standards and recommended practices

Approved American National Standards

On December 19, 1969, the American National Standards Institute approved seven new American National Standards which are published here for your information.

PH22.154-1969, Dimensions of Projectable Image Area on Super 8 Motion-Picture Film

PH22.160-1969, Dimensions for Projection Reels for Super 8 Motion-Picture Film

PH22.169-1969, Dimensions for 35mm Motion-Picture Film Perforated Super 8, 2R-1664 (1–0)

PH22.164-1969, Dimensions for Magnetic Sound Record on Super 8 Motion-Picture Film Perforated 1R-1667

PH22.172.1-1969, Dimensions of Cemented Splices on 8mm Motion-Picture Film Perforated Super 8, Projection Type

PH22.172.2-1969, Dimensions of Tape Splices on 8mm Motion-Picture Film Perforated Super 8, Projection Type

PH22.176-1969, Dimensions of Magnetic Striping of 16mm Motion-Picture Film Perforated Super 8, 2R-1667 (1–3)

Inasmuch as compliance with American National Standards is purely voluntary, these standards will become truly effective only when broad publicity is given to their existence. ANSI and the SMPTE would appreciate any personal influence to promote the use of these standards where such action is appropriate and proper. Copies of the Standards may be obtained for a nominal fee from the American National Standards Institute, 1430 Broadway, New York City, 10018.

American National Standard Reaffirmed

On December 4, 1969, the American National Standards Institute, taking the recommendation of the SMPTE Engineering Committees and the ANSI Standards Committee C98, reaffirmed without change C98.1-1963, Dimensions of 2-Inch Video Magnetic Tape. (Published in December 1963 *Journal*.)

SMPTE Recommended Practices Reaffirmed

On September 28, 1969, the SMPTE Board of Governors, taking the recommendation of the Photo-Instrumentation Committee and the SMPTE Standards Committee reaffirmed without change RP17-1964, SMPTE Recommended Practice A Photographic Recording Technique for Measuring High-Speed Camera Image Unsteadiness.

Draft American National Standard

With the increased use of color motion pictures for television broadcast it was found necessary to specifically state that the resulting densities of the leaders and trailers, as specified in the American National Standard Specifications for Leaders and Cue Marks for 35mm and 16mm Sound Motion-Picture Release Prints, PH22.55-1966, were to be neutral in color. It is therefore proposed that the word "neutral" be inserted in the Standard in all places referring to densities. In addition, the density specifications for the sections of the leader and trailer which are adjacent to the picture portion shall be replaced with the word "black."

The 70mm sound start frame is also being deleted as it was incorrectly positioned. The proposed action has also been submitted to the PH22 committee. Consequently, all comments received through this *Journal* publication will be reviewed by that committee.

American National Standard PH22.55-1966, was published in the March 1966 *Journal*.

Proposed SMPTE Recommended Practice

The Video Tape Recording Committee has recommended that the following be added to Section 4.2 of the SMPTE Recommended Practice on Specifications of Tracking Control Record for 2-Inch Quadruplex Video Magnetic Tape Recordings, RP16-1968.

"To assist in certain restricted types of color editing, alternate frame pulses may be omitted. Since omission of alternate frame pulses may result in slightly lengthened lock-up time in tape replay, users may wish to obtain prior agreement before distributing such tapes."

RP16-1968 was published in the September 1968 *Journal*. Comments should be addressed to Alex E. Alden, Staff Engineer, at Society Headquarters prior to April 30, 1970. If no adverse criticism is received by this date, the Proposed Recommended Practice will be submitted to the SMPTE Board of Governors for final approval.

Proposed Withdrawal of SMPTE Recommended Practice

The Photo-Instrumentation Committee and the SMPTE Standards Committee have proposed the withdrawal of SMPTE Recommended Practice RP3-1957, Lens Mount Surface for High-Speed Motion-Picture Cameras. The withdrawal has been recommended because the specifications were not being followed. RP3 was published in the *SMPTE Journal* of August 1957.

If no adverse criticism is received by April 30, 1970, the recommendation will be forwarded to the SMPTE Board of Governors for consideration.—*A.E.A.*

American National Standard
dimensions for projection reels for super 8 motion-picture film

Approved December 19, 1969 Sponsor: Society of Motion Picture and Television Engineers, Inc.

1. Scope

This standard specifies the dimensions for super 8 motion-picture reels used for projection having film capacities of 50, 100, 200, 400, 600, 800, and 1,200 ft.

2. Dimensions

2.1 The dimensions shall be as given in the figure and tables.

2.2 Dimensions C and K apply from the core to the periphery of the reel except for the area of Dimension J. All points of the outside surface of the flanges, including the rim, lettering, lugs, and other protrusions, will fall between the planes as defined by Dimension K.

