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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 17899-2023

Replacing GB/T 17899-1999

Corrosion of metals and alloys - Method of measuring the pitting potential for stainless steels by potentiodynamic control in sodium chloride solution

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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 17899-1999 "Measurement method of pitting corrosion potential of stainless steel". Compared with GB/T 17899-1999, except for the structure

In addition to adjustments and editorial changes, the main technical changes are as follows.

---Modified the scope (see Chapter 1, Chapter 1 of the.1999 edition);

---Added terms and definitions (see Chapter 3);

---Added principles (see Chapter 4);

--- Added instructions for avoiding crevice corrosion (see 5.4, Appendix A.1 and A.2);

---Changed the ratio of the minimum solution volume to the sample area (see 5.5.5, 6.1 of the.1999 edition);

---The reference electrode has been changed (see 5.7, Chapter 5 of the.1999 edition);

---Changed the preparation of specimens (see 7.2.1, 3.6 of the.1999 edition);

---Changed the preparation of the test solution (see 7.3, Chapter 4 of the.1999 edition);

--- Changed the solution deoxygenation test procedure (see 7.4.3, 6.3 of the.1999 edition);

---Changed the potential scanning speed (see 7.4.3, 6.4 of the.1999 version);

---Changed the observation of test results (see 7.6.3, 6.5 of the.1999 version);

---Changed the number of parallel tests (see 8.1, 3.8 of the.1999 version);

This document is modified to adopt ISO 15158.2014 "Corrosion of metals and alloys - Potentiodynamic potential of stainless steel in sodium chloride solution.

Measurement methods".

Compared with ISO 15158.2014, this document has made the following structural adjustments.

---Add Chapter 2 and Chapter 3, and adjust the original order of Chapter 2 ~ Chapter 7 to Chapter 4 ~ Chapter 9.

The technical differences between this document and ISO 15158.2014 and their reasons are as follows.

---Added "It is recommended that the purity of N2 or Ar be above 99.99% to obtain a lower initial self-corrosion potential Ecorr, and throughout the

Ventilation and oxygen removal were continued during the test. "The reason is that the oxygen removal link is important (see 7.4.3).

This document has made the following editorial changes.

---Replaced ISO 17474 with the informative reference GB/T 40299 (see 5.7.2);

---Added a note (see 5.7.2);

---Replaced ISO 14802 with the informative reference GB/T 40796 (see 8.2).

Please note that some content in this document may be subject to patents. The publisher of this document assumes no responsibility for identifying patents.

Introduction

Although stainless steel is widely used as a corrosion-resistant material, it is prone to pitting corrosion, crevice corrosion, stress corrosion cracking, etc. That

Among them, pitting corrosion is one of the most common corrosion phenomena on stainless steel surfaces. A common parameter used to evaluate the resistance of stainless steels to pitting corrosion is the so-called pitting corrosion resistance.

potential, which defines the lowest potential, and it is considered that stable pitting pits will not grow below this potential. Generally, pitting corrosion is affected by size, orientation, alloy composition,

It shows randomness due to the influence of factors such as impurities, inclusions, segregation, surface treatment, heat treatment history, usage time and environmental fluctuations, so its

The measurement requires at least two numerical values.

Corrosion of Metals and Alloys Stainless Steel in Sodium Chloride

Potentiodynamic measurement method of pitting corrosion potential in solution

1 Scope

This document describes a method for determining the pitting corrosion potential of stainless steel under potentiodynamic control.

This document is applicable to the measurement of pitting corrosion potential of stainless steel (austenite, ferrite, austenite, ferrite, martensitic stainless steel).

Compared with the test method using constant potential [1][2], the main advantage of this method is the rapidity of the test. Using this method at a primary potential

The pitting corrosion potential can be measured during scanning.

The pitting corrosion potential measured in this document can be used as a relative indicator of performance, for example to compare the relative performance of different batches of stainless steel.

The tests described in this document are not intended to determine the pitting corrosion potential whether actual pitting corrosion actually occurs or not under real service

conditions.

2 Normative reference documents

This document has no normative references.

3 Terms and definitions

There are no terms or definitions to be defined in this document.

4 Principles

This test exposes a specimen to a sodium chloride solution of a specified concentration at a constant temperature, increasing its anodic potential at a specified scan rate.

Pitting corrosion potential (V'C10 or V'C100) is defined as the potential when the current density exceeds 10μA/cm2 or 100μA/cm2 for more than 60s.

Bit[3]. The 60 s delay is to ensure that the observed current increase results from the steady-state development of pitting corrosion and not from the short-term development of metastable pitting corrosion.

current peak value.

The specimen holder and specimen itself are designed to ensure that crevice corrosion does not occur.

5.1 Potentiostat

The potentiostat should be able to control the electrode potential within the range of +/-1mV of the given value.

5.2 Electrode potential measuring instrument

The electrode potential measuring instrument should have high input impedance enough to eliminate the potential reading error caused by the current brought into the instrument during measurement. Typical

The impedance is on the order of 1011ohm~1014ohm. The sensitivity and accuracy of the instrument should be sufficient to detect a 1.0mV change in potential.

5.3 Current measuring instrument

The current in the loop is calculated by measuring the potential drop across a known resistor. Many potentiostats have this feature integrated within them.