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

*Revêtements métalliques et autres revêtements inorganiques —
Couches de conversion au chromate sur zinc, cadmium et alliages
d'aluminium-zinc et de zinc-aluminium — Méthodes d'essai*





COPYRIGHT PROTECTED DOCUMENT

© ISO 2021

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Reagents	2
5 Apparatus	3
6 Test methods	4
6.1 General.....	4
6.2 Test for the presence of a colourless chromate coating on zinc.....	4
6.3 Test for the presence of a colourless chromate coating on zinc and cadmium.....	4
6.4 Test for the presence of a colourless chromate coating on zinc-aluminium (mass fraction of aluminium: 5 %) alloys.....	5
6.5 Test for the presence of hexavalent chromium in both colourless and coloured chromate coatings.....	5
6.5.1 General.....	5
6.5.2 Test method employing test solution C 1.....	5
6.5.3 Test method employing alternative test solution C 2 (destructive).....	5
6.5.4 Expression of results.....	7
6.5.5 Calibration of spectrophotometer.....	7
6.6 Determination of hexavalent chromium content of coloured chromate coatings.....	8
6.6.1 Preparation of calibration graph.....	8
6.6.2 Blank test.....	8
6.6.3 Determination.....	8
6.6.4 Expression of results.....	8
6.7 Determination of total chromium content of coloured chromate coatings.....	9
6.7.1 Preparation of calibration graph.....	9
6.7.2 Blank test.....	9
6.7.3 Determination.....	9
6.7.4 Expression of results.....	9
6.8 Determination of mass per unit area of both colourless and coloured chromate coatings by gravimetric method.....	9
6.9 Test for adhesion by abrasion.....	9
6.10 Quality evaluation test of chromate layers on zinc and cadmium surfaces.....	10
7 Test report	10
Bibliography	11

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 107, *Metallic and other inorganic coatings*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 262, *Metallic and other inorganic coatings, including for corrosion protection and corrosion testing of metals and alloys*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fourth edition cancels and replaces the third edition (ISO 3613:2010), which has been technically revised. The main changes compared with the previous edition are as follows:

- [Table 1](#) has been revised;
- analysis method described in [6.5](#) was aligned with the method described in IEC 62321-7-1;
- procedure for the preparation of test solution C 2 in [4.3.2](#) has been revised and a second standard solution has been added;
- limiting time has been amended in [6.1](#);
- procedure for testing with test solution C 2 has been revised in [6.5.2](#);
- description of the calibration of spectrophotometer has been added.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document specifies methods for the qualitative determination of the presence of chromate conversion coatings as well as the total chromium content of chromate conversion coatings.

The application of very thin, colourless, practically invisible chromate conversion coatings is frequently called “passivation”, while the application of thicker, coloured chromate conversion coatings is called “chromating”. The term “passivation” is not correct, as it does not conform to the ISO 2080 designation, and is therefore deprecated.

Chromate conversion coatings are based on a solution containing Cr(VI). Both the process solution and the coating contain hexavalent chromium. The term passivation is nowadays often used for Cr(VI)-free coatings replacing chromate conversion coatings. Products containing Cr(VI) are not allowed within EU and processes using Cr(VI) are strictly regulated.

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

WARNING — This document calls for the use of substances and/or procedures that can be injurious to health if adequate safety measures are not taken. This document does not address any health hazards, safety or environmental matters associated with its use. It is the responsibility of the user of this document to establish appropriate health, safety and environmentally acceptable practices and take suitable actions for any national and international regulations.

1 Scope

This document specifies methods for the determination of

- the presence of colourless chromate conversion coatings,
- the presence of hexavalent chromium in colourless and coloured coatings on zinc or cadmium or aluminium-zinc (mass fraction of aluminium: 55 %, within a range of 54 % to 56 % mass fraction) and zinc-aluminium (mass fraction of aluminium: 5 %) alloys,
- the total chromium content per unit area on zinc and cadmium,
- the mass per unit area of both colourless and coloured coatings,
- the satisfactory adhesion of chromate conversion coatings, and
- the quality of chromate coatings.

These methods are applicable to

- colourless and coloured chromate conversion coatings containing trivalent and hexavalent chromium in varying proportions and produced by either chemical or electrochemical processes, and
- chromate coatings that are free from any supplementary coatings, such as oil, water or solvent-based polymers or wax.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3892, *Conversion coatings on metallic materials — Determination of coating mass per unit area — Gravimetric methods*

ISO 4520, *Chromate conversion coatings on electroplated zinc and cadmium coatings*

IEC 60068-2-30, *Environmental testing — Part 2-30: Tests — Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

3 Terms and definitions

No terms and definitions are listed in this document.