2.3 Dimension J shall apply within a circle of 1.0 in. (25mm) diameter or more, centered on the spindle hole axis. However, this area may contain cutouts or depressions.

2.4 Lateral runout, Dimension L in Table 1, is the total excursion of all points at a radius on the flange of the reel when the reel is rotated about Datum axis Y while being held against a 1.0 in. (25mm) diameter circular reference support or flange of a horizontal spindle. The value applies to all radii on the flange. (See Appendix A2.)

2.5 The surface of the core and the periphery of the flanges shall be concentric with the spindle holes to within 0.020 in. (0.51mm) total indicator reading.

2.6 For reels of 100-ft (30-meter) capacity or less, the tolerance for Dimension D shall be + 0.010 — 0.00 in. (+ 0.25 — 0.0mm).

2.7 Dimensions M and N provide for a minimum rectangular clearance of a film-retention clip cutout in the core of the reel at the film attachment slot. Dimension M is perpendicular to and centered on the radius passing through the center of the film attachment slot. Dimension N is measured along this radius, and a nominal value of 0.25 in. (6.4mm) is suggested. These dimensions apply to reels of 400-ft capacity or smaller and are optional for larger reels.

2.8 Dimensions P and P′ have been established to ensure symmetry of the recess area represented by Dimension J. They apply only when Dimension K exceeds Dimension J. They shall be measured at the point of departure of Dimension J to the larger Dimension K. The difference between Dimension P and Dimension P′ shall not exceed + 0.020 in. (0.51mm).

NOTE 1: The flanges of the reel shall have three radial driving slots spaced approximately 120° and conforming to Dimensions E and F. The drive slots of the two flanges shall be aligned. If properly aligned, the reel will fit on a test spindle (gauge) of 0.50-in. (12.7mm) diameter with a radial spindle drive key having: a length from the spindle shoulder greater than the reel width, Dimension J; a thickness of 0.058 in. (1.47mm); and a height, measured as a radius from the spindle axis, of 0.36 in. (9.1mm).

NOTE 2: To facilitate flexibility in design of plastic snap-on containers for 50- and 100-ft reels, which use one flange of the reel as a cover, one flange (excluding the hub area) shall be solid. This flange shall contain no interruptions to the periphery such as slots to facilitate threading. (See Appendix A5.)

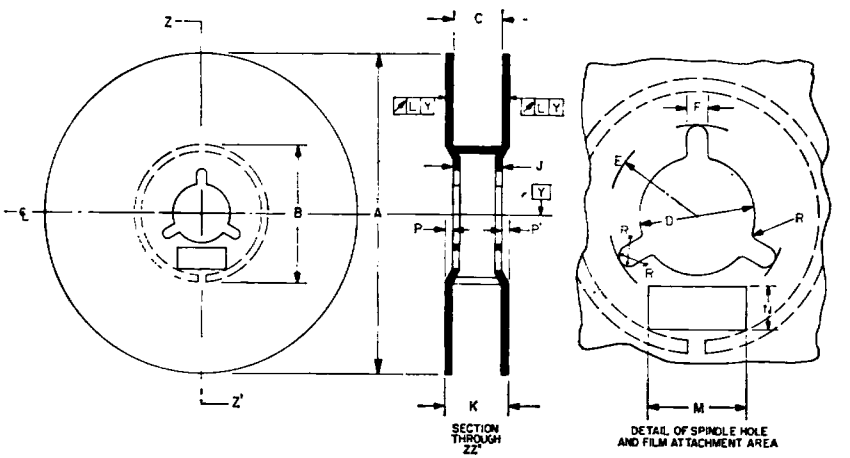


Table 1

Nominal Reel Capacity Feet	Nominal Reel Capacity Meters	Dimensions	Inches Min	Inches Max	Millimeters Min	Millimeters Max
50	15	A	2.91	2.95	74.0	75.0
		B	1.25	1.30	31.8	33.0
		L		0.04		1.0
100	30	A	3.90	3.94	99.1	100.0
		B	1.77	1.81	45.0	46.0
		L		0.04		1.0
200	60	A	5.00	5.04	127.0	128.0
		B	1.77	2.00	45.0	50.8
		L		0.06		1.5
400	120	A	7.00	7.09	177.8	180.1
		B	2.36	2.50	59.9	63.5
		L		0.08		2.0
600	180	A	9.25	9.31	235.0	236.5
		B	4.85	4.91	123.2	124.7
		L		0.10		2.5
800	240	A	10.47	10.55	265.9	268.0
		B	4.85	4.91	123.2	124.7
		L		0.12		3.0
1,200	360	A	12.23	12.27	310.6	311.7
		B	4.85	4.91	123.2	124.7
		L		0.12		3.0

