INTERNATIONAL STANDARD

ISO 69

Third edition
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Cinematography — 16 mm motion-picture and magnetic film — Cutting and perforating dimensions

Cinématographie — Films cinématographiques et magnétiques 16 mm — *Dimensions de coupe et de perforation*

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 69 was prepared by Technical Committee ISO/TC 36, *Cinematography*.

This third edition cancels and replaces the second edition (ISO 69:1990), clauses 2, A.2 and A.6 of which have been technically revised.

Annex A of this International Standard is for information only.

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Cinematography — 16 mm motion-picture and magnetic-film — Cutting and perforating dimensions

1 Scope

This International Standard specifies the cutting and perforating dimensions for 16 mm motion-picture and magnetic films with one or two rows of perforations for the following two categories:

a) 16 mm motion-picture and magnetic films;

b) manufacturer-designated 16 mm professional motion-picture camera films with tighter tolerances.

This International Standard applies to safety raw stock film as described in ISO 543.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 543:1990, *Photography — Photographic films — Specifications for safety film.*

ISO 544:1976, *Standard atmospheres for conditioning and/or testing — Specifications.*

3 Dimensions

3.1 The dimensions and tolerances shall be as given in table 1 and in the accompanying figures 1 to 4, and apply to safety raw stock film as described in ISO 543. The dimensions shall apply at the time of cutting and perforating for film adjusted to a temperature of 23 °C ± 1 °C and a relative humidity of (50 ± 2) %, which is the recommended atmosphere for conditioning and/or testing with reduced tolerances specified in ISO 554.

NOTES

1 If required by usage, the manufacturer may indicate other atmospheric conditions which applied to the dimensional control and testing at the time of cutting and perforating.

2 This International Standard is based on values adopted for film defined as “low-shrinkage”. See annex A, clause A.3 for definition of “low-shrinkage”.

3.2 The dimensions and tolerances of 16 mm full-coat magnetic materials at the time of cutting and perforating shall be as specified by dimensions B' and L' in table 1.

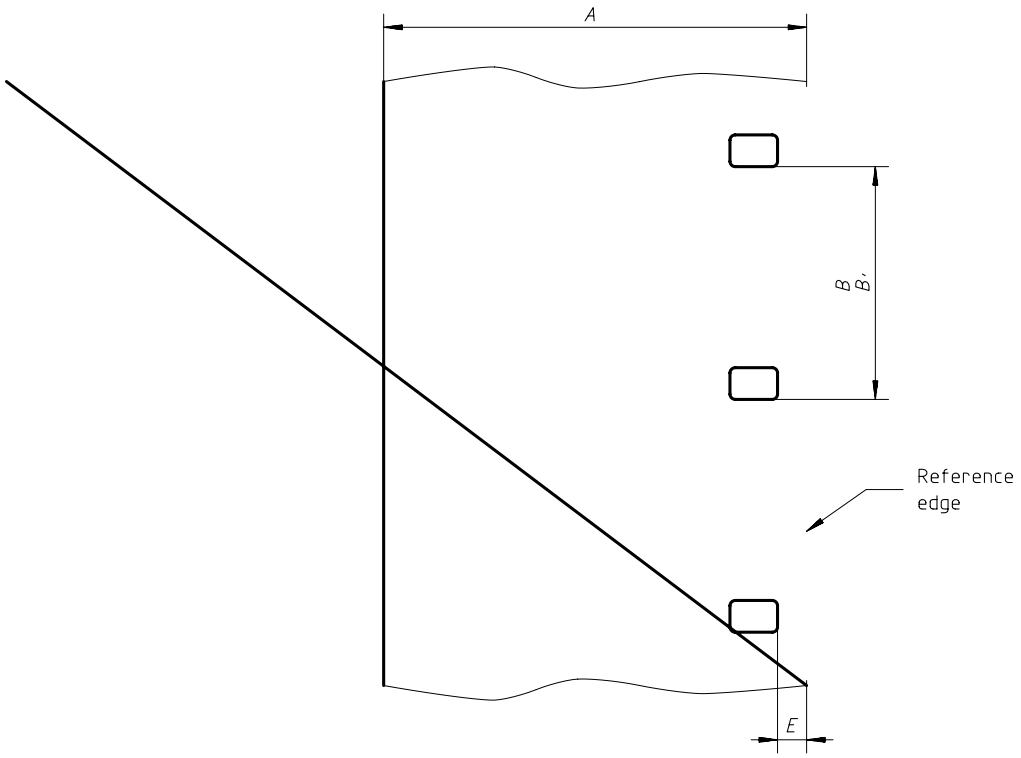

Figure 1 — Film with perforations along one edge (Type 1)

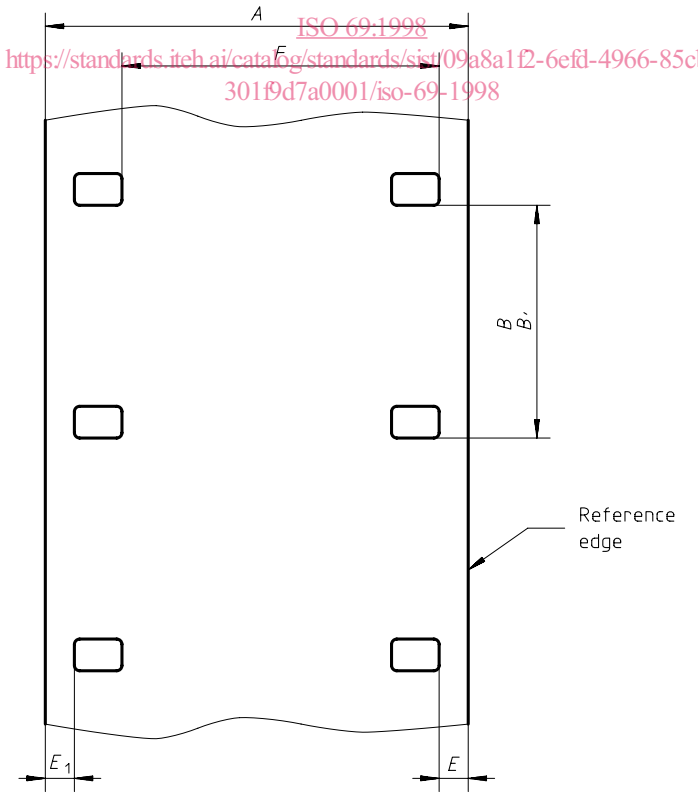

Figure 2 — Film with perforations along two edges (Type 2)

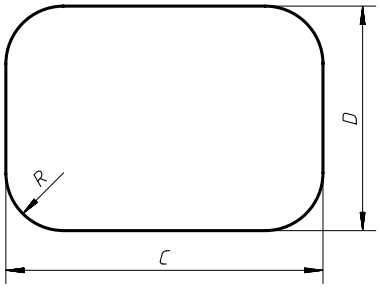

Figure 3 — Detail of perforation

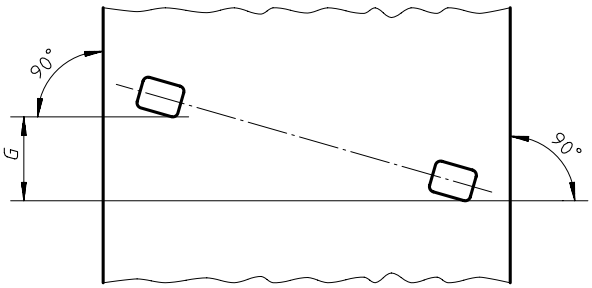

Figure 4 — Permissible alignment deviation of the rows of perforations (Type 2)

Table 1 — Dimensions and tolerances

Dimension	All films		Designated professional camera films (with tighter tolerances in bold type)		
	mm	in	mm	in	Notes
A	15,950 ± 0,025	0,628 0 ± 0,001 0	15,950 ± 0,025	0,628 0 ± 0,001 0	
*) B	7,620 ± 0,010	0,300 0 ± 0,000 4	7,620 ± 0,010	0,300 0 ± 0,000 4	4 and 5
**) B'	7,605 ± 0,010	0,299 4 ± 0,000 4	7,605 ± 0,010	0,299 4 ± 0,000 4	4 and 5
C	1,830 ± 0,010	0,072 0 ± 0,000 4	1,830 ± 0,010	0,072 0 ± 0,000 4	4
D	1,270 ± 0,010	0,050 0 ± 0,000 4	1,270 ± 0,010	0,050 0 ± 0,000 4	4
E	0,900 ± 0,050	0,035 5 ± 0,002 0	0,900 ± **0,025**	0,035 5 ± **0,001 0**	4 and 5
E_1	0,900 ± 0,050	0,035 5 ± 0,002 0	0,900 ± 0,050	0,035 5 ± 0,002 0	
F	12,32 ref.	0,485 ref.	12,32 ref.	0,485 ref.	
G	0,025 max.	0,001 0 max.	**0,010 max.**	**0,000 4 max.**	
*) L	762,0 ± 0,8	30,00 ± 0,03	762,0 ± 0,8	30,00 ± 0,03	
**) L'	760,5 ± 0,8	29,94 ± 0,03	760,5 ± 0,8	29,94 ± 0,03	
R	0,25 ± 0,03	0,010 ± 0,001	0,25 ± 0,03	0,010 ± 0,001	

*) B and L refer to long pitch.

**) B' and L' refer to short pitch.

NOTES (applicable to all 16 mm films)

1 Dimensions L and L' represent the length of any 100 consecutive perforation intervals.

2 Dimensions B' and L' (short perforation pitch) are provided to fulfil the requirements of continuous-sprocket printing (see annex A, clause A.4).

3 F is given as a reference dimension and typically represents manufacturing punch and die setup.

NOTES (applicable only to films designated by the manufacturer for professional camera use)

4 In addition, the range of values measured in any 50 consecutive perforations shall not exceed 0,010 mm (0,000 4 in) for dimensions B, B', C and D, and 0,020 mm (0,000 8 in) for dimension E (see annex A, clause A.1).

5 In addition, the difference in dimensional value B and B' between any consecutive perforation intervals shall not exceed 0,005 mm (0,000 2 in). Between consecutive perforations, the difference in dimensional value of E shall not exceed 0,010 mm (0,000 4 in) (see annex A, clause A.1).

4 Identification of reference edge for guiding

4.1 For film perforated along one edge, the edge adjacent to the perforation is the reference edge.

4.2 For film perforated along two edges, the reference edge shall be identified by the winding of the film. With the film wound emulsion-in, and the roll of film unwinding downwards toward the observer, the reference edge is along the right-hand side of the film (see figure 5).

4.3 The sequential edge numbers (key numbers or footage numbers) are exposed by the film manufacturer along the reference edge of the film.

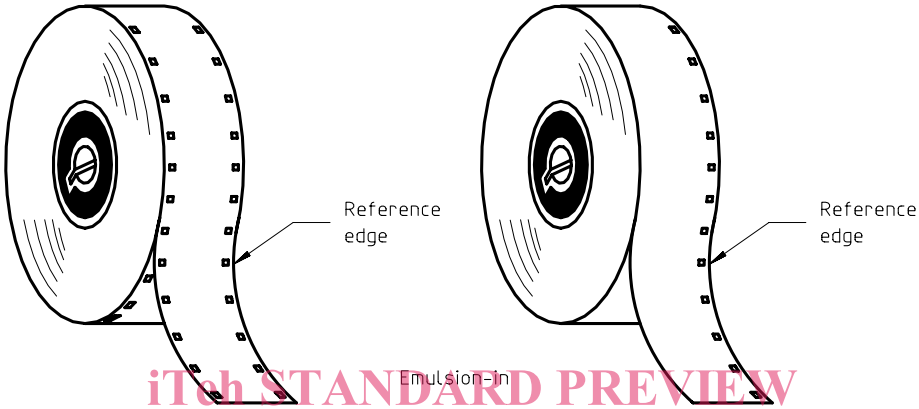

Figure 5 — Identification of reference edge

Annex A
(informative)

Explanatory notes

The uniformity of pitch, hole size and margin (dimensions B or B', C and D, and E) are important variables affecting image steadiness. Variations in these dimensions within a roll, from one perforation to the next, are more significant than variations from roll to roll. Actually, it is the maximum variation from one perforation to the next within any small group of consecutive perforations that is the most important variable.

A.2 Dimensional stability

The user is reminded that film dimensions can change due to moisture, temperature, and strain effect, or, in some film-base materials, due to solvent or plasticizer loss. These changes are generally uniform throughout the roll.

A.3 Definition of low-shrinkage film

Low-shrinkage film is film which shrinks no more than 0,2 % from its original dimensions at the time of cutting and perforating, after the film has been

a) kept in the manufacturer's normal commercial packing for six months at recommended storage conditions;

b) exposed;

c) processed and dried as recommended by the manufacturer;

d) stored in roll form, exposed to air, for a period not to exceed 30 d at 18 °C to 24 °C and 50 % to 60 % relative humidity.

The film is measured under the same conditions of temperature and humidity as defined in 3.1.

A.4 Choice of longitudinal pitch

The choice of different pitch (B: long pitch and B': short pitch), for original and print motion-picture films, depends on the necessity of printing and the type of printer used.

In the most common type of printer, the original and print films move continuously over a printing sprocket. Consequently, the original film must be shorter in pitch than the print film in the approximate proportion of the thickness of the film to the radius of curvature of the printing sprocket. With current printing sprocket designs, the value for this pitch differential is 0,3 %, with experience showing that a tolerance of ± 0,1 % is acceptable.

With "low-shrinkage" film base, it is common manufacturing practice to set the aim for the pitch of original films at a value of 0,2 % shorter than that of the films on which they will be printed. The additional shrinkage that occurs in the original film, because of processing and ageing before printing, should result in the desired 0,3 % ± 0,1 % shorter pitch.

A.5 Effect of humidity

It is the common tendency of the film to expand when exposed to high relative humidity. Allowance should be made for this factor in equipment design.

A.1 Uniformity of perforating

A.6 Equipment design

In order to achieve optimum cancellation of dimensional variables, it is preferable that equipment (e.g. cameras, printers, telecines and projectors) position the film laterally using the reference edge. Optimum vertical steadiness results when the same perforation (with respect to the image) is used for vertical positioning in all equipment, and the +3 perforation is recommended as shown in figure A.1 (see ISO 25:1994, *Cinematography — Camera usage of* 16 mm *motion-picture film — Specifications*).

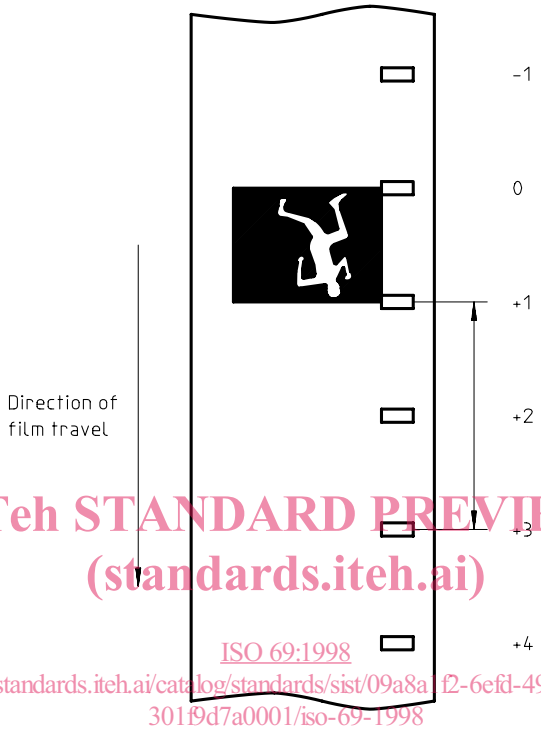

Figure A.1 — Standard image position reference