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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 12967.5-2022

Replacing GB/T 12967.5-2013

**Test methods for anodic oxidation coatings and organic
polymer coatings on aluminium and aluminium alloys - Part
5: Assessment of resistance to cracking**

铝及铝合金阳极氧化膜及有机聚合物膜检测方法 第5部分：抗破裂性的测定

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Table of Contents

- 1 Scope
- 2 Normative references
- 3 Surface Treatment
- 4 Method overview

Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for Standardization Work Part

1. Structure and Drafting Rules of Standardization Documents" drafted. This document is part 5 of GB/T 12967 "Testing Methods for Anodic Oxidation Films and Organic Polymer Films of Aluminum and Aluminum Alloys". GB/T 12967 The following sections have been published.

1. Determination of abrasion resistance;

3. Salt spray test;

4. Determination of light and heat resistance;

5. Determination of rupture resistance;

6. Color difference and appearance quality. This document replaces GB/T 12967.5-2013 "Evaluation of crack resistance of anodic oxide films by deformation method for anodic oxidation of aluminum and aluminum alloys". Compared with GB/T 12967.5-2013, except for structural adjustment and editorial changes, the main technical changes are as follows:

--- Changed the applicable object of "scope", adding aluminum and aluminum alloy anodized composite films and organic polymer films (see Chapter 1, Chapter 1 of the 2013 edition);

--- Added "normative references" (see Chapter 2);

--- Added "Terms and Definitions" (see Chapter 3);

--- Changed the "Method Overview" (see Chapter 4, Chapter 2 of the 2013 edition);

--- Added the requirements for materials in "Reagents and Materials" (see Chapter 5, Chapter 3 of the 2013 edition);

--- Added impact test equipment, cupping test equipment, type I bending test equipment, type II bending test equipment, Contents of crushed stone impact test equipment, sharp

tool processing test equipment, micrometers and rulers (see Chapter 6,.2013 edition of 4 chapter);

--- Changed the "sample" (see Chapter 7,

1 Scope

GB/T 12967.5-2022 is the Chinese national standard on test methods for anodic oxidation coatings and organic polymer coatings on aluminium and aluminium alloys - part 5:assessment of resistance to cracking, in the field of manufacturing engineering. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 9 March 2022 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 October 2022. Classification: ICS 25.220.20, CCS H20. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

2.Mass loss method, GB/T 8014.3 "Measurement method of thickness of anodic oxide film of aluminum and aluminum alloy Part

3.Spectral beam microscopy, GB/T 8752 "Continuity test method for anodized thin anodic oxide films of aluminum and aluminum alloys" Acid copper method", GB/T 8753.1 "Evaluation method for sealing quality of anodized oxide films of aluminum and aluminum alloys - Part

1.Acid etching weight loss Law", GB/T 8753.3 "Assessment Method for Sealing Quality of Anodized Oxidation Films of Aluminum and Aluminum Alloys Part

3.Admittance Method", GB/T 8753.4 "Assessment Method for Sealing Quality of Anodized Oxidation Films of Aluminum and Aluminum Alloys Part

4.Staining Spots After Acid Treatment Law", GB/T 8754 "Determination of Insulation Properties of Anodized Films of Aluminum and Aluminum Alloys and Organic Polymer Films", GB/T 20503 "Aluminum and Aluminum Alloys" Determination of Specular Reflectance and Specular Gloss of Anodized Anodized Films", GB/T 20504 "Aluminium and Aluminum Alloy Anodic Oxidation Standard method for the determination of image clarity of chemical film", GB/T 20505 "Determination of surface reflection characteristics of anodized anodic oxide film of aluminum and aluminum alloys" The Definite Integrating Sphere Method together constitutes the standard system of detection methods for aluminum and aluminum alloy anodic oxide films and organic polymer films. GB/T 12967 consists of five parts.

1.Determination of abrasion resistance. The purpose is to establish a method for evaluating the wear resistance of the anodic oxide film and the organic polymer film layer.

3.Salt spray test. The purpose is to establish the salt spray corrosion resistance evaluation of anodic oxide film and organic polymer film layer method.

