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18932:2009

Imaging materials - Adhesive mounting systems - Specifications

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National foreword

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A list of organizations represented on this committee can be obtained on request to its secretary.

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ISO 18932 was prepared by Technical Committee ISO/TC 42, *Photography*.

This second edition cancels and replaces the first edition (ISO 18932:2005), of which it constitutes a minor revision.

The following changes have been made to the first edition:

— updating of normative references;

— removal of the former Annex A.

Introduction

Adhesives can either be permanent (of more interest to consumers mounting photos in albums) or reversible (of more interest to museums and conservators). This International Standard focuses on permanent adhesives, rather than on reversible adhesives. This International Standard assures that adhesives used to mount images are both permanent and photo safe.

INTERNATIONAL STANDARD **ISO 18932:2009(E)**

Imaging materials — Adhesive mounting systems — Specifications

1 Scope

This International Standard provides specifications for adhesive mounting materials for use in attaching prints, including photographic, electrophotographic, electrostatic, thermal transfer or inkjet prints to mounting boards, album leaves, file cards and other supports. This International Standard covers both pressure-sensitive and thermally-activated adhesives. Spray adhesives are specifically excluded from this International Standard.

This International Standard is not applicable to situations in which the permanent mounting of a photograph is not recommended.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 14145-1:1998, *Roller ball pens and refills — Part 1: General use*

ISO 18902, *Imaging materials — Processed imaging materials — Albums, framing and storage materials*

ISO 18916, *Imaging materials — Processed imaging materials — Photographic activity test for enclosure materials*

ASTM D3330/D3330M-04, *Standard Test Method for Peel Adhesion of Pressure-Sensitive Tape*

EN 28510-1:1993, *Adhesives — Peel test for a flexible-bonded-to-rigid test specimen assembly — Part 1: 90° peel*

3 Requirements

3.1 Characteristics of adhesive mounting systems

3.1.1 General

Pressure-sensitive adhesive mounting systems commonly consist of two basic forms: supported and unsupported. They are usually applied to the back of the print. Both systems use release-coated liners to protect the adhesive prior to use.

Liquid adhesives require a compatible dispenser or applicator to apply the adhesive to the back of the print or the front of the mounting board. Pastes are more viscous and are usually applied with a brush or roller. Solid adhesives are usually adhered to the back of prints by manual pressure.

Thermally-activated dry mounting adhesives shall have uniform thickness, be flexible, be essentially non-tacky at normal room temperature and consist of two basic forms: supported and unsupported.

3.1.2 Reactivity

The adhesive shall not cause discoloration of the print, paper or mounting board. The adhesive shall meet the requirements of the bleed test in Clause 5 and the requirements of the photographic activity test in Clause 6.

3.1.3 Coating

Pressure-sensitive adhesives shall be applied uniformly to each side of a supporting carrier or a release liner. The adhesive surface shall be tacky to the touch at 23 °C.

Thermally-activated adhesives shall be uniformly coated on both sides of a carrier membrane or be independent as a dry unsupported sheet. The thermally-activated film adhesive shall have uniform thickness and be flexible, dry and essentially non-tacky at 23 °C. Thermally-activated film adhesives do not have release liners.

3.1.4 Physical characteristics

Important physical properties of the supports and adhesive layers of thermally-activated and pressure-sensitive adhesive materials shall include:

a) no surface structures that could impart texture patterns to the image due to pressure applied in mounting;

b) uniform thickness and resistance to damage caused by handling;

c) no voids, particles or other irregularities;

d) uniformly white or light colours if transparent; uniform colour if translucent or opaque.

3.1.5 Liners

Protective liners shall be easily removed from the adhesive without tearing or delaminating. The release coating on the release liners shall be uniformly coated without voids or streaks and shall be sufficiently bonded to the liner to prevent any transfer to the adhesive.

3.2 Types of construction

3.2.1 Supported pressure-sensitive adhesives

This adhesive system consists of a layer of pressure-sensitive adhesive coated on both sides of a carrier. The carrier may be any relatively thin, flexible material such as paper, film, polyester web, non-woven synthetic, etc. The carrier shall be uniform in thickness and appearance. The carrier shall comply with all requirements for paper or plastic materials in ISO 18902 and shall pass Photographic Activity Testing (PAT) in accordance with ISO 18916.

