



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

GB/T 15970.1-2018

**Corrosion of metals and alloys -- Stress corrosion testing --
Part 1: General guidance on testing procedures**

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Table of Contents

Foreword

1 Scope

1.2 This section also sets out general guidelines for the selection of test methods.

2 Terms and definitions

3 background

4 Selection of test methods

4.5 See Appendix A for a brief guide to the selection of test methods.

5 loading system

5.1 Overview

5.2 Constant strain test

5.3 Constant load test

5.4 Slow strain rate test

6 Environmental aspects

6.1 Overview

6.2 Temperature

6.3 Aqueous solution

Foreword

GB/T 15970 "Corrosion Stress Corrosion Test for Metals and Alloys" has been or is planned to be released as follows.

--- Part 1. General rules for 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-cracked specimens under incremental or incremental displacement;

---Part 10. Reverse U-bend test method;

--- Part 11. Guide to hydrogen embrittlement and hydrogen induced cracking of metals and alloys.

This part is the first part of GB/T 15970.

This part is drafted in accordance with the rules given in GB/T 1.1-2009.

This part replaces GB/T 15970.1-1995 "Corrosion stress corrosion test of metals and alloys - Part 1

then". Compared with GB/T 15970.1-1995, the main technical changes are as follows.

--- Added a description of the solution flow rate in the test environment of Chapter 6;

--- Added a description of the time correlation of Chapter 7;

--- Added the description of welding specimens in the design and manufacture of specimens in Chapter 8;

--- Added Appendix A to the selection of mechanical test methods.

This section uses the translation method equivalent to the international standard ISO 7539-1.2012 "Corrosion Stress Corrosion Test of Metals and Alloys"

Part 1. General Rules for Test Methods.

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

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

This section was drafted by. China Aviation Aviation Beijing Aviation Materials Research Institute, Metallurgical Industry Information Standards Institute, Beijing University of Science and Technology, China Branch

Institute of Metals.

1 Scope

1.1 This part of GB/T 15970 specifies general considerations for the design and evaluation of metal stress corrosion susceptibility tests and assessments.

1.2 This section also sets out general guidelines for the selection of test methods.

Note 1. The details of the specific test methods are not described in this section. These

methods are described in other parts of ISO 7539.

Note 2. This section applies to cathodic protection conditions.

2 Terms and definitions

The following terms and definitions apply to this document.

2.1

Stress corrosion stresscorrosion

The combined action of metal corrosion and strain caused by applied or residual stress.

2.2

Critical stress (for stress corrosion)

The minimum stress level required for stress corrosion initiation and expansion under specific test conditions.

2.3

Critical stress intensity factor (for stress corrosion) thresholdstressintensityfactor

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Above this stress intensity factor, the stress corrosion crack continues to expand.

Note 1. The critical stress intensity factor is the concept of Linear Elastic Fracture Mechanics (LEFM), which is applicable to microstructures.

When the size of the elastic region is larger, and the elastic deformation constraint is dominant, such as under the plane strain dominant condition. Expansion of stress corrosion cracking

Exhibitions do not have to apply LEFM details, but are often used as a utility.

Note 2. Stress corrosion cracks may originate from surface or surface defects and expand in the form of "short cracks" at stress levels below the surface critical stress intensity factor.

exhibition. However, LEFM cannot be applied to "short crack" conditions, and the crack propagation requires a stress level higher than the critical stress intensity factor.

2.4

Test environment testenvironment

The environment in which the sample is exposed can be either a use environment or a laboratory-prepared environment, which can be kept constant or agreed upon.

Change.

Note. The exposure environment required for stress corrosion of a particular material is often specific (see Chapter 6).

2.5

Start of test

The moment when stress is applied or the sample is exposed to the test environment, regardless of the order in which they are applied, the latter shall prevail.

2.6

Crack initiation time crackinitiationtime

The time from the start of the test to the detection of a crack by some means.

2.7

Expiration time timetofailure

The time taken from the start of the test to the failure. The criterion for failure is the first occurrence of a crack or the overall separation of the specimen or an agreed intermediate condition.

2.8

Slow strain rate test slowstrainratetest

A test for evaluating the stress corrosion susceptibility of metals, usually stretching the specimen at a constant displacement rate to a fracture in a representative environment, and then evaluating

The price is its fracture sensitivity index. The strain rate is generally 10^{-5} s^{-1} ~ 10^{-7} s^{-1} in order to select the displacement rate.

Note. The slow strain rate test can also be applied to curved specimens.

2.9

Fracture strain straintofailure

In the slow strain rate test, the plastic strain is usually expressed to the strain at the time of the fracture, see ISO 7539-7.

2.10

Average crack growth rate averagecrackvelocity

The quotient of the maximum crack depth and test time produced by stress corrosion.

2.11

Orientation