

American National Standard for motion-picture film (16-mm)— 100-mil magnetic audio record

Approved July 1, 1983
Secretariat: Society of Motion Picture and Television Engineers

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1. Scope

- 1.1 This standard specifies the position, dimensions, and reproducing speed of the nominal 100-mil (2.54-mm) magnetic audio record on 16-mm motion-picture film.
- 1.2 This standard also specifies the longitudinal picture-audio displacement on the film.

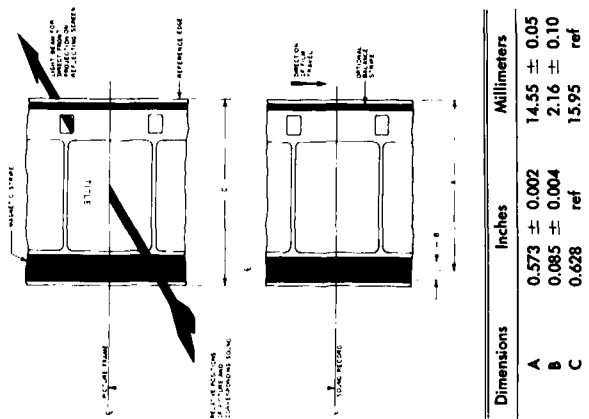
2. Reference Standards

The following American National Standards are intended to be used in conjunction with this standard:

- ANSI PH22.10-1980, Specifications for Projector Usage of 16-mm Motion-Picture Film
- ANSI PH22.87-1966 (R1977), Dimensions of 100-Mil Magnetic Striping on 16-mm Motion-Picture Film Perforated One Edge
- ANSI PH22.109-1980, Dimensions for 16-mm Motion-Picture Film Perforated 1R

3. Sound Record

- 3.1 The lateral location and width of the magnetic audio record shall be as specified in the figure and table.
- 3.2 The recording shall be made so that the azimuth of the record is at an angle of $90^\circ \pm 5'$ to the reference edge of the film.



- 3.3 With the direction of travel as shown in the figure, the magnetic striping is on the surface toward the observer.

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4. Reproducing Speed

The recording shall be made so that the audio record will reproduce properly at 24 perforations per second (approximately 36 ft [11 m] per minute or 7.2 in [183 mm] per second) which is 24 frames per second.

5. Longitudinal Picture-Audio Displacement

The magnetic audio record on the film shall precede the center of the corresponding picture by a distance of 28 frames $\pm 1/2$ frame (see Appendix A5).

Appendix

(The Appendix is not a part of this American National Standard, but is included for information purposes only.)

A1. Record Width

The width of the recorded area must be measured with great care as it enters directly into the calculation of flux per unit track width.

When the recording head gap is narrower than the width of the coating or stripe, as is normal for all motion-picture test films, there is a measurement complication involving both the uncertainties in seeing the track end in determining the recording fringing.

If the recording head is available, the track width is best measured indirectly by measuring the gap width and adding to this dimensions twice the thickness of the test record magnetic coating. This correction will usually be 0.0003 to 0.0006 in (8 to 15 μ m).

If the recording head is unavailable, the recorded record may be made visible by the use of a carbonyl iron suspension. Care should be taken to apply the minimum quantity that makes the recording visible, so that the developed image is not wider than the actual recorded area.

A2. Recording Head Gap Width

The recommended recording head gap width is 0.085 ± 0.004 in (2.16 ± 0.10 mm). Combination record-reproduce heads should also have a gap width of 0.085 in (2.16 mm).

A3. Reproducing Head Gap Width

If precision measurements or calibrations are to be made in accordance with this standard, reproducing head gaps

of the same width dimension or wider than the recorded track must be used to take into account edge effects or fringing.

A4. Reference Standards

Motion-picture prints conforming to this standard are usually made on film manufactured in accordance with ANSI PH22.109-1980; magnetically striped in accordance with ANSI PH22.87-1966, which specifies the minimum striping width as 0.095 in (2.41 mm); and projected in accordance with ANSI PH22.10-1980.

A5. Longitudinal Picture-Audio Displacement

As a working procedure, the accuracy of picture-audio displacement in a projection print is frequently judged by screening in a review room. It is important that the standard thread-path in this review room projector be set accurately to the value specified in this standard minus 1 frame for every 50 ft (15 m) separating the loudspeaker from the observer. Otherwise, nonstandard prints may be produced.

A6. Audio Record Position

The centerline, Dimension A, of the magnetic record may be determined only by the measurement of the record position relative to the reference edge. This derived centerline is a very useful dimension assisting interchangeability among various recorders and reproducers.

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ANSI PH22.112-1983

American National Standard for motion-picture film (70-mm) — projectable image area

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1. Scope

This standard specifies the maximum dimensions of the film image area intended for projection from a 70-mm motion-picture film, and the placement of this area relative to the perforations and the reference edge of the film.

tended to be used in conjunction with this standard:

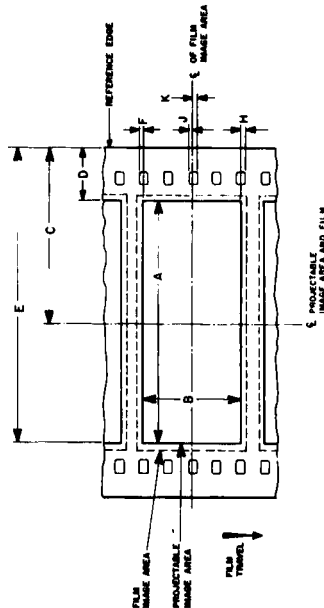
ANSI PH22.119-1981, Dimensions for 70-mm Motion-Picture Film, Perforated 65-mm, KS-1870

3. Dimensions

The dimensions shall be as given in the figure and table.

2. Reference Standard

The following American National Standard is in-



Projectable Area on Film as Seen Looking Through the Film Toward the Lens

Dimensions	Inches	Millimeters
A	1.912 nom	48.56 nom
B	0.870 max	22.10 max
C	1.377 ref	34.98 ref
D	0.420 min	10.67 min
E	2.334 max	59.28 max
F = H	within 0.008	within 0.20
J = K	nominally equal	nominally equal

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4. Relationship to Other Standards

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 the print (which is of primary importance because the projection print is the most commonly interchanged item). (See Appendix A2.)

NOTE 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 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 positioning, etc.

NOTE 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.

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

NOTE 4: Film Perforations. Film intended for projection with this image is normally perforated as specified in ANSI PH22.119-1981.

Appendix

(The Appendix is not a part of this American National Standard, but is included for information purposes only.)

A1. Centerlines

The centerlines of the image 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 projectable image area.

A2. Projectable Image Area

Essentially, the entire image within the maximum established by this standard will be transferred in such operations as reduction printing and other indirect uses of the picture information. Since the entire area will be presented, it is important that the projectable area include only material that meets recognized standards for technical and artistic excellence.