This product is supplied in three basic forms:

— in roll form with one release liner;

— in roll or sheet form sandwiched between two release liners;

— coated on one side of a mounting board with one release liner.

Pressure-sensitive adhesives shall be free from imperfections and conform to ISO 18916 and ISO 18902.

3.2.2 Unsupported pressure-sensitive adhesives

This adhesive material has a single uniform layer of adhesive that is not reinforced or supported by a carrier.

The product is supplied in three basic forms:

— in roll form with one release liner;

— in roll or sheet form sandwiched between two release liners;

— coated on one side of a mounting board with one release liner.

3.2.3 Supported thermally-activated adhesives

This adhesive system consists of a layer of a thermally-activated adhesive film coated on both sides of a carrier. The carrier may be any relatively thin, flexible material such as paper, film, polyester web, non-woven synthetic, etc. The carrier shall be uniform in thickness and appearance. The carrier shall comply with all requirements for paper or plastic materials in ISO 18902 and should pass PAT in accordance with ISO 18916.

The product is supplied in four basic forms:

— in roll form;

— in sheet form;

— coated on one side of a mounting board;

— coated on one side of canvas or other soft substrate with or without one release liner.

3.2.4 Unsupported thermally-activated adhesives

This adhesive system consists of a single uniform layer of adhesive that has not been reinforced or supported by a carrier.

The product is supplied in four basic forms:

— in roll form;

— in sheet form;

— coated on one side of a mounting board;

— coated on one side of canvas or other soft substrate with or without one release liner.

3.3 Types of thermally-activated materials

3.3.1 Type I — Non-removable

The adhesive of this mounting material shall provide bonding between print and mounts, preventing deliberate separation to the print or mounting board surface by reheating for the time as specified by the manufacturer and temperature specified in 3.4.1 and 3.4.2. This type of adhesive will permanently bond after having reached recommended time/adhesion temperature within the mounting system.

3.3.2 Type II — Removable

The adhesive of this mounting material shall allow separation of the print from the mounting board without injury to either surface by reheating to the temperatures specified in 3.4.1 and 3.4.2, but otherwise shall maintain satisfactory bonding. Thermally-detachable adhesives shall be cooled under pressure for no less than 15 s to activate the bond.

3.4 Classes of thermally-activated materials

3.4.1 Class 1 — Low temperature

The thermally-activated coating shall provide adhesion at temperatures of 66 °C to 108 °C.

3.4.2 Class 2 — High temperature

The thermally-activated coating shall be adhesive at temperatures of 108 °C to 163 °C under the conditions of time and temperature specified by the manufacturer. This class of adhesives is not recommended for resin-coated (RC) or digital imaging materials because the required temperatures are likely to damage the emulsion surface and/or the colorants.

3.5 Other adhesives

3.5.1 Liquid

Liquid adhesives are transparent, translucent, opaque or colour-changing.

3.5.2 Pastes

Pastes are more viscous than liquid adhesives and are typically translucent or opaque.

3.5.3 Solid

Solid adhesives include glue sticks and are typically translucent, opaque or colour-changing.

3.6 Adhesive strength

3.6.1 Pressure-sensitive adhesive strength

The adhesive should form an immediate bond to the print as well as the mounting board when pressed together with enough uniform pressure to provide intimate contact. This is typically best accomplished using roll-laminating equipment so as to prevent any air entrapment during the bonding process. Adhesion should be such that forcible separation results in tearing, delaminating or distortion of the print or mounting board. If none of these occur, minimum bond strength of 1,3 N/cm (132 g-force/cm) shall be obtained when tested in accordance with 4.1 to 4.6.

3.6.2 Thermally-activated adhesive strength

When available, the manufacturer's recommended procedures shall be used for mounting the print. Adhesion shall be completed within 120 s after reaching bond temperature in all cases. Applied pressure shall be uniform and high enough to evenly bond. Adhesive strength and longevity is directly related to the correct amount of bonding time, proper temperature, adequate pressure and reduced moisture content.

