INTERNATIONAL STANDARD

ISO 14523

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Photography — Processed photographic materials — Photographic activity test for enclosure materials

Photographie — Matériaux photographiques traités — Essai d'activité photographique pour les matériaux de fermeture

Contents

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 14523 was prepared by Technical Committee ISO/TC 42, *Photography*.

Annexes A and B of this International Standard are for information only.

Introduction

The use of photographic materials for the storage of records having a long-term value has necessitated the development of International Standards to specify important considerations in this field. Satisfactory long-term storage is dependent upon three factors:

a) suitability of photographic materials;

b) satisfactory photographic processing conditions;

c) recommended storage conditions.

International Standards have been published which specify the material requirements for silver-gelatin type film (ISO 10602), diazo film (ISO 8225), and vesicular film (ISO 9718). Specifications for proper processing are also included in these documents. ISO 3897, ISO 5466 and ISO 6051 specify the storage conditions for photographic plates, films, and paper prints, respectively.

In addition to the storage conditions, the filing materials used are extremely important. Processed photographic materials in archival collections require a high degree of individual packaging to protect them from atmospheric influences, dust, and handling damage, and also to keep them from contaminating each other. For this purpose, a wide variety of paper and plastic materials is commercially available, fabricated into boxes, sleeves, envelopes, folders, mat boards, and interleaving tissues. However, it is absolutely essential that these storage enclosures must not themselves cause harm to the photographic image. For optimum stability, storage enclosures and their components must meet the requirements in ISO 10214 which includes passing the criteria of the photographic activity test.

The photographic activity test described in this International Standard is a predictive test of interactions between the storage enclosure and the photographic image. It can also be used to evaluate possible photographic activity caused by components of enclosures such as adhesives, inks, paints, labels and tape.

Photography — Processed photographic materials — Photographic activity test for enclosure materials

1 Scope

This International Standard specifies the procedure for the photographic activity test.

This International Standard applies to general photographic enclosure materials such as paper, tissue, cardboard, mat board, and plastics.

It also applies to components of photographic enclosure materials such as adhesives, inks, paints, labels and tape.

This International Standard evaluates possible chemical or photographic interactions between enclosures with processed silver-gelatin, colour (dye-gelatin) and diazo images after long-term storage. It does not pertain to important criteria of enclosures such as their inherent chemical stability, physical integrity, and workmanship.

Subclause 8.6 applies to interactions between print albums and both black-and-white and colour (dye-gelatin) images.

2 Normative references

The following standards contain provisions, which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 5-2:1991, *Photography — Density measurements — Part 2: Geometric conditions for transmission density.*

ISO 5-3:1995, *Photography — Density measurements — Part 3: Spectral conditions.*

ISO 5-4:1995, *Photography — Density measurements — Part 4: Geometric conditions for reflection density.*

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1
image interaction
measurable density change in the image interactions detector

3.2
mottle
localized non-uniform visual density variation in the image interaction detector

3.3
stain
measurable density increase in the stain detector

4 Test conditions

4.1 Principle

The photographic activity test consists of incubating the enclosure material or its component against the surfaces of two sensitive detectors ([1] in annex B). The photographic density of these detectors shall be measured both before and after incubation and the density changes compared with those obtained when the detectors are incubated against a filter-paper control. Three criteria are used to evaluate an enclosure: its tendencies to cause image interaction, stain, and mottle on the detectors. Specific details for each property are given in clauses 5, 6 and 7. The test conditions described in clauses 4 through 7 pertain to paper, cardboard, mat board, interleaving tissue, and plastic enclosures. Modifications of the photographic activity test for enclosure components or interactions with diazo or colour images are given in clause 8.

4.2 Detectors

Two detectors are used in this test, one for image interactions and one for stain.

The image interaction detector is unprocessed colloidal silver (i.e. Carey Lea Silver) in gelatin on a polyester base[1)].

The stain detector is a conventional non-resin-coated black-and-white photographic paper processed to minimum density (D_{min}) according to the manufacturer's instructions.

A suitable non-resin-coated paper is premium-grade print material having a relatively thick emulsion layer. (A warm-tone paper base shall not be used.) The paper shall be processed without development, using a fix, wash, hypo-clearing agent, and wash stages. A satisfactory fix solution is 240 g of sodium thiosulfate pentahydrate and 15 g of anhydrous sodium sulfite added to 1 litre of water at 50 °C. The hypo-clearing agent shall be 5 g of anhydrous sodium sulfite and 26 g of sodium hydrogen sulfite per litre of water. It is recommended that the final washing be for 0,5 h with good agitation. This will avoid uneven leaching of brightener.

NOTE Longer wash times may cause physical distortion. The uniformity of the fluorescent brightener can be checked by examination using a UV lamp.

4.3 Incubation

Sandwiches of the detectors and enclosure material shall be subjected to an accelerated ageing test of 70 °C ± 1 °C and 86 % ± 3 % relative humidity for 15 days. Exposure to these temperature and humidity conditions may be provided by means of a conditioned air cabinet that provides 70 °C ± 1 °C and 86 % ± 3 % relative humidity.

