

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION R 543

DEFINITION AND MARKING OF SAFETY FILM
FOR MOTION-PICTURE USES

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BRIEF HISTORY

The ISO Recommendation R 543, *Definition and Marking of Safety Film for Motion-Picture Uses*, was drawn up by Technical Committee ISO/TC 36, *Cinematography*, the Secretariat of which is held by the United States of America Standards Institute (USASI).

Work on this question by the Technical Committee began in 1948 and led, in 1961, to the adoption of a Draft ISO Recommendation.

In November 1963, this Draft ISO Recommendation (Nº 637) replacing Draft ISO Recommendation No. 83 was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies:

Belgium	France	Romania
Brazil	Germany	Spain
Bulgaria	Greece	Sweden
Canada	Hungary	Switzerland
Chile	Italy	United Kingdom
Colombia	Japan	U.S.A.
Czechoslovakia	Netherlands	U.S.S.R.
Denmark	New Zealand	

No Member Body opposed the approval of the Draft.

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council which decided, in December 1966, to accept it as an ISO RECOMMENDATION.

DEFINITION AND MARKING OF SAFETY FILM FOR MOTION-PICTURE USES

1. SCOPE

The specifications contained in this ISO Recommendation apply to both unprocessed and processed film * and to film having magnetic coatings or stripes. Motion-picture films are classified as safety films if they are difficult to ignite, slow burning and low in nitrate nitrogen content.

2. IGNITION TIME

2.1 Definition

Motion-picture films are classified as difficult to ignite when the ignition time is greater than 10 min at the temperature specified below.

2.2 Method of measurement

The ignition time of motion-picture films is measured as follows:

2.2.1 Preparation of test sample. A sample 35 mm (1.38 in) long and 8 mm (0.32 in) wide should be cut from the film to be tested. The sample should be free of perforations as far as is practicable. The sample should be conditioned for at least 4 h at a temperature of $20 \pm 2^\circ\text{C}$ and a relative humidity of $50 \pm 5\%$.

2.2.2 Procedure. The test should be made in an electric resistance oven, the interior of which is in the form of a vertical cylinder (preferably with a rounded bottom), having a diameter of 70 mm ($2\frac{3}{4}$ in) and a mean height of 70 mm. The top of the oven should be closed by means of a closely overlapping lid having two holes of 7 mm (0.28 in) and of 15 mm (0.59 in) respectively, the centres being at a distance of about 15 mm from each other. A thermocouple should be introduced through the smaller opening, the connecting wires having a porcelain coating fitted tightly into the hole. Alternatively, the temperature in the cylinder may be measured by means of a mercury thermometer protected from rising heat by means of a cork disk lying a little above the lid.

2.2.2.1 Temperature of tests. The oven should be brought to, and maintained at, a temperature of $300 \pm 3^\circ\text{C}$ ($572 \pm 5^\circ\text{F}$). When this temperature is reached, the sample attached to a thin U-shaped wire hook should be introduced through the larger opening. The thermocouple (or the thermometer) and the sample should be fixed in such a way that the thermojunction (or the mercury bulb) and the centre of the sample are at an equal depth of about 35 mm (1.38 in).

2.2.2.2 Preparation for tests. Between tests, the oven should be thoroughly aired.

2.2.3 Expression of results. The time interval from the insertion of the sample to the ignition of the sample is recorded as the ignition time.

* Normally, unprocessed and processed films have the same safety characteristics, so that either may be tested for conformance to these specifications. In case of doubt, both unprocessed and processed films should be tested.

3. BURNING TIME

The burning time may be determined by either of the two methods specified.

3.1 First method of measurement

- 3.1.1 Principle of method.** Motion-picture films having a thickness equal to or greater than 0.08 mm (0.0032 in) are classified as slow burning when the burning time is not less than 45 s. Motion-picture films having a thickness less than 0.08 mm (0.0032 in) are classified as slow burning when the burning time is not less than 30 s.
- 3.1.2 Preparation of test samples.** Three samples each 40 cm (15.8 in) long and 35 mm (1.38 in) wide should be cut from the film to be tested. If only films narrower than 35 mm are available, samples 40 cm (15.8 in) long and their full width may be tested.* Each sample should be marked at a point 5 cm (2 in) from each end. If not already perforated, the sample should be perforated with holes 3 mm (0.12 in) in diameter along both edges. Perforations should be at intervals of not more than 20 mm (0.8 in). The sample should be conditioned for at least 4 h at a temperature of $20 \pm 2^\circ\text{C}$ and a relative humidity of $50 \pm 5\%$.**
- 3.1.3 Procedure.** The burning time of motion-picture films is measured as follows: a wire having a diameter of not more than 0.5 mm (0.02 in) should be threaded through the perforations on one side so that the sample is supported at points not more than 20 mm (0.8 in) apart. With the wire stretched horizontally and the sample hanging vertically from it, the bottom corner of one end should be ignited.
- 3.1.4 Test conditions.** The test should be made in a room free from draughts. At least three tests should be made.
- 3.1.5 Expression of results.** The time which elapses from the moment the flame reaches the first mark until it reaches the second mark should be recorded as the burning time. If the sample does not ignite or if the flame does not reach the second mark, the film should be classified as slow burning.

3.2 Alternative method of measurement

- 3.2.1 Principle of method.** Motion-picture films are classified as slow burning if each of six samples fulfils one of the following conditions:
- (a) the sample fails to burn beyond the specified mark;
 - (b) a period of not less than 120 s elapses from the time of ignition of the alcohol to the time at which the flame reaches the specified mark.
- 3.2.2 Preparation of test samples.** The test samples should be taken from either end or both ends of the continuous length of film which is to be examined. For the purpose of the burning test, six samples should be taken, each of a length of 533 mm (21 in) for both 35 mm and 16 mm film. The samples should be tested in the condition in which they are cut from the continuous length without removal of protective or magnetic coatings, stripes or emulsion. The samples should be conditioned for at least 4 h at a temperature of $20 \pm 2^\circ\text{C}$ and a relative humidity of $50 \pm 5\%$.**

NOTE. — It is important to observe that the whole of the samples for both methods of test should be taken from the same continuous length, and that if the roll of film to be examined contains splices, then each individual continuous length should be examined separately. The object of taking six samples for the burning test is to obtain accurate results in the test and not to confirm the homogeneity of the film; the samples may therefore be taken consecutively.

* Motion-picture films, when tested by this method, have similar flame propagation characteristics and about the same burning times, regardless of whether the width of the sample tested is 16 mm or 35 mm.

** Experience has shown that safety film will meet the requirements for burning time when conditioned to any relative humidity in the range of 10 to 70 %. The more stringent range of $50 \pm 5\%$ of this test method is specified in the interest of obtaining strictly comparable results. Likewise, the 4 h conditioning time is not critical and may be reduced to 1 h minimum if the urgency of the test makes this desirable.