

# American National Standard for motion-picture film (16-mm) — projector usage

Approved December 13, 1985  
Sponsor: Society of Motion Picture and Television Engineers

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## 1. Scope

This standard specifies the position of the emulsion and the rate of projection for 16-mm motion-picture film perforated one or two edges, and the projector thread-up distance between audio and picture for 16-mm motion-picture film with audio.

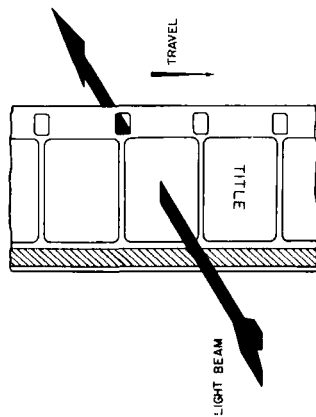
## 2. Referenced American National Standards

This standard is intended for use in conjunction with the following American National Standards:  
ANSI PH22.41-1983, Motion-Picture Film (16-mm) — Prints — Photographic Sound Records

ANSI PH22.112-1983, Motion-Picture Film (16-mm) — 100-Mil Magnetic Audio Record

## 3. Emulsion Position

For original reversal film, the emulsion side shall be toward the projection lens. For prints, the emulsion position is dependent upon the process of preparation and either emulsion to light source or emulsion to projection lens orientation may be encountered. (See note.) The actual emulsion position should be indicated on the leader and film container by notation or diagram.



Film as Seen from Projector  
Light Source Looking toward Lens

## 4. Projection Rate

4.1 The rate of projection for film perforated two edges not used for audio shall normally be 18 or 24 frames per second, depending upon its intended use. Amateur films are usually photographed at 18 frames per second and should be projected at that rate. Professional films may be photographed at any rate from time lapse to high speed but are generally intended for projection at 24 frames per second, except when special study is desired.

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4.2 The rate of projection for film containing an audio record shall be 24 frames per second for both photographic and magnetic audio, except for films photographed at 18 frames per second having post-process recorded magnetic audio which should be projected at 18 frames per second.

## 5. Relationship Between Audio and Picture

The projection thread-up path for motion-picture films containing an audio record, regardless of projection rate, shall place the audio-scanning point ahead (in the direction of film travel) of the center of the picture being projected. Counting the frame in the projector picture aperture as zero, the audio-scanning point shall be opposite the center of the 26th frame for photographic audio or the 28th frame for magnetic audio to accommodate film with audio, as specified in ANSI PH22.41-1983 and ANSI PH22.112-1983. If there is a significant distance between the aver-

age observer and the loudspeaker when the audio record is reproduced, the distance from the center of the projected aperture to the audio-scanning point may need to be shortened in the projector thread-up to bring the picture and audio into synchronization for the average observer (because of the slower rate of travel of audio compared to that of light). If the average loud-speaker-to-audience distance is greater than 50 ft (15 m), the projector thread-up distance between projected picture and audio scan should be shortened by one frame for each nominal 50 ft of distance from loudspeaker to average audi-

ence.

Note: When a relatively small number of prints is required, contact prints are often made from 16-mm original materials, resulting in the emulsion position toward the light source. The majority of 16-mm release prints are printed by contact from a 16-mm intermediate or by reduction from a 35-mm intermediate in order to protect the originals. The resulting prints generally have the emulsion side toward the projection lens. This permits intercutting of prints and originals without requiring a change of picture or sound focus during projection.

# American National Standard for motion-picture film— safety film

Approved December 13, 1985

Sponsor: Society of Motion Picture and Television Engineers

## 1. Scope

This standard defines and specifies safety film for motion-picture use.

## 2. Referenced American National Standards

This standard is intended for use in conjunction with the following American National Standards:

ANSI PH1.25-1984, Specifications for Safety Photographic Film

ANSI/NFPA 40-1982, Cellulose Nitrate Motion-Picture Film

## 3. Definition

The term safety film as used in this standard includes all perforated film used in the motion-picture industry. Specifically included are leaders, including unperforated leaders; sensitized stock based on the silver halide, dye transfer, vesicular, or other image-producing systems; raw and pro-

cessed stock; and magnetically coated perforated film.