Adhesion should be such that forcible separation results in tearing, delaminating or distortion of the print/ mounting board. If none of these occur, minimum bond strength of 1,3 N/cm (132 g-force/cm) shall be obtained when tested in accordance with 4.1 to 4.6.

The adhesive strength of Type I adhesives shall be sufficient to prevent peeling of the print from the mount during the cooling period. Type II adhesives bond during cooling; therefore, the adhesive strength shall be sufficient to prevent peeling of the print from the mount after cooling for 30 s or to 10 °C below the bonding temperature.

3.7 Blocking

Blocking is a term used to describe the adhesion of surfaces of materials that are in intimate contact, as in a package, pile or roll. If the thermally-activated adhesive of a mounting material tends to block under normal storage or use conditions, it shall be protected with an appropriate interleaving material, such as waxed or silicone-treated paper. However, slight-to-moderate blocking is acceptable at room temperature, even with interleaved material, if the surfaces can be separated readily without damage to the adhesive.

3.8 Shelf-life and storage conditions

Pressure-sensitive and thermally-activated mounting systems should be stored in their original container, suspended from the roll core, or by standing the roll on end. Optimum storage conditions are cool and dry, such as 23 °C and 50 % relative humidity or lower. Temperatures for extended periods at or above 38 °C can lead to adhesive ooze at the roll edges and/or significant loss of adhesion properties.

4 Adhesion tests

4.1 General

In order to measure the bonding strength of an adhesive to an imaging material and mounting board, there are two mandatory peel-adhesion tests and two additional tests required for some applications, as outlined below.

— Unaged adhesive test: this test applies to all adhesive types and is intended for adhesives which are to be used immediately and are tested shortly after application.

— Heat-aged adhesive test: this test applies to all adhesive types and is intended to determine the adhesive strength after the adhesive has aged.

— Initial adhesive stress test: this test shall be required if the intended use can result in an initial stress on the adhesive bond.

— Adhesive shelf-life test: this test shall be required if the adhesive will not be applied immediately after preparation.

These tests shall be performed in accordance with EN 28510-1:1993, with the modification that the “flexible adherent” specified in EN 28510-1:1993, 5.1.2, shall be the imaging material.

4.2 Unaged adhesive test

4.2.1 Double-sided pressure-sensitive tapes

With respect to EN 28510-1:1993, 5.2, the following shall be substituted for testing double-sided pressure-sensitive tapes.

A 300 mm specimen of the tape to be tested shall be removed. 12 mm at one end of the adhesive shall be folded to form a tab. The other end of the specimen shall be touched to one end of the mounting board. The other end of the tape shall be held so that it does not make contact with the mounting board, but is positioned above it. The assembly shall be rolled mechanically or by hand twice in each lengthwise direction, causing it to apply the tape to the mounting board. This prevents entrapment of air between the adhesive and the mounting board. If entrapment of air occurs, the entire specimen shall be discarded.

The liner shall be removed and the imaging material shall be superimposed. The imaging material shall be applied in the manner of applying the double-sided tape to the mounting board so that the roller makes the actual application of the imaging material to the double-sided tape.

The roller used shall be as described in ASTM D3330/D3330M-04, 6.4. Where the width of the tape is less than 25 mm, strips of the tape are applied to give an equivalent width of 25 mm for rolling purposes or a roller of the appropriate weight shall be used to obtain a line pressure equal to 2 040 g for 25 mm. If a steel panel is used to provide reinforcement, the panel shall be wiped with a clean piece of absorbent cleaning material containing a small amount of isopropyl alcohol before testing the adhesive material. The panel shall be free of fingerprints, dirt and residual adhesive.

4.2.2 Liquid, paste and solid adhesives

With respect to EN 28510-1:1993, 5.2, the following shall be substituted for testing liquid, paste and solid adhesives.

75 mg of adhesive shall be applied over a length of 100 mm at one end of the imaging material. Wait for 30 s.

The other end of the imaging material shall be held so that it does not make contact with the mounting board but shall be positioned above it. Roll mechanically or by hand twice in each lengthwise direction, causing the roller to apply the imaging material to the mounting board. This prevents entrapment of air between the adhesive and the mounting board. If entrapment of air occurs, the entire specimen shall be discarded.

