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Imaging materials — Scratch resistance of photographic prints —

Part 2: Sclerometer test method

Matériaux pour l'image — Résistance à la rayure des épreuves photographiques —

Partie 2: Méthode d'essai au scléromètre

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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

A list of all parts in the ISO 18951 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

This method is one of a series ISO 189xx relating to permanence and durability of image prints, which is their resistance to mechanical, chemical and/or environmental stresses in conditions of use. The permanence of the image under environmental stresses is tested by each stress factor individually: light (ISO 18937[6]), heat (ISO 18936[5]), ozone (ISO 18941[7]), and humidity (ISO 18946[8]). These stress factors are given by the ambient conditions, over which the user often has limited control. The exposure to mechanical and physical stress may often be controlled by the user, unless intense handling is integral to intended use. Tests for rubbing of prints resulting in abrasion or smearing of the image are handled in ISO 18947-1[9] and ISO 18947-2[10], scratch resistance (of film) is addressed in ISO 18922[3] and durability tests to simulate accidental exposure to water are described ISO 18935[4].

Photographic prints are also susceptible to scratching when handled. This problem is particularly evident with digital prints, which may be composed of various layers and may include colorants on the surface that are not protected from physical damage. Test methods for evaluating the scratch resistance of photographic prints are another means to characterise the physical durability of photographic prints.

This document provides standardized requirements to evaluate the scratch resistance of image prints in their various formats. Scratch might occur accidentally or repeatedly by handling of the image. The following are some examples of sources of scratching:

— fingernails;

— sharp edge of metallic or mineral object (e.g. accessories such as rings);

— improper cleaning.

Test devices for scratch tests allow a wide variety of test conditions and parameters. Therefore, the test method and test conditions should be carefully determined considering the print material and its expected use.

Scratching tends to occur in a specific location at a single point of contact, as opposed to abrasion which affects larger areas of the print material.

There is no general correlation between damage to digital prints from abrasion and from scratches. For example, some inkjet prints show both abrasion and scratch damage, while other inkjet prints are damaged from scratches but not abrasion. Similarly, some digital press samples are damaged by abrasion, but not from scratches[14].

All types of digital prints may benefit from additional protection against abrasion and scratches. Polyester or polyethylene sleeves and laminates, including liquid, thermal, and pressure-sensitive materials, can provide this additional protection. Eliminating contact with adjacent surfaces, which is achieved with window-matted prints, is also effective in preventing damage from abrasion and scratches[5].

As a test method for scratching, the pencil test is well-known[2]. However, it was determined to be insufficient for photographic prints through round-robin testing in this committee because scratch resistance of photographic prints has wider variety than the scale of pencil hardness. The pencil test also proved difficult to carry out in a reproducible manner with photographic prints.

The sclerometer[13] is also used extensively in determining the scratch resistance of paints and varnishes[1][12].

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Imaging materials — Scratch resistance of photographic prints —

Part 2: Sclerometer test method

1 Scope

This document specifies test parameters, test procedures, test targets, and reporting requirements for determining the scratch resistance of photographic prints using the sclerometer test method. It is applicable to photographic prints that have no protection as well as photographic prints that are protected by a coating or lamination. It is specifically useful as a low-cost, easily implemented procedure for evaluating scratch resistance of these prints.

It is not the purpose of this document to define limits of acceptability or failure. Limits would be determined by the user and the intended application.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 18913, *Imaging materials — Permanence — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 18913 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
sclerometer
handheld, pen-like instrument used to determine scratch susceptibility of a material by drawing a tungsten carbide tip across the material at a specified force

Note 1 to entry: The shape and size of the tungsten carbide tip, as well as its angle towards the surface under test, affects the severity of scratching for a given force. The force is adjusted by means of a compressed spring in the pen-like instrument.

4 Principle

4.1 General

Scratch resistance is a desirable property of prints and substrates. The degree to which it is required depends on the intended applications of the photographic print.

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