

Australian Standard®

Methods of test for single sided and double sided pressure-sensitive adhesive tape

Method 4.1: Printing properties—Determining indelibility of printed labels

PREFACE

This Standard was prepared by the Standards Australia Committee PK-025, Packaging Code at the request of Australian Industry.

The objective of this Standard is to specify a method of test to determine the indelibility of print.

METHOD

1 SCOPE

This Standard specifies a method for determining the indelibility of print on pressure-sensitive adhesive labels.

2 REFERENCE DOCUMENTS

The following documents are referred to in this Standard:

AS

- 1745 Outdoor weathering of plastics in the Australian environment
- 1745.1 Part 1: Commercial products
- 1745.2 Part 2: Guide for design purposes

2400 Packaging

- 2400.1 Part 1: Glossary of packaging terms

3530 Solvents—Mineral turpentine and white spirit

AS/NZS

- 1734 Aluminium and aluminium alloys—Flat sheet, coil, sheet and plate

ASTM

- G154 Standard practice for operational fluorescent light apparatus for UV exposure of nonmetallic materials
- G155 Standard practice for operating xenon arc light apparatus for exposure of non-metallic materials

3 DEFINITIONS

For the purposes of this Standard, the following definitions in AS 2400.1 apply.

4 PRINCIPLE

The surface of the label, before and after water immersion followed by temperature cycling, is subjected to the motion of absorbent lint in the dry or wet state is used in under load is used in a succession of various solvents and the indelibility of the print assessed in terms of its legibility.

5 REAGENTS

The following reagents are required:

- (a) Non-ionic detergent* (a nonylphenol ethylene oxide condensate).
- (b) White lint, soaked in white spirit, complying with AS 3530.
- (c) Warm distilled water.
- (d) Distilled water.

6 APPARATUS

The following apparatus is required:

- (a) Panels of aluminium complying with AS/NZS 1734, having a rolled finish and minimum dimensions of 150 mm × 100 mm × 1.5 mm, degreased by repeated swabbings using untreated paper tissue and either acetone or a mixture of equal volumes of toluene, methyl ethyl ketone and industrial methylated spirits, dried at $80 \pm 2^\circ\text{C}$ for 15 min and cooled in a desiccator to the test temperature ($23 \pm 2^\circ\text{C}$).
- (b) A steel roller, 80 ± 5 mm diameter and 45 ± 1 mm wide covered with rubber approximately 6 mm thick having a Shore durometer hardness of 80 ± 5 . The mass of the roller proper which applies pressure to the specimen shall be 2.0 ± 0.1 kg. It shall be so constructed that the mass of the handle is not added to the mass of the roller during use.
- (c) Artificial weathering machine carbon-arc type instrument complying with ASTM G154.
- (d) An oven, capable of being controlled at $50 \pm 2^\circ\text{C}$.
- (e) A refrigerator capable of being controlled at $-3 \pm 2^\circ\text{C}$.
- (f) Device for testing indelibility of markings on labels as illustrated in Figure 1 having, as its principal part, a disc of hard white buffing felt, 65 mm diameter × 7.5 mm thick. The appropriate part of the buffing disc is covered with one layer of white absorbent lint with the nap surface external. The disc is locked against rotation and is arranged to move across the surface to be tested with a stroke of 20 mm to exert a measurable force on this surface. Twelve strokes, (i.e. six rotations of the eccentric) shall be applied, using a weight having a mass of 750 ± 5 g and shall take approximately 15 s.
- (g) Damp cloth.

7 TEST SPECIMENS

Three test specimens are required.

* For encapsulated adhesives, the manufacturer should be consulted regarding the application

8 PROCEDURE

8.1 Specimen 1

One test specimen (designated Specimen 1) shall be tested as follows:

- (a) Remove the protective release backing of the specimen and apply to the aluminum substrate panel with the aid of the roller. As the test specimen is 80 mm wide and the roller is only 45 mm wide, make two passes of the roller in the same direction with the first pass just overlapping one edge, so that the two passes just overlap in the middle of the specimen. Make six pairs of such passes in each direction at a constant speed of approximately 6 s for each traverse of 120 mm, taking care that only the mass of the roller is applied and that no air bubbles are entrapped.
- (b) Allow to stand at $23 \pm 2^\circ\text{C}$ for 24 h.
- (c) Place the specimen in the device, and, using the white absorbent lint in the dry state, apply 12 strokes for a period of 15 s, using the weight having a mass of 750 ± 5 g (see Clause 6(f)).
- (d) Soak the white absorbent lint in distilled water and apply 12 strokes for a period of 15 s, using the weight having a mass of 750 ± 5 g (see Clause 6(f)).
- (e) Apply sufficient drops of the non-ionic detergent to cover the print, stand for 4 h, remove the detergent residue using a very fine spray of the warm distilled water or by wiping very lightly with the damp cloth, and allow to dry.
- (f) Soak the white absorbent lint (see Clause 6(f)) in the non-ionic detergent and repeat Step (c) above.
- (g) Shake off surplus detergent and, using the white spirit-soaked lint, repeat Step (c) above.
- (h) Observe visually whether the marking is still legible.

NOTES:

- 1 For Steps (c) to (g) inclusive, the width of the buffing disc may be progressively reduced from 7.5 mm to 2.5 mm minimum and the applied mass correspondingly reduced to maintain lint pressure in order that the print may be reached and rubbed.
- 2 If the shape or position of the print is such that it cannot be reached or rubbed (e.g. by recessing the marked surface), then Steps (f), (g) and (h) are omitted.

8.2 Specimen 2

The second test specimen (designated Specimen 2) shall be tested as follows:

- (a) Repeat Steps (a) and (b) of Clause 8.1.
- (b) Expose the specimen to artificial weathering in accordance with ASTM G155 for 1000 h if using xenon arc light, or in accordance with ASTM G154 for 2000 h if using fluorescent UV light, or subject the specimen to natural weathering in accordance with AS 1745.1 and AS 1745.2.

NOTE: No single operating procedure for light exposure, with or without water can be specified as a direct simulation of natural exposure. The main purpose of laboratory testing is to compare printed labels and not determine the actual durability of a single system.

- (c) Allow to stand at $23 \pm 2^\circ\text{C}$ for 24 h.
- (d) Carry out Steps (c) to (h) of Clause 8.1 using Specimen 2.

8.3 Specimen 3

The third test specimen (designated Specimen 3) shall be tested as follows:

- (a) Immerse the specimen in not less than 1 L of distilled water at $23 \pm 2^\circ\text{C}$ for 24 h.