SMPTE 109-2003
Revision of
ANSI/SMPTE 109-1998

SMPTE STANDARD

for Motion-Picture Film (16-mm) — Perforated 1R and 2R

1 Scope

This standard specifies the cutting and perforating dimensions for 16-mm motion-picture film with perforations along one or both edges and a perforation pitch of either 0.2994 in or 0.3000 in (7.605 mm or 7.620 mm) for the following two categories:

a) 16-mm motion-picture films;

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

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below.

SMPTE 223M-2001, Motion-Picture Film – Safety Film

3 Dimensions

3.1 The dimensions and tolerances shall be as given in table 1 and in the accompanying figures 1, 2, and 3.

3.2 The dimensions pertain to a safety film as defined in SMPTE 223M.

3.3 The dimensions apply at the time of cutting and perforating for film adjusted to a temperature of 23°C ± 1°C (nominally converted to 73°F ± 1°F) and a relative humidity of (50 ± 2)%. The manufacturer may indicate other nominal temperature and humidity conditions under which the dimensions apply.

NOTE – The title of this standard was established by the application of a nomenclature system developed for all film dimension standards: Each title provides an indication of the film width, a code designation for the perforation shape (BH, KS, DH, or CS), or the number of rows of perforations (1R, 2R, etc.), depending upon which is the significant factor, or the perforation pitch without the decimal point.

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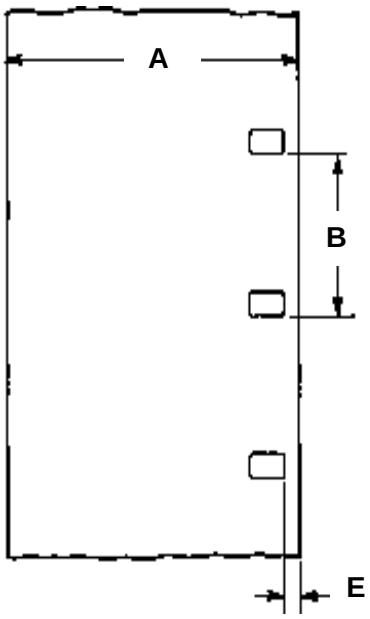

Figure 1 – 16-mm film perforated 1R

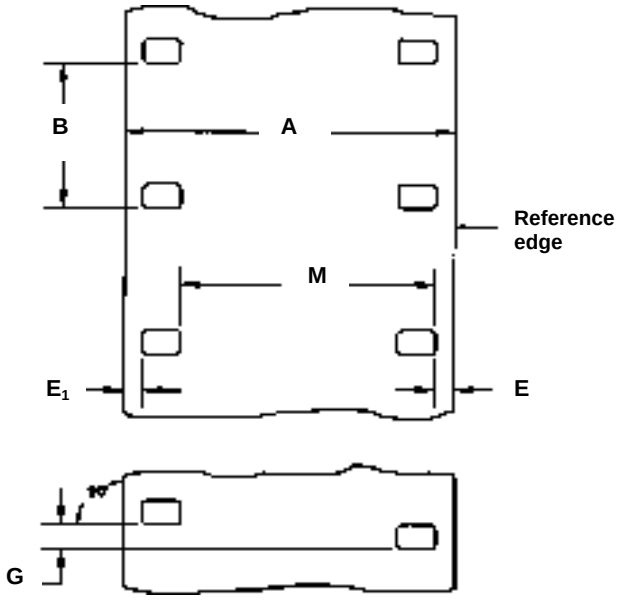

Figure 2 – 16-mm film perforated 2R

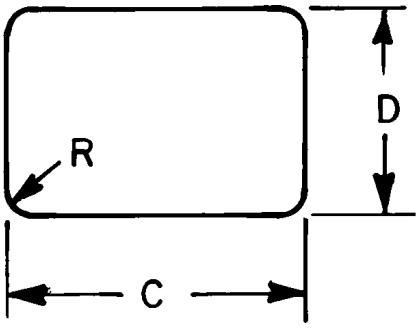

Figure 3 – Perforation for 16-mm film 1R and 2R

Table 1 – Dimensions

	All films		Designated professional camera films (only dimensions which differ from all films are shown)		
Dimensions	Inches	Millimeters [1]	Inches	Millimeters [1]	Notes
A [2]	0.628 ± 0.001	15.950 ± 0.025			
B [3]	0.3000 ± 0.0004	7.620 ± 0.010			5, 6
B' [3]	0.2994 ± 0.0004	7.605 ± 0.010			5, 6
C	0.0720 ± 0.0004	1.830 ± 0.010			5
D	0.0500 ± 0.0004	1.270 ± 0.010			5
E	0.0355 ± 0.0020	0.900 ± 0.050	0.0355 ± 0.0010	0.900 ± 0.025	5, 6
E_1	0.0355 ± 0.0020	0.900 ± 0.050			
G	0.001 max	0.025 max	0.0004 max	0.010 max	
L [3, 4]	30.00 ± 0.03	762.0 ± 0.8			
L' [3, 4]	29.94 ± 0.03	760.5 ± 0.8			
M	0.485 ± 0.001	12.32 ± 0.03			
R	0.010 ± 0.001	0.25 ± 0.03			

NOTES (applicable to all 16-mm films):
1 The metric dimensions are chosen to reflect the practice in those countries which use the metric system primarily.
2 The metric conversion of dimension A is purposely chosen and shown to three decimal places to prevent the maximum width dimension from exceeding 16 mm.
3 Dimensions B and L apply to long perforation pitch; dimensions B' and L' apply to short perforation pitch.
4 Dimensions L and L' represent the length of any 100 consecutive perforation intervals.

NOTES (applicable to films designated by the manufacturer for professional camera use):
5 The range of values measured in any 50 consecutive perforations shall not exceed 0.0004 in (0.010 mm) for dimensions B, B', C and D, and 0.0008 in (0.020 mm) for dimension E (see A.3).
6 The difference in the dimensional value of B or B' between any consecutive perforation intervals shall not exceed 0.0002 in (0.005 mm). Between consecutive perforations, the difference in the dimensional value of E shall not exceed 0.0004 in (0.010 mm) (see A.3).

Annex A (informative)
General information

A.1 The user is reminded that, as a plastic, film can change dimensions temporarily due to moisture or temperature, or permanently due to solvent loss or strain effect.

A.2 Film for positive use has a longitudinal pitch 0.2% longer than its companion negative. Shrinkage of the negative during processing and aging prior to printing will generally not exceed 0.2%. Thus, the negative stock is expected to be 0.3% ± 0.1% shorter than the positive. This difference will minimize slippage between the two on the 12-in 305-mm) circumference sprocket of the printer, assuming a film thickness of 0.0055 in to 0.0065 in (0.140 mm to 0.165 mm).

A.3 The uniformity of pitch, hole size, and margin (dimensions B, C, D, and E) is an important variable affecting steadiness. Variations in these dimensions, from roll to roll, are of little significance compared to variations from one perforation to the next within any small group of consecutive perforations. As an example, the uniformity of the margin is uniquely critical for optical printing.