

# INTERNATIONAL STANDARD

**ISO  
543**

Second edition  
1990-12-01

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## **Photography — Photographic films — Specifications for safety film**

*Photographie — Films photographiques — Spécifications pour le film de sécurité*



Reference number  
ISO 543 : 1990 (E)

## 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 543 was prepared jointly by Technical Committee ISO/TC 42, *Photography*, and ISO/TC 36, *Cinematography*.

This second edition cancels and replaces the first edition (ISO 543 : 1974), as well as ISO 7830 : 1983.

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

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International Organization for Standardization

Case postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

## Introduction

This International Standard is a revision and consolidation of ISO 543 : 1974, *Cinematography — Motion-picture safety film — Definition, testing and marking*, and ISO 7830 : 1983, *Photography — Safety photographic films other than motion-picture films — Material specifications*.

Although the manufacture of films not complying with this International Standard is currently very rare, if it takes place at all, there remains a great amount of such films stored in libraries and archives. Due to the risk of ignition caused by careless handling, of self-ignition after long and adverse storage conditions, or rapid burning characteristics, it is necessary to provide film owners with a method of determining whether their film is "safety photographic film". That is the objective of this International Standard.

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# Photography — Photographic films — Specifications for safety film

## 1 Scope

This International Standard provides specifications and test procedures for establishing the safety of photographic films with respect to hazards from fire. The specifications apply to both unprocessed and processed<sup>1)</sup> films on any type of currently known plastic support. These specifications cover silver films (both gelatin and non-gelatin types), colour films, diazo films, vesicular films, and striped or full-width magnetic films. Magnetic tapes and video recording tapes are excluded.

A field test for burning behaviour is described in annex A, and methods of marking film are defined in annex B. A simple test to distinguish non-safety nitrate base film from cellulose ester and polyester base film is given in annex C.

## 2 Definition

For the purposes of this International Standard, the following definition applies.

**safety photographic film:** Photographic film which passes the ignition time test and burning time test as specified in this International Standard.

## 3 Property requirements

### 3.1 Ignition time

Photographic films are classified as having passed the ignition time test when the ignition time is not less than 10 min when tested as specified in clause 4.

### 3.2 Burning time

Photographic films having a thickness equal to or greater than 0,08 mm are classified as having passed the burning time test when the burning time is greater than 45 s when tested as specified in clause 5. Photographic films having a thickness less than 0,08 mm are classified as having passed the burning time test when the burning time is greater than 30 s.

## 4 Ignition time test

### 4.1 Apparatus

**4.1.1 Electric resistance oven**, the interior of which is a cavity of appropriate size to hold the film specimen and an instrument for measuring temperature (4.1.2) in the centre of the cavity. The top of the oven shall be closed by means of a closely overlapping lid having two holes of diameter approximately 7 mm and 15 mm respectively, the centres being at a distance of about 15 mm from each other.

**4.1.2 Thermocouple**, having connecting wires with an insulated coating fitting tightly into the smaller hole of the lid of the oven (4.1.1).

Alternatively, the temperature in the cavity may be measured by means of other temperature measuring instruments such as a **mercury thermometer** fitted into the smaller hole, protected from the rising heat by means of a cork disc lying above the lid.

### 4.2 Specimens

Cut three specimens 35 mm long and 8 mm wide from the film to be tested. The specimens shall be free from perforations as far as is practicable.

### 4.3 Procedure

Bring the oven to, and maintain it at, a temperature of  $(300 \pm 10) ^\circ\text{C}$ . When this temperature is reached, attach the specimen to a thin U-shaped wire hook and introduce it through the larger opening in the lid of the oven. Fix the instrument for measuring temperature (4.1.2) and the specimen in such a way that the thermojunction (or mercury bulb) and the centre of the specimen are at an equal depth of approximately 35 mm.

Record the time interval from the insertion of the specimen to the ignition time of the specimen as the ignition time.

Test the three specimens. Before each measurement, thoroughly air the oven.

1) Normally, unprocessed and processed films have the same safety characteristics, so either one may be tested for conformance to these specifications. If an additional treatment such as a lacquer coating has been applied after processing, the safety characteristics may or may not be affected. In case of doubt, both unprocessed and processed films must be tested.

4.4 Expression of results

If any one of the three specimens does not meet the ignition time requirement, the material is considered to have failed the test.

5 Burning time test

5.1 Specimens

Cut three specimens each 400 mm long and 35 mm wide from the film to be tested. If only films narrower than 35 mm are available, specimens 400 mm long and of full width may be tested<sup>1)</sup>. Mark each specimen at a point 50 mm from each end. If the specimens are not already perforated, perforate them with holes approximately 3 mm in diameter along one edge, at intervals of not more than 20 mm.

If a continuous strip 400 mm long cannot be obtained from the film being tested, shorter lengths may be stapled together with a 1 mm to 2 mm overlap to give the required length.

Thread a wire having a diameter of not more than 0,5 mm through the perforations on one side so that the specimen is supported at points not more than 20 mm apart.

Though no conditioning other than the normal room temperature is required, the film shall be dry to the touch.

5.2 Procedure

Make the test in a room free from draughts.

