A New Title for the Journal

With the January 1976 issue, the *SMPTE Journal* is the new title of this Journal. Publication began in 1916 as the *Transactions of the Society of Motion Picture Engineers*. By 1930 the *Transactions* had become the *Journal of the Society of Motion Picture Engineers*. In 1950 the name of the Society was changed to encompass its growing interest in television engineering and the Journal became the *Journal of the Society of Motion Picture and Television Engineers*. A few years later its name was shortened to the less cumbersome designation of *Journal of the SMPTE*. Each change of title of the Society's Journal reflected its expanding interests or the trend of the times toward brevity and succinctness.

The new title, *SMPTE Journal*, was deemed to be more euphonious, briefer, and easier to say and to write than its immediate predecessor. More important, it was found to be the title by which most *Journal* users have referred to it for many years.

One minor inconvenience to authors is that they must remember that the abbreviation for the Society's Journal (in references and bibliographies) is:

SMPTE Jour. for 1976 and following years
Jour. SMPTE for 1950 through 1975
Jour. SMPE for 1930 through 1949

Otherwise, the rules for references remain the same.

We hope that you like the new title and new design of our Society's Journal. Sixty years is a long time to maintain continuity and, at the same time, adapt to and grow with the times.

Notice to Subscribers: Availability of the 1976 Directory for Members

The Society's publication, *Directory rectory for Members,* containing all relevant information about the Society including an alphabetical list of of individual members with their addresses, will be available in late March. Subscribers may order the *Directory* at a price of $3.50 a copy. The *Directory* is sent to Individual and Sustaining Members of the SMPTE without charge.

Standards & Recommended Practices

Approved American National Standards

On 20 November 1975, the American National Standards Institute approved six standards which are primarily editorial revisions of the earlier issues: PH22.20-1975, Dimensions of Projectable Image Area on 8-mm Type R (Regular 8) Motion-Picture Film; PH22.23-1975, Dimensions of Projection Reels for 8-mm Type R (Regular 8) Motion-Picture Film; PH22.107-1975, Dimensions of Double 8-mm Type R (Regular 8) Motion-Picture Camera Spools (25-Ft [7.6-M] Capacity); PH22.143-1975, Specifications for Length of Film on 8-mm Type R (Regular 8) Motion-Picture Camera Spools (25-Ft [7.6-M] Capacity); PH22.173-1975, Dimensions for Double 8-mm Type R (Regular 8) Motion-Picture Camera Spools (100-Ft [30-M] Capacity); and PH22.174-1975, Dimensions for 16-mm Daylight-Loading Motion-Picture Camera Spools (50- to 400-Ft [15- to 120-M] Capacity).

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

Proposed SMPTE Recommended Practices

Two Proposed SMPTE Recommended Practices are published here for a trial period and public review: RP 67, Specifications for Buzz-Track Test Film for 16-mm Motion-Picture Sound Reproducers, Photographic-Type; and RP 68, Specifications for Buzz-Track Test Film for 35-mm Motion-Picture Sound Reproducers, Photographic-Type.

These Recommended Practices are transformations of the American National Standards which specify the test films, PH22.57-1963 and PH22.68-1962 which are being withdrawn, and do not reflect any technical changes.

Proposed Withdrawal of American National Standards

In keeping with the decision to transform into Recommended Practices all standards which specify SMPTE produced test materials, PH22.57-1963, Specifications of 16-mm Buzz-Track Test Films, Photographic Type, and PH22.68-1962, Specifications for Buzz-Track Test Film for 35-mm Motion-Picture Sound Reproducers, Photographic Type, have now been transformed into RP 67 and RP 68 and the parent standards will be withdrawn.

Comments on the practices and withdrawals should be addressed to Alex Alden, Staff Engineer, at Society Headquarters prior to 1 April 1976. If no adverse criticism is received by that date, the Proposed Recommended Practices and Withdrawals will be submitted to the Board of Governors for final approval.

Approved International Standards

The International Organization for Standardization (ISO) approved International Standard ISO 360-1975, Cinematography — Recording and Reproducing Head Gaps for Four Magnetic Sound Records on 35-mm Motion-Picture Film Containing No Picture — Positions and Width Dimensions. The Standard is in complete agreement with American National Standard PH22.108-1974. Copies of all International Standards are sold through the American National Standards Institute, 1430 Broadway, New York, NY 10018.

ISO is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. The International Standard published here was developed by Technical Committee 36 on Cinematography. The work of this committee is administered by the Engineering Department of the SMPTE which functions as the secretariat in ANSI's name. The report of the last meeting of the committee was published in the February 1974 *Journal of the SMPTE*. — Alex E. Alden, *Staff Engineer*

American National Standard
dimensions of projectable image area on 8-mm type R (regular 8) motion-picture film

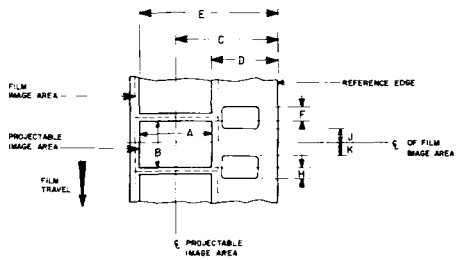
Approved November 20, 1975 Secretariat: Society of Motion Picture and Television Engineers, Inc.

1. Scope

This standard specifies the maximum dimensions of the film image area intended for projection from an 8-mm Type R (regular 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
A	0.172 ref	4.37 ref
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 Appendix.

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

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 American National Standard Dimensions of 8-mm Motion-Picture Camera Aperture Image, PH22.19-1964 (R1969), defines the image area for other important phases of motion-picture operations, and is consistent with this standard under currently acceptable commercial practice.

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 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.

NOTE 4: Film Perforations. Film intended for projection with this image area is normally perforated as specified in American National Standard Dimensions for 16-mm Motion-Picture Film Perforated 8-mm Type R (Regular 8), 2R-1500, PH22.17-1974.

NOTE 5: Print Preparation. Prints conforming to this standard are prepared for use as specified in American National Standard Specifications for Projector Usage of 8-mm Type R (Regular 8) Motion-Picture Film Perforated One Edge, PH22.22-1975.

Appendix

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

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 0.048 in (1.22 mm) nominal.

