

SMPTÉ RECOMMENDED PRACTICE

Specifications for Flutter Test Film for 16-mm Audio Reproducers, Photographic-Type

RP 70-1984



1. Scope

This practice specifies a test film for determining the presence of flutter in 16-mm motion-picture photographic audio reproducers operating at approximately 36 ft (11 m) per minute.

2. Test Film Signal

2.1 Frequency. The audio record shall reproduce at a frequency of 3150 ± 25 Hz when the linear velocity of the film is 24 perforations per second or approximately 36 ft per minute (7.2 in or 18.3 cm per second).

2.2 Distortion. The total harmonic distortion of the recorded signals shall not exceed 0.5 percent.

2.3 Location and Dimensions. The location and dimensions of the recorded audio record shall be in accordance with American National Standard for Motion-Picture Film (16-mm)—Prints—Photographic Sound Records, ANSI PH22-41:1983.

2.4 Recording. The test film shall have an originally recorded, variable-area audio track. The geometrical modulation of this recording shall be 80 ± 5 percent of the maximum nominal geometrical amplitude of 0.055 in (1.40 mm). This is equivalent to an rms nominal geometrical amplitude of 0.0410 ± 0.0028 in (1.118 \pm 0.071 mm).

2.5 Signal Fluctuation. The output level of the film shall be constant within ± 0.25 dB. This is equivalent to a peak-to-peak amplitude tolerance of approximately 2.9 percent of the 80-percent modulation or ± 0.0013 in (0.033 mm).

2.6 Density. The density of the dark portion of the audio track shall be between 1.2 and 1.4 and shall be uniform throughout the length of the film within a tolerance of ± 0.05 . The combined base and fog density shall be 0.05 ± 0.01 . All densities shall be measured in conformity with American National Standard Conditions for Diffuse and Doubly Diffuse Transmission Measurements (Transmission Density). ANSI PH2.19-1976 (R1983).

2.7 Flutter. The weighted peak flutter of the audio record shall not exceed ± 0.10 percent when meas-

ured in accordance with American National Standard Weighted Peak Flutter of Sound Recording and Reproducing Equipment, ANSI/IEEE 193-1982.

2.8 Azimuth. The azimuth of the audio record shall be $90^\circ \pm 3^\circ$ to the reference edge of the film.

3. Film Stock

3.1 The film stock, preferably polyester, shall be splice-free, of the low-shrinkage, safety type in compliance with American National Standard Specifications for Motion-Picture Safety Film, ANSI PH22.31M-1980, and cut and perforated in accordance with long-pitch dimensions specified in American National Standard Dimensions for 16-mm Motion-Picture Film Perforated IR, ANSI PH22.109-1980.

3.2 In the event that triacetate film stock is used, it shall be splice-free and shall have a maximum lengthwise shrinkage of 0.50 percent when tested as follows: At least 20 strips of film approximately 31 inches in length shall be cut for measurement of shrinkage. After normal development and drying (not over 80°F [27°C]), the strips shall be placed at least 1/4 in apart in racks and kept for seven days in an oven maintained at 120°F (49°C) and a relative humidity of 20 percent. The strips shall then be removed, reconditioned thoroughly to 50 percent relative humidity at 70°F (21°C), and the shrinkage measured by a suitable method. The percent shrinkage shall then be calculated on the basis of deviation from the nominal dimension for the length of 100 consecutive perforation intervals given in ANSI PH22.109-1980.

4. Identification

Each test film shall be identified by a suitable identification marking. The marking shall be printed lengthwise in the picture area and the spacing between consecutive titles shall be approximately 12 in (305 mm).

NOTE: A test film made in accordance with this practice is available from the Society of Motion Picture and Television Engineers.

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PROPOSED

SMPTÉ RECOMMENDED PRACTICE

Requirements for 35-mm, 16-mm and 8-mm Type S Tape Splices on Magnetic Audio Recording Motion-Picture Film

RP 129

1. Scope

This practice specifies the significant requirements for tape splices for 35-mm, 16-mm, and 8-mm Type S magnetic motion-picture film intended for audio recording.

2. Requirements

2.1 The requirements shall apply to magnetic audio recording films within acceptable shrinkage tolerances.

2.2 The film width at the splice shall not be increased by more than 0.003 in (0.08 mm) over the film width being spliced.

