standards and recommended practices

Approved American National Standards

On 25 November 1974, the American National Standards Institute approved three new standards: PH22.17-1974, Dimensions for 16-mm Motion-Picture Film Perforated 8-mm Type R (Regular 8), 2R-1500; PH22.169-1974, Dimensions for 35-mm Motion-Picture Film Perforated 8-mm Type S (Super 8), 2R-1664 (1-0); and PH22.171-1974, Dimensions for 35-mm Motion-Picture Film Perforated 16-mm, 3R (1-3-0). The documents have been editorially modified to conform with other similar standards and do not reflect a change in specifications.

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.

Draft American National Standard

Draft American National Standard C98.14, Dimensions of Plastic Reels for ½-Inch Video Magnetic Tape, is published here for a trial period and public review. The proposal specifies dimensions for plastic reels designed for home, industrial and institutional video recording applications.

Comments should be addressed to Alex E. Alden, Staff Engineer, at Society Headquarters prior to 1 June 1975. The proposal has been submitted to American National Standards Committee C98. All comments received through *Journal* publication will be reviewed before conclusion of action by that Committee.

Approved International Standards

The International Organization for Standardization (ISO) approved three International Standards, the technical content of which is published here for information. ISO 1189-1975, Cinematography — Recorded Characteristics for Magnetic Sound Records on 35-mm Motion-Picture Film — Specifications, and ISO 1753-1975, Cinematography — Recording and Reproducing Head Gaps for Six-Track Magnetic Sound Records on 35-mm Motion-Picture Film Containing No Picture — Positions and Width Dimensions, are in complete agreement with USA practices although there are no comparable American National Standards. ISO 3025-1974, Cinematography — Motion-Picture Camera Cartridge, 8-mm Type S, Model II — Film Load Position, is in complete agreement with Draft American National Standard PH22.189, now being considered by the PH22 committee.

Complete copies of all International Standards are available from 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.

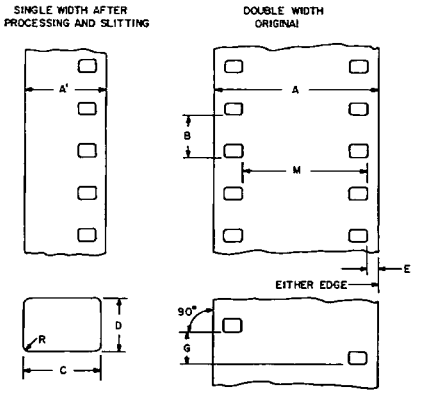
The International Standards published here were developed by Technical Committee 36 on Cinematography. The work of this Committee is administered by the Engineering Department of the SMPTE which functions as the Secretariat in ANSI's name. A report of the last meeting of the Committee was published in the February 1974 *Journal of the SMPTE*. The next meeting is scheduled for the spring of 1976 in Paris, France. — Alex E. Alden, *Staff Engineer*

American National Standard dimensions for 16-mm motion-picture film perforated 8-mm type R (regular 8), 2R-1500

Approved November 25, 1974 Secretariat: Society of Motion Picture and Television Engineers, Inc.

1. Scope

This standard specifies the cutting and perforating dimensions for 16-mm motion-picture film with two rows of 8-mm Type R (regular 8) perforations and a perforation pitch of 0.1500 in (3.810 mm). The width of the 8-mm strip after processing and slitting is also specified.



	Dimensions	Inches	Millimeters
A	Film width	0.628 ± 0.001	15.95 ± 0.03
A'	Film width after slitting	0.314 ± 0.002	7.98 ± 0.05
B	Perforation pitch	0.1500 ± 0.0005	3.810 ± 0.013
C	Perforation width	0.0720 ± 0.0004	1.829 ± 0.010
D	Perforation height	0.0500 ± 0.0004	1.270 ± 0.010
E	Edge to perforation	0.0355 ± 0.0020	0.902 ± 0.051
G	Perforation misalignment	0.001 max	0.03 max
L	100 consecutive perforation pitches	15.000 ± 0.015	381.00 ± 0.38
M	Lateral perforation displacement	0.485 ± 0.001	12.32 ± 0.03
R	Radius of perforation fillet	0.010 ± 0.001	0.25 ± 0.03

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 (R1973).

