

Australian Standard®

Paints and related materials—Methods of test

Method 403.2: Abrasion resistance

PREFACE

This Standard was prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee CH-003, Paints and Related Materials to supersede the 1994 edition of the Standard.

METHOD

1 SCOPE

This Standard sets out a method for determining the abrasion resistance of a paint coating or other finishes, such as anodising, electroplating, paper products, rubbers, plastics, textiles, glass and concrete, using an abramer.

NOTE: The Taber abramer might not be appropriate with some coatings which can clog the abrasive wheels.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS/NZS

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| 1580 | Paints and related materials—Methods of test |
| 1580.101.1 | Method 101.1: Conditions of test—Temperature, humidity and airflow control |
| 1580.104.1 | Method 104.1: Recommended materials for test panels |

ASTM

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| D 2240 | Test method for rubber property—Durometer hardness |
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3 DEFINITIONS

For the purpose of this Standard, the following definitions apply:

3.1 Mass loss

The mass loss in milligrams, determined after a specified number of abrasion cycles.

3.2 Wear appearance

The change in appearance of a test film after it has been subjected to abrasion under a specific set of test conditions.

3.3 Wear index

The rate of wear, expressed as 1000 times the loss in weight in milligrams per cycle.

4 PRINCIPLE

Coated test panels or panels of a specified material are subjected to an abrasion test by means of a pair of weighted rotating abrasive wheels for a specific number of cycles. The characteristic rub-wear action of the abramer is produced by the contact of a test sample, turning on a vertical axis, against the sliding rotation of the abrading wheels. The abrading wheels rotate in opposite directions about a horizontal axis displaced tangentially from the axis of the test sample. One abrading wheel rubs the test panel outwards toward the periphery and the other inwards toward the centre of the test panel. The resulting abrasion marks form a pattern of crossed arcs over an area of approximately 300 square millimetres.

The abrasion resistance of the test coating or test material is assessed by determining—

- (a) the wear appearance;
- (b) the mass loss; or
- (c) the wear index.

5 OCCUPATIONAL HEALTH AND SAFETY GUIDANCE

The following criteria apply:

- (a) During handling, the precautions for use, as outlined in supplier's Materials Safety Data Sheet (MSDS) should be followed.
- (b) Wear appropriate personal protective equipment.

6 APPARATUS

6.1 Abraser

Constructed so that wheels of several grades of abrasiveness can be readily used. Loads of 250, 500 and 1000 g on each wheel shall be obtained by the use of changeable weights and counterweights. The turntable of the abramer shall rotate substantially in a plane with a deviation at a distance of 2 mm from its periphery, of not greater than ± 0.5 mm.

6.2 Abrasive wheels

Resilient calibrase wheels of type CS-10 or CS-17, as appropriate.

NOTES:

- 1 Because the rubber bonding material on the abrasive wheels has a tendency to harden with age, only wheels which are no more than 12 months old should be used. This can be determined by the date of manufacture located on the side of the wheels, or by keeping a record of the date of purchase. Alternatively, the hardness may be checked by a Shore Durometer using the A-2 scale in accordance with ASTM D 2240. The acceptable hardness is 81 ± 5 units. When wheels are replaced, they are to be replaced in pairs.
- 2 CS-17 wheels produce a harsher abrasion than CS-10 wheels.

6.3 Refacing components

Paper refacing discs of Type S-11 to reface the abrasive wheels. Alternatively, a diamond wheel refacing tool may be used.

6.4 Vacuum pick-up assembly

Consisting of a vacuum unit, a variable transformer suction regulator, a nozzle with a variable adjustment bracket attachment and a connecting hose.

6.5 Analytical balance

Accurate to 0.005 g.

6.6 Small brush

A soft bristle brush.

7 TEST PANELS

Test panels shall be 100 mm × 100 mm × 2 mm plain low carbon steel sheet conforming to AS/NZS 1580.104.1 unless otherwise specified. The panels shall be flat, and for safety reasons should have all corners and edges rounded. A hole shall be drilled in the centre of each panel to enable it to be held securely in position on the turntable.

8 PREPARATION OF TEST PANELS

Test panels shall be prepared, coated and cured in accordance with the appropriate methods. A minimum of two test panels is required for each test.

NOTE: The abrasion resistance of the coating may be affected by the degree of cure before testing. This should be recognized when preparing the test panel and scheduling the timing of the test.

9 TEST CONDITIONS

The test shall be carried out under routine conditions specified in AS/NZS 1580.101.1. In cases of dispute, the panel preparation, curing and abrasion test shall be carried out under referee conditions specified in AS/NZS 1580.101.1.

10 EQUIPMENT PREPARATION

The instrument and wheels shall be prepared as follows:

- (a) Mount the specified abrasive wheels on their respective flange holders, taking care not to touch the abrasive surfaces. Unless otherwise specified, adjust the mass on each wheel to 1000 g.
- (b) Mount the refacing disc in accordance with the manufacturer's instructions for the model of the instrument being used. Lower the abrasive wheels until they rest squarely on the refacing disc. Position the vacuum pick-up nozzle above the refacing disc and adjust it to a distance of 1 mm above the surface of the disc.
- (c) Set the counter on the instrument to zero and set the suction of the vacuum regulator to approximately 50 points on the dial. This setting may be increased if more effective removal of the abradings is required.
- (d) Start the vacuum and turntable of the abrader. Reface the abrasive wheels by running them for 50 cycles. If the abrasive wheels are not satisfactorily refaced after 50 cycles, reface them for another 50 cycles using a new paper refacing disc (see NOTE). If using a diamond wheel-refacing tool, follow the manufacturer's instructions for its operation, and reface the wheels for the previously stated number of cycles.
- (e) Throughout the test, reface the abrasive wheels after each 500 cycles. Care shall be taken to ensure the abrasive wheels are not reduced below the manufacturer's recommended minimum diameter, which is usually the outer diameter of the label affixed to the side of each wheel. Wheels exceeding this reduction shall be replaced.

NOTE: A paper refacing disc has an effective working life of 50 cycles.