2.3 In the event that triacetate film stock is used, a portion of the spliced film is placed against a straight edge, the other portion will not deviate more than 0.006 in (0.15 mm) in 5 in (125 mm). The perforations across the splice and the film edges shall be aligned in accordance with Fig. 1. The spliced film shall maintain nominal perforation pitch as specified for the film gauge used. The splice shall have a negligible gap between the mated cuts of the film ends and there shall not be any film overlap at the splice.

2.4 An angle of 73° to the edge of the film is preferred to minimize hinging and reduce audibility

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as the splice passes over the head gap. However, an angle of 90° is acceptable.

2.5 The dimensions of the splicing tape applied to secure a splice shall not interfere with the film width dimensions specified for the particular film. Splicing tape shall not interfere with sprocket hole perforation opening dimensions. (See Figs. 2, 3, and 4.)

2.6 It is recommended that the splicing tape adhere to not less than 0.3 in (76 mm) on each side of the cut to ensure adequacy of retention for the normal use of each film gauge.

2.7 Tape splices shall be made with a tape having a thickness less than 0.003 in (0.08 mm) and resulting in a splice capable of withstanding 10 or (283 gr) of longitudinal tension without dimensional change.

2.8 The splicing tape shall adhere uniformly to the film without corrugations or entrapped air bubbles.

2.9 The splicing tape used shall encompass the full width of the film and be applied to the base side only.

2.10 Splice cuts and splicing tape edges shall be centered between perforations. (See Figs. 2, 3, and 4.)

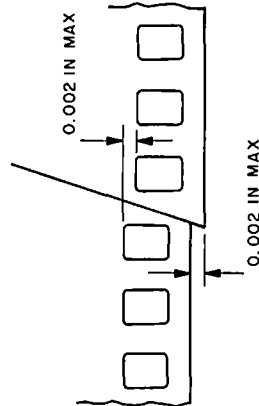


Fig. 1
Splice Alignment Viewed Base Up

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PROPOSED

SMPTE RECOMMENDED PRACTICE

RP 130

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

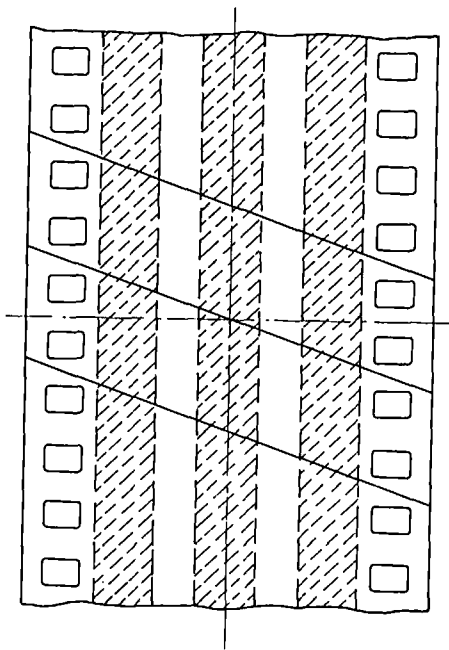


Fig. 2
Sound Splice on 35-mm Stock Viewed Base Up

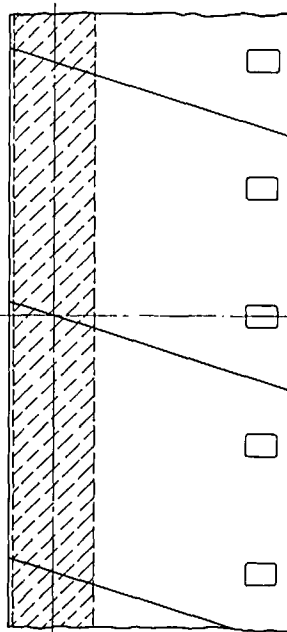


Fig. 3
Sound Splice on 16-mm Stock Viewed Base Up

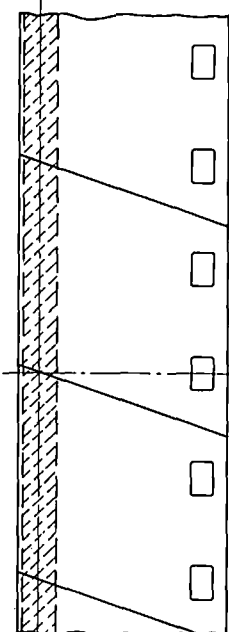


Fig. 4
Sound Splice on 8-mm Type S Stock Viewed Base Up

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**

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.
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 0.002 in (0.05 mm) (Dimension G) unless a difference in the lateral shrinkage of the two strips makes it impossible to maintain the tolerance. (See Appendix A2).
- 3.4 The angle between the respective edges of the spliced film shall be $180^\circ \pm 4'$. 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 PH22.24-1982, 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 1R, ANSI PH22.109-1980; 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.

