

Standards and Recommended Practices

Approved American National Standards

Three American National Standards were approved by the American National Standards Institute on January 28, 1993: ANSI/SMPTE 151-1993, Motion-Picture Film (8-mm Type S) — 16-mm Film Perforated 8-mm Type S, (1-3); ANSI/SMPTE 184M-1993, Motion-Picture Film — Raw Stock Identification and Labeling; and ANSI/SMPTE 234-1993, Motion-Picture Film (8-mm Type R) — Projectable Image Area and Projector Usage. ANSI/SMPTE 151 and 234 are available from Society Headquarters for \$10.00 per copy and ANSI/SMPTE 184M for \$13.00.

Proposed SMPTE Standards

Published here for a trial period and public review are three Proposed SMPTE Standards: SMPTE 263M, Television Digital

Recording — 1/2-in Type D-3 Composite Format — Tape Cassette; SMPTE 264M, Television Digital Recording — 1/2-in Type D-3 Composite Format — 525/60; and SMPTE 265M, Television Digital Recording — 1/2-in Type D-3 Composite Format — 625/50.

The proposals will be submitted to the American National Standards Institute for approval as American National Standards if no adverse comments are received from publication. Comments should be addressed to Sherwin H. Becker, Director of Engineering, at Society Headquarters prior to August 1, 1993. Copies of SMPTE 263M are available for \$30.00; SMPTE 264M and 265M may be purchased at \$32.00.

— *Sherwin H. Becker,*
Director of Engineering

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SMPTE STANDARD

**for Motion-Picture Film (8-mm Type S) —
16-mm Film
Perforated 8-mm Type S, (1-3)**



1 Scope

This standard specifies the cutting and perforating dimensions for 16-mm motion-picture film with 8-mm type S perforations in positions 1 and 3 and a perforation pitch of either 0.1664 in or 0.1667 in (4.227 mm or 4.234 mm). The width of the 8-mm strip after processing and slitting is also specified.

2 Dimensions

- 2.1 The dimensions shall be as given in figure 1 and table 1.
- 2.2 The dimensions pertain to a safety film as defined in ANSI/SMPTE 223M.

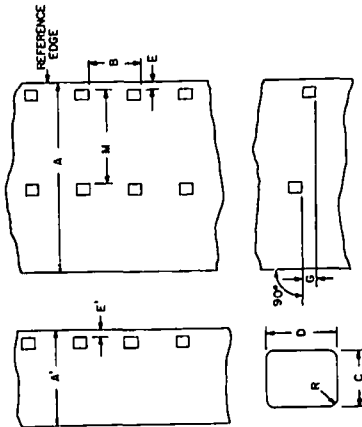


Figure 1 - Dimensions

Table 1 - Specifications

| Dimensions | Inches | Millimeters |
|--|-----------------|---------------|
| A Film width | 0.828 ± 0.001 | 15.95 ± 0.03 |
| A' Film width after slitting | 0.314 ± 0.002 | 7.98 ± 0.05 |
| B Perforation pitch (long) | 0.1667 ± 0.0004 | 4.234 ± 0.010 |
| B' Perforation pitch (short) | 0.1664 ± 0.0004 | 4.227 ± 0.010 |
| C Perforation width | 0.0360 ± 0.0004 | 0.914 ± 0.010 |
| D Perforation height | 0.0450 ± 0.0004 | 1.143 ± 0.010 |
| E Edge to perforation | 0.020 ± 0.002 | 0.51 ± 0.05 |
| E' Edge to perforation after slitting | 0.020 ± 0.002 | 0.51 ± 0.05 |
| G Perforation misalignment | 0.001 max | 0.03 max |
| L 100 consecutive perforation pitches | 16.670 ± 0.017 | 423.42 ± 0.43 |
| L' 100 consecutive perforation pitches | 16.640 ± 0.017 | 422.66 ± 0.43 |
| M Lateral perforation displacement | 0.314 ± 0.001 | 7.98 ± 0.03 |
| R Radius of perforation fillet | 0.005 ± 0.001 | 0.13 ± 0.03 |

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2.3 Except for dimensions A' and E', 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 ± 2°F) and a relative humidity of (50 ± 2)%. The manufacturer may indicate other nominal temperature and humidity conditions under which the dimensions apply. Dimensions A' and E' apply immediately after processing and slitting.