American National Standard
dimensions of projectable image area on super 8 motion-picture film

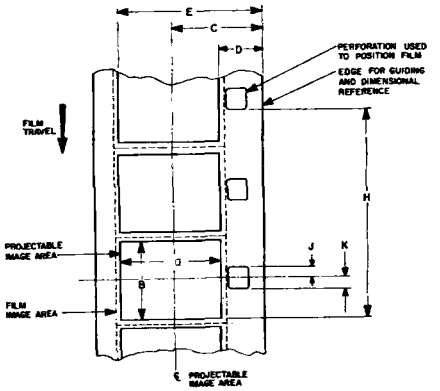
Approved December 19, 1969 Sponsor: Society of Motion Picture and Television Engineers, Inc.

1. Scope

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

2. Dimensions

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



PROJECTABLE AREA ON FILM AS SEEN LOOKING THROUGH THE FILM TOWARD THE LENS

Dimensions	Inches	Millimeters
B	0.158 max	4.01 max
D	0.063 min	1.60 min
E	0.278 max	7.06 max
H*	0.389 nom	9.88 nom
The following values are included for convenience		
a	0.209 ref	5.31 ref
c**	0.170 ref	4.32 ref
j=k	nominally equal	nominally equal

*See Note 6.

**See Appendix.

Table 2

Dimensions	Inches	Millimeters
C	0.33 $^{+0.06}_{-0.00}$	8.4 $^{+1.5}_{-0.0}$
D*	0.502 $^{+0.006}_{-0.000}$	12.75 $^{+0.15}_{-0.00}$
E	0.406 ± 0.005	10.31 ± 0.13
F	0.06 $^{+0.01}_{-0.00}$	1.5 $^{+0.3}_{-0.0}$
J	0.45 $^{+0.00}_{-0.05}$	11.4 $^{+0.0}_{-1.2}$
K	0.56 max	14.2 max
M	0.47 min	12.0 min
N	0.22 min	5.6 min
P	See 2.8	
R	Maximum is ½ value used for Dimension F	

*See 2.6.

NOTE 3: Provision shall be made for securing the end of the film so as to accept the full width of the film, and so that the film will be freely released at the end of its run. If film attachment is provided by a slot in the core, there shall be a suitable cutout in the core (see 2.7) to allow free access to the film end and to provide for attachment of a film end retention clip or plug when the reel is used on automatic rewind equipment. The cutout area for the film-retention clip shall be in both flanges.

NOTE 4: The dimensions were determined for reels made from a dimensionally-stable material such as metal. If the reel or reel hub is made from plastic or other dimensionally-unstable material, the spindle hole diameter, D, should be so adjusted that at least the minimum dimension (0.502 in. or 12.75mm) is maintained throughout the normal use range of temperature and relative humidity.

NOTE 5: The spindle hole may be a sleeve or there may be an air space between the spindle holes in the flanges, depending upon the type of construction. Because of this, the means of retaining the reel on the projector spindle should be outboard of the reel as defined by Dimension J.

Appendix

(The Appendix is not a part of this American National Standard, but is included to facilitate its use.)

A1. Although the reel specifies three drive slots on each flange, only one is generally used to drive the reel. Three slots are specified in the standard to facilitate easy loading of the reel on the drive spindle.

A2. As noted, a spindle shoulder of 1.0 in. (25mm) in diameter is required for the measurement of lateral runout. The wobble of the reel on the projector will be lessened if a shoulder of this diameter is also incorporated on the projector spindle and provision made to fit the reel tightly to this shoulder. In any case, it is expected that projector manufacturers will incorporate a spindle shoulder of at least 0.63 in. (16mm) in diameter. The symbol for runout, ⌰ | L | Y | , shown in the figure is in accordance with drafting practices specified in American National Standard Dimensioning and Tolerancing for Engineering Drawings, Y14.5-1966. The arrow indicates runout of the referenced surface with respect to Datum axis Y and to the limits for Dimension L in Table 1.

A3. This standard applies to reels used for projection which are considered to be interchangeable on all types of projection equipment. Take-up reels, which may be considered an integral part of the manufacturer's projection equipment, may deviate from the provisions of this standard. As an example, it may be desirable to taper the flanges from the core to the periphery or to provide for special film attachment mechanisms.

A4. The nominal reel capacity specified in Table 1 is based on a total film thickness (including any magnetic striping or winding allowance) not exceeding 0.0065 in. (0.165mm).