The roller used shall be as described in ASTM D3330/D3330M-04, 6.4. If necessary for reinforcement, a steel panel shall be wiped with a clean piece of absorbent cleaning material containing a small amount of isopropyl alcohol prior to adhering the mounting board. The panel shall be free of fingerprints, dirt and adhesive.

4.2.3 Thermally-activated non-removable, low temperature adhesives

With respect to EN 28510-1:1993, 5.2, the following shall be substituted for testing thermally-activated non-removable, low temperature adhesives (Type I, Class 1).

A sheet of dry mounting material slightly larger than (200 $\times$ 200) mm shall be prepared, as shall a sample of mounting board (200 $\times$ 250) mm. All layers other than the adhesive shall be pre-dried.

For fibre-base imaging materials, the imaging material and dry mounting material shall be tacked on one end of the mounting board, covered with a non-adhering protective release paper sheet, placed in a dry mounting press heated to 88 °C (or other temperature as specified by the manufacturer) and kept under suitable pressure for no less than 60 s. A mechanical softbed press at (20 $\pm$ 7) kPa [(3 $\pm$ 1) pounds per square inch] shall be the equipment of choice.

For resin-coated imaging materials, a porous adhesive shall be used to better control the potential for trapped air between two nonporous surfaces. The imaging material and adhesive shall be surface tacked to one end of the mounting board. The tacked imaging material and mounting material shall be covered with a non-adhering protective release paper sheet, placed in a mechanical dry mount press heated to 88 °C and kept under pressure for no less than 60 s.

After removal from the press, the mounted imaging material shall be allowed to cool to room temperature without pressure or restraint. After room temperature equilibration, no edge lift shall be discernible between the imaging material and adhesive layer or between the adhesive layer and the mounting board. Flexing of the mounting board, without irreversibly deforming the mounting board, shall not loosen the imaging material from the mounting board.

A 25 mm wide strip shall be cut lengthwise from the centre of the mounted imaging material.

4.2.4 Thermally-activated non-removable, high-temperature adhesives

With respect to EN 28510-1:1993, 5.2, the following shall be substituted for testing thermally-activated non-removable, high-temperature adhesives (Type I, Class 2).

The test shall proceed as indicated in 4.2.3, except that the application temperature for imaging materials shall be 121 °C or other temperature as specified by the manufacturer.

4.2.5 Thermally-activated removable, low temperature adhesives

With respect to EN 28510-1:1993, 5.2, the following shall be substituted for testing thermally-activated removable, low temperature adhesives (Type II, Class 1).

Testing shall proceed as indicated in 4.2.3, but the specimen shall be placed in a dry mounting press heated to 76 °C ± 2 °C with a pressure of (20 ± 7) kPa [(3 ± 1) pounds per square inch] for no less than 60 s.

After removal from the press, the mounted imaging material shall be placed under a mass of 1 kg. After room temperature equilibration, no edge lift shall be discernible between the imaging material and adhesive layer or between the adhesive layer and the mounting board. Flexing of the mounting board, without irreversibly deforming the mounting board, shall not loosen the imaging material from the mounting board.

To test for removal of the imaging material from the mounting board, the mounted imaging material shall be returned to the press at a temperature of (81 ± 2) °C for an additional 3 min. Immediately upon removal from the press, it shall be possible to peel the print from the mount by grasping the unsealed portion, without causing tearing of the fibres in either the print, adhesive or mounting board. These adhesives bond as they cool under a weight of even pressure; allowing the test mounting to begin to cool during separation will initiate the bond.

4.2.6 Thermally-activated removable, high-temperature adhesives

With respect to EN 28510-1:1993, 5.2, the following shall be substituted for testing thermally-activated removable, high-temperature adhesives (Type II, Class 2).

Testing shall proceed as indicated in 4.2.3, except that the application temperature for imaging materials shall be 121 °C or other temperature as specified by the individual manufacturer.

4.2.7 Sample conditioning and adhesive strength requirements

Each specimen shall be individually prepared. Once the bond is made and prior to conducting the test, the sample shall be allowed to remain at (23 ± 1) °C and (50 ± 5) % relative humidity for 30 min.

