

STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard

METHODS OF TEST FOR METALLIC AND RELATED COATINGS

PART 3—CORROSION AND RELATED PROPERTY TESTS

AS 2331.3.5—1980

SULPHUR DIOXIDE/HYDROGEN SULPHIDE POROSITY TESTS

FOREWORD

Electroplated coatings of non-tarnishing precious metals such as gold and rhodium for engineering purposes are required to retain, over long periods of storage and use, the ability to perform the functions they serve. Among these functions are —

- (a) low contact resistance;
- (b) ease of solderability; and
- (c) provision of a stable surface suitable for carrying high frequency currents.

Impairment of performance may result from—

- (i) the formation of corrosion products at discontinuities in the coating; or
- (ii) corrosion of the coating itself where the alloying elements are not sufficient to withstand the environmental conditions.

Environments containing sulphur compounds are most likely to produce the effects described above.

This standard provides for two types of atmospheres, viz H₂S which will produce an effect on silver and copper but none with nickel or tin, and SO₂ which will produce visible effects on any basis metal or undercoat.

The test chosen should be capable of revealing the exposure of the basis metal or any of the undercoats. For general purposes it has not been considered necessary to include a test during which the correctly applied undercoat metal is likely to be penetrated. The thickness of undercoats specified should be an adequate safeguard against penetration of corrosion to the basis metal in normal service. However, when exceptionally severe environmental conditions are required to be met, special tests may be required to be developed.

NOTE: Special tests are a matter for agreement between the purchaser and the supplier.

See also AS 2331.3.6.

METHOD

1 SCOPE. This standard sets out the method for assessing the degree of porosity in coatings on undercoats and basis metals that form visible compounds when exposed to sulphur dioxide-hydrogen sulphide atmospheres.

2 APPLICATION. The method is suitable for assessing porosity in electroplated coatings of such metals as gold, palladium and rhodium on basis metals or substrates that form visible compounds in accordance with Clause 3.

3. PRINCIPLE. The method relies on the formation of visible corrosion products when gaseous sulphur dioxide and hydrogen sulphide are allowed to come into contact with metal that forms visible compounds with the gases.

4 APPARATUS. The following apparatus is required:

- (a) A suitable test vessel made of glass or acrylic resin of about 10 L capacity, capable of being closed by a gas-tight cover or door.

A conventional 10 L desiccator is recommended.

- (b) Provision for the support of test pieces or test specimens within the vessel so that they are about 100 mm about its base. They may be supported on a perforated ceramic plate or suspended from rods by means of suitable material, e.g. nylon thread or glass hooks.

All materials must be non-metallic and inert to the action of SO₂ or H₂S gas. Glass or acrylic resin are suitable materials.

During progress of the test, the test vessel should be kept screened from draughts or from any source of local radiant heat so that sudden temperature fluctuations and local heating of the test vessel are avoided.

5 TEST ATMOSPHERE. The atmosphere in the test vessel shall contain 100 mL of gas for each 10 L of capacity. Gases shall be prepared as follows:

- (a) *Sulphur dioxide.* Add 50 mL of 50 percent sulphuric acid (ρ_{20} 1510 kg/m³) to 200 mL of 20 percent (m/V) solution of sodium thiosulphate (Na₂S₂O₃·5H₂O).

To avoid loss of gas, add chemicals together in the test vessel.