A5. The usual winding of film on a reel with a solid flange will be with the film perforations closest to the nonsolid flange.

2.2 The angle between the horizontal edges of the image area and the reference edge of the film shall be 90° ± ½°.

2.3 Dimension H is measured lengthwise along the path of the film from the bottom of the maximum image area projected by the aperture to the bottom of the frame-positioning perforation (two perforations above the perforation adjacent to the projected image).

3. Relationship to Other Standards

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

3.2 The following standards define image areas for other important phases of motion-picture operations, and are consistent with this standard and with one another under currently acceptable commercial practice:

PH22.153-1967, Location of Printed Area in Super 8 Optical Reduction Printing on 16mm Motion-Picture Film

PH22.157-1967, Dimensions of Camera Aperture Image on Super 8 Motion-Picture Film

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 sound 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 non-rectangular (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 non-planar, 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. (0.25mm) at the film plane is recommended.

NOTE 4: Film Perforations. Film intended for projection with this image area is normally perforated as specified in American National Standard Dimensions for 8mm Motion-Picture Film, Perforated Super 8, IR-1667, PH22.149-1967.

NOTE 5: Print Preparation. Prints conforming to this standard are prepared for use as specified in American National Standard Specifications for Projector Usage of Super 8 Motion-Picture Film, PH22.155-1967.

NOTE 6: Dimension H. In this format, the positioning of the projectable image with respect to the film perforations has been established by the nominal value H, together with limitations on image positioning in the following standards:

PH22.153-1967, Location of Printed Area in Super 8 Optical Reduction Printing on 16mm Motion-Picture Film

PH22.157-1967, Dimensions of Camera Aperture Image on Super 8 Motion-Picture Film

Appendix

(The Appendix is not a part of this American National Standard, but is included to facilitate its use.)

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 projectable image area. Note that the centerline of the projectable image area is displaced from the centerline of the film by 0.013 in. (0.33mm) nominal.

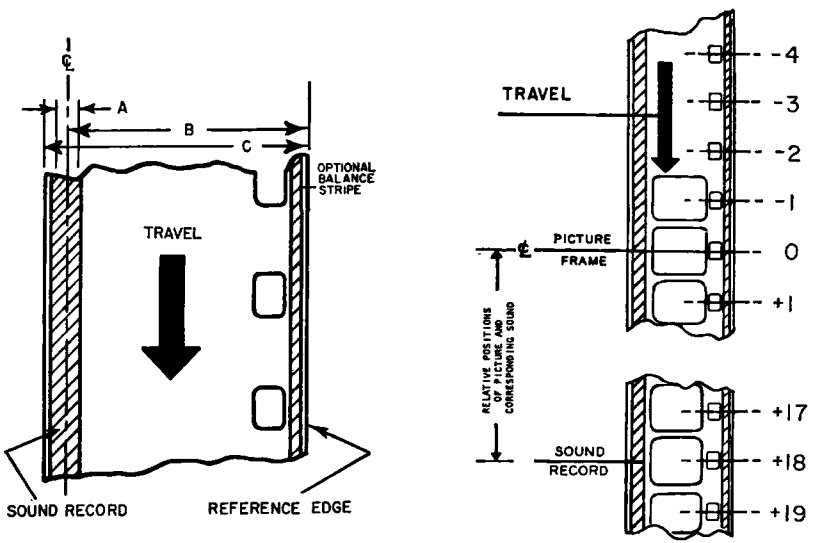
American National Standard dimensions for magnetic sound record on super 8 motion-picture film perforated 1R-1667

Approved December 19, 1969 Sponsor: Society of Motion Picture and Television Engineers, Inc.

1. Scope

1.1 This standard specifies the lateral location and dimensions of the magnetic sound record on super 8 motion-picture film.

1.2 This standard also specifices the picture-sound separation of super 8 motion-picture film with a magnetic sound record.



Film As Seen from Inside the Projector Looking Toward the Lens

Dimensions	Inches	Millimeters
A*	0.019 min	0.48 min
B	0.298 ± 0.001	7.58 ± 0.03
C	0.314 ref	7.98 ref

* See Note.

American National Standard
dimensions of cemented splices on 8mm motion-picture film perforated super 8, projection type

Approved December 19, 1969 Sponsor: Society of Motion Picture and Television Engineers, Inc.

1. Scope

This standard specifies the dimensions of cemented splices on 8mm film perforated super 8 primarily intended for projection.