## 4. Specification

**4.1** Safety film, as applied to the motion-picture industry, shall comply with ANSI PH1.25-1984.

**4.2** All films intended for the motion-picture industry shall be manufactured in compliance with ANSI PH1.25-1984.

**4.3** ANSI PH1.25-1984 includes in the nitrogen analysis not only the support film but also the emulsion and any other applied coating or treatment such as protective lacquers.

Note: 35-mm nitrate motion-picture film is no longer manufactured in the United States. However, there are existing nitrate films still in use or in storage and there are others existing or of future manufacture which may be imported. There is no intent in this standard to limit the use of such 35-mm nitrate films but, by designating them as nonstandard, it is intended to emphasize that the hazard involved in their handling requires the observance of adequate precautions and safeguards. (See ANSI/NFPA 40-1982.)

## Appendix

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

Because of its attendant fire hazards, nitrate film has never been manufactured in the United States in 16-mm and 8-mm widths since these are traditionally for amateur and nontheatrical use. However, small quantities of ni-

trate film may be in existence as a result of foreign import or from slitting operations of certain intermediate laboratory processing films.

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## SMPTE RECOMMENDED PRACTICE

RP 130-1985

### Dimensions of Tape Splices on 16-mm and 8-mm Type R Motion-Picture Film, Projection Type



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1. Scope
  - 1.1 This practice specifies the significant dimensions of mated cut splices for 16-mm and 8-mm type R motion-picture film made with an adhesive tape and intended for projection and exhibition.
  - 1.2 There are a number of methods for splicing triacetate or polyester motion-picture film that have found practical and commercial acceptance and that meet the operational requirements for the physical strength of the bond. This practice is not intended to recommend one method over another, but rather to emphasize the requirements common to all tape splices.
  2. Application
    - 2.1 Inasmuch as the film is usually a print, the primary objective is for the splice to be unobtrusive in the projected image area and the reproduced sound. Film guiding and positioning are usually achieved through the film seeking an equilibrium position through edge guiding for lateral positioning, and perforation reference against a loose-fitting tooth or claw for vertical positioning. Splices used for projection applications may have slightly broader width tolerances than those used for laboratory applications.
    - 2.2 The dimensions shall be as given in the figures and table and apply to freshly-made splices on processed films and leaders having a nominal shrinkage of not more than 0.2%.
    - 2.3 The transverse cut to provide the mated pairs of film for the tape splice shall fall within the area defined by Dimensions A, C, and D. However, if the mated cut is not a straight cut made on one frame line, the cut configuration shall intrude into only one of the two adjoining picture frames and the splice shall be as inconspicuous as possible. (See Appendix A6.)
3. Dimensions
  - 3.1 The dimensions shall be as given in the figures and table and apply to freshly-made splices on processed films and leaders having a nominal shrinkage of not more than 0.2%.
  - 3.2 The transverse cut to provide the mated pairs of film for the tape splice shall fall within the area defined by Dimensions A, C, and D. However, if the mated cut is not a straight cut made on one frame line, the cut configuration shall intrude into only one of the two adjoining picture frames and the splice shall be as inconspicuous as possible. (See Appendix A6.)
  - 3.3 Edges of the two spliced films shall not be offset laterally by more than 0.0625 in (0.005 mm) (Dimension G), unless a difference in the lateral shrinkage of the two strips makes it impossible to maintain the tolerance. (See Appendix A7.)
  - 3.4 The angle between the respective edges of the spliced film shall be 180° ± 1°. Thus, the spliced film shall be aligned to the extent that when one portion of the film is placed against a straight edge, the other portion will not deviate more than 0.006 in (0.15 mm) in 6 in (152 mm).
  - 3.5 The splice should have a negligible gap between the mated cuts of the film ends to prevent hinging and there should not be any film overlap at the splice. Films joined by tape splices are not acceptable for use as originals in commercial printing operations or those intended for magnetic striping. (See American National Standard Dimensions of Transverse-Cemented Splices on 16-mm and 8-mm Type R Motion-Picture Film, ANSI PH22.21-1982, for such usage.)
  - 3.6 The width of the tape used shall encompass the full width of the film on one side, and may exclude the perforation area and the area of the magnetic records and balance stripes on the opposite side. Splices with tape on one side only are not functional in projection and are unacceptable.
  - 3.7 Except as described in 3.9, the dimensions of the tape applied to secure the splice shall be such as not to interfere with film dimensions (especially perforations) as specified in American National Standards Dimensions for 16-mm Motion-Picture Film Perforated (R, ANSI PH22.10-1980); Dimensions for 16-mm Motion-Picture Film Perforated (2R, ANSI PH22.110-1980); and Dimensions for 16-mm Motion-Picture Film Perforated (8mm Type R, 2R, ANSI PH22.17-1982, and shall fall within the area described by Dimension F.