ANSI PH22.23–1975
Revision of PH22.23-1969

American National Standard
dimensions of projection reels for 8-mm type R (regular 8) motion-picture film

Approved November 20, 1975
Secretariat: Society of Motion Picture and Television Engineers, Inc.

1. Scope

This standard specifies the dimensions for 8-mm Type R (regular 8) motion-picture reels used for projection having film capacities of 50, 100, 200, 400, 600, 800 and 1200 ft (15, 30, 60, 120, 180, 240 and 360 m).

2. Dimensions

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

2.2 The dimensions apply regardless of the material used for construction (See Note 3).

2.3 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 all other protrusions, shall fall between planes as defined by Dimension K. If spring fingers are used to engage the edges of the film, Dimension C shall be measured with the fingers fully expanded.

2.4 Dimension A applies to both flanges.

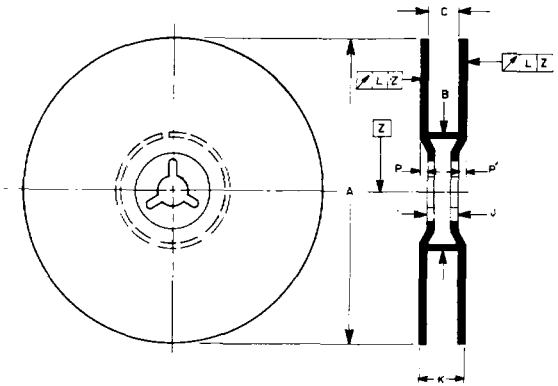
2.5 Dimension J shall apply within a circle of 1.0-in (25-mm) diameter or larger, centered on the spindle hole axis.

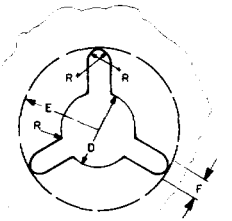
2.6 Dimension L in Table 1 is the total indicator reading on the flanges of the reel at any distance from the reel axis (datum line Z), measured through a complete revolution of the reel. The reel is to be rotated about its axis while being *held against a 1-in (25-mm) diameter circular* reference support or flange of a horizontal spindle. An exception is made and the restricted runout does not apply over the small zone of transition from Dimension J to Dimension K.

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

2.8 For reels of increasing radius or capacity, progressively smaller tolerances for Dimension D are specified in Table 2. This is done because the potential for greater runout and the masses involved increase with diameter, and larger reels require more precise and positive alignment on the spindle.

2.9 *Dimensions P and P' have been established* to ensure symmetry of the recessed area represented by Dimension J. They apply only when Dimension K exceeds Dimension J. They should be measured at the point of departure of Dimension J to the larger Dimension K.





ENLARGED VIEW OF SPINDLE HOLE AREA

Table 1

Nominal Reel Capacity		Dimensions	Inches		Millimeters	
Feet	Meters		Min	Max	Min	Max
50	15	A	2.91	2.95	73.9	74.9
		B	1.25	1.30	31.7	33.0
		L		0.04		1.0
100	30	A	3.90	3.94	99.1	100.1
		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
1200*	360	A	12.23	12.27	310.6	311.7
		B	4.85	4.91	123.2	124.7
		L		0.12		3.0

*See Appendix A5.

Table 2

Dimensions	Inches	Millimeters
C	0.33 $^{+0.06}_{-0.00}$	8.4 $^{+1.5}_{-0.0}$
D (100 ft or less)	0.316 $^{+0.010}_{-0.000}$	8.03 $^{+0.25}_{-0.00}$
(200 ft)	0.316 $^{+0.004}_{-0.000}$	8.03 $^{+0.10}_{-0.00}$
(400 ft or more)	0.316 $^{+0.003}_{-0.000}$	8.03 $^{+0.08}_{-0.00}$
E	0.312 ± 0.005	7.92 ± 0.13
F	0.06 $^{+0.01}_{-0.00}$	1.5 $^{+0.3}_{-0.0}$
J	0.490 $^{+0.00}_{-0.06}$	12.45 $^{+0.0}_{-1.5}$
K	0.56 max	14.2 max
P = P′	0.020 max	0.51 max
R	Maximum is ½ value used for Dimension F	

NOTE 1: For future construction, it is preferred that the flanges of the reel shall have three radial driving slots spaced approximately 120° and conforming to Dimensions E and F, and that the drive slots of each flange shall be aligned. If properly aligned, the reel will fit on a test spindle (gauge) of 0.314-in (7.98-mm) diameter with a radial spindle drive key having a length from the spindle shoulder greater than the width of the reel, Dimension J; a thickness of 0.058 in (1.47 mm) and a height, measured as a radius from the spindle axis, of 0.27 in (6.9 mm). Existing reels with drive slots in only one flange are recognized temporarily.

NOTE 2: Provision should be made for securing the end of the film so that the reel accepts the full width of the film, and that the film will be freely released at the end of its run. If film attachment is provided by a slot in the core, a suitable cutout in the core may be included 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.

NOTE 3: The dimensions were determined for reels made from a dimensionally-stable material such as metal. If the reel or reel hub is made of plastic or other dimensionally-unstable material, the spindle hole diameter, Dimension D, should be adjusted so that at least the minimum dimenison (0.316 in, 8.03 mm) is maintained throughout the normal use range of temperature and relative humidity.

NOTE 4: The International Organization for Standardization has established the minimum diameter of the spindle hole, Dimension D, as 0.317 in (8.05 mm) to ensure satisfactory fit on internationally available 8-mm projector spindles, and to provide for compatibility of the minimum spindle hole diameter for 8-, 16- and 35-mm camera and projector spools and reels. It is, therefore, recommended that USA manufacturers direct future production to the 0.317 in minimum.

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 for information purposes only.)

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

A2. As noted, a spindle shoulder of 1.0 in (25 mm) in diameter is required for the measurement of lateral runout. The wobble of the reel on the projector will be less if a shoulder of this diameter is also incorporated on the projector spindle and provision made to fit the reel tightly to this shoulder. It is expected that projector manufacturers will incorporate a spindle shoulder of at least 0.50 in (12.7 mm) in diameter.

The symbol for runout, ↗ | L | Z | , shown in the figure is in accordance with drafting practices specified in American National Standard for Dimensioning and Tolerancing, Y14.5-1973. The arrow indicates runout of the referenced surface with respect to Datum axis Z and to the limits listed for Dimenion 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 dimensions in this standard. For 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 stipulated in Table 1 is based on a total film thickness (including any magnetic striping or winding allowance) not exceeding 0.006 in (0.15 mm).