With the wire stretched horizontally and the specimen hanging vertically from it, ignite the bottom of one end (see figure 1).

Record the time which elapses from the moment the flame reaches the first mark until the time it reaches the second mark as the burning time.

Test the three specimens.

5.3 Expression of results

If the specimen does not ignite or if the flame does not reach the second mark within the stipulated time, classify the film as having passed the burning time test.

If any one of the three specimens does not pass the burning time test, the material is considered to have failed.

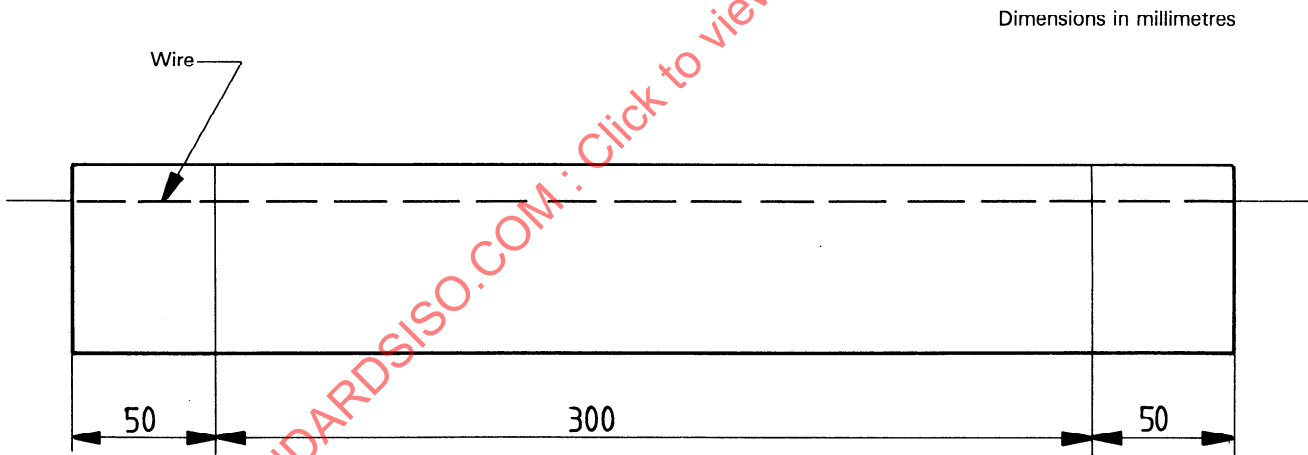


Figure 1 — Burning time test specimen  
(not to scale)

1) Photographic films, when tested by this method, have similar flame propagation characteristics and approximately the same burning times, regardless of whether the width of the samples tested is 35 mm or less.

## Annex A (informative)

### Field test

#### A.1 Principle

The following test method may be used for quickly identifying whether most photographic films are of the safety or of the nitrate variety, without technical equipment or the expenditure of large amounts of specimen film. However, it does not determine compliance of a film with this International Standard.

Anyone unfamiliar with the burning of safety and nitrate photographic films should first conduct this test on samples of both types of film, the identities of which are known.

#### A.2 Specimen

Cut a piece of film approximately 16 mm wide and 35 mm long. Bend the film lengthwise and crease it sufficiently so that when released it will stand upright.

#### A.3 Procedure

Stand the specimen (with the crease vertical) on a flat fireproof surface, such as an ashtray, glass plate, concrete floor, etc.

**WARNING — This must be done at a safe distance from all film stocks.**

With a match flame, ignite one of the top corners of the film.

#### A.4 Expression of results

If the specimen ignites easily, burns downward rapidly and vigorously with a bright yellow flame, and is completely consumed in less than 15 s, the film probably contains dangerous quantities of cellulose nitrate and probably will not pass the tests of this International Standard for safety film. If the specimen ignites with difficulty and burns only partially, or if it burns completely in a time not under 15 s, it is likely but not assured that the film will pass the tests described in this International Standard.

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## Annex B (informative)

### Marking

Photographic film which meets the requirements of this International Standard may be suitably marked as such.

In some countries, markings between perforations or along the edge of the film comprising **S** or **SAFETY** have been used. An alternative or supplementary way of marking is by means of a fluorescent compound in or on the film base. National regulations may require these or other markings but this practice is not a mandatory requirement of this International Standard.

Safety identification marking applied at the time of film manufacture is sometimes obliterated or transferred from another film in printing operations, so the identification is lost or confused. If the film cannot be positively identified as safety film by the marking, it should be identified by the laboratory tests specified in this International Standard. Where there is a very limited quantity of film and a small degree of uncertainty is acceptable, the field test given in annex A may be sufficient.

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## Annex C (informative)

### Float test

#### C.1 Principle

The following test method may be used for easy distinguishing of nitrate base photographic films from the safety base films. This method does not determine compliance of a film with this International Standard.

#### C.2 Procedure

Place a 6 mm square piece of dry film in a test tube containing trichloroethylene. Shake the tube to make sure that the film sample is completely wetted. If the sample sinks, it is cellulose nitrate; if it floats, it is acetate or polyester.

**WARNING** — Although trichloroethylene is not flammable, it is volatile and its vapour should not be inhaled.

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