Designation: F 2226 – 03

Standard Practice for Determining the Adhesion of Prints and Laminating Films[1]

This standard is issued under the fixed designation F 2226; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice covers procedures for printing a document, applying a laminating film and subsequently delaminating. The laminate film is used for encapsulating and mounting prints to preserve them in office and outdoor environments.

1.2 This practice describes procedures for determining the adhesion strength of lamination film when it is applied to black and white and color prints produced by printers, copiers and other reprographic devices.

1.3 This practice can be used to test different laminates with a given set of inks and media or it can be used to evaluate inks and media with a given laminate.

1.4 This practice specifies size of specimens and defines conditions for measurement of peel adhesion at a 180° angle and delamination speed.

1.5 This practice is applicable to constructions where the substrate surface is subject to failure under peel conditions.

1.6 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.7 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Terminology

2.1 *Definitions:*

2.1.1 *high temperature lamination*—lamination at temperature not lower than 80°C (180°F). The maximum applied temperature is 115 to 121°C (240 to 250°F).

2.1.2 *lamination film*—plastic film having an adhesive layer on one side. The film can be glossy, semi-glossy, or matte and contain additives modifying its optical properties. The film usually has a thickness between 25 to 250 µ (1 to 10 mils).

2.1.3 *low temperature lamination*—lamination at room temperature with applied pressure mostly to mounting board using a pressure-sensitive adhesive.

2.1.4 *mounting board*—paperboard, plastic board, or any supporting board, which could be used to display prints.

2.1.5 *printed media*—recording elements used by printers to receive inks or toners. The substrate may be paper, plastic, canvas, fabric, or other ink receptive material. The substrate may, or not, be coated with an ink receptive layer(s).

2.2 *Definitions of Terms Specific to This Standard:*

2.2.1 *adhesion strength of a laminate*—load per unit necessary to remove the laminate from a prescribed surface when measured in accordance with this test method.

2.2.2 *delaminating/debonding*—separation of a laminating film from a printed media.

2.2.3 *kinetic peak*—load per unit presenting the maximum force that occurs during the average time during the peel test. See Fig. 1.

2.2.4 *peel or stripping strength*—the average load per unit width of sample required to separate or peel the laminate from the printed media at the adhered interface at a separation angle of approximately 180° and at a separation rate of preferably 308 mm (12 in.) per minute. It is expressed in Newtons per meter width, grams per inch width, or ounces per inch width.

2.2.5 *root-mean-square (RMS)*—a mathematical treatment of the force data intended to qualify the extent to which the value deviates about its average value.

2.2.6 *static peak*—load per unit presenting the maximum force that occurs during the delay time before starting the peel test. See Fig. 1.

2.2.7 *valley*—load per unit presenting minimum force during the average time under kinetic conditions. See Fig. 1.

3. Summary of Practice

3.1 Coated or uncoated substrate is printed under standard conditions using four primary, three secondary colors and composite black. Eight color strips 2.54 mm wide and one unprinted are generated.

3.2 The prints having eight color strips are conditioned (preferably for 24 h) and subsequently laminated.

3.3 The laminated prints are conditioned (preferably for 24 h), cut into 25.4-mm strips and subsequently delaminated.

3.4 Comparative studies require testing under well-defined conditions.

4. Significance and Use

4.1 The image life of printed media displayed in both typical office and outdoor environments can be extended by lamination or encapsulation. While natural aging is the most reliable method of assessing lamination adhesion, the length of

[1] This practice is under the jurisdiction of ASTM Committee F05 on Business Imaging Products and is the direct responsibility of Subcommittee F05.03 on Research.

Current edition approved Jan. 10, 2003. Published March 2003.

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