2.4 Notwithstanding accumulation of tolerances, dimensions A' and E' shall be as specified.

NOTES

- 1 The principal use of film stock perforated 0.1667 in is for the production of prints. The principal use of the stock perforated 0.1664 in is as an intermediate film in the production of prints.
- 2 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.

**Annex A (informative)
Additional data**

- 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 unprocessed negative. Shrinkage will generally not exceed 0.2%. Thus, the processed negative stock is expected to be 0.3% ± 0.1% shorter than the unprocessed 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,

**Annex B (informative)
Bibliography**

ANSI/SMPTE 75M-1988, Motion-Picture Film — Designation of A and B Windings for Raw Stock

The numerals (1-3) have been added to the title of this standard to specify how the rows of perforations are placed on the film. This designation is necessary only when the film stock is wider than its end use and more than one combination of perforation rows is possible. The perforation rows shall be numbered starting at the reference edge. The reference edge is that edge of the strip nearest to the perforations which is retained on one of the slit prints that is not discarded in any subsequent slitting. The designation 1 through 4 of 16-mm films indicates that the perforations are in row

- 1 — adjacent to the reference edge
- 2 — on the reference side of center
- 3 — on the nonreference side of center
- 4 — adjacent to the nonreference edge

when the film end is observed from the base side with the wound roll above and away from the point of observation.

There can be two different windings for the same numbered rows of perforations. This applies, however, only when the film is perforated in the 1-3 position and the designation of the film would be 1-3, regardless of winding. Winding could be A or B, depending upon the location of the reference edge. (Refer to ANSI/SMPTE 75M).

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. During the printing process, the placement of the image on the film is usually with respect to successive lateral pairs of perforations at one-frame intervals. During subsequent projection, however, the portion of the image projected is usually located, not by these perforations, but by the edge of the film. The lateral steadiness of the projected image is, therefore, directly related to the frame-to-frame uniformity of the margin.

A.4 For historical background on the development of this standard, refer to A. J. Miller and A. C. Robertson, "Motion-picture film — its size and dimensional characteristics," Jour. SMPTE, 74: 3-11, Jan. 1965.

SMPTE STANDARD

for Motion-Picture Film — Raw Stock Identification and Labeling



Page 1 of 5 pages

1 Scope

This standard specifies the information to be included by the manufacturer covering the physical specifications and certain packaging characteristics of motion-picture raw stock. The suggested location of this information on the manufacturer's label is also specified.

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.

ANSI/SMPTE 75M-1988, Motion-Picture Film — Designation of A and B Windings for Raw Stock

3 Film identification

3.1 The physical specifications of the raw stock shall be contained in one sequential listing, preferably in one line but allowing a continuance on a second line if there are space restrictions.

3.2 The method of identifying the cutting and perforating physical specifications and the sequence in which the information should appear when included shall be as follows:

3.2.1 The film shall be specified in its nominal millimeter equivalent. For example, the common,

placed on the film. This designation is necessary only when the film stock is wider than its end-use and more than one combination of perforation rows is possible. The total number of rows for the perforation type and end-use considered is determined by including all rows of all combinations.

The perforation rows shall be numbered starting at the reference edge. The reference edge is that edge of the strip nearest to the row of perforations which is retained on one of the slit prints (i.e., not discarded in any subsequent slitting). The row(s) of perforations which is discarded will always be given by the number 0. Negative or intermediate films which are not slit may contain the 0-numbered row of perforations if that perforation row corresponds to the discard row of perforations in the subsequent print stock.

