



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

GB/T 40403-2021

**Corrosion of metals and alloys - Methodology for determining
the resistance of metals to stress corrosion cracking using the
four-point bend method**

Issued on: August 20, 2021

Implemented on: March 1, 2022

**Issued by: State Administration for Market Regulation, China National
Standardization Administration**

Table of Contents

- Foreword
- 1 Scope
- 2 Normative references
- 3 Terms and definitions
- 4 Test principle

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.

The translation method used in this document is equivalent to ISO 16540.2015 "Corrosion of metals and alloys using four-point bending method to determine the stress resistance of metals

Methods of Corrosion Cracking."

The Chinese documents that have consistent correspondence with the normatively cited international documents in this document are as follows.

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

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. Anke Engineering Technology Research Institute (Beijing) Co., Ltd., An Gong Corrosion Testing Laboratory Technology (Wuxi) Co., Ltd.

Company, Metallurgical Industry Information Standards Research Institute, Pabo Testing Technology Service Co., Ltd., National Standard (Beijing) Inspection and Certification Co., Ltd., CRRC Qingdao Fourth

Fang Locomotive and Rolling Stock Co., Ltd., University of Science and Technology Beijing.

1 Scope

This document provides a four-point bending test guide for evaluating the stress corrosion resistance of metals including carbon steel, low-alloy steel and corrosion-resistant alloys

Cracking performance. This document gives test guidance for base metals and welds, including those that are applicable to stress-strain behaviors where there is no obvious and obvious buckling.

Test procedures for serving metal. This document is a general method for four-point bending test.

According to relevant standards.

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.

ISO 8407 Corrosion of metals and alloys. Removal of corrosion products in test samples (Corrosionofmetalsand

alloys-Removalofcorrosionproductsfromcorrosiontestspecimens)

3 Terms and definitions

The following terms and definitions apply to this document.

3.1

Corrosion resistance alloy; CRA

In the environment where carbon steel can corrode, it is an alloy resistant to general corrosion and local corrosion.

3.2

Heat affected zone heataffectedzone;HAZ

In the process of welding or cutting, the part of the base metal that has not melted but the structure and properties have changed due to heat.

3.3

Soft zone cracking; SZC

When steel contains a local "soft zone" with low yield strength and is exposed to an environment containing H₂S under stress, a type of sulfur that may occur

Forms of chemical stress cracking.

Note. Under the service load, the soft zone may yield and accumulate plastic deformation locally, increasing the cracking sensitivity of the anti-cracking material. These soft areas are usually associated with carbon steel

The weld is related.

4 Test principle

The four-point bending test is a constant displacement test in which the bending beam specimen is supported on two loading rollers (bearing cylinders), and the other two loading rollers apply

The load is realized so that one side of the sample is in a state of tension (uniform force is applied between the inner loading rollers), and the other side is in a state of compression.

The stress at the middle thickness of the sample section is zero, the stress gradient changes significantly in the thickness direction, and the change is more obvious for thin samples. Crack may

Initiation, but then the crack will stop growing or its growth rate will decrease. Therefore, the probability of complete fracture during the test exposure period is relatively