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# NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA



# GB/T 20251-2026

Replacing GB/T 20251-2006

## Nickel foam

泡沫镍

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## Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1.Structure and Drafting Rules of Standardization Documents". Drafting. This document replaces GB/T 20251-2006 "Foamed Nickel for Batteries". Compared with GB/T 20251-2006, the only changes are structural adjustments and editing. Aside from the gender changes, the main technical changes are as follows:

a) The scope has been changed (see Chapter 1, Chapter 1 of the.2006 edition);

b) The terms porosity and apparent resistivity have been added (see 3.2, 3.4);

c) The product's technical requirements have been changed (see Chapter 5, Chapter 4 of the.2006 edition);

d) Improved product geometry and microstructure (see 5.1);

e) The product testing methods have been changed (see Chapter 6, Chapter 5 of the.2006 edition);

f) A conversion formula between tensile force and tensile strength has been added (see 6.5);

g) The testing items and sampling methods have been changed (see 7.3,

6.4 in the.2006 edition);

h) Product packaging requirements have been changed (see 8.2,

7.2 of the.2006 edition);

i) The requirements for product storage conditions and shelf life have been changed (see 8.3,

7.3 in the.2006 edition);

## 4 Product Categories

Nickel foam is classified into two categories based on its production method. rolled strip and sheet/block.

### 5.1 Product geometry and microstructure

5.1.1 Hole Structure Nickel foam has a three-dimensional interconnected network structure, consisting of interconnected pores and edges that form a mesh framework composed of dodecahedral units. Each The unit contains 12 pentagonal holes, which are interconnected through the edges of the holes, forming channels through which fluids or gases can freely pass. (Ni foam) The hole structure is shown in Figure 1.

5.1.2 Microscopic morphology The nickel foam skeleton is composed of polycrystalline nickel grains ranging from 1μm to 20μm, with well-defined grain boundaries and a smooth surface (the surface may vary depending on the heat treatment process). The surface may exhibit some porosity, but there are no obvious dendrites or twins. The typical microstructure of nickel foam is shown in Figure 2.

5.2 Chemical composition The chemical composition of the product shall conform to the requirements of Table 1.

5.3 Physical Properties The areal density and its deviation, the number of pores and its deviation, and the porosity of the product shall conform to the provisions of Table 2.

5.4 Dimensions and Dimensional Tolerances The dimensions and permissible deviations of the product shall conform to the provisions of Table 3, wherein the length of the product shall be determined by the supplier and the buyer through negotiation.

5.5 Room temperature mechanical properties The room temperature mechanical properties of the product should conform to the specifications in Table

4.For products with a surface density of 320 g/m^2, the tensile strength corresponds to a specific value. For every decrease in surface density... For every 1 g/m^2 decrease or increase, the lower limit of longitudinal tensile strength decreases or increases by

0.1 N/2 cm, and the lower limit of transverse tensile strength decreases or increases

accordingly. 0.07N/2cm.

5.6 Electrical Performance The resistivity of products with an areal density of 320 g/m^2 should conform to the specifications in Table 5; for every 1 g/m^2 decrease or increase in areal density, the longitudinal resistivity should increase. The upper limit value will increase or decrease by 2.0x10^-8 Omega·m accordingly, and the upper limit value of the transverse resistivity will increase or decrease by 3.0x10^-8 Omega·m accordingly.

5.7 Surface copper particles When required by the customer, there should be no free copper particles on the product surface.

5.8 Thickness deposition ratio The thickness deposition ratio of the product should not be less than 60.00%.

5.9 Apparent resistivity ratio The apparent resistivity of the product should be between

### 5.10 Appearance Quality

5.10.1 The product surface has a silver-gray metallic luster and should be clean.

5.10.2 Slight watermarks and spots are allowed on the product surface.

5.10.3 The product shall not have cracks, visible carbon black, or uncoated areas.

5.10.4 The product shall not have through holes with a diameter greater than 3mm, nickel plating with a length greater than 2mm, or scratches with a length greater than 3mm.

5.10.5 After the edges of the rolled strip products are cut, the strips should be rolled neatly (the flatness of the side should not exceed 5mm).

5.11 Number of coiled joints For rolled strip products, the number of joints in a roll of.200m length shall not exceed 4, and the distance between two joints shall not be less than 20m.

## 6 Test Methods

6.1 Product geometry and microstructure The product's geometry and microstructure were examined using a scanning electron microscope.

6.2 Chemical composition The determination of the chemical composition of the product shall be carried out in accordance with the provisions of GB/T 8647 (all parts).

### 6.3 Physical Properties

6.3.1 The surface density of the product is measured using an electronic balance with an accuracy of not less than 0.01g and a vernier caliper with an accuracy of 0.02mm, following these steps. Perform measurements.

a) Cut the sample into rectangular specimens and measure its length and width using vernier calipers;

b) Weigh the sample using an electronic balance;

c) The surface density (rho) is calculated according to formula (1).

6.3.2 The number of holes in the product was measured using an optical microscope with a magnification of 100x.

6.3.3 The determination of product porosity shall be carried out in accordance with the provisions of GB/T 5163.

### 6.4 Dimensions and Dimensional Tolerances

6.4.1 The product length shall be measured using a measuring instrument of appropriate accuracy.

6.4.2 When the width of the nickel foam is no greater than 500mm, a vernier caliper with an accuracy of 0.02mm shall be used for inspection; when the width of the nickel foam is greater than 500mm, a vernier caliper with an accuracy of 0.02mm shall be used for inspection. When the diameter is 500mm, use a ruler or tape measure with an accuracy of 1mm for inspection.

6.4.3 The product thickness is measured using a micrometer with an accuracy of

0.001 mm.

6.5 Room temperature mechanical properties The tensile strength and elongation after fracture of the product shall be tested in accordance with the provisions of GB/T 228.1.

6.6 Electrical Performance Resistivity shall be measured in accordance with the provisions of Appendix A.

6.7 Surface copper particles The detection of copper particles on the product surface shall be carried out in accordance with the provisions of Appendix B.

Note. When testing copper particles on the product surface, the copper particles react with the reagent to show a blue color, with one copper particle showing one blue dot.

6.8 Thickness deposition ratio The product thickness deposition ratio test shall be conducted in accordance with the provisions of Appendix C.

6.9 Apparent resistivity ratio The apparent resistivity ratio (AR) of the product is calculated according to formula (3).

6.10 Appearance Quality The appearance quality of the product is inspected visually, and when necessary, it is measured with measuring tools of appropriate precision.

6.11 Number of coiled joints The number of coil joints for rolled strip products is checked visually.