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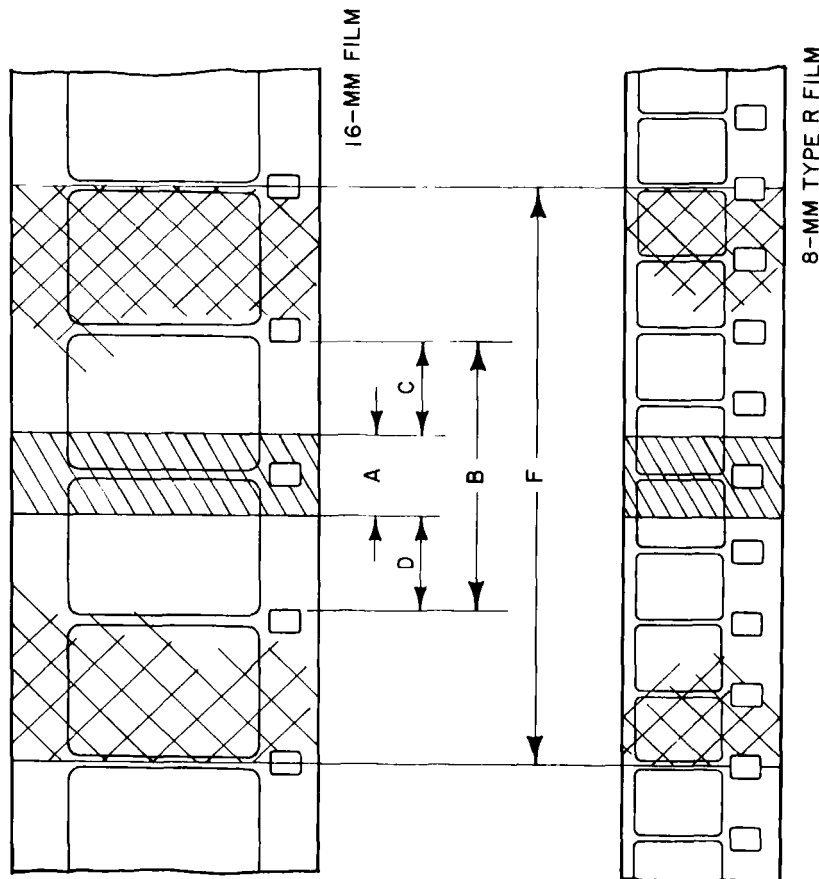


Fig. 1  
Splice and Tape Area

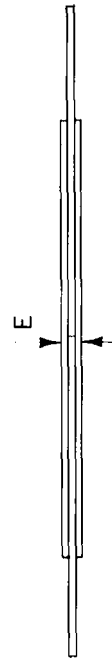


Fig. 2  
Overall Thickness

Dimensions	Inches	Millimeters
A	0.150 max	3.81 max
B	0.518 ± 0.002	13.52 ± 0.03
C	0.319 min	8.86 min
D	0.319 min	8.86 min
E	0.010 max	0.25 max
F	1.198 ± 0.002	30.13 ± 0.05
G	0.002 max	0.05 max

- 3.8 The tape shall be wide enough to cover at least a frame on each side of the splice. For esthetic considerations, tape ends should not intrude into the picture area. Tape splices shall be made with an optically clear, transparent tape resulting in a splice capable of withstanding tension at least 50% greater than projector gate tension for that film width. The tape shall adhere uniformly to the film and be applied in such a manner as to prevent corrugations or entrapped air bubbles.
- 3.9 Splices made with tape wrapped around either edge of the film are not recommended since they

**Appendix**

The Appendix is not a part of this SMPTE Recommended Practice, but is included for information purposes only.

