

Australian Standard[®]

**ELECTROPLATED COATINGS OF
RHODIUM FOR GENERAL
ENGINEERING APPLICATIONS**

The following scientific, industrial and governmental organizations and departments were officially represented on the committee entrusted with the preparation of this standard:

Aluminium Development Council
Australasian Institute of Metal Finishing
Australian Zinc Development Association
Bureau of Steel Manufacturers of Australia
Confederation of Australian Industry
Copper and Brass Information Centre
Department of Defence
Department of Productivity
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

This standard, prepared by Committee MT/9, Metal Finishing, was approved on behalf of the Council of the Standards Association of Australia on 23 December 1980, and was published on 1 May 1981.

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First published (as AS K170)	1967
AS 2429 first published	1981

PUBLISHED BY STANDARDS AUSTRALIA
(STANDARDS ASSOCIATION OF AUSTRALIA)
1 THE CRESCENT, HOMEBUSH, NSW 2140

ISBN 0 7262 2193 7

PREFACE

This standard was prepared by the Association's Committee on Metal Finishing at the request of the Metals Standards Board as a metrication and a replacement for AS K170—1967 which is now withdrawn. It is identical technically with AS K170—1967 except for the change from imperial to metric units.

During the revision the committee decided to extract the various test methods which are now covered by AS 2331. Matters considered to be contractual in nature are now included in an appendix.

This standard requires reference to the following Australian standards:

AS 2331	Methods of Test for Metallic and Related Coatings 2331.1.1 Part 1— Local Thickness Tests—Micrographic Examination of Cross-sections 2331.2.1 Part 2— Average Thickness Tests—Dissolution Methods—Strip and Weigh, and Analytical
AS CK13	Code of Recommended Practice for Preparation of Metal Surfaces for Electroplating*
AS ...	Sampling Procedures for Electroplated Items†

* In course of revision.

† In course of preparation.

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STANDARDS ASSOCIATION OF AUSTRALIA

**Australian Standard
for
ELECTROPLATED COATINGS OF RHODIUM FOR GENERAL ENGINEERING
APPLICATIONS**

1 SCOPE. This standard specifies requirements for electroplated coatings of rhodium on metallic substrates for general engineering applications.

NOTE: Guidelines to purchasers on requirements that must be specified and/or agreed at the time of enquiry or order are given in Appendix A.

2 DEFINITIONS. For the purpose of this standard, the following definitions apply:

2.1 Surface—the surface of the item on which the electroplater is to work.

2.2 Significant surface—that part of the surface to be covered by the coating and which is essential to the appearance and serviceability of the item.

2.3 Finished state—the condition of the item at the completion of all electroplating operations.

2.4 Underplate—a preliminary coating applied to alter the surface characteristics of the basis metal.

2.5 Strike—an electrodeposition process of short duration applied to the basis metal or undercoat to assist the adhesion of subsequent electrodeposits and to limit metallic contamination of the electrolyte and/or subsequent electrodeposits.

2.6 Coated specimen—a test piece made from the same basis metal as the plated item and which has been processed through the same sequence of operations and at the same time as the plated item.

3 APPLICATION. Electroplated coatings of rhodium are hard (approximately HV800) and do not tarnish readily which makes such coatings important in the general engineering field but more particularly in the fields of electronics and electrical engineering.

High reflectivity of rhodium in the infrared and visible sections of the spectrum, in association with its resistance to tarnishing, make it suitable for use as a reflector coating.

Rhodium is chemically inert and very resistant to acids and other corrosive materials at ordinary temperatures but is subject to oxidation at temperatures above 400°C.

Since electroplated coatings of rhodium are usually thin, arcing or sparking can lead to the coating being penetrated, and hence rhodium-plated contacts should only be used in radio-frequency and audio-frequency circuits where current and voltage are low. Arcing and sparking problems do not arise with sliding contacts, hence it is in this field that rhodium electrodeposits are particularly useful. Sliding contacts of rhodium working against each other tend to wear rapidly, and it is usual for one of the contact members to be an alternative noble metal (e.g. gold), or for the contact member that is subject to the greater wear to have a thicker rhodium coating and for the contact pressure to be reduced to the minimum. Typical thickness of coatings and their

applications are given in Table 1. Rhodium can be deposited directly onto silver, copper, brass, phosphor-bronze (copper-tin-phosphorus) nickel, nickel-brass, and beryllium-copper alloys.

NOTE: Phosphor-bronze and beryllium-copper alloys require special treatment to ensure adequate adhesion of rhodium coatings (see AS CK13).

Owing to the acidic nature of rhodium plating baths and the position of rhodium in the electrochemical series, rhodium cannot be plated directly onto iron, steel, zinc, aluminium, lead or tin. Accordingly the use of an underplate or a strike on these metals is necessary.

NOTE: Precise details of the type of strike are subject to agreement between the purchaser and the electroplater (see Appendix A and Appendix B).

4 CONDITION OF THE ITEM BEFORE PLATING.

4.1 Surface Finish. The surface finish of the item shall comply with the particular requirements of the purchaser, where any such requirements are so specified (see Appendix A).

NOTE: The surface finish may be important to the appearance or serviceability of the item and it is the purchaser's responsibility to provide precise details to the electroplater at the time of ordering.

4.2 Pre-plating Condition. The item as delivered to the electroplater shall be in a condition suitable for processing by normal electroplating processes.

NOTES:

1. Where a mechanical treatment such as deburring is required, details should be specified by the purchaser at the time of ordering (see Appendix A).
2. As items which are rhodium plated generally have a fine surface finish, it is necessary to take suitable precautions to ensure that the surface finish is not impaired at any stage.

Items made of steel having a tensile strength (or equivalent hardness) equal to or greater than 1000 MPa or which are known to or suspected of having residual stress shall be given the appropriate stress-relieving treatment described in AS CK13 prior to being plated.

5 COATING REQUIREMENTS.

5.1 General. The coating on significant surfaces shall be continuous and smooth, and be free from plating defects, discoloration and staining.

NOTES:

1. Where a contact mark is unavoidable its position is subject to agreement between the purchaser and the electroplater (see Appendix A).
2. It is recommended that the purchaser indicate by means of a prepared sample the type of surface finish required.

Except as specified in Clauses 5.2 to 5.5, items shall be tested in the finished state.

5.2 Partially Coated Surfaces. Where the coating is required to be deposited on a portion of a surface