Australian Standard®

Methods of test for metallic and related coatings

Method 1.6: Local thickness tests—Taper section 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 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.

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

4.1 Linear enlargement factor—the factor by which the true coating thickness is apparently increased by taper section.

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 ±0.2 μm or ±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 μm 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 flatly 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.