Hainan, a transformer yard downwind of a coal-fired boiler in Shanxi and a distribution cabinet in a dry inland province are three different chemical environments, and specifying the same coating system, the same enclosure material and the same maintenance interval for all three means either wasting money in one place or losing equipment early in another. A corrosion map turns that judgement into data. The document sets out what has to be collected before a map can be drawn: the climatic element data of temperature, humidity, wind speed and direction, from more than five years of record for the open atmosphere and more than one year for the inside of buildings and equipment; the chemically active substance data, which is where the real corrosivity lies, covering salt spray deposition rate and the concentrations of sulphur dioxide, nitrogen oxides, ammonia and hydrogen sulphide; the environmental corrosivity data, being the measured first-year corrosion rate of standard specimens of carbon steel, copper, zinc or aluminium exposed at known positions; and the base map, whether an electronic map on the national geodetic coordinate system, a building structural drawing or an equipment structural drawing. It then classifies the environment into the six corrosivity grades of GB/T 19292.1, from C1 very low through C5 very high to CX extreme, and specifies how the map is drawn at three different scales - the atmospheric map by administrative area, the building internal map by building, and the equipment internal map by individual item of equipment, the last of these mattering because the inside of a sealed cabinet in a humid climate can be more aggressive than the air outside it. It applies to generation, transmission, transformation, distribution, utilisation and energy storage facilities together with their measuring, control and protection equipment. It was issued on 24 September 2024 by the National Energy Administration and takes effect on 24 March 2025.

This document specifies the basic data required for drawing the environmental corrosion distribution map of power facilities, the classification of the environmental corrosion grades of power facilities, and the method of drawing the environmental corrosion distribution map.

This document applies to power facilities in service in weather-protected and non weather-protected locations, including generation, transmission, transformation, distribution, utilisation and energy storage facilities, together with their associated measuring, control and protection equipment.

2 Normative references

The contents of the following documents constitute indispensable provisions of this document through normative reference in the text. For dated references, only the edition corresponding to that date applies to this document. For undated references, the latest edition, including all amendments, applies to this document.

GB 22021 Basic technical rules for national geodetic surveying

GB/T 19292.1 Corrosion of metals and alloys - Corrosivity of atmospheres - Part 1: Classification, determination and estimation

GB/T 19292.4 Corrosion of metals and alloys - Corrosivity of atmospheres - Part 4: Determination of corrosion rate of standard specimens for the evaluation of corrosivity

GB/T 50001 Unified standard for building drawings

GB/T 50105 Standard for structural drawings

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 environmental corrosion distribution map

The distribution map drawn according to defined grading principles, after data analysis and processing, from the corrosion monitoring data of metals and alloys and from the environmental parameter data that affect the corrosion of metals and alloys, used to characterise the distribution of environmental corrosivity in weather-protected and non weather-protected conditions.

4 Basic data

4.1 Climatic element data

The climatic element data shall include the following:

- a) the position distribution of all the climatic factor monitoring points within the area to be mapped;

b) the monitoring data of all the climatic factor monitoring points within the area to be mapped, including air temperature, relative humidity, wind speed and wind direction.

For the atmospheric environment, climatic element data covering more than 5 years should be used; for the internal environment of buildings and the internal environment of equipment, climatic element data covering more than 1 year should be used. Where there are special requirements, quarterly, monthly, daily, hourly, minute or specified-period climatic element data may also be used.

4.2 Chemically active substance data

The chemically active substance data shall include the following:

- a) the position distribution of all the sources of chemically active substances and of all the monitoring points for chemically active substances within the area to be mapped;
- b) the monitoring data of all the chemically active substance monitoring points within the area to be mapped, which should include the salt spray deposition rate and the concentrations of sulphur dioxide, nitrogen oxides such as nitrogen dioxide, ammonia and hydrogen sulphide.

For the atmospheric environment, chemically active substance data covering more than 1 year should be used; for the internal environment of buildings and of equipment, data covering more than 3 months should be used.

4.3 Environmental corrosivity data

The environmental corrosivity data shall include the first-year corrosion rate value of at least one of the standard metal specimens of carbon steel, copper, zinc or aluminium, together with data on the spatial distribution of the standard specimen test positions.

4.4 Base map data

4.4.1 The base map for drawing the environmental severity distribution map shall be an electronic map, a building structural drawing or an equipment structural drawing.

4.4.2 An electronic map used as the base map shall include the administrative division boundaries, the water systems, the coastline, the railways and the roads. The electronic map shall use the national geodetic coordinate system specified in GB 22021.

4.4.3 A building structural drawing used as the base map shall include the building structure and materials, the doors and windows, the equipment layout and the environmental control devices, and shall satisfy the relevant requirements of GB/T 50105 and GB/T 50001.

4.4.4 An equipment structural drawing used as the base map shall include the structure - such as the cabinet doors, the ventilation openings, the distribution of the internal components of the equipment and the environmental control devices - together with the bill of materials.