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Replacing GB/T 12967.3-2008

Test methods for anodic oxidation coatings and organic polymer coatings on aluminium and aluminium alloys - Part 3 : Salt spray test

铝及铝合金阳极氧化膜及有机聚合物膜检测方法 第3部分：盐雾试验

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1 Scope

GB/T 12967.3-2022 is the Chinese national standard on test methods for anodic oxidation coatings and organic polymer coatings on aluminium and aluminium alloys - part 3 : salt spray test, 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.

This document provides an overview of the salt spray test method for anodic oxidation films and organic polymer films on aluminum and aluminum alloys. It specifies the test conditions, reagents, apparatus, test specimens, test procedures, expression of results, and test reports. This document is applicable to the determination of the salt spray corrosion resistance of anodic oxidation films, anodic oxidation composite films, and organic polymer films on aluminum and aluminum alloys.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 1766, Paints and Varnishes -- Rating Schemes of Degradation of Coats

GB/T 6461, Methods for corrosion testing of metallic and other inorganic coatings on metallic substrates -- Rating of test specimens and manufactured articles subjected to corrosion tests

GB/T 8005.3, Aluminium and Aluminium Alloys -- Terms and Definitions -- Part 3. Surface Treatment

GB/T 9754, Paints and varnishes -- Determination of gloss value at 20°, 60°and 85°

GB/T 10125, Corrosion tests in artificial atmospheres -- Salt spray tests

GB/T 10587, Specifications for salt mist testing chambers

GB/T 11186.3, Method for measuring the colour of paint films -- Part

3 Terms and definitions

For the purposes of this document, the terms and definitions defined in GB/T 8005.3 as well as the followings apply.

3.1 peeling The phenomenon of a coating detaching over a large area due to a loss of adhesion. [Source: GB/T 5206-2015, 2.187, modified]

3.2 mottling Irregularly shaped areas appear on the surface of the film layer, characterized by inconsistent color and/or gloss, resulting in a random distribution of non-uniform patches. [Source: GB/T 5206-2015, 2.160, modified]

3.3 cracking The phenomenon of film layer rupture. [Source: GB/T 5206-2015, 2.65, modified]

3.4 blister A raised deformation appearing on a film layer, resulting from the localized peeling of one or more layers within the film system. [Source: GB/T 5206-2015, 2.29, modified]

3.5 reference specimen A test specimen with known performance, used to verify the repeatability and reproducibility of test results obtained from a test chamber.

4 Overview of test methods

Compressed air is utilized to atomize various test solutions - primarily composed of sodium chloride - via a spray device, allowing the resulting mist to naturally settle onto the surface of the test specimen. Following either a continuous, uninterrupted spraying process or a

cyclic spraying process conducted under specific temperature and humidity conditions, corrosion occurs on the specimen's surface. Based on the corrosion observed on the specimen after undergoing these tests, this method evaluates a product's resistance to salt spray corrosion within various corrosive environments. - Neutral salt spray test (hereinafter referred to as the "NSS test"). A corrosion test in which a neutral 5% sodium chloride solution is uniformly and continuously atomized and deposited onto the surface of a test specimen under specified test parameters. This method is applicable for assessing the salt spray corrosion resistance of various anodic oxidation films and organic polymer coatings. - Acetic acid salt spray test (hereinafter referred to as the "AASS test"). A corrosion test conducted under specified parameters, in which a 5% acidic sodium chloride solution is uniformly and continuously atomized and deposited onto the surface of a test specimen. This method is primarily used to evaluate the extent of corrosion occurring beneath organic polymer coatings. - Copper-accelerated acetic acid salt spray test (hereinafter referred to as the "CASS test"). A corrosion test conducted under specified parameters, wherein an acidic 5% sodium chloride solution containing copper chloride is uniformly and continuously atomized and deposited onto the surface of a test specimen. This method is primarily used to evaluate the degree of pitting corrosion on anodic oxidation films and anodic oxidation composite films. - Cyclic electrolyte spray/dry test (hereinafter referred to as the "Prohesion test"). A cyclic test in which test specimens are repeatedly subjected to a cycle of corrosion -induced by the atomized deposition of a mixed solution of sodium chloride and ammonium sulfate - followed by drying, under a set of specified test parameters. This method is applicable for assessing the corrosion resistance of anodic oxide films and organic polymer coatings. - Cyclic acidified seawater salt spray test (hereinafter referred to as the "SWAAT test"). A cyclic test in which specimens are repeatedly subjected to corrosion caused by the deposition of atomized acidic sodium chloride solution, as well as degradation within a humid and hot environment, under a set of specified test parameters. This method is primarily used to evaluate the salt spray corrosion resistance of anodized films and organic polymer coatings intended for automotive applications. - Cyclic accelerated salt spray test (hereinafter referred to as the "CCT test"). - Under specified test parameters, test specimens are subjected to a cyclic test (hereinafter referred to as the "CCT-AASS test") involving repeated exposure to corrosion from the atomized deposition of a 5% acidic sodium chloride solution, followed by drying, and subsequent exposure to a humid and hot environment. This method is applicable for assessing the corrosion resistance of anodic oxide films and organic polymer coatings. - Under specified test parameters, test specimens are subjected to a cyclic test (hereinafter referred to as the "CCT-CASS test") involving repeated exposure to corrosion from the atomized deposition of a 5% acidic sodium chloride solution containing copper chloride, followed by drying, and subsequent exposure to a humid and hot environment. This method is applicable for assessing the corrosion resistance of anodic oxide films and organic polymer coatings.

5 Test conditions

The ambient temperature for the test is room temperature. The relative humidity in the Prohesion test environment does not exceed 75%.

6 Reagents

Unless otherwise specified, only reagents confirmed to be analytically pure shall be used.

6.1 Sodium chloride solution Prepare a sodium chloride solution with a concentration of 50 g/L ± 5 g/L using sodium chloride and distilled or deionized water (having a conductivity not exceeding 20 μS/cm at a temperature of 25°C ± 2°C). At 25°C, the density of the prepared solution shall range from

1.036 g/cm^3. The total content of heavy metals, such as copper, nickel and lead, in the sodium chloride shall be less than 0.005% (by mass). The sodium iodide content in the sodium chloride shall not exceed 0.1% (by mass), or, calculated on a dry-salt basis, the total impurities shall not exceed 0.5% (by mass). NOTE

7 Instruments and equipment

7.1 Salt spray test chamber. shall comply with the requirements of Annex A.

7.2 pH meter. shall be equipped with an electrode suitable for weakly buffered sodium chloride solution (dissolved in deionized water).

8 Specimen

8.1 The specimen length shall be 150 mm, and the width shall be 75 mm. If it is not possible to cut a specimen meeting these requirements, a standard test plate may be used as a substitute.

8.2 The test specimen shall be clean and free from dirt, stains, and other foreign matter. If stains are present, they shall be removed using a clean, soft cloth or similar material after moistening with water or an appropriate organic solvent (such as ethanol). Organic solvents that corrode the test area or form a protective film on the test area shall not be used.