NOTE 1 To minimize moisture condensation when placing the sandwiches in the oven, the sandwiches may be put in the oven when the latter is at room temperature and low humidity. The oven can then be brought to the incubation conditions.

Alternatively, these temperature and humidity conditions can be obtained readily by storing the sandwiches in a desiccator jar that is placed in a forced-air circulating oven at 70 °C. The 86 % relative humidity can be obtained by keeping a saturated solution of barium chloride in water [2, 3], at the bottom of the jar[2)]. Care shall be exercised so that the saturated solution contains an excess of undissolved crystals at 70 °C. The surface area of the solution should be as large as practical.

NOTE 2 Test results obtained in a desiccator are less precise than those obtained in a humidity chamber. This is believed to be due to the absence of circulating air in the former.

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1) The sensitivity of the colloidal silver detector is dependent upon the silver grain size and the degree of hardness. To ensure test sensitivity and reliability, the colloidal silver detector can be obtained from either the Image Permanence Institute, Rochester Institute of Technology, 70 Lomb Memorial Dr., Rochester, NY 14623-5604, USA; Agfa-Gevaert AG, Sparte Bild-Foto, D-51301, Leverkusen, Germany or equivalent.

2) The relative humidity is based on the nominal vapour pressure of the salt solution, but the relative humidity tolerance cannot be specified.

The sandwiches shall not be humidity-conditioned prior to incubation[3]. The sandwiches shall be pulled apart after they are removed from the desiccator or humidity chamber. Failure to do so may result in the adhering of adjacent layers and detectors.

4.4 Measurement

Status A blue diffuse density of the detector strips shall be measured both before and after incubation at four locations for each strip. The after-incubation measurements shall be made at the same location as the before-incubation measurements. The use of a template can aid in establishing the measurement location. Measurements shall not be made at the edges of the strip. Densities shall be measured on a densitometer having spectral conformance to ISO 5-3, and geometric conformance to ISO 5-2 and ISO 5-4. Transmission density shall be determined on the colloidal silver detector and reflection density on the photographic paper stain detector.

5 Image interaction test

5.1 Procedure

A stack of two image interaction test sandwiches shall be made of the enclosure material and the colloidal silver image-interaction detector. A sandwich shall be constructed so that the emulsion side of each image interaction detector strip faces a filter-paper separator as shown in figure 1. These two sandwiches shall consist of two strips of the image interaction detector, two strips of the enclosure material, two strips of a filter-paper separator[4], and two pieces of glass. The glass shall be clean and shall be discarded if there are any signs of corrosion. The enclosure materials and detectors in the sandwich shall be under a pressure of 500 Pa (includes the weight of glass), which can be obtained by adding weights to the sandwich surface. The enclosure material, filter-paper separators, detectors and glass shall be cut into strips having the same dimension, being at least 100 mm × 20 mm. Sandwich construction is facilitated by using a specimen jig (see figure 2) to hold the materials in place.

Two control sandwiches shall also be made using filter paper[5] instead of the enclosure material.

Within any single evaluation, the detector (and the filter paper) shall be from the same batch of material.

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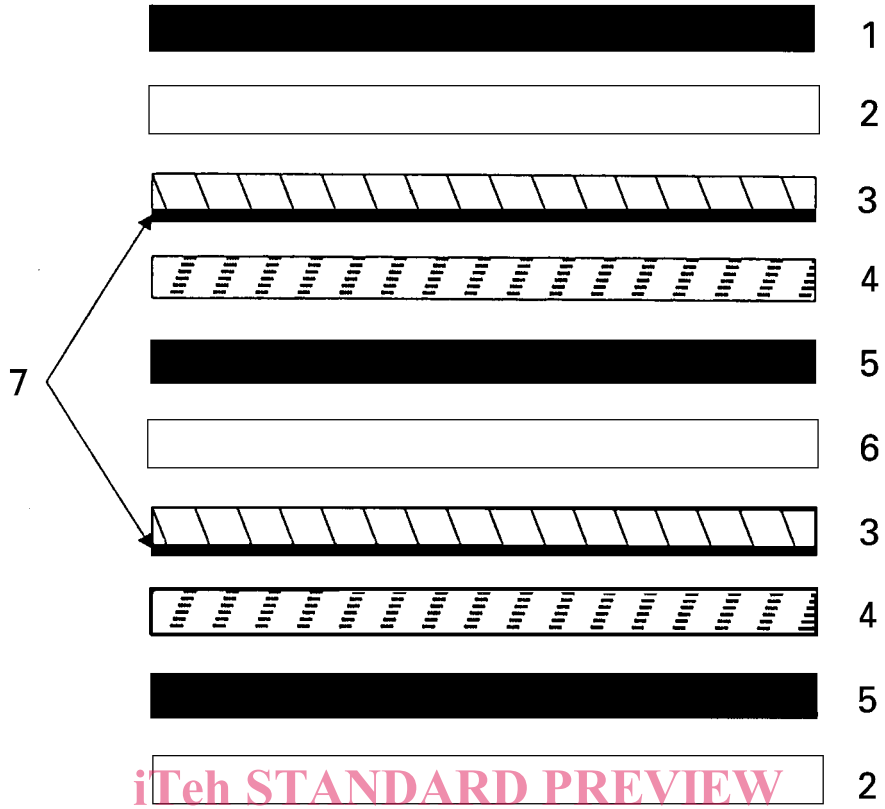
[3] Humidity conditioning is not necessary as the 15 day incubation time and narrow specimen size allow moisture equilibration to be reached.

