



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

GB/T 15970.10-2021

**Corrosion of metals and alloys - Stress corrosion testing - Part
10: Reverse U-bend method**

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Standardization Administration**

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2012 (see Chapter 3, 6.4);

2009 (see 6.8).

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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" Drafting.

This document is part 10 of GB/T 15970 "Corrosion stress corrosion test of metals and alloys", GB/T 15970 has been released

The following parts.

---Part 1. General rules of test methods;

---Part 2. Preparation and application of curved beam specimens;

---Part 3. Preparation and application of U-shaped bending specimens;

---Part 4. Preparation and application of uniaxially loaded tensile specimens;

---Part 5. Preparation and application of C-ring specimens;

---Part 6. Preparation and application of pre-crack specimens under constant load and constant displacement;

---Part 7. Slow strain rate test;

---Part 8. Preparation and application of welding specimens;

---Part 9. Preparation and application of pre-crack specimens under incremental load or incremental displacement;

---Part 10. Reverse U-shaped bending test method;

--- Part 11. Metal and alloy hydrogen embrittlement and hydrogen-induced cracking test guide.

This document uses the redrafting method to modify the ISO 7539-10:2013 "Corrosion Stress Corrosion Test of Metals and Alloys Part 10"

Sub. Reverse U-shaped bending test method.

Compared with ISO 7539-10:2013, this document has more structural adjustments. Appendix A lists this document and ISO 7539-10.

The 2013 structural adjustment checklist.

The technical differences between this document and ISO 7539-10:2013 and the reasons are as follows.

---Regarding normative reference documents, this document has made adjustments with technical differences to adapt to my country's technical conditions and adjustments.

The situation is collectively reflected in Chapter 2 "Normative Reference Documents", and the specific adjustments are as follows.

* Replace ISO 7539-1 cited in ISO 7539-10:2013 with GB/T 15970.1-2018 which is equivalent to adopting international standards.

2012 (see Chapter 3, 6.4);

* Replace ISO 8407 quoted in ISO 7539-10:2013 with GB/T 16545-2015 equivalent to adopting international standards.

2009 (see 6.8).

This document has made the following editorial changes.

---In accordance with the provisions of GB/T 1.1-2020, supplementary explanations to Figure B.1, Figure B.2, Figure C.1 and Figure C.3.

This document was proposed by the China Iron and Steel Association.

This document is under the jurisdiction of the National Steel Standardization Technical Committee (SAC/TC183).

Drafting organizations of this document. China Aviation Development Beijing Institute of Aeronautical Materials, Metallurgical Industry Information Standards Institute, CRRC Qingdao Sifang Locomotive

Co., Ltd.

Introduction

Stress corrosion is a low-stress brittle fracture phenomenon caused by metal materials under the combined action of tensile stress and corrosive environment. Normal material strength

The higher the value, the greater the stress corrosion sensitivity. Correctly evaluate the stress corrosion performance of various high-strength structural materials, study their stress corrosion behavior and

The mechanism can not only provide a reliable basis for the design and selection of materials, but also for the development of new types of high-strength structural materials that are resistant to stress corrosion.

Is of great significance.

GB/T 15970 is a series of method standards for assessing the stress corrosion resistance of metals and alloys. Various methods are used.

The sample form and evaluation index are different, and the focus of research and analysis is different. This part is a special test to evaluate the stress corrosion sensitivity.

The part of the metal of the shape itself is reversely bent to maintain the U shape, and the initial tensile stress is ensured to exceed the yield strength value of most of the inner surface, and then

The sample is exposed to corrosive media for testing. Compared with the conventional U-shaped bending test, the stress relaxation is significantly reduced, and it is used as a pipe and plate.

Rapid screening test for stress corrosion susceptibility evaluation of materials, bars and other products (including welded products).

Corrosion stress corrosion test of metals and alloys

Part 10.Reverse U-shaped bending test method

Warning. This document may involve hazardous materials, operations and equipment. Standard users are responsible for identifying and establishing corresponding safety and health

Measures, and determine the scope of application of relevant standard restrictions before use.

1 Scope

This document specifies the principle, sample, test procedure, result evaluation and test report of the reverse U-shaped bending test method.

This document is suitable for testing the stress corrosion of metals and alloys using reverse U-bend specimens.

2 Normative references

The contents of the following documents constitute the indispensable clauses of this document through normative references in the text. Among them, dated quotations

Only the version corresponding to that date is applicable to this document; for undated reference documents, the latest version (including all amendments) is applicable to

This document.

GB/T 15970.1-2018 Corrosion stress corrosion test of metals and alloys Part 1.General test methods (ISO 7539-1.

2012, IDT)

GB/T 16545-2015 Corrosion of metals and alloys. Removal of corrosion products on corrosion samples (ISO 8407.2009, IDT)

3 Terms and definitions

The terms and definitions defined in GB/T 15970.1-2018 are applicable to this document.

4 Principle

4.1 The reverse U-bend (RUB) test is a special and rigorous test method for evaluating the stress corrosion cracking susceptibility. The test is mainly used

For metals with high corrosion resistance, such as nickel-based alloys, this method significantly reduces stress relaxation compared with conventional U-shaped bending tests, and is used as pipes and plates.

Screening tests for materials, bars and other products (including welding materials). The RUB test can also be used as a service performance acceptance test for both parties to the agreement.

4.2 The principle of the test is to introduce very severe stress on the high corrosion resistance metal, and reduce the stress relaxation to improve the induced stress corrosion

Possibility of cracking.

4.3 In the test, the metal with a semicircular cross-section is reversely bent, maintaining the U shape, and ensuring that the initial tensile stress at most positions on the inner surface exceeds

Yield strength, and then expose the specimen to corrosive media. By introducing complex