For all films with nonsymmetrical perforation rows, there could be two different windings for the same numbered rows of perforations. Film perforated 16/8 1-3 would be 1-3 regardless of winding, but the winding could be A or B, depending upon the location of the reference edge.

3.2.7 A designation of emulsion orientation shall be specified. If the emulsion side of the film is in, it shall face toward the center of the wound roll, and the designation EI shall be used. If the emulsion side of the film is out, it shall face away from the center of the wound roll, and the winding designation EO shall be used.

3.2.8 The designation of winding orientation is indicated only when a nonsymmetrical format is involved, and shall be specified as A or B in compliance with ANSI/SMPTE 75M.

3.2.9 The designation M shall be included if the film has been striped with a magnetic coating for audio recording. Magnetic striping is usually placed on the base of the product; however, variations are possible when it is believed important to the end use. To identify the location of the stripe, the symbol MB may be used when the magnetic material is on the base side and the symbol ME when it appears on the emulsion side.

4 Spooling specifications

4.1 The roll length (which in some cases may be the usable length) shall be specified on the label and designated in feet and meters. In lieu of or in addition to the separate designation, the roll length may be included as part of the sequential listing of physical specifications following the item designated in 3.2.9 with the length specified first in meters and parenthetically in feet; e.g., 304.8 (1000). When the designation of length applies to the slit width (not a usual practice), the designation SL shall follow the length specification.

4.2 Currently, there is no national standard nomenclature for the device (core, spool, reel, or cartridge) containing the film. If such standard nomenclature is derived, it should be indicated in the sequential listing or separately.

5 Suggested characteristics and specifications of the label

5.1 The label may be any color and of any suitable material. The shape should be a simple geometric form and of a size consistent with legibility.

5.2 The line (2) of physical specification (clauses 3 and 4 above) should be distinct and placed prominently in the upper half of the label. The line(s) may also be used on other parts of the individual or bulk film containers.

5.3 The manufacturer's notices (e.g., warranty, disclaimer, open in darkness, safety film, etc.) should be grouped together in one area of the label, preferably the lower portion.

5.4 The description of the film product should include the primary intended use of the film together with the manufacturer's product code identification and trade name. Examples of common uses of motion-picture films are: negative, positive or print, intermediate, internegative, reversal, and leader.

NOTE — The nomenclature system adopted several years ago for titles of American National Standards contains a reference to the perforation types used for 35-mm films. However, symbols for 16-mm, 8-mm type R, and 8-mm type S perforation shapes were not included. The list below specifies the symbols used for identifying perforation shapes. The symbols differ from those previously used and

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represent international agreement. It is anticipated that revisions of American National Standards on film dimensions will incorporate the new symbols in their titles and that these documents will specify the symbols for any new perforation shapes.

Perforation shape symbols

- KS – 35-mm, 65-mm, 70-mm positive type (known internationally as P)
- BH – 35-mm negative (known internationally as N)
- DH – 35-mm Dubray-Howell

**Annex A (informative)
Application**

Listed below is the recommended method of applying the specifications for film identification and spooling (contained in clauses 3 and 4) to most of the existing motion-picture film sizes and formats. The emulsion

SE – 16-mm and 8-mm (8-mm type R)¹

S – 8-mm type S

SC – Soviet CinemaScope

AC – American CinemaScope (now preferred and documented as CS)

¹Caution is advised when incorporating the SE designator in any labeling used in international distribution. Currently, ISO documents specify no symbol identifier for 16-mm and 8-mm type perforations.

orientation, winding, magnetic coating, and length are hypothetical and included to supplement the perforation format and gauge specifications shown to illustrate possible applications of this standard.