[4] The filter-paper separator is used to prevent any physical interactions between smooth impermeable enclosures and the detector, as well as any fibre transfer, enclosure sticking, ink transfer or adhesive sticking to the detector surface.

[5] Whatman Number 1 filter paper has proven suitable.



Key

1 Weight to provide 500 Pa (including glass)
2 Glass
3 Image interaction or stain detector
4 Filter-paper separator
5 Enclosure material
6 Uncoated polyester [1)]
7 Colloidal silver or D_{min} silver-gelatin layer

1) Required as an impermeable separator between sandwiches for the stain test only. For the image interaction test, the polyester base of the detector acts as an impermeable separator between sandwiches.

Figure 1 — A stack of two image interaction or stain test sandwiches

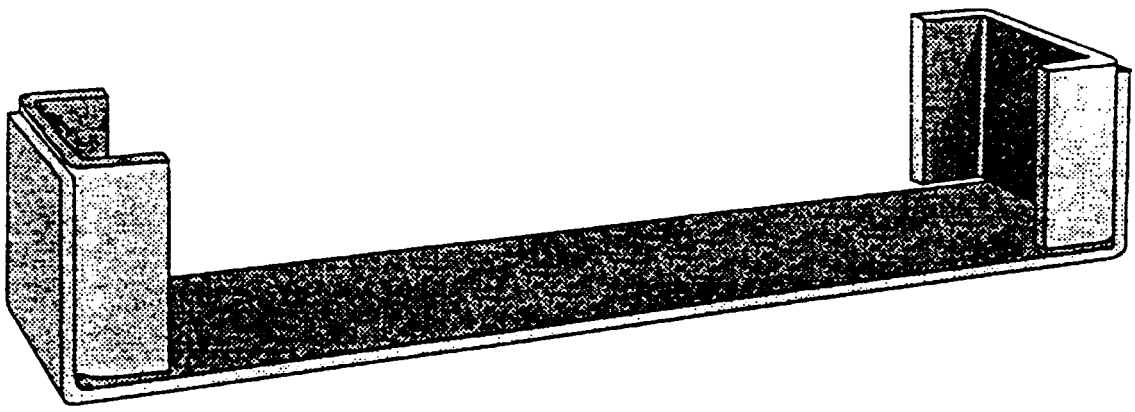


Figure 2 — Specimen jig to hold sandwiches

5.2 Criteria

Image interaction of the colloidal silver detector shall be calculated by subtracting the final Status A blue diffuse transmission density from the initial blue density for each of the four locations on each of the two image interaction detector strips. The before-and-after incubation measurements shall be made at the same location. The mean image interaction and the standard deviation shall be calculated from these eight density changes. The mean and the standard deviation of the image interaction values produced by the filter-paper controls shall also be calculated.

Any fibre pickoff from the filter-paper separators or filter-paper controls onto the detector shall be removed by gentle rubbing. Fibres that are not removed shall be ignored in the evaluation.

The density change of the detector in contact with the enclosure material shall be calculated as a percentage of the change shown by the detector in contact with the filter-paper control using the following formula:

$$X = \frac{\Delta D_e - \Delta D_f}{\Delta D_f} \times 100$$

where

X is the image interaction difference, expressed as a percentage;

ΔD_e is the density change of the enclosure detector;

ΔD_f is the density change of the filter-paper control detector.

The enclosure material shall not produce a percent image interaction difference in the colloidal silver fade detectors greater than ± 20 % for the control.

NOTE A large percent image interaction difference indicates a chemical effect of the enclosure (see annex A).

6 Stain test

6.1 Procedure

A stack of two stain test sandwiches shall be made of the enclosure materials and the D_{min} processed photographic paper stain detector. A sandwich shall be constructed so that the emulsion side of each stain-detector strip faces a filter-paper separator as shown in figure 1. These two sandwiches shall consist of two strips of the stain detector, two strips of the enclosure material, two strips of filter-paper separator, one strip of uncoated polyester and two pieces of glass. The uncoated polyester strip shall be used as shown in figure 1 to act as an impermeable separator between sandwiches within the stack.

The enclosure materials and detectors in the sandwich shall be under a pressure of 500 Pa (including the weight of the glass), which can be obtained by adding weights to the sandwich surface. The enclosure material, detectors and glass shall be cut into strips having the same dimension, being at least 100 mm × 20 mm. Sandwich construction is facilitated by using a specimen jig to hold the materials in place.

Two control sandwiches shall also be made using filter paper[6] instead of the enclosure material.

Within any single evaluation, the detector (and the filter paper) shall be from the same batch of material.

6) Whatman Number 1 filter paper has proven suitable.