2.3 Except for Dimension A', the dimensions apply at the time of cutting and perforating for film adjusted to a temperature of 23 ± 1°C (nominally converted to 73 ± 2°F) and a relative humidity of 50 ± 2 percent. The manufacturer may indicate other nominal temperature and humidity conditions under which the dimensions apply. Dimension A' applies immediately after slitting.

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, or 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 Metric Practice Guide, Z210.1-1973.

Appendix

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

A1. The user is reminded that, as a plastic, film can change dimensions temporarily due to moisture or temperature, or permanently due to solvent loss or strain effect.

A2. 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.

A3. For historical background on the development of this standard, refer to A. J. Miller and A. C Robertson, "Motion-picture film—its size and dimensional characteristics," Jour. SMPTE, 74: 3-11, Jan. 1965

ANSI PH22.169–1974
Revision of PH22.169-1969

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

Approved November 25, 1974

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

1. Scope

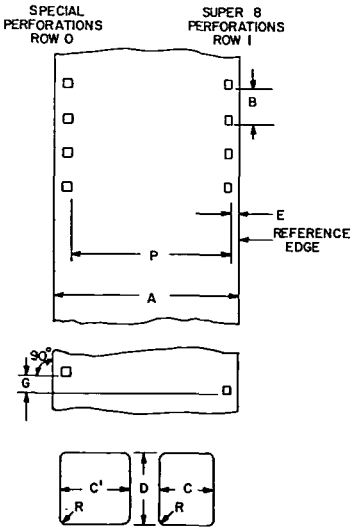
This standard specifies the cutting and perforating dimensions for 35-mm motion-picture film with one row of 8-mm Type S (super 8) perforations and one row of special perforations having a perforation pitch of 0.1664 in (4.227 mm). The film stock described in this standard is intended for use as an intermediate 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 (R1973).

2.3 The dimensions apply at the time of cutting and perforating for film adjusted to a temperature of 23 ± 1°C (nominally converted to 73 ± 2°F) and a relative humidity of 50 ± 2 percent. The manufacturer may indicate other nominal temperature and humidity conditions under which the dimensions apply.



	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'	Special 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 misalignment	0.0015 max	0.038 max
L	100 consecutive perforation pitches	16.640 ± 0.017	422.66 ± 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

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, or 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 Metric Practice Guide, Z210.1-1973. The metric conversion of Dimension A is purposely chosen and shown to three decimal places to prevent the maximum width dimension from exceeding 35 mm.

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 special row of perforations has a lesser edge-to-perforation spacing relative to the row of super 8 perforations. The perforations in the special row also are larger than the latter.

Appendix

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

A1. The user is reminded that, as a plastic, film can change dimensions temporarily due to moisture or temperature, or permanently due to solvent loss or strain effect.

A2. Film for positive use has a longitudinal pitch 0.2 percent longer than its companion negative. Shrinkage of the negative during aging and processing prior to printing will generally not exceed 0.2 percent. Thus, the negative stock is expected to be 0.3 ± 0.1 percent shorter than the positive. This difference will minimize slippage between the two on the 12-inch (305-mm) circumference sprocket of the printer, assuming a film thickness of 0.0055 to 0.0065 in (0.140 to 0.165 mm).

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.

A4. For historical background on the development of this standard, refer to A. J. Miller and A. C. Robertson, "Motion-picture film—its size and dimensional characteristics," Jour. SMPTE, 74: 3-11, Jan. 1965.

ANSI PH22.171–1974
Revision and consolidation of PH22.170-1968 and PH22.171-1968

American National Standard dimensions for 35-mm motion-picture film perforated 16-mm, 3R (1-3-0)

Approved November 25, 1974 Secretariat: Society of Motion Picture and Television Engineers, Inc.

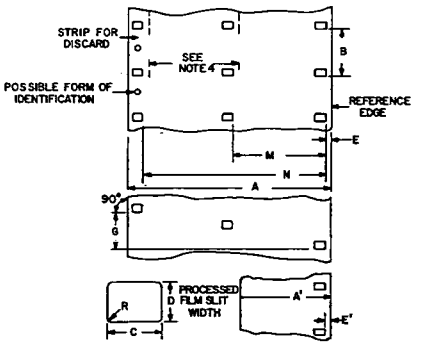
1. Scope

This standard specifies the cutting and perforating dimensions for 35-mm motion-picture film with 16-mm perforations in positions 1-3-0 and a perforation pitch of either 0.2994 or 0.3000 in