A1. Maintaining continuity of pitch across the splice requires that the perforation interval within which the splice lies be equal to the perforation intervals in the unspliced portions. This may be difficult to measure, however, inasmuch as forming the bond may slightly distort perforation walls in those perforations nearest the bond (because of mechanical action) and, therefore, introduce uncertainty into the measurement.

Dimension B controls the longitudinal registration of the two films being spliced. It is measured to the perforations that are most commonly used for registration on splicing blocks, and to the nearer edges of these perforations because they are the edges generally used.

A2. The lateral alignment that is most significant for the projection and exhibition mode of film use is the avoidance of any offset of the film edges before and after the splice, Dimension G. Therefore, for projection applications, this is the most convenient control parameter. (See Fig. 3.)

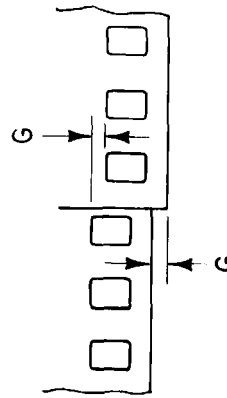


Fig. 3  
Alignment Dimension

A3. When spliced film is bent into an arc of approximately 2-in (50-mm) diameter, it should flex smoothly, with no excessive stiffness or tendency to fold. Tape should always be applied to both sides of the film.

A4. When tape splices are used, care should be taken to keep perforations clear of foreign matter. This requires careful alignment of pre-perforated tape, or clean, precise perforating of the tape by the splicer.

interfere with guiding. However, if the perforated edge is used to form the wrap-around tape splice, it is recommended that the splice add no more than 0.002 in (0.05 mm) to the film width. The overall width of the spliced area should not exceed 0.632 in (16.05 mm) on 16-mm motion-picture film and 0.319 in (8.10 mm) on 8-mm type R motion-picture film. If the film is trimmed after the wrap-around splice has been made, the film width shall not be less than 0.626 in (15.90 mm) on 16-mm motion-picture film and not less than 0.312 in (7.92 mm) on 8-mm type R film, and shall not affect the perforated edge of the film.

A5. Splices should be inspected frequently for defects including dirt, discoloration, edge lifting, etc. With tape splices, it is important to inspect for stretching, binding, oozing of adhesive, and widthwise expansion which can cause a hangup in projection. Currently available perforated or unperforated transparent polyester tape with pressure-sensitive adhesive is recommended.

A6. The transverse cut may be made in numerous configurations. Fig. 4 shows some typical configurations.

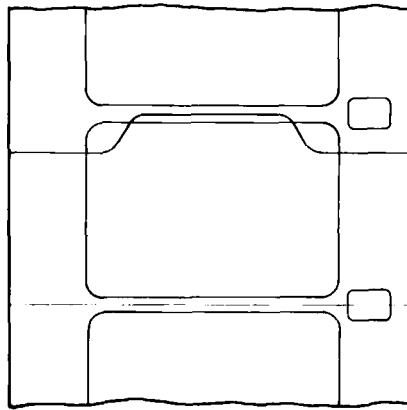


Fig. 4  
Typical Splice Cut Configurations

A7. Visual disruption of the projected image caused by the splice will be minimized if the length of the splicing tape, Dimension F, is kept as short as possible within the requirements of splice performance and strength. It is anticipated that, as adhesives are improved, the length of the splicing tape may be reduced to one or two frames. Ideally, the ends of the tape should fall on the framelines to minimize visual disruption.