A5. Reels of 600-, 800- and 1200-ft capacity are not in common use at this time. Specifications are provided so that a standard will be available should these reels come into use.

ANSI PH22.143—1975
Revision of PH22.143-1965

American National Standard
specifications for length of film on 8-mm type R (regular 8) motion-picture camera spools (25-ft [7.6-m] capacity)

Approved November 20, 1975 Secretariat: Society of Motion Picture and Television Engineers, Inc.

1. Scope and Purpose

1.1 This standard describes the total length and the photographically useful length of raw film supplied on an 8-mm Type R (regular 8) motion-picture camera spool of 25-ft (7.6-m) nominal capacity described in American National Standard Dimensions of Double 8-mm Type R (Regular 8) Motion-Picture Camera Spools (25-Ft [7.6-M] Capacity, PH22.107-1975.

1.2 The purpose of this standard is to provide a uniform basis for the operation of automatic or nonadjustable footage counters in cameras.

2. Length of Film

The total length of film on the spool shall be 33.0 ± 0.5 ft (10.06 ± 0.15 m). A leader and trailer are required to protect the middle portion of the film from fog in loading and unloading. The leader and trailer shall be 4.0 ± 0.3 ft (1.22 ± 0.09 m) in length but these tolerances shall not be used in such a way as to yield less than the nominal 25 ft (7.6 m) useful length for picture taking.

NOTE: Spool capacity is based on a film thickness of approximately 0.006 in (0.15 mm).

ANSI PH22.107–1975
Revision of PH22.107-1964

American National Standard
dimensions of double 8-mm type R (regular 8) motion-picture camera spools (25-ft [7.6-m] capacity)

Approved November 20, 1975

Secretariat: Society of Motion Picture and Television Engineers, Inc.

1. Scope

1.1 The dimensions shown in this standard are for double 8-mm Type R (regular 8) motion-picture film spools with a nominal capacity of 25 ft (7.6 m). These spools are used in cameras of the type in which each roll of film is passed through the camera twice for exposure in accordance with American National Standard Specifications for Camera Usage of Double-Width 8-mm Type R (Regular 8) Motion-Picture Film Perforated Two Edges, PH22.21-1975. The spindle holes in the spool are shown with splines which are intended to assist in assuring correct orientation of the spool in the camera.

1.2 This standard does not specify the relative orientation of the splines in the two spindle holes (or of the core slot).

2. Operation in Camera

2.1 When the spool is on the supply spindle, the flange with the 3-splined spindle hole, flange A (Fig. 1), shall be on the left-hand side (as seen from the lens).

2.2 The half of the film adjacent to the flange with the 3-splined hole, when the spool is on the supply spindle, shall be in line with the camera lens.

2.3 When the spool is on the take-up spindle, the flange with the 4-splined spindle hole, flange B (Fig. 3), shall be on the left-hand side (as seen from the lens).

2.4 When the loaded camera is viewed from the side, with the lens to the left, both the supply and take-up spools shall rotate in a clockwise direction.

3. Dimensions

3.1 The dimensions shall be as given in the figures and table.

3.2 If rivet heads or other fastening devices extend beyond the outer surface of the flange, they shall lie within the zone indicated by diameters K and L (Fig. 3). It is not intended that this standard prescribe the nature or number of these fastening devices.

3.3 Dimension H_1 (Fig. 2) is the space between the flanges outside the core. It is measured from a point on the inner surface of one flange to the corresponding point on the opposite flange. The measurement shall be made with an instrument which does not distort the flanges.

3.4 Dimension H_2 (Figs. 2, 4) is the space between the flanges just inside the core. This space shall be sufficient to permit maximum width film of 0.630 in (16.00 mm) to fit freely into the film slot. The space between the inner surfaces of the splines, Dimension H_3 (Fig. 4), within a diameter of 0.384 in (9.75 mm), Dimension D (Figs. 1, 3), shall not be less than 0.622 in (15.80 mm).

3.5 Dimension J_1 (Fig. 4) is the overall thickness of the spool within a 0.615-in (15.62-mm) diameter zone at the center of each flange.

3.6 When the spool is rotated on an accurate, tight-fitting spindle, the maximum outward deviation from the intended plane of rotation for any point on the flange outside the 0.615-in (15.62-mm) diameter zone shall not exceed 0.015 in (0.38 mm). This 0.015-in (0.38-mm) tolerance includes fastening devices, variations in flange thickness, flatness and lateral runout of the flanges.