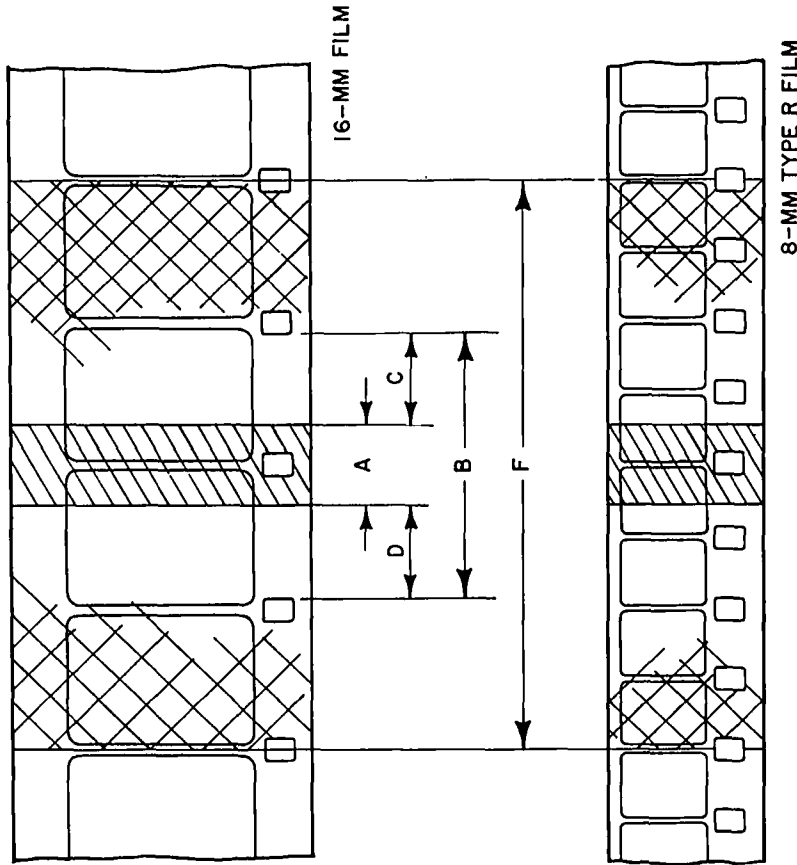


Fig. 1
Splice and Tape Area

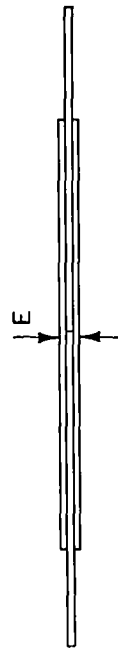


Fig. 2
Overall Thickness

Dimensions	Inches	Millimeters
A	0.150 max	3.81 max
B	0.548 ± 0.002	13.92 ± 0.05
C	0.349 min	8.86 min
D	0.349 min	8.86 min
E	0.010 max	0.25 max
F	1.198 ± 0.002	30.43 ± 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

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 0.682 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.

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.)

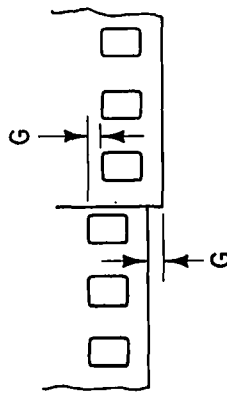


Fig. 3
Alignment Dimension

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.

A5. Splices should be inspected frequently for defects including dirt, discoloration, edge lifting, etc. With tape splices, it is important to inspect for stretching, fringing, coating 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.

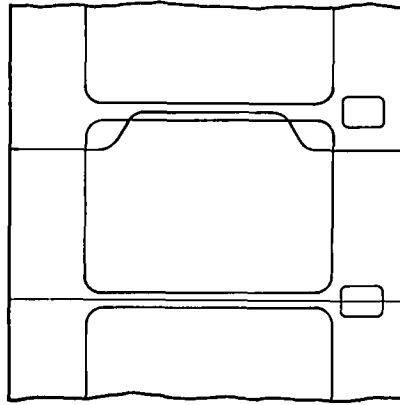


Fig. 4
Typical Splice Cut Configurations

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.