2. Dimensions

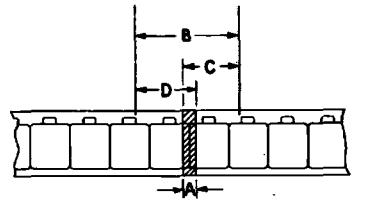
2.1 The dimensions shall be as given in the figure and table.

2.2 The film width at the splice shall not exceed 0.318 in. (8.08mm). If the film has been widened during scraping, the extra material shall be removed.

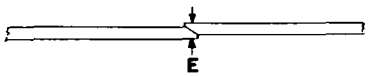
2.3 The spliced films shall not be offset by more than 0.002 in. (0.05mm), Dimension G, as measured by the difference in the alignment of the reference edge side of the perforation holes on either side of the spliced halves.

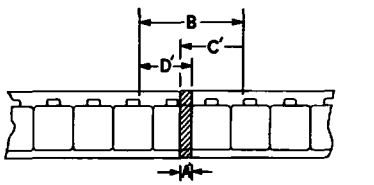
2.4 In the plan view, the angle between the respective edges of the spliced film shall be 180° ± 8′. Thus, the spliced film shall be aligned to the extent that, when one portion of the film is placed against a straight edge, the other portion will not deviate more than 0.014 in. (0.36mm) in 6 in. (152.4mm).

NOTE: The splice should never cut into or include a perforation.

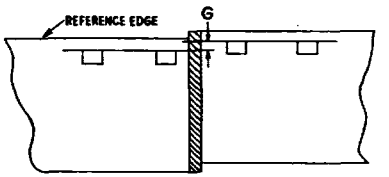


RECOMMENDED SPLICE METHOD





OPTIONAL SPLICE METHOD



ENLARGEMENT OF ALIGNMENT DIMENSION

2. Dimensions

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

3. Picture-Sound Separation

The magnetic sound record on the film shall precede the center of the corresponding picture by a distance of 18 frames · 1 frame.

4. Magnetic Striping

The magnetic striping shall be as specified in American National Standard Dimensions of Magnetic Striping of Super 8 Motion-Picture Film Perforated 1R-1667, PH22.161-1968.

NOTE: Dimension A applies to records produced in equipment using the same head for recording and reproducing. In commercially-produced prints intended for use on a variety of reproducers, it is recommended that a recording head be used capable of producing a 0.025-in. minimum width record having the same centerline.

Dimensions	Inches	Millimeters
A	0.055 ± 0.015	1.40 ± 0.38
A′	0.055 ± 0.008	1.40 ± 0.20
B	0.454 ± 0.001	11.53 ± 0.03
C	0.255 ± 0.007	6.48 ± 0.18
C′	0.283 ± 0.004	7.20 ± 0.10
D	0.255 ± 0.007	6.48 ± 0.18
D′	0.228 + 0.001 − 0.004	5.79 + 0.03 − 0.10
E	0.012 max	0.30 max
G	0.002 max	0.05 max

Appendix

(The Appendix is not a part of this American National Standard, but is included to facilitate its use.)

A1. Splices for super 8 films have been made narrower than conventional 8mm splices because narrower splices are less conspicuous on the screen and are less likely to affect the usual curvature of the film as it follows the bends in its path through cine machinery or continuous-loop cartridges.

A2. 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.

A3. In the plan view, the splice is arranged with the perforations at the top in order to show them as they appear on most splicers. Bevelled splices are recommended, especially for films which will be run over magnetic heads. However, if unbevelled overlap splices are made, it is desirable to orient the films in splicing so that a magnetic head scanning the film would, at a splice, drop down onto the trailing film rather than bump up onto it.

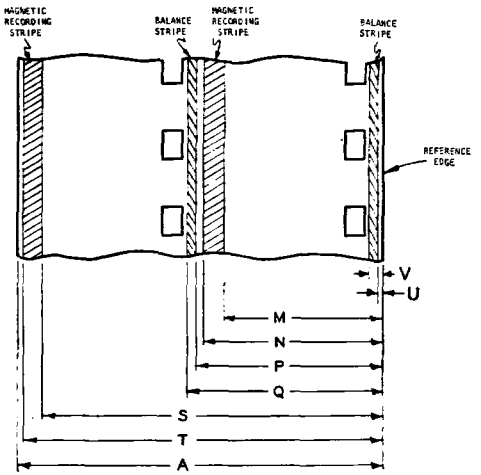
A4. The scraped area should be limited as closely as possible to the area covered by the overlapping film, in order to prevent the appearance of a white line on the screen.

American National Standard
dimensions of magnetic striping of 16mm motion-picture film perforated super 8, 2R-1667 (1-3)

Approved December 19, 1969 Sponsor: Society of Motion Picture and Television Engineers, Inc.

