

ICS 75.180.10

CCS E 92



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

GB/T 44764-2024

**Petroleum, petrochemical and natural gas industries - Metallic
materials resistant to sulfide stress cracking in corrosive
petroleum refining environments**

石油、石化和天然气工业 腐蚀性石油炼制环境中抗硫化物应力开裂的金属材料

(English Translation)

Issued on: October 26, 2024

Implemented on: May 1, 2025

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

Table of Contents

Preface	
1 Scope	
2 Normative references	
3 Terms and Definitions	
4 Symbols and abbreviations	
5 Responsibility	
5.1 End User Responsibilities	
5.2 Manufacturer's Responsibilities	
6 Factors that promote SSC	
6.1 General parameters affecting SSC	
6.2 Effect of material state and stress level on SSC sensitivity	
6.3 Effect of Hydrogen Permeation Flux on SSC	
6.4 Effects of high temperature exposure on SSC	
6.5 Factors affecting SSC failure time	
6.6 Basis for determining whether equipment is covered by this document	
7 Materials included in this document	
8 Hardness requirement	
9 Procedures for adding new materials or processes	
9.1 General Voting Requirements	
9.2 Field Experience Data Requirements	
9.3 Laboratory test data requirements	
10 New restrictions and discontinued materials	
11 Specification of alloys, conditions and/or processes not listed in this list for specific applications	
12 Standards Roadmap	
13 Iron-based materials	
13.1 Carbon steel and alloy steel	
13.2 Cast iron and ductile iron	
13.3 Ferritic stainless steel	
13.4 Martensitic stainless steel	
13.5 Austenitic stainless steel	
13.6 Specific austenitic stainless steels	

- 13.7 High alloy austenitic stainless steel
- 13.8 Duplex stainless steel
- 13.9 Precipitation Hardening Stainless Steel
- 14 Non-ferrous materials
 - 14.1 Nickel alloy
 - 14.2 Cobalt-nickel-chromium-molybdenum alloy
 - 14.3 Cobalt-nickel-chromium-tungsten alloy
 - 14.4 Titanium Alloy
 - 14.5 Aluminum Alloy
 - 14.6 Copper Alloy
- 15 Manufacturing Requirements
 - 15.1 General manufacturing requirements
 - 15.2 Corrosion-resistant cladding, surface hardening cladding and metallurgically bonded coatings
 - 15.3 Welding
 - 15.4 Metallurgically bonded coatings on carbon steel, alloy steel, and martensitic stainless steel
 - 15.5 Printing of logos
 - 15.6 Threading
 - 15.7 Cold Deformation Process
- 16 Bolt connection
 - 16.1 General bolt connection requirements
 - 16.2 Exposed bolted connections
 - 16.3 Non-exposed bolted connections
- 17 Electroplating, spraying and diffusion processes
- 18 Special Parts
 - 18.1 General requirements for special components
 - 18.2 Bearings
 - 18.3 Spring
 - 18.4 Instruments and Controls
 - 18.5 Sealing rings and gaskets
 - 18.6 Buckle
 - 18.7 Special Process Parts
- 19 Valve
- 20 Compressors and pumps
- Appendix A (Informative) Sulfide Type Distribution Map

Appendix B (Informative) Background information and requirements for hardness testing
Appendix C (Normative) Welding Procedure Assessment Hardness Test Point Selection Requirements
Reference

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 for standardization documents" Drafting.

This document is equivalent to ISO 17945:2015 "Petroleum, petrochemical and natural gas industries - Resistance to sulphide compounds in corrosive petroleum refining environments" Stress-cracking metal materials.

The following minimal editorial changes have been made to this document.

--- Deleted the three abbreviations HI, HIC and SOHIC in Chapter 4, which are not cited in the text;

--- The abbreviation of the obsolete unit ppmw has been deleted and replaced with the international unit "mg/kg" in the text.

1 Scope

This document specifies requirements for metallic materials resistant to sulfide stress cracking (SSC) in sour petroleum refining and related processing environments.

In the environment, H₂S is in the gas phase or dissolved in the aqueous phase (liquid water) with or without hydrocarbons. This document does not include design specifications, nor does it include wet H₂S cracking, environmental fracture, corrosion and other failure modes. This document is intended for refiners, equipment manufacturers, engineering contractors and construction companies.

For contractor use.

Specifically, this document is intended to prevent equipment used in the petroleum refining industry (including pressure vessels, heat exchangers, piping, valves, pumps, and compressors) from SSC prevention for carbon steel under P-No.1 category in Section IX of the ASME Boiler and Pressure Vessel Code (BPVC) Requirements are consistent with NACE SP0472.

This document applies to all equipment components exposed to sour refinery environments (see Chapter 6) where SSC failure will.

- a) endanger the integrity of the pressure-containing system;
- b) interfere with the essential functions of the equipment; and/or
- c) Prevent the equipment from returning to an operational condition while continuing to be pressurized.

2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document.

For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to this document.

ANSI/NACEMR0175/ISO 15156 Materials for use in H₂S-containing environments in oil and gas production in the petroleum and natural gas industries (Pe-production)

Note 1: GB/T 20972.1-2007 Petroleum and natural gas industries Materials for use in hydrogen sulfide environments in oil and gas production Part 1: Selection of crack-resistant materials General principles of safety (ISO 15156-1:2001, IDT).

Note 2: GB/T 20972.2-2008 Petroleum and natural gas industry Materials for use in hydrogen sulfide environments in oil and gas production Part 2: Cracking-resistant carbon steel, low Alloy steel and cast iron (ISO 15156-2:2003, MOD).

Note 3: GB/T 20972.3-2008 Petroleum and natural gas industry Materials for use in hydrogen sulfide environments in oil and gas production Part 3: Cracking and corrosion resistant alloys and other alloys (ISO 15156-3:2003, MOD).

Note: GB/T 33362-2016 Conversion of hardness values of metal materials (ISO 18265:2013, IDT)