AS 1791—1986
UDC 621.357.7:669.587:669.1

Australian Standard®

CHROMATE CONVERSION COATINGS— ZINC AND CADMIUM

[Title allocated by Defence Cataloguing Authority: CHROMATE COATING, CONVERSION (on Zinc and Cadmium Electrodeposits)]

This Australian standard was prepared by Committee MT/9, Metal Finishing. It was approved on behalf of the Council of the Standards Association of Australia on 14 January 1986 and published on 7 April 1986.

The following interests are represented on Committee MT/9:

Aluminium Development Council
Australasian Institute of Metal Finishing
Australian Zinc Development Association
Bureau of Steel Manufacturers of Australia
Confederation of Australian Industry
Department of Defence
Electricity Supply Association of Australia
Metal Finishing Supply Houses
Metal Trades Industry Association of Australia
Royal Australian Chemical Institute
Society of Automotive Engineers—Australasia
Telecom Australia
University of Queensland

Australian Standard®

CHROMATE CONVERSION COATINGS— ZINC AND CADMIUM

First published (as AS CK10) 1965
AS 1791 first published 1976
Second edition 1986

PUBLISHED BY STANDARDS AUSTRALIA
(STANDARDS ASSOCIATION OF AUSTRALIA)
1 THE CRESCENT, HOMEBUSH, NSW 2140
ISBN 0 7262 4087 7

PREFACE

This edition of this standard was prepared by the Association's Committee on Metal Finishing to supersede AS 1791—1976.

In preparing this edition the committee considered the latest information contained in ISO/DIS 4520.2*.

This standard differs from the ISO standard in as much as the 6 h salt spray test for Type B coatings has been retained in preference to a 24 h test requirement introduced by ISO. The committee believes that the additional exposure time is unrealistic for production type handling and testing.

Essential technical differences between this standard and the 1976 edition are that the specific requirement for the hexavalent chromium content has been deleted together with the analytical test procedures. Information on the preparation of surfaces for chromating, the make-up of chromating solutions, their uses and methods of analysis have also been deleted on the grounds that they do not form part of the end requirements for chromate conversion coatings. However, if such information is required it will be the subject of a separate standard.

Guidelines for the purchasing of chromated coatings have been included as an Appendix.

---

* ISO/DIS 4520.2, Chromate Conversion Coatings on Electrodeposited Zinc and Cadmium Coatings.

CONTENTS

FOREWORD

Coatings of zinc (electroplated, mechanical), and cadmium are chromate treated in order to retard the formation of corrosion products that form on the exposed surfaces of coatings in the atmosphere. The treatment improves corrosion resistance in high humidity, or in the presence of certain vapours from organic substances.

Although it is not normal practice to chromate-passivate galvanized coatings to the degree specified in this standard, in special cases, small items may be required to be passivated to the grades in this standard in order to meet greater than normal corrosion resistance requirements.

Attention is drawn to the fact that handling of chromate coated components with bare hands can lead to discoloration and premature breakdown of the coating.

Chromate conversion coatings are normally applied by dipping and are usually acidic and contain hexavalent chromium salts together with other salts which may be varied to effect the appearance and hardness of the film. The colour of the film and, therefore, the type of conversion coating depend on the composition of the chromating solution, but are also affected by pH and temperature, the duration of treatment and the nature and surface condition of the coating being treated.

Chromate conversion coatings may be applied by any suitable method, subject to the requirements of Clause 4.

Any heat treatment of zinc or cadmium coated items for the relief of hydrogen embrittlement must be carried out prior to conversion coating to prevent the protective properties from being considerably reduced.

When hot water is used as the final rinse after the chromating process, it is essential that the time of rinsing be kept as short as possible to prevent the dissolution of hexavalent chromium from the coating.

Drying of items after chromating should not be carried out in excess of 60°C as this has been found to reduce the corrosion resistance of the conversion coating.

STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard
for
CHROMATE CONVERSION COATINGS—ZINC AND CADMIUM

1 SCOPE. This standard applies to chromate conversion coatings on zinc and cadmium coatings intended to give increased corrosion protection.

NOTES:

1. The zinc coating may be applied by hot-dipping (see Foreword), electroplating, or mechanical means.
2. Information required to augment the standard is given in Appendix A.

2 APPLICATION. This standard does not provide for treatments for galvanized coatings generally, although in special cases, small items may be required to be passivated to the grades specified in this standard. Zinc and cadmium coatings suitable for chromate treatment are covered in AS 1214, AS 1789, AS 1790, AS 1897 and AS K132, Parts 1 and 2. Treatments giving particular colours or improvement in paint adhesion are not covered by this standard.

3 REFERENCED DOCUMENTS. The following standards are referred to in this standard.

AS 1214 Hot-dip Galvanized Coatings on Threaded Fasteners (ISO metric coarse thread series)

AS 1789 Electroplated Coatings—Zinc on Iron and Steel

AS 1790 Electroplated Coatings—Cadmium on Iron and Steel

AS 1897 Electroplated Coatings on Threaded Components

AS 2331 Methods of Test for Metallic and Related Coatings
- AS 2331.3.1 Corrosion and Related Property Tests—Neutral Salt Spray (NSS) Test
- AS 2331.3.8 Corrosion and Related Property Tests—Humidity Test—24 h Cycle, Damp Heat

AS 2483 Metal Finishing—Recommended Sampling Plans for the Inspection and Testing of Coatings

AS K132 Electroplated Coatings on Threaded Components
Part 1—Cadmium on Steel Components
Part 2—Zinc on Steel Components

4 CLASSIFICATION OF CHROMATE CONVERSION COATINGS. Chromate conversion coatings are classified according to the chromate coating mass per unit area and to their typical appearance in accordance with Table 1.

5 REQUIREMENTS FOR CHROMATE CONVERSION COATINGS.

5.1 General. Chromate conversion coatings are soft when first produced and harden with age through gradual dehydration; coatings must, therefore, be handled carefully for the first 24 h after treatment.

Tests apply only to zinc and cadmium surfaces which have been chromated without an organic supplementary treatment, and to coatings produced more than 24 h but not more than 72 h prior to testing.

NOTE: Tests performed on coatings outside these limits may require a different basis for assessment.

5.2 Presence. The chromate conversion coating shall be continuous over the zinc or cadmium surface. The presence of Type A or B coatings shall be verified by the method described in Paragraph B2 or B3 of Appendix B.

5.3 Adhesion. Chromate coatings shall be adherent. Coloured coatings Types C and D shall be tested by one of the methods described in Paragraph B1 of Appendix B.

TABLE 1
CLASSIFICATION OF CHROMATE CONVERSION COATINGS

Coating designation	Coating type	Typical appearance	Coating mass g/m^2	Corrosion protection
A	Clear	Transparent clear, sometimes with bluish tinge	Up to 0.5	Slight, for example against staining or handling or against high humidity in mildly corrosive conditions
B	Bleached	Transparent with slight iridescence	Up to 1.0	
C	Iridescent	Yellow iridescent	1.0 to 1.5	Considerable, including protection against certain organic vapours
D	Opaque	Olive green, shading to brown or bronze	Greater than 1.5	

NOTE: The bleached coating Type B is normally produced by treating a yellow iridescent coating in an alkaline solution. A coating so, produced may yield slightly better corrosion resistance than Type A coatings, although the test requirements of Clause 5.5 are identical.