

STANDARDS AUSTRALIA

RECONFIRMATION

OF

AS 2331.1.6—2004

Methods of test for metallic and related coatings

Method 1.6: Local thickness tests—Taper section method

RECONFIRMATION NOTICE

Technical Committee MT-009 has reviewed the content of this publication and in accordance with Standards Australia procedures for reconfirmation, it has been determined that the publication is still valid and does not require change.

Certain documents referenced in the publication may have been amended since the original date of publication. Users are advised to ensure that they are using the latest versions of such documents as appropriate, unless advised otherwise in this Reconfirmation Notice.

Approved for reconfirmation in accordance with Standards Australia procedures for reconfirmation on 20 March 2017.

The following are represented on Technical Committee MT-009:

Australasian Institute of Surface Finishing
Australian Chamber of Commerce and Industry
Australian Industry Group
Australian Steel Institute
Bureau of Steel Manufacturers of Australia
Galvanizers Association of Australia
Galvanizing Association of New Zealand
New Zealand Metal Roofing Manufacturers

NOTES

Methods of test for metallic and related coatings

Method 1.6: Local thickness tests—Taper section method

PREFACE

This Standard has been prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee MT-009, Metal Finishing, to supersede AS 2331.1.6—1990.

After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian Standard rather than an Australian/New Zealand Standard.

The objective of this Standard is to revise the requirements for the Taper Section Method for determining local thickness so they are closely aligned with ISO 4524-3:1985, *Metallic coatings—Test methods for electrodeposited gold and gold alloy coatings, Part 3: Electrographic tests for porosity*.

The term ‘informative’ has been used in this Standard to define the application of the appendix to which it applies. An ‘informative’ appendix is only for information and guidance.

METHOD

1 SCOPE

This Standard sets out a method for measuring the local thickness of metallic coatings on various substrates, by micrographic examination of a taper cross-section. The method is normally applicable to coatings less than 5 µm thick. At this thickness level, an error of up to ±10% can be expected.

NOTE: The method is suitable for use only by personnel experienced in metallography and in the use of the appropriate equipment.

2 REFERENCED DOCUMENTS

The following document is referred to in this Standard:

AS

2331 Methods of test for metallic and related coatings

2331.1.1 Method 1.1: Local thickness tests—Micrographic examination of cross-sections

3 DEFINITION

For the purpose of this Standard, the definition below applies.

3.1 Linear enlargement factor

The factor by which the true coating thickness is apparently increased by taper section.

4 PRINCIPLE

Test pieces are cut from coated products, over-plated with a protective coating, metallographically mounted, and ground and polished at an appropriate angle to produce an enlarged thickness of the coating to be measured. The measured thickness is corrected by use of a simple geometric equation to obtain the true thickness.

5 APPARATUS

The following items of apparatus are required:

- (a) Test piece mounting equipment, including mould and filler material.
- (b) Specially prepared polishing jig manufactured from hardened steel and designed to hold the mount at the desired angle for polishing (see Figure 1).
- (c) Metallographic polishing equipment.
- (d) Metallographic microscope employed to measure the apparent coating thickness at an appropriate magnification.

The microscope, its use, its calibration requirements, and the method of preparation of the cross-section are selected so as to allow the coating thickness to be determined to within $\pm 0.2 \mu\text{m}$ or $\pm 10\%$, whichever is the greater, of the actual coating thickness.

6 PROCEDURE

6.1 Preparation of test pieces

Test pieces shall be prepared taking care to avoid damage to the metallic coating. They shall be free from foreign matter and, if necessary, degreased in a solvent, which does not attack the coating.

Prior to mounting, the test pieces shall be overplated with a suitable electroplate or electroless plated coating, of not less than $12 \mu\text{m}$ in thickness, to provide edge support during polishing operations. Any burrs present should be removed using a smooth file.

NOTE: Copper coatings are frequently employed for overplating. When applied over zinc or cadmium, an initial layer should be applied by immersion in an appropriate cyanide-plating solution, after which an appropriate acid-plating solution may be used to build up the coating.

6.2 Mounting of test pieces

The test pieces shall be placed flat on the die block in a mould with the plating to be measured placed facing downwards. Mounting materials such as acrylate, epoxy or phenolic resin are added. Where the coating may be affected by high temperatures, e.g. tin coating, a cold-setting resin should be used. When the mounting procedure is completed, remove the mount from the die.

NOTE: It is good practice to ensure that the centre of interest of the prepared section coincides with the centre of the mould.

6.3 Grinding and polishing

The mount shall be metallographically ground and polished to the desired taper until the surface is free from scratches, and so that the metallic coating and the overplated coating are clearly visible (see Figure 2).

NOTES:

- 1 A polishing jig should be used to hold the mounted test piece during grinding and polishing, and to ensure that the section is flat and at the required angle. It is important to measure the angle as accurately as possible.
- 2 Appendix A gives advice on the grinding and polishing of mounted test pieces.