4.Determination of light and heat resistance. The purpose is to establish the weather resistance and resistance of the anodic oxide film and the organic polymer film layer. Thermal performance evaluation method.

5.Determination of rupture resistance. The purpose is to establish the evaluation of crack resistance of anodic oxide film and organic polymer film layer method.

6.Color difference and appearance quality. The purpose is to establish the color difference and appearance quality of the anodized film and organic polymer film layer Evaluation method. In.1991, my country identically adopted ISO 3211.1977 "Deformation method for anodizing aluminum and aluminum alloys to evaluate the crack resistance of anodic oxide films. For the first time, GB/T 12967.5-1991 "Evaluation of crack resistance of anodic oxide films by deformation method for anodic oxidation of aluminum and aluminum alloys" was formulated. In.2013, my country revised and adopted ISO 3211.2010 "Evaluation of crack resistance of anodic oxide films by deformation method for anodizing of aluminum and aluminum alloys", Released GB/T 12967.5-2013.GB/T 12967.5-2013 replaces GB/T 12967.5-1991, adds reagents, repairs Changed the requirements for the base of the instrument, and increased the requirements for the service life of the sample and the soaking solution. In recent years, various surface film preparation techniques have been The anodic oxide film and organic polymer film are more and more widely used in aluminum alloy products, and the development prospect is broad, and the existing standards cannot meet the requirements. Evaluation requirements for crack resistance of different types of membranes, so it is necessary to specify the crack resistance of different types of membranes in GB/T 12967.5 Test methods to meet the testing and evaluation needs of different film products. This document focuses on supplementing the impact test, cupping test, bending test, flexibility test, crushed stone impact test, positive Sharp tool processing test of anodized film, anodized composite film and organic polymer film. Aluminum and aluminum alloy anodized films and organic polymer films Test methods part 5.determination of crack resistance

2 Normative references

The contents of the following documents constitute essential provisions of this document through normative references in the text. Among them, dated citations documents, only the version corresponding to that date applies to this document; for undated references, the latest edition (including all amendments) applies to this document.

GB/T 8005.3 Terms of Aluminum and Aluminum Alloys Part

3 Surface Treatment

GB/T 8170 Numerical Rounding Rules and Representation and Judgment of Limit Values

4 Method overview

The following tests are carried out under the conditions of controlled laboratory environment, specified equipment and fixed test procedures, and the samples under different conditions are investigated. The deformation of the film and the rupture of the film under the stress state were used to evaluate the rupture resistance of the product under different test conditions.

---Bending deformation rate test. bend the sample along the spiral engraved with the deformation index, and observe in the direction of the deformation index from small to large. Observe, mark the position of the first transverse film crack in the sample, and then convert the radius of curvature of the sample, and then calculate the Bending deformation rate. The method is suitable for the bending deformation rate of aluminum and aluminum alloy anodic oxide films (thickness generally does not exceed 5 μ m). Determination.

---Impact test. place the weight of the specified mass at an appropriate height and drop it freely, impact the surface or back of the film layer of the sample, and check the change. Shape position and surrounding film changes. The method is suitable for the determination of the impact resistance of organic polymer films, but not for anodic oxygen Determination of the impact resistance of chemical films or organic polymer films pretreated by anodization.

--- Cupping test. use a die of specified specification to fix the sample, and move the punch to the specified depth along the fixed path to make the sample change. Shape, check the changes of the film on the convex part of the sample and around it. The method is suitable for the determination of the anti-cupping properties of organic polymer films.

---Bending test. Bend the sample under the specified radius of curvature, and visually observe the change of the film layer at the bending part, or use adhesive tape. Check the film surface for sticking phenomenon. The method is suitable for the determination of the bending resistance of organic polymer films.

---Flexibility test. Bend the sample 180° to fit, and repeatedly wrap it inward and bend 180° to fit, so as to continuously improve the bending half of the film. Diameter, until the film layer does not crack or fall off for the first time, and the flexibility of the film layer is evaluated according to the number of bending times. The method is suitable for evaluating organic polymers The flexibility of the composite film layer.

--- Crushed stone impact test. under the specified conditions, make the crushed stone impact the surface of the sample, remove the debris according to the dimples in the selected evaluation area