8 1R SE3810(1500) EB 30.5(100)



8 1R S4234(1667) EOB 13.2(50)



16 1R SE765(2994) EB M 122(400)



16 1R SE3810(1500) EB 61(2000)



16 2R SE7620(3000) EI 30.5(100)



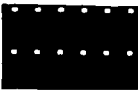
16/8 2R SE3810(1500) 1-4 EI M 15.2(50)



16/8 2R S4234(1667) 1-4 EI M 30.5(1000)



16/8 2R SE3810(1500) 1-3 EB 30.5(1000)



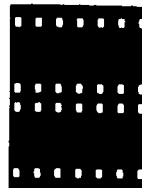
16/8 2R S4227(1664) 1-3 EOA M 610(2000)



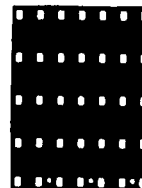
35/16 2R SE7620(3000) 1-4 EO 610(2000)



35/16 4R SE7620(3000) 1-2-3-4 EI 610(2000)



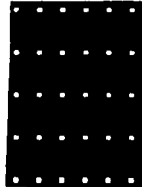
35/8 4R SE3810(1500) 1-4-5-8 EO 610(2000)



35/8 5R SE3810(1500) 1-3-5-7-0 EIA 610(2000)



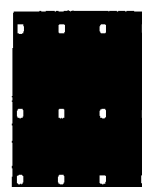
35/8 2R SE3802(1497) 1-0 EOB 610(2000)



35/8 5R S4234(1667) 1-3-5-7-0 EIA M 610(2000)



35/8 2R S4227(1664) 1-0 EIB 610(2000)



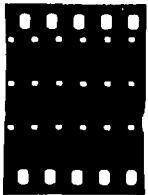
35/16 3R SE7620(3000) 1-3-0 EIA 610(2000)



35 2R KS4750(1870) EI 610(2000)



35 2R DH4750(1870) EI 610(2000)



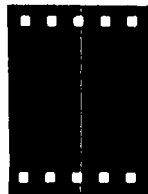
35/8 3R S4234(1667) 1-3-5 2R BH4740(1866)
EIA 610(2000)



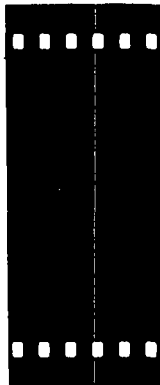
35 2R BH4740(1866) EI 30.5(100)



65 2R KS4740(1866) EI 30.5(1000)



35 2R AC4750(1870) EO 610(2000)



70 2R KS4750(1870) EO 610(2000)

SMPTE STANDARD

for Motion-Picture Film (8-mm Type R)— Projectable Image Area and Projector Usage

ANSI/SMPTE 234-1993
Revision and consolidation of
ANSI/SMPTE 232M-1987
and
ANSI/SMPTE 234-1987



Page 1 of 3 pages

1 Scope

1.1 This standard specifies the maximum dimensions of the film image area intended for projection from an 8-mm type R motion-picture film, and the placement of this area relative to the perforations and the reference edge of the film.

1.2 This standard also specifies the position of the emulsion, the rate of projection, and the orientation of the image area for 8-mm type R motion-picture film as used in a motion-picture projector.

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.

ANSI/SMPTE 239-1989, Motion-Picture Film (16-mm)—Perforated 8-mm Type R, 2R

3 Dimensions

3.1 The dimensions shall be as given in figure 1 and table 1.

3.2 The angle between the horizontal edges of the image area and the reference edge of the film shall be $90^\circ \pm 1/2^\circ$.

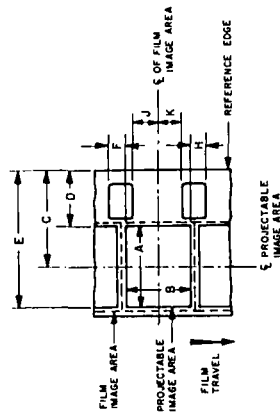


Figure 1 — Projectable image area on film as seen looking through the film toward the lens

Table 1 — Dimensions

| Dimensions | Inches | Millimeters |
|------------|-----------------|-----------------|
| A | 0.172 nom | 4.37 nom |
| B | 0.130 max | 3.30 max |
| C* | 0.205 ref | 5.21 ref |
| D | 0.117 min | 2.97 min |
| E | 0.293 max | 7.44 max |
| F = H | within 0.014 | within 0.36 |
| J = K | nominally equal | nominally equal |

* See A.1.

