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**Imaging materials — Scratch  
resistance of photographic prints —**

**Part 1:  
General test method**

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

*Partie 1: Méthode d'essai générale*



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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](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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](http://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](http://www.iso.org/members.html).

## Introduction

This document is one of a series ISO 189xx relating to permanence and durability of image prints, which is the 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<sup>[8]</sup>), heat (ISO 18936<sup>[7]</sup>), ozone (ISO 18941<sup>[9]</sup>), and humidity (ISO 18946<sup>[10]</sup>). 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 (all parts)<sup>[11]</sup>, scratch resistance is addressed in ISO 18922<sup>[5]</sup> (for film) and durability tests to simulate accidental exposure to water are described ISO 18935<sup>[6]</sup>.

Photographic prints are also susceptible to scratching when handled during their intended use. This problem is particularly evident with digital prints, which may have colorants on the surface without protection from physical damage. The test methods in this document for evaluating the scratch resistance of photographic prints provides another means of characterizing the physical durability of photographic prints.

Scratching tends to occur in a specific location at a single point of contact, as opposed to abrasion which affect larger areas of the print material. And it might occur accidentally or repeatedly by handling of the print.

This document provides standardized requirements to evaluate the scratch resistance of image prints in their various formats. As a test method for scratching, pencil hardness is well-known. However, the pencil test is proved difficult to carry out in a reproducible manner with photographic prints.

In the same point of view, test devices for scratch test show wide variety of the test conditions and parameters. Therefore, the test method and test conditions should be carefully determined taking into account the mechanical stresses that are expected during the use of the printed matter, and also consideration of print material.

This document describes the general guidelines of the scratch test and general considerations for the test device and parameter setting, test sample preparation, general test procedure, assessment of results, reporting requirements and examples of test equipment. The scratch test in this document can be used not only by a printer manufacturer, but also by a system integrator in a printing house to optimize the selection of ink set and substrate combination which will offer strong scratch resistance of the image, or it can be used as an agreeable QC test method between a photo print supplier and their customers, or it could be used by an ink developer to select desirable ingredients that will yield inks with strong scratch resistance, etc. ISO 18951-2<sup>[12]</sup> describes a specific test method with detailed test parameter selection, test procedure and results assessment for a sclerometer.



# Imaging materials — Scratch resistance of photographic prints —

## Part 1: General test method

### 1 Scope

This document specifies test method, test target, and reporting requirements to determine the scratch resistance of prints with photographic images. Photographic images can be produced by a wide range of printing technologies, including silver halide, electrophotography, inkjet, dye diffusion thermal transfer, commonly known as dye sublimation, and dye transfer processes. This document is applicable to prints with paper substrate and other type of substrates including prints on plastic, glass, metal and other materials. This document is applicable to photographic prints that have no protection as well as photographic prints that are protected by a coating or lamination.

It is not the purpose of this document to define limits of acceptability or failure. They 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.

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology 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

##### **nano scratch**

scratch with a testing device using a stylus, which diameter is smaller than 10  $\mu\text{m}$

Note 1 to entry: An example is a spherical stylus with diameter 2  $\mu\text{m}$  providing a contact area with a diameter of ~500 nm.

#### 3.2

##### **micro scratch**

scratch with a testing device using a stylus, which diameter is equal or larger than 10  $\mu\text{m}$  and smaller than 0,5 mm

Note 1 to entry: An example is a spherical stylus with diameter 50  $\mu\text{m}$  providing a contact area with a diameter of ~12  $\mu\text{m}$