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## **Imaging materials — Processed silver-gelatin-type black-and-white films — Specifications for stability**

*Matériaux pour l'image — Films noir et blanc de type gélatino-argentique traités — Spécifications relatives à la stabilité*



Reference number  
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## Contents

Page

Foreword .....	iv
Introduction.....	v
1 Scope .....	1
2 Normative references .....	1
3 Terms and definitions .....	2
4 Film base requirements .....	3
5 Processed film requirements .....	3
5.1 Storage conditions .....	3
5.2 Safety film.....	3
5.3 Amount of free acid.....	3
5.4 Tensile properties and loss in tensile properties .....	3
6 Requirements for the emulsion and backing layers of processed film.....	4
6.1 Layer adhesion .....	4
6.2 Emulsion flow .....	4
6.3 Blocking.....	4
6.4 Thiosulfate concentration.....	4
6.5 Residual silver compounds.....	5
7 Image-stability requirements .....	5
7.1 General .....	5
7.2 Radiographic films .....	5
7.3 Microfilms.....	6
7.4 Other films.....	6
8 Test methods .....	6
8.1 Identification of film base .....	6
8.2 Accelerated-ageing conditions .....	6
8.3 Determination of the amount of free acid .....	7
8.4 Tensile property test for processed film.....	8
8.5 Tape-stripping adhesion test .....	8
8.6 Humidity-cycling adhesion test .....	9
8.7 Emulsion-flow test.....	10
8.8 Blocking test.....	10
8.9 Residual silver compound test .....	11
8.10 Image-stability test .....	11
<b>Annex A</b> (informative) <b>Washing and the effect of residual thiosulfate on the developed silver image .....</b>	<b>13</b>
<b>Annex B</b> (informative) <b>Effect of residual silver compounds on the developed silver image .....</b>	<b>14</b>
<b>Annex C</b> (informative) <b>Accelerated image-stability test for radiographic films .....</b>	<b>15</b>
<b>Annex D</b> (informative) <b>Accelerated image-stability test for microfilms.....</b>	<b>17</b>
<b>Annex E</b> (informative) <b>Accelerated image-stability test for aerial films .....</b>	<b>19</b>
<b>Bibliography.....</b>	<b>21</b>

## 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

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.

ISO 18901 was prepared by Technical Committee ISO/TC 42, *Photography*.

This second edition cancels and replaces the first edition (ISO 18901:2002), which has been technically revised.

This International Standard is one of a series of International Standards dealing with the physical properties and stability of imaging materials. To facilitate identification of these International Standards, they are assigned a number within the block from 18900 to 18999.

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## Introduction

Since 1930, great advances have been made in the use of photographic films for the preservation of records. The preservation of film records by governments, banks, insurance companies, industry and other enterprises has been stimulated by a recognition of the economies in storage space, organization, accessibility and ease of reproduction that result from the use of film records.

During the early development period of the art of copying documents, 35 mm nitrate motion picture film was sometimes used. This material is highly flammable and is not a safety film as specified in ISO 18906. Nitrate film is not acceptable for any record film. The manufacture of nitrate film declined after World War II and was discontinued in most countries in the 1950s.

From about 1908 to 1956, the only safety-type film bases in commercial use were cellulose acetate, cellulose acetate propionate and cellulose acetate butyrate. The useful life of these cellulose-ester-type bases is somewhat conjectural because of limited practical experience. However, the results of laboratory incubation tests indicate a useful life of at least 50 to 100 years when cellulose-ester-base films are stored under recommended conditions (see References [1], [2], [3] and [4]).

A second type of polymer safety film base was introduced commercially in 1956. This is a polyester-class material whose chemical name is polyethylene terephthalate.

**NOTE** Another type of polyester base, known as polyethylene naphthalate, has been used for APS (Advanced Photo System) type films since 1996.

Polyester base has several advantages over cellulose-ester base, including greater strength, stiffness, tear resistance and dimensional stability, which are important in many photographic applications (see References [5] and [6]). Accelerated ageing tests supplemented by 35 years of practical experience indicate a potential useful life of 500 years.

This International Standard provides image-stability predictions for three classes of black-and-white films in terms of LE (life expectancy) ratings. These three classes are radiographic films, microfilms and all other films. Two or three LE ratings are given for each of these film classes depending on their residual thiosulfate concentrations.

Studies on the stability of silver-gelatin-type films have investigated the effect of residual hypo on the image permanence of radiographic films, microfilms and aerial films (see References [7], [8] and [9]). This work suggested modifications to the residual hypo limits and a more quantitative image-stability test was included in the first edition of this International Standard. Residual hypo limits and image-stability tests are now included for all film categories.

This International Standard identifies certain hazards to permanence attributable to the chemical or physical characteristics of processed film and provides methods for evaluating them. Some of these are inherent film characteristics, some are related to the chemical processing procedure and some are influenced by both factors. However, storage conditions can also have a pronounced influence on film permanence. The essential requirements for longevity are proper storage temperature and humidity as well as protection from the hazards of fire, water, fungus, and atmospheric pollutants. Proper storage conditions are specified in ISO 18902 and ISO 18911.