To pass this test, the results shall be either a visible tearing, delaminating or distortion of the “test surface” or a minimum of 1,3 N/cm (132 *g*-force/cm) peel force, when tested in accordance with EN 28510-1:1993, Clause 7.

4.3 Heat-aged adhesive test

The test shall be conducted in the same manner as the unaged adhesive test except for 4.2.7. The following shall be substituted.

Each specimen shall be individually prepared. Once the bond is made, the samples shall be placed in an oven at (60 ± 2) °C and (50 ± 5) % relative humidity for a period of 84 d. After the samples are removed from the oven, the samples shall be allowed to remain at (23 ± 1) °C and (50 ± 5) % relative humidity for 30 min.

To pass this test, the results shall be either a visible tearing, delaminating or distortion of the “test surface”, or a minimum of 1,3 N/cm (132 *g*-force/cm) peel force, when tested in accordance with EN 28510-1:1993, Clause 7.

4.4 Initial adhesive stress test

The adhesive bond strength shall be tested 2 min after application if the intended use shall be likely to result in initial stress on the adhesive bond.

The test shall be conducted in the same manner as the unaged adhesive test except for 4.2.7, where the following shall be substituted.

Each specimen shall be individually prepared. Once the bond shall be made and prior to conducting the test, allow the sample to remain at (23 ± 1) °C and (50 ± 5) % relative humidity for 2 min.

To pass this test, the results shall be either a visible tearing, delaminating or distortion of the “test surface”, or a minimum of 1,3 N/cm width (132 *g*-force/cm width) peel force, when tested in accordance with EN 28510-1:1993, Clause 7.

4.5 Adhesive shelf-life test

The adhesive shelf-life shall be tested if the adhesive will not be applied immediately after preparation.

For pressure-sensitive adhesives, the test shall be conducted in the same manner as the unaged adhesive stress test except that for 4.2.7 the following shall be inserted.

The pressure-sensitive adhesive shall be incubated in an oven at (66 ± 2) °C and (80 ± 5) % relative humidity for a period of 96 h. After incubation, the pressure-sensitive adhesive shall be conditioned at (23 ± 1) °C and (50 ± 5) % relative humidity for 4 h before testing. Each specimen shall be individually prepared.

For thermally-activated, solid and liquid adhesives, the test shall be conducted in the same manner as the unaged adhesive stress test except for 4.2.7, where the following shall be inserted.

The packaged adhesive shall be incubated for 14 d at (50 ± 2) °C and (80 ± 5) % relative humidity without significant blocking (see 3.7) or other deterioration. After incubation, the packaged adhesive shall be conditioned at (23 ± 1) °C and (50 ± 5) % relative humidity for 4 h before testing.

To pass this test, the results shall be either a visible tearing, delaminating or distortion of the “test surface”, or a minimum of 1,3 N/cm width (132 *g*-force/cm width) peel force, when tested in accordance with EN 28510-1:1993, Clause 7.

4.6 Combined shelf-life/heat-aged adhesive test

The combined shelf-life/heat-aged adhesive test shall be conducted if the adhesive will not be applied immediately after preparation.

The sample shall be tested in accordance with the procedure given in 4.5 and 4.3.

To pass this test, the results shall be either a visible tearing, delaminating or distortion of the “test surface”, or a minimum of 1,3 N/cm width (132 *g*-force/cm width) peel force, when tested in accordance with EN 28510-1:1993, Clause 7.

5 Bleed test (penetration of adhesive through paper)

The bleed test shall be conducted to confirm that the adhesive is not migrating from the interface between the imaging material and the mounting board.

A sample shall be prepared as indicated in 4.2.1 to 4.2.6, except that the preferred material shall be test paper conforming to ISO 14145-1:1998, 5.2. Place the test specimen in an oven at (70 ± 2) °C and (50 ± 5) % relative humidity for a period of 84 d.

To pass this test, no traces of adhesive shall be visible on the back of the test paper after the 84 d incubation period.

6 Photographic activity test

It is possible for an adhesive or its components to migrate through fibre-based or even RC paper and affect the print. The suitability of the adhesive shall be determined by conducting the photographic activity test in accordance with ISO 18916.

Bibliography

[1] ASTM D3611-06, *Standard Practice for Accelerated Aging of Pressure-Sensitive Tapes*

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