4 Relationship to other standards

4.1 This standard may be used as the basis for establishing picture areas from original photography for final viewing because it presents a description of the picture area on the projection print that is usable for the indicated purposes of

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the print which is of primary importance because the projection print is the most commonly interchanged item.

4.2 ANSI/SMPTE 231 defines the image area for other important phases of motion-picture operations, and it is consistent with this standard under currently acceptable commercial practice.

5 Emulsion position

Most 8-mm films are projected with the emulsion toward the screen. There are, however, some systems which produce prints that are projected with the base toward the screen.

6 Rate of projection

The normal rate of projection shall be 18 frames per second for silent film and 24 frames per second for sound film.

NOTES

1 Camera and printer apertures. The actual image on the film is significantly larger than the maximum area intended for projection, so that in placement of the images throughout the sequence of the films the tolerance is not restrictive of commercial practice. Upper limits have been established through consideration of good practice in avoiding frame overlap, encroachment upon areas reserved for audio records, flare from perforation edges, etc. Lower limits are similarly related to the avoidance of image effects at a defined edge, tolerances in film position, etc.

2 Projector aperture. Dimensions B, D, and E define the maximum image area on the film that is available for projection. They do not define the opening in the aperture plate of a projector. The size of this opening may differ from dimensions A and B, for example, because of the physical separation necessary between the aperture plate and the film to avoid scratching the film, the slant of the marginal rays accepted by the projection lens, etc.

3 Actual projected area. It is recognized that, in many cases, the actual film image area that is projected may be

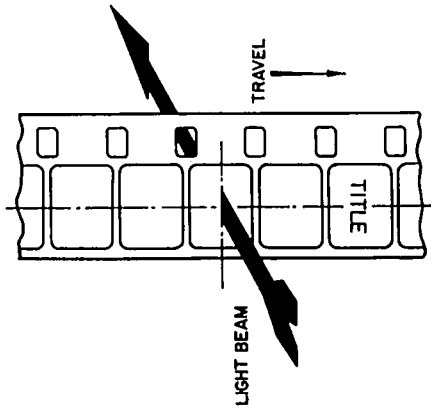


Figure 2 — Film as seen from projector light source looking toward lens

smaller than the projectable maximum and, in some cases, may be nonrectangular (for example, an irregular four-sided figure bound by either straight or curved lines). Such departures may result from equipment considerations such as slight inconsistencies among lenses, screen sizes, etc.; from geometric limitations such as the screen surface being at an angle other than 90° from the projection axis, or being nonplanar, or both; and from aesthetic considerations such as pictorial composition within more restrictive image limits. In the absence of specific instructions to the contrary, it is intended that the actual projected film image area be the largest appropriately-shaped figure that can be inscribed within the specified dimensions.

When the picture outline on the screen is defined by the projector aperture, it is customary to round the corners of the projected film area. A maximum corner radius of 0.010 in (0.25 mm) at the film plane is recommended.

4 Film perforations. Film intended for projection with this image area is normally perforated as specified in ANSI/SMPTE 231.

Annex A (informative) General Information

A.1 The centerlines of the image area are given for convenience in interpreting the standard, facilitating such applications as the optical design of equipment, and assisting in the understanding of suitable mechanical embodiments related to the projectable image areas. Note that the centerline of the projectable image area is displaced from the centerline of the film by 0.049 in (1.22 mm) nominal.

Annex B (informative) Bibliography

ANSI/SMPTE 231-1989, Motion-Picture Film (8-mm Type R)
— Camera Aperture Image and Usage