1. Scope

This standard specifies the location and dimensions of recording stripes and balance stripes applied to 16mm motion-picture film with two rows of super 8 perforations in positions 1 and 3.



Dimensions	Inches	Millimeters
A	0.628 nom	15.95 nom
M	0.285 ± 0.002	7.24 ± 0.05
N	0.312 ± 0.002	7.92 ± 0.05
P	0.317 ± 0.003	8.05 ± 0.08
Q	0.329 ± 0.003	8.36 ± 0.08
S	0.599 ± 0.002	15.21 ± 0.05
T	0.626 ± 0.002	15.90 ± 0.05
U	0.003 ± 0.003	0.08 ± 0.08
V	0.015 ± 0.003	0.38 ± 0.08

2. Dimensions

2.1 The location and dimensions of the magnetic recording stripes and balance stripes shall be as given in the figure and table.

2.2 The magnetic striping material shall be applied to the surface of the film away from a camera or projector lens; for example, toward the light source of a projector arranged for direct front projection on a reflection-type screen.

2.3 The stripes designated as "recording" are made of a magnetic material and are intended for the sound record. The stripes adjacent to the perforations are the balance stripes. The balance stripes may be stripes of magnetic or nonmagnetic material of such thickness that the balance and recording stripes project above the surface of the film to substantially the same degree.

3. Film Stock

The film stock used shall be of the low-shrinkage, safety type, cut and perforated in accordance with American National Standard Dimensions for 16mm Motion-Picture Film, Perforated Super 8, 2R-1667 (1-3), PH22.150-1967.

NOTE 1: The width and edge-to-perforation distance of the 8mm slit strip shall be in accordance with American National Standard Dimensions for 16mm Motion-Picture Film, Perforated Super 8, 2R-1667 (1-3), PH22.150-1967. The location of the magnetic record and balance stripes shall be in accordance with American National Standard Dimensions of Magnetic Striping of Super 8 Motion-Picture Film Perforated 1R-1667, PH22.161-1968. Consequently, it is not possible to take full advantage of the tolerances of both the slit width and the location of the magnetic record and balance stripes.

NOTE 2: Tolerances for the center recording stripe and center balance stripe are specified to permit usage of a single wide stripe or two separate stripes. If two stripes are used, the amount of separation between the stripes should be sufficient to permit slitting within the requisites of the standard without obtaining undesirable feather edges of magnetic material. The separation required is determined by laboratory practice.

American National Standard dimensions for 35mm motion-picture film perforated super 8, 2R-1664 (1-0)

Approved December 19, 1969 Sponsor: Society of Motion Picture and Television Engineers, Inc.

1. Scope

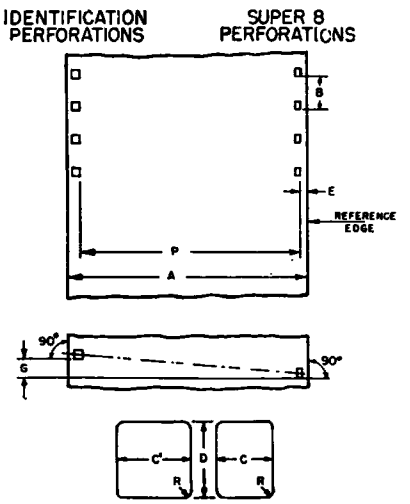
This standard specifies the cutting and perforating dimensions for 35mm motion-picture film with one row of super 8 perforations and one row of special perforations having a perforation pitch of 0.1664 in. The film stock described in this standard is intended for use as an intermediate film in the production of prints.

2. Dimensions

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

2.2 The dimensions pertain to a safety film as defined in American National Standard Specifications for Motion-Picture Safety Film, PH22.31-1967.

2.3 The dimensions apply to material immediately after cutting and perforating.



	Dimensions	Inches	Millimeters
A	Film width	1.377 ± 0.001	34.975 ± 0.025
B	Perforation pitch	0.1664 ± 0.0004	4.227 ± 0.010
C	Perforation width	0.0360 ± 0.0004	0.914 ± 0.010
C'	Identification perforation width	0.0450 ± 0.0004	1.143 ± 0.010
D	Perforation height	0.0450 ± 0.0004	1.143 ± 0.010
E	Edge to perforation	0.050 ± 0.002	1.27 ± 0.05
G	Perforation skewness	0.0015 max	0.038 max
L	100 consecutive perforation pitch intervals	16.640 ± 0.017	422.70 ± 0.43
P	Lateral perforation displacement	1.251 ± 0.001	31.78 ± 0.03
R	Radius of perforation fillet	0.005 ± 0.001	0.13 ± 0.03

2.4 Dimension L represents the length of any 100 consecutive perforation pitch intervals.

NOTE 1: 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, and the perforation pitch without the decimal point.

NOTE 2: The metric values in the table of dimensions are converted from the inch values in accordance with conversion principles outlined in American National Standard Practice for Inch-Millimeter Conversion for Industrial Use, B48.1-1933 (Reaffirmed 1947). The metric conversion of Dimension A is purposely shown in three figures to prevent the maximum width dimension from exceeding 35mm.

NOTE 3: As indicated in the Scope, the film for which this standard applies will normally be used as an intermediate and, therefore, will not be slit into smaller width strips at any stage of its use. The identification row of perforations has a lesser edge-to-perforation spacing relative to the row of super 8 perforations. The perforations in the identification row also are larger than the latter. Nevertheless, this row will be provided with additional means of identification which will be readily visible on the raw film.

Appendix

(The Appendix is not a part of this American National Standard, but is included to facilitate its use.)

A1. The dimensions given in this standard represent the practice of film manufacturers in that the dimensions and tolerances are for film stock immediately after perforation. The punches and dies themselves are made to tolerances considerably smaller than those given, but since film is a plastic material, the dimensions of the slit and perforated film stock never agree exactly with the dimensions of the slitters, punches and dies. Film can shrink or swell due to loss or gain in moisture content or can shrink due to loss of solvent. These changes invariably result in changes in the dimensions during the life of the film. The change is generally uniform throughout a roll.

A2. It will be noted that among the various standards for slitting and perforating film stock there are often two standards that seem much alike in wording. The difference lies in the longitudinal pitch which is either 0.1667 in. or 0.1664 in. for this standard. In general, the longer pitch is for print stock and the shorter pitch is for negative or intermediate stock.

The choice of pitch for negative or intermediate motion-picture film depends, within certain limits, on the type of printer to be used. Where release step-printers are used and the film is stationary when exposed, the choice of pitch is not strictly limited. Where the film moves continuously over a cylindrical surface at time of printing (sprocket-type contact printer), there are three major considerations involved in choosing the pitch. These considerations are: (1) the sprocket diameter and tooth engagement, (2) the film thickness, and (3) the film shrinkage and the rate at which shrinkage occurs.

Maximum steadiness and definition are secured on a sprocket-type printer when the negative stock is somewhat shorter in pitch than the positive stock in the approximate proportion of the thickness of the film to the radius of curvature. For printing on a 72-tooth sprocket (circumference of about 12 in.) with film 0.0055 to 0.0065 in. thick, the optimum pitch differential is 0.3 percent. The use of the ideal pitch differential for the negative would minimize slippage between the positive stock and negative during the printing operation, thus reducing the amount of blurring and jumping in the vertical axis of the picture or sound image. (This error is to be differentiated from the jump caused by nonuniformity of successive pitches, Dimension B.)

Experience has shown that the average pitch derived from Dimension L of the intermediate can vary ± 0.1 percent from the ideal pitch, which is 0.3 percent shorter than the positive stock, without blurring of picture and sound image being easily detected.

For many years this desired difference in pitch was caused by the shrinkage of the negative film during processing and aging. Current film bases shrink less than the earlier ones and hence a shorter initial pitch becomes desirable. To satisfy this requirement for picture- or sound-negatives, it is common manufacturing practice to aim for a pitch value 0.2 percent shorter than the positive stock onto which they will be printed. The additional shrinkage that occurs during processing and the aging that takes place before the release prints are made then bring the pitch differential close to the optimum and desired value of 0.3 percent. Accordingly, the pitch chosen for the negative or intermediate stock is 0.1664 in.

Low-shrinkage negative film perforated to these dimensions should not thereafter shrink appreciably more than 0.2 percent under normal use conditions, and for a reasonable life span, so that the optimum pitch differential from the positive stock of 0.3 ± 0.1 percent is maintained. (The film should be measured after equilibration with air at 70°F and 55 percent relative humidity or at the conditions prevailing at the time of perforating.)

American National Standard
dimensions of tape splices on 8mm motion-picture film perforated super 8, projection type

Approved December 19, 1969 Sponsor: Society of Motion Picture and Television Engineers, Inc.

1. Scope

This standard specifies the dimensions of mated cut splices on 8mm motion-picture film perforated super 8 made with an adhesive tape and intended only for projection.

2. Dimensions

2.1 The dimensions shall be as given in the figures and table and apply to a freshly-made splice.

2.2 The mated cut of the film 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 frameline, the cut configuration shall intrude into only one of the two adjoining picture frames.

2.3 The spliced films shall not be offset by more than 0.002 in. (0.05mm), Dimension G, as measured by the difference in the alignment of the reference side edge of the perforation holes on either side of the spliced halves.

2.4 In the plan view, the angle between the respective edges of the spliced film shall be 180° ± 8′. 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 0.014 in. (0.36mm) in 6 in. (152.4mm).

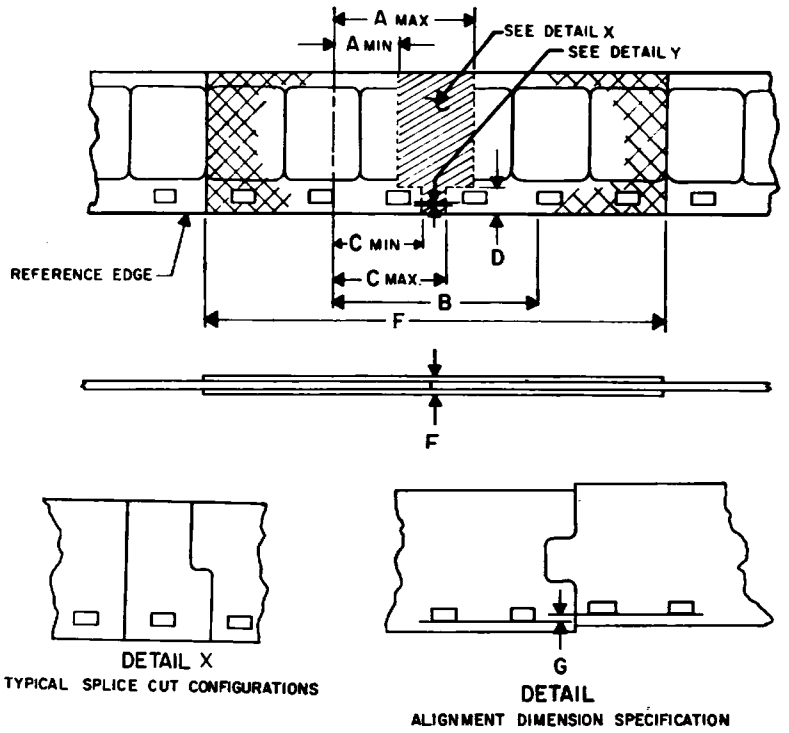
2.5 Except as described in 2.6 below, the dimensions of the tape applied to secure the splice shall be such as not to interfere with the film dimensions (especially perforations) as specified in American National Standard Dimensions for 8mm Motion-Picture Film Perforated Super 8, 1R-1667, PH22.149-1967, and fall within the area described by Dimension F. The width of the adhesive material should encompass the full width of the film if applied to only one side; however, if also applied to the second side, it may exclude either the perforation area or the sound stripe area.

2.6 If the tape used to form a splice is wrapped around the film, either film edge may be used as the wrap-around edge. However, if the perforated edge is used, it is recommended that the splice add no more than 0.002 in. (0.05mm) to the film width. The overall width of the spliced area should not exceed 0.319 in. (8.10mm). If the film is trimmed after the wrap-around splice has been made, the film width shall not be less than 0.312 in. (7.92mm) and shall not affect the perforated edge of the film.

NOTE 1: The splice should have a negligible gap between the mated cuts of the film ends and there should not be any film overlap at the splice.

NOTE 2: Films joined with tape splices are not acceptable for use as originals in commercial printing operations. (See American National Standard Dimensions of Cemented Splices on 8mm Motion-Picture Film Perforated Super 8, Projection Type, PH22.172.1-1969, for this use.)

A3. 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. 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.



Dimensions	Inches		Millimeters	
A	0.144	min	3.66	min
	0.311	max	7.90	max
B	0.455 ±	0.002	11.56 ±	0.05
C	0.197	min	5.00	min
	0.258	max	6.55	max
D	0.062	min	1.57	min
E	0.010	max	0.25	max
F	1.00	max	25.4	max
G	0.002	max	0.05	max

Appendix

(The Appendix is not a part of this American National Standard, but is included to facilitate its use.)

A1. The transverse cut to provide the mated pairs of film for the tape splice may be made in numerous configurations. Detail X of the figure shows only some typical configurations. It is desirable, however, to make the splice as inconspicuous as possible; therefore, the transverse cuts would usually be on the frameline or occur in only one frame.

A2. 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.

A3. If tape splices are made with films to which magnetic oxide has been applied or may be applied, it will be necessary to exclude the splicing material from the magnetic record stripe area.

A4. The 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 dimensional stability. It is anticipated that, as adhesives are improved, the length of the splicing tape may become as little as one or two frames.