

ICS 25.220.20

CCS A 29



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

GB/T 9791-2025

Replacing GB/T 9791-2003

**Metallic and other inorganic coatings - Chromate conversion
coatings on zinc, cadmium, aluminium-zinc alloys and
zinc-aluminium alloys - Test methods**

金属及其他无机覆盖层 锌、镉、铝-锌合金和锌-铝合金的铬酸盐转化膜 试验方法
(English Translation)

Issued on: October 31, 2025

Implemented on: May 1, 2026

Issued by: State Administration for Market Regulation

Table of Contents

Preface	
1 Scope	
2 Normative References	
3 Terms and Definitions	
4 Reagent	
4.1 Test solution A	
4.2 Test solution B	
4.3 Test solution C2	
4.4 Test solution D2	
4.5 1:3 sulfuric acid solution	
4.6 Ammonium persulfate $[(\text{NH}_4)_2\text{S}_2\text{O}_8]$	
4.7 Sodium hydroxide (NaOH) solution (240 g/L)	
4.8 Silver nitrate (AgNO_3) solution (17 g/L)	
4.9 Potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$) standard solution	
4.10 Phosphate buffer	
5 Instruments	
5.1 General Rules	
5.2 Photoelectric colorimeter (colorimeter)	
5.3 Spectrophotometer	
5.4 Analyzing the Balance Scale	
6 Test Methods	
6.1 General Rules	
6.2 Test for the presence of a colorless chromate conversion film on zinc	
6.3 Test for the presence of colorless chromate films on zinc and cadmium	
6.4 Tests for the presence of colorless chromate conversion films on aluminum-zinc and zinc-aluminum alloys	
6.5 Test for the presence of hexavalent chromium in colorless and colored chromate conversion films	
6.6 Determination of Hexavalent Chromium Content in Colored Chromate Conversion Coatings	
6.7 Determination of total chromium content in colored chromate conversion coatings	
6.8 Gravimetric determination of the mass per unit area of colorless and colored chromate conversion coatings	

6.9 Adhesion test using the wiping method

6.10 Corrosion resistance test of chromate conversion coatings on zinc and cadmium surfaces

7 Test Report

References

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 supersedes GB/T 9791-2003 "Test Methods for Chromate Conversion Coatings of Zinc, Cadmium, Aluminum-Zinc Alloys and Zinc-Aluminum Alloys", and is consistent with...

Compared with GB/T 9791-2003, apart from structural adjustments and editorial changes, the main technical changes are as follows.

---The composition of test solution A has been changed (see 4.1, 3.1 in the 2003 edition);

---Test solution C2 has been added (see 4.3.2, 3.3 in the 2003 edition);

---Added the instrument "Analytical Balance" (see 5.4);

---The trial period has been changed (see 6.1, 5.1 in the 2003 version);

---Added the use of alternative test solution C2 (destructive) for determining hexavalent chromium in colorless and colored chromate conversion films and the presentation of results.

(See 6.5.3 and 6.5.4);

---Added spectrophotometer calibration (see 6.5.5);

---Change "quality of chromate conversion coating" to "corrosion resistance of chromate conversion coating" for clearer wording (see 6.10, 2003).

Version 5.10);

---Added requirements for test reports (see Chapter 7).

This document is modified to adopt ISO 3613:2021 "Metallic and other inorganic coatings - Zinc, cadmium, aluminum-zinc alloys and zinc-aluminum alloys - Chromates".

Conversion membrane test methods.

This document has undergone the following structural adjustments compared to ISO

3613:2021.

---5.2 corresponds to 5.1 of ISO 3613:2021; 5.3 corresponds to 5.2 of ISO 3613:2021; 5.4 corresponds to...

The technical differences between this document and ISO 3613:2021, and the reasons therefor, are as follows.

---Added descriptions of ammonium persulfate $[(\text{NH}_4)_2\text{S}_2\text{O}_8]$, sodium hydroxide (NaOH) solution, and silver nitrate (AgNO_3) solution (see...) 4.6, 4.7 and 4.8);

---IEC 60068-2-30 (see 6.4) has been replaced by the normatively referenced GB/T 2423.4, and ISO 3892 has been replaced by GB/T 9792.

(See 6.8) GB/T 9800 replaced ISO 4520 (see 6.10) to adapt to my country's technical conditions;

---The normative reference GB/T 10125 (see 6.10) has been added to adapt to my country's technical conditions.

The following editorial changes have been made to this document.

---Added a title to 5.1 (see Chapter 5).

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed by the China Machinery Industry Federation.

This document is under the jurisdiction of the National Technical Committee on Standardization of Metallic and Non-metallic Coatings (SAC/TC57).

1 Scope

This document describes the test methods for the following items.

---The presence of a colorless chromate conversion film;

---Colorless and colored chromates of zinc, cadmium, aluminum (55% Al, permissible range 54%~56%)-zinc alloys and zinc-aluminum (5% Al) alloys Qualitative measurement of the presence of hexavalent chromium in conversion films;

---Total chromium content per unit area for zinc and cadmium;

---Metal mass per unit area of colorless and colored chromate conversion films;

---Adhesion of the chromate conversion coating;

---Corrosion resistance of chromate conversion coatings.

This document applies to the testing of the following chromate conversion coatings.

---Colorless and colored chromate conversion films containing different proportions of trivalent and hexavalent chromium, produced by chemical or electrochemical methods;

---Chromate conversion films without any additional covering layer (e.g., oil film, water-based or solvent-based polymer film or wax film).

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included.

For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies.

This document.

GB/T 2423.4 Environmental testing of electrical and electronic products - Part 2: Test methods - Test Db. Alternating damp heat (12h 12h cycle) (GB/T 2423.4-2008, IEC 60068-2-30:2005, IDT) GB/T 9792 Determination of the mass per unit area of conversion coating on metallic materials-Gravimetric method (GB/T 9792-2003) ISO 3892:2000, MOD) GB/T 9800 Chromate conversion coatings for electroplated zinc and cadmium layers (GB/T 9800-1988, eqv ISO 4520:1981) GB/T 10125 Corrosion test under artificial atmosphere - Salt spray test

3 Terms and Definitions

This document does not contain any terms or definitions that need to be defined.

4 Reagents

Unless otherwise specified, analytical grade reagents and distilled water or deionized water of equivalent purity shall be used in the test.