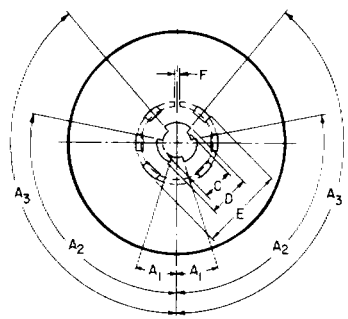


Figure 1

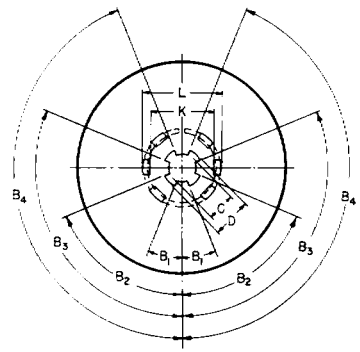


Figure 3

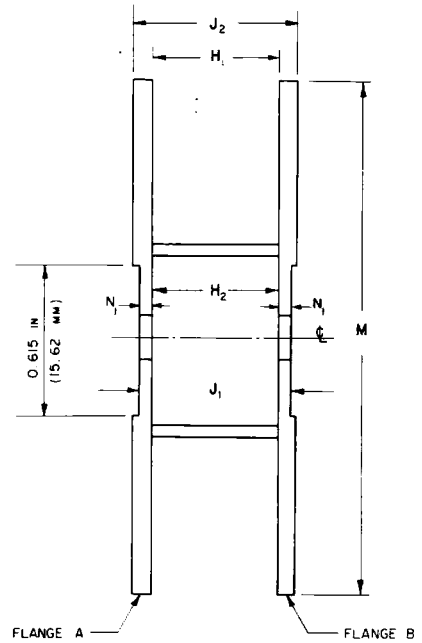


Figure 2

Dimensions	Degrees	Dimensions	Inches	Millimeters
A_1	19¼ ± 1	C (bore for spindle)	0.288 + 0.007 — 0.004	7.32 + 0.18 — 0.10
A_2	100¾ ± 1	D	0.384 min	9.75 min
		E (core diameter)	0.750 ± 0.015	19.05 ± 0.38
A_3	139¼ ± 1	F	0.035 ± 0.020	0.89 ± 0.51
		H_1 (see 3.3)	0.631 min	16.03 min
		H_2 (see 3.4)	0.630 min	16.00 min
B_1	19¼ ± 1	H_3 (see 3.4)	0.622 min	15.80 min
		J_1 (see 3.5)	0.720 ± 0.020	18.29 ± 0.51
B_2	70¾ ± 1	J_2 (see 3.7)	0.760 max	19.30 max
		K (see 3.2)	0.615 min	15.62 min
B_3	109¼ ± 1	L (see 3.2)	0.812 max	20.62 max
		M	2.031 ± 0.015	51.59 ± 0.38
B_4	160¾ ± 1	N_1 (see 3.9)	0.038 min	0.97 min
		N_2 (see A4)	0.025 min	0.64 min

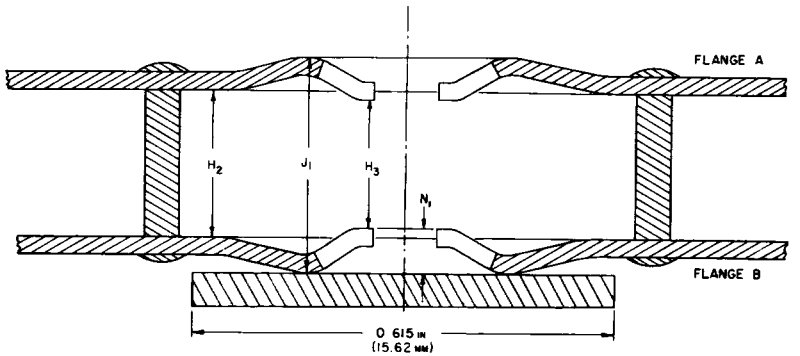
The intended plane of rotation is defined as a plane perpendicular to the axis of the spindle and coincident with the surface of a flat support centered on the spindle axis and having a diameter of 0.395 in (10.03 mm).

3.7 Dimension J_2 (Fig. 2) is the overall thickness of the spool outside the 0.615-in (15.62-mm) zone which is centered on each flange. J_2 is a composite dimension covering all of the spool characteristics described in 3.6.

3.8 Dimension F (Fig. 1) specifies the width of the slot in the core for attaching the end of the film.

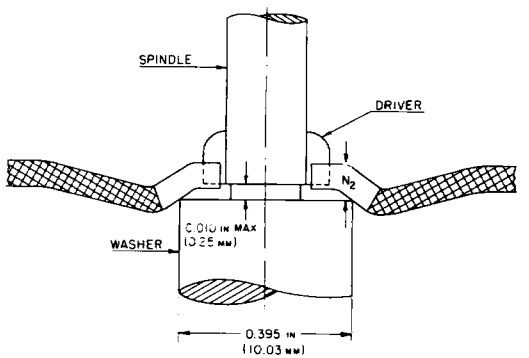
3.9 Dimension N_1 (Fig. 4) is the effective thickness of the 4-splined webs which engage most camera drivers. It is measured from a plane perpendicular to the axis of the spindle and coincident with the surface of a flat support having a diameter of 0.615 in (15.62 mm).

NOTE: Spool capacity is based on a film thickness of approximately 0.006 in (0.15 mm).



ENLARGED SECTION FOR DIMENSION N_1

Figure 4



SPINDLE AND SPOOL RELATIONSHIPS

Figure 5

Appendix

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

A1. Figure 2 is in the nature of a "space diagram," that is, its outside dimensions represent the space that was reliably available for film spools in all 8-mm cameras on the market at the time this standard was drafted. Film spools will not necessarily look much like this diagram, but there should be no operational interference between a film spool and a current 8-mm motion-picture camera as long as the spools are manufactured with dimensions that fall within the indicated limits. Since the maximum value of H_1 (Fig. 2) does not affect the interchangeability of the spool, no limit is specified. However, the maximum is an important quality characteristic and it is expected that every spool manufacturer will hold H_1 within the narrowest limits that his design and manufacturing process permits.

A2. The angular dimensions and tolerances for the width of the tongues in the splined spindle holes are in accord with current practice for new spools and with the requirements of existing cameras. However, there are in existence and use spools of older design with tongues slightly wider by 1 to 2° on each edge of each tongue.

A3. Camera spindles should allow for a radius of not more than 0.015 in (0.38 mm) at each corner of each tongue.

A4. Figures 4 and 5 represent special case examples of how the needs of certain dimensions critical to proper performance in some cameras can be met by appropriate shaping or embossing of the spool stock if spools are made of a thin-gage material (much less than 0.040 in, 1.02 mm). For a number of years, the effective thickness of the 4-splined webs which engage most camera drivers, Dimension N_1 (Fig. 4), was the stock thickness, nominally 0.040 in (1.02 mm). Recently, spools have been made from thinner materials which require embossing to maintain Dimension J_1 (Fig. 4) and to enable the splines to engage the camera drivers, some of which have a clearance approaching 0.025 in (0.64 mm).

As outlined in 3.9, Dimension N_1 (Fig. 4) is normally measured to a flat support having a diameter of 0.615 in (15.62 mm). Many cameras have spool support washers with diameters considerably less than 0.615 in (15.62 mm). In order to assure proper operation with such cameras, the dimension from the inside of the 4-splined flange to the plane of a flat support 0.395 in (10.03 mm) in diameter centered on the flange, Dimension N_2 (Fig. 5), shall be at least 0.025 in (0.64 mm).

The enlarged section for Dimension N_1 (Fig. 4) illustrates one method of shaping the splines in the 4-splined flange so they will engage the camera driving spindle when the flange thickness is less than 0.025 in (0.64 mm).

Camera spindles engaging the 4-splined flange of the spool should not have a gap greater than 0.010 in (0.25 mm) between the bottom of the spindle driving spline and the top of the spindle shoulder or washer that supports the spool.

It is recommended that, in newly designed cameras, the diameter of the supporting spindle shoulder or washer be not less than 0.500 in (12.70 mm) and no greater than 0.615 in (15.62 mm).

ANSI PH22.173—1975
Revision of PH22.173-1969

American National Standard dimensions for double 8-mm type R (regular 8) motion-picture camera spools (100-ft [30-m] capacity)

Approved November 20, 1975 Secretariat: Society of Motion Picture and Television Engineers, Inc.

1. Scope

The dimensions shown in this standard are for for double 8-mm Type R (regular 8) motion-picture film spools with a nominal capacity of 100 ft (30 m). These spools are used in cameras of the type in which each roll of film is passed through the camera twice for exposure in accordance with American National Standard Specifications for Camera Usage of Double-Width 8-mm Type R (Regular 8) Motion-Picture Film Perforated Two Edges, PH22.21-1975. The spindle holes in the spool are shown with splines which are intended to assist in assuring correct orientation of the spool in the camera.

2. Dimensions

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

2.2 If rivet heads or other fastening devices extend beyond the outer surfaces of the flanges, they shall lie at a larger diameter than the minimum K diameter and within the boundaries defined by other portions of the Volume of Rotation Diagram.

2.3 Dimension H_2 is the space between the flanges inside the core, but outside the D diameter zone.

2.4 Dimension H_3 applies within a diameter of 0.38 in (9.7 mm) centered on the spindle hole of each flange.

2.5 Dimension J represents the thickness of the spool within the K diameter area, which is centered on the spindle hole axis of each flange.

2.6 A reference plane of rotation for each flange is defined by a plane perpendicular to the axis of the spindle and coincident with the surface of a flat, 0.615-in (15.62-mm) diameter support, which is in contact with the flange and centered on the spindle hole axis of the flange.

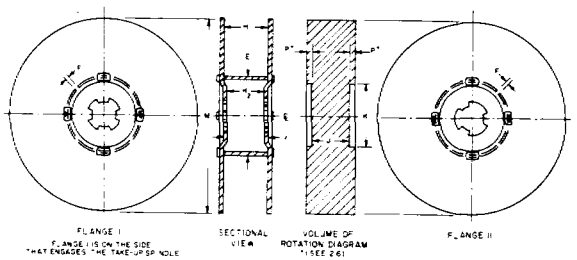
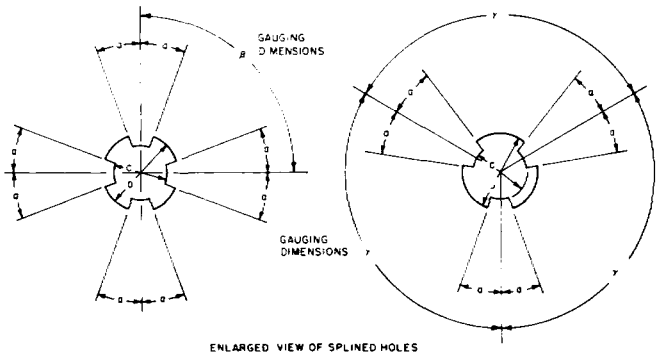
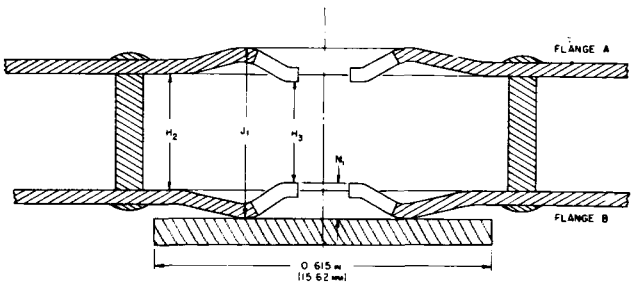


Figure 1



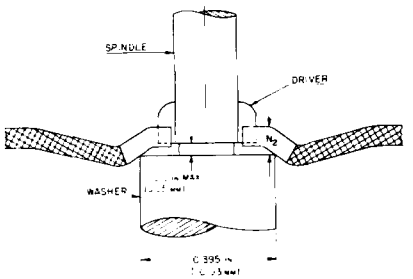
ENLARGED VIEW OF SPLINED HOLES

Figure 2



ENLARGED SECTION FOR DIMENSION N_1

Figure 3



SPINDLE AND SPOOL RELATIONSHIPS

Figure 4

Dimensions	Inches	Millimeters
C	0.287 $^{+\ 0.008}_{-\ 0.000}$	7.29 $^{+\ 0.20}_{-\ 0.00}$
D	0.384 min	9.75 min
E (See 2.9)	0.750 ± 0.015	19.05 ± 0.38
F	0.035 ± 0.020	0.89 ± 0.51
H_1	0.632 $^{+\ 0.014}_{-\ 0.000}$	16.05 $^{+\ 0.36}_{-\ 0.00}$
H_2	0.630 min	16.00 min
H_3	0.622 min	15.80 min
J	0.73 $^{+\ 0.00}_{-\ 0.02}$	18.5 $^{+\ 0.0}_{-\ 0.5}$
K	0.615 min	15.62 min
M	3.62 $^{+\ 0.00}_{-\ 0.04}$	91.9 $^{+\ 0.0}_{-\ 1.0}$
N_1	0.038 min	0.97 min
N_2	0.025 min	0.64 min
P (See 2.6)	0.020 max	0.51 max
	Degrees	
α	20 + 0—1	
β	90	
γ	120	

Dimension P is the distance measured outwardly from the reference plane of rotation to the farthest plane of rotation described by any point on the flange outside the K diameter zone when the spool is rotated on an accurate, tight-fitting spindle. This includes rivets or other fastening devices, variations in flange thickness, flatness and lateral runout of the flanges. (The reference plane from which P is measured is not necessarily coincident with all points within the K diameter zone but only with those which are in contact with the reference support which has a diameter smaller than K.)

Selection of a value for Dimension P is dependent upon the thickness of the material used for the flanges. According to the flange material thickness, (1) the K diameter area may be depressed (with P greater than zero), or (2) the outside surfaces of the flanges may be flat from the spindle hole area to the periphery (with P equal to zero), or (3) in the case of flanges made of very thin material, the K diameter area may be raised rather than recessed (effectively, P less than zero).

2.7 The maximum effective thickness of spools (including all the characteristics mentioned in 2.6) outside the K diameter area has not been stated because it is a function of a spool's specific J value between the 0.615-in (15.62-mm) diameter reference zones on each flange. The largest overall effective thickness, however, will be J max + 2P max = 0.77 in (19.6 mm).

2.8 The eccentricity of the core with respect to the spindle hole axis should not exceed a total radius variation (total indicator reading) of 0.03 in (0.8 mm).

2.9 A dimension of 1.26 ± 0.02 in (32.0 ± 0.5 mm) should be considered for the diameter of the core. All future design should be directed toward this dimension to aid in the design of metering devices.

2.10 When thin material is used for flanges, Appendixes A3 and A4 should be taken into account.

2.11 Dimension F (Fig. 1) specifies the width of the slot in the core for attaching the end of the film.

NOTE 1: When the loaded camera is viewed from the side, with the lens to the left, and the bottom of the housing downward (regardless of whether or not the spool-loading mechanism is visible from that side), both the supply and the take-up spools rotate in a clockwise direction.

NOTE 2: Flanges should be opaque and their surfaces should have low reflectance characteristics.

NOTE 3: Spool capacity is based on a film thickness of approximately 0.006 in (0.15 mm).

Appendix

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

A1. It is expected that every spool manufacturer will hold H_1 within the narrowest limits that his design and manufacturing process permits.

A2. Camera spindles should allow for a radius of not more than 0.015 in (0.38 mm) at each corner of each tongue.

A3. Figures 3 and 4 represent special examples of how the needs of certain dimensions critical to proper performance in some cameras can be met by appropriate shaping or embossing of the spool stock if spools are made of a thin-gage material (much less than 0.040 in, 1.02 mm). For a number of years, the effective thickness of the 4-splined webs which engage most camera drivers, Dimension N_1 was the stock thickness, nominally 0.040 in (1.02 mm). Recently, spools have been made from thinner materials which required embossing to maintain Dimension J in order to enable the splines to engage the camera drivers, some of which have a clearance approaching 0.025 in (0.64 mm). Dimension N_1 is normally measured to a flat support having a diameter of 0.615 in (15.62 mm). Many cameras have spool support washers with diameters considerably less than 0.615 in (15.62 mm). In order to assure proper operation with such cameras, the dimension from the inside of the 4-splined flange to the plane of a flat support 0.395 in (10.03 mm) in diameter centered on the spindle hole axis of the flange, Dimension N_2 (Fig. 4), shall be at least 0.025 in (0.64 mm).

The enlarged section for Dimension N_1 (Fig. 3) illustrates one method of shaping the splines in the 4-splined flange so they will engage the camera driving spindle when the flange thickness is less than 0.025 in (0.64 mm).

A4. Camera spindles engaging the 4-splined flange of the spool should not have a gap greater than 0.010 in (0.25 mm) between the bottom of the spindle driving spline and the top of the spindle shoulder or washer that supports the spool.

It is recommended that, in newly designed cameras, the diameter of the supporting spindle shoulder or washer be not less than 0.500 in (12.70 mm) and no greater than 0.615 in (15.62 mm).

A5. To facilitate the distinction between a roll of film which has been exposed along only the first side (one-half width) and a roll of film which has not been exposed at all or has been exposed along both the first and second sides (both one-half widths), it is recommended that the flanges of spools be marked prominently as follows:

	Raw Stock Spools Numeral	*Camera Accessory Spools* Numeral and/or Phrase
Flange with 4-splined spindle hole	1	2 No Phrase (or numeral) necessary if phrase shown below is included on other flange.
Flange with 3-splined spindle hole	2	1 Phrase or equivalent as follows: Film on this spool is half exposed.

Attention is called to the fact that if a camera accessory spool wound with the first exposure run of film is removed from the camera, identification of the film exposure status is more obvious if the spool has been marked with a phrase instead of (or in addition to) numerals. Some camera accessory spools have identical 4-splined holes in each flange. (Supply spindles of such cameras have one small lug or none.) Both flanges of such accessory spools should be marked with the phrase suggested above. To ensure proper orientation for the second exposure in this case, in addition to the phrase, it is helpful to have the numeral 1 on one flange and the numeral 2 on the other.

A6. Neither this document nor American National Standard PH22.21-1975 restrict the perforation type of double-perforated 8-mm film that can be supplied with the spools. Generally, these spools are used only with conventional 8-mm motion-picture films, i.e., those cut and perforated 16-mm 2R-1500. Double super 8 motion-picture films (16-mm 2R-1664 or 1667) are usually supplied on 16-mm camera spools having square spindle holes aligned as specified in American National Standard Dimensions for 16-mm Daylight-Loading Motion-Picture Camera Spools (50- to 400-Ft [15- to 120-M] Capacity), PH22.174-1975).

ANSI PH22.174–1975
Revision of PH22.174-1969

American National Standard
dimensions for 16-mm daylight-loading motion-picture camera spools (50- to 400-ft [15- to 120-m] capacity)

Approved November 20, 1975 Secretariat: Society of Motion Picture and Television Engineers, Inc.

1. Scope

1.1 This standard specifies the dimensions for 16-mm daylight-loading motion-picture camera spools having capacities from 50- to 400-ft (15- to 120-m) of film.

1.2 This standard further specifies the configuration of the positioning of the spindle holes in the two flanges. These shall be identified as Styles 1, 2 and 3 (See Fig. 2).

2. Dimensions

The dimensions shall be as specified in Figures 1 and 2 and Tables 1 and 2.

3. Spindle Hole Alignment

In Styles 2 and 3, the alignment of the sides of the squares in the two flanges shall be such that a test bar 0.316 in (8.03 mm) square may be passed completely through the spool. The corner keyways in the two flanges of Style 2 shall be aligned with each other.

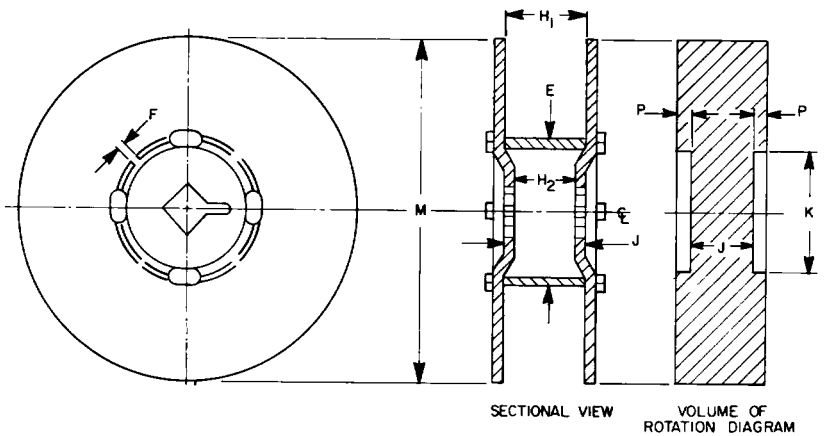
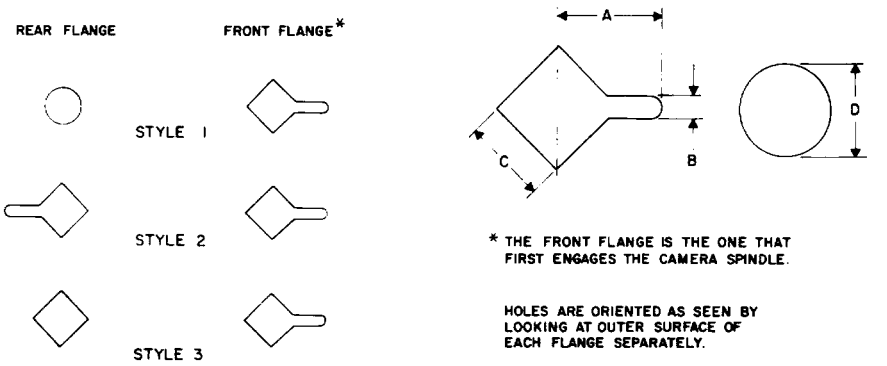


Figure 1



* THE FRONT FLANGE IS THE ONE THAT FIRST ENGAGES THE CAMERA SPINDLE.

HOLES ARE ORIENTED AS SEEN BY LOOKING AT OUTER SURFACE OF EACH FLANGE SEPARATELY.

Figure 2

Table 1

Nominal Spool Capacity

Dimensions	Feet	Meters	Inches	Millimeters
E	50	15	1.26 ± 0.02	32.0 ± 0.5
	100	30	1.26 ± 0.02	32.0 ± 0.5
	200	60	1.26 ± 0.02	32.0 ± 0.5
	400	120	2.12 ± 0.02	53.8 ± 0.5
K	50	15	1.00 min	25.4 min
	100	30	1.00 min	25.4 min
	200	60	1.00 min	25.4 min
	400	120	1.5 min	38 min
M	50	15	2.81 + 0.00 − 0.04	71.4 + 0.0 − 1.0
	100	30	3.62 + 0.00 − 0.04	91.9 + 0.0 − 1.0
	200	60	4.96 + 0.00 − 0.04	126.0 + 0.0 − 1.0
	400	120	6.65 + 0.00 − 0.04	169.0 + 0.0 − 1.0

Table 2

Dimensions Common to Spools in Table 1

	Dimensions	Inches	Millimeters
A	Keyway depth	0.30 $^{+\ 0.04}_{-\ 0.00}$	7.6 $^{+\ 1.0}_{-\ 0.0}$
B	Keyway width	0.12 $^{+\ 0.02}_{-\ 0.00}$	3.0 $^{+\ 0.5}_{-\ 0.0}$
C	Side of square spindle hole	0.317 $^{+\ 0.006}_{-\ 0.000}$	8.05 $^{+\ 0.15}_{-\ 0.00}$
D	Spindle hole diameter	0.317 $^{+\ 0.006}_{-\ 0.000}$	8.05 $^{+\ 0.15}_{-\ 0.00}$
F	Film slot (See 4.1)	0.03 $^{+\ 0.03}_{-\ 0.00}$	0.8 $^{+\ 0.8}_{-\ 0.0}$
H_1	At periphery	0.632 $^{+\ 0.014}_{-\ 0.000}$	16.05 $^{+\ 0.36}_{-\ 0.00}$
H_2	Distance between flanges at spindle holes	0.630 min	16.00 min
J	Overall thickness at spindle holes	0.73 $^{+\ 0.00}_{-\ 0.02}$	18.5 $^{+\ 0.0}_{-\ 0.5}$
P	(See Note 6)	0.020 max	0.51 max

4. Specifications

4.1 Dimension F represents a slot in the spool core for attaching film. Its sides shall be straight, parallel, and 0.028 to 0.059 in (0.71 to 1.50 mm) apart. It is permissible for the slot sides to diverge in the center portion of the slot. Any divergence shall not be greater than one half the width of the slot.

4.2 Dimension J is the thickness of the spool within the K diameter zone, which is centered on the spindle hole axis of each flange.

4.3 The eccentricity of the core with respect to the spindle hole axis shall not exceed a total radius variation (total indicator reading) of 0.030 in (0.76 mm) for all spool sizes.

NOTE 1: The metric values in the tables of dimensions are converted from the inch values in accordance with conversion principles outlined in American National Standard Metric Practice Guide, Z210.1-1973.

NOTE 2: The Style 2 configuration of spindle holes is recommended as the preferred standard for future design.

NOTE 3: Flanges shall be opaque and their inner surfaces shall have a low-reflectance characteristic.

NOTE 4: If the spool or spool hub is made from plastic or other dimensionally-unstable material, spindle hole Dimensions C and D shall be adjusted so that at least the minimum dimension is maintained throughout the normal use range of temperature and humidity.

NOTE 5: Rivet heads or other fastening devices, which extend beyond the outer surface of the flange, shall lie outside the K diameter zone but within the boundaries defined by the Volume of Rotation Diagram (i.e., 0.770 in [19.56 mm] max).

NOTE 6: A reference plane of rotation for each flange is defined by a plane perpendicular to the axis of the spindle and coincident with the surface of a flat 0.590 in (14.99 mm) diameter support in contact with flange and centered on the spindle hole axis of the flange. Dimension P is the distance measured outwardly from this reference plane of rotation to the farthest plane of rotation generated by any point on the flange outside the K diameter zone when the spool is rotated on an accurate, tight-fitting spindle.

NOTE 7: The maximum effective thickness of spools (including all the characteristics mentioned in Note 6) outside the K diameter zone has not been stated because it is a function of a spool's specific J value between the 0.590 in (14.99 mm) diameter reference zones on each flange. The largest such overall effective thickness, however, will be J max + 2P max = 0.770 in (19.56 mm).

NOTE 8: There may be other cutouts or holes in the hub area of the flanges within the limits of Dimension K, provided the spool remains nominally in dynamic balance.

Cinematography — Recording and reproducing head gaps for four magnetic sound records on 35 mm motion-picture film containing no picture — Positions and width dimensions

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies the location and dimensions of the sound record and the recording and reproducing gaps for recording four magnetic sound records on 35 mm motion-picture film. It also relates the placement of the magnetic coating on the film to the direction of film travel.

2 REFERENCES

ISO 491, *Cinematography — 35 mm motion-picture film — Cutting and perforating dimensions.*

ISO 1189, *Cinematography — Recorded characteristic for magnetic sound records on 35 mm motion-picture film — Specifications.*

3 LOCATION AND DIMENSIONS

The location and dimensions of the four recording and reproducing head gaps shall be as shown in the figure and given in the table.

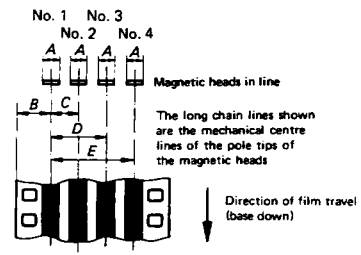
4 MAGNETIC COATING

With the direction of film travel as shown in the figure, the magnetic coating shall be on the upper face of the film base.

5 ALIGNMENT OF HEADS

The recording or reproducing gaps in the magnetic head assemblies shall be in line at an angle of 90° ± 5′ to the direction of film travel.

Dimension	mm	in
A	$3{,}8\ ^{+\ 0{,}1}_{\ 0}$	$0.150\ ^{+\ 0.004}_{\ 0}$
B	7,9 ± 0,05	0.314 ± 0.002
C	6,4 ± 0,05	0.250 ± 0.002
D	12,8 ± 0,05	0.500 ± 0.002
E	19,2 ± 0,05	0.750 ± 0.002



NOTE — The metric dimensions in the table are based upon the practice of countries using the metric system, and similarly the inch dimensions follow the practice of those countries using the inch system.

In some instances, the values are not exact conversions; the differences are small and magnetic head assemblies made to either system of dimensions will, for all practical purposes, be interchangeable.

PROPOSED

SMPTE RECOMMENDED PRACTICE — RP 67

Specifications for Buzz-Track Test Film for 16-mm Motion-Picture Sound Reproducers, Photographic-Type

1. *Scope*

This recommended practice specifies a test film for checking the lateral position of the sound scanning beam in 16-mm motion-picture photographic sound reproducers.

2. *Test Film*

2.1 The test film shall have originally recorded 300- and 1000-Hz signal tracks on opposite sides of the central exposed strip as shown in the figure.

2.2 The position of the tracks shall be in accordance with the dimensions given in the table.

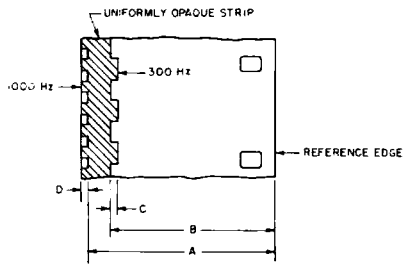
2.3 The central exposed strip and the exposed portions of the two signal tracks shall have a density of 1.0 + 0.4 — 0.0.

3. *Film Stock*

The film stock shall be splice-free, of the low-shrinkage, safety type in compliance with American National Standard Specifications for Motion-Picture Safety Film, PH22.31-1967 (R1973), and cut and perforated in accordance with long-pitch dimensions specified in American National Standard Dimensions for 16-mm Motion-Picture Film Perforated 1R, PH22.109-1974.

4. *Identification*

Each test film shall be identified by a suitable identification marking. This marking shall be printed lengthwise in the picture area and the spacing between consecutive titles shall be approximately 12 in (30 cm).



Dimensions	Inches	Millimeters
A	0.6060 + 0.0 — 0.0005	15.392 + 0.0 — 0.013
B	0.5340 + 0.0005 — 0.0	13.564 + 0.013 — 0.0
C	0.022 min	0.56 min
D	0.022 min	0.56 min

NOTE: A test film conforming to this practice is available from the Society of Motion Picture and Television Engineers.

PROPOSED

SMPTE RECOMMENDED PRACTICE — RP 68

Specifications for Buzz-Track Test Film for 35-mm Motion-Picture Sound Reproducers, Photographic-Type

1. *Scope*

This recommended practice specifies a test film for checking the lateral position of the sound scanning beam in 35-mm motion-picture photographic sound reproducers.

2. *Test Film*

2.1 The test film shall have originally recorded 300- and 1000-Hz signal tracks on opposite sides of the central exposed strip as shown in the figure.

2.2 The position of the tracks shall be in accordance with the dimensions given in the table.

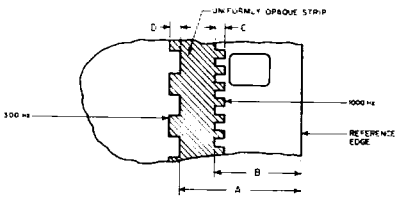
2.3 The central exposed strip and the exposed portions of the two signal tracks shall have a density of 1.0 + 0.4 — 0.0.

3. *Film Stock*

The film stock shall be splice-free, of the low-shrinkage, safety type in compliance with American National Standard Specifications for Motion-Picture Safety Film, PH22.31-1967 (R1973), and cut and perforated in accordance with long-pitch dimensions specified in American National Standard Dimensions for 35-mm Motion-Picture Film Perforated KS, PH22.139-1974.

4. *Identification*

Each test film shall be identified by a suitable identification marking. This marking shall be printed lengthwise in the picture area and the spacing between consecutive titles shall be approximately 12 in (30 cm).



Dimensions	Inches	Millimeters
A	0.287 + 0.000 — 0.001	7.29 + 0.00 — 0.03
B	0.201 + 0.001 — 0.000	5.11 + 0.03 — 0.00
C	0.012 min	0.30 min
D	0.012 min	0.30 min

NOTE: A test film conforming to this practice is available from the Society of Motion Picture and Television Engineers.