

Australian Standard™

AS 2331.4.5

Methods of test for metallic and related coatings

Method 4.5: Physical tests—Electroplated plastics—Thermal cycling tests

1 SCOPE

This Standard sets out two thermal cycling test procedures for assessing the adhesion of electroplated coatings on plastics items by inducing stresses in the coatings.

Although there is no restriction on the use of the two test procedures, Procedure A is suited to the testing of coated household items and Procedure B to the testing of automotive items.

2 PRINCIPLE

Coated items are subjected to alternate hot and cold temperature cycles. Loss of coating adhesion is used as the criterion for assessment.

3 REFERENCED DOCUMENT

The following document is referred to in this Standard:

AS

2331 Methods of test for metallic and related coatings

2331.4.1 Method 4.1: Physical tests—Qualitative adhesion tests

4 APPARATUS

The following apparatus is required:

- (a) An air oven capable of maintaining a temperature of $85 \pm 2^\circ\text{C}$.
- (b) A refrigerator capable of maintaining a temperature of $-30 \pm 2^\circ\text{C}$.

5 PREPARATION OF ITEMS FOR THERMAL CYCLING

Items shall be allowed to stabilize at ambient temperature for at least 24 h following the electroplating process.

6 THERMAL PROCEDURES

6.1 General

Coated items shall be tested in accordance with either Procedure A or Procedure B.

6.2 Procedure A

The test shall be conducted as follows:

- (a) Load the oven with the coated items. Heat the oven to $85 \pm 2^\circ\text{C}$ and hold at this temperature for 1 h.
- (b) Remove the hot items from the oven and allow to stand at $20 \pm 5^\circ\text{C}$ for at least 30 min.
- (c) Refrigerate the items at $-10 \pm 2^\circ\text{C}$ for 1 h.



- (d) Remove the cold items from the refrigerator and allow to stand at $20 \pm 5^{\circ}\text{C}$ for 30 min.
- (e) Repeat Steps (a) to (d) three times to make four complete cycles.
- (f) Examine the cycled items for blistering or other forms of loss of adhesion between layers of the coating or between the coating and the basis material.
- (g) Report the test result.

6.3 Procedure B

The test shall be conducted as follows:

- (a) Load the oven with the coated items. Heat the oven to $85 \pm 2^{\circ}\text{C}$ and hold at this temperature for 1 h.
- (b) Remove the hot items from the oven and allow to stand at $20 \pm 5^{\circ}\text{C}$ for at least 30 min.
- (c) Refrigerate the items at $-30 \pm 2^{\circ}\text{C}$ for 1 h.
- (d) Remove the cold items from the refrigerator and allow to stand at $20 \pm 5^{\circ}\text{C}$ for 30 min.
- (e) Repeat Steps (a) to (d) three times to make four complete cycles.
- (f) Examine the cycled items for blistering or other forms of loss of adhesion between layers of the coating or between the coating and the basis material.
- (g) Test adhesion by means of a fine-toothed hacksaw in accordance with AS 2331.4.1.
- (h) Report the test result.

7 TEST REPORT

The test report shall include the following information:

- (a) Reference to this Australian Standard, i.e. AS 2331.4.5.
- (b) Identification of test specimen.
- (c) Identification of the coating system or the product tested.
- (d) The test procedure used.
- (e) The test result.
- (f) Any deviation from the method specified.
- (g) Any factor that may influence the result.
- (h) Report number and date of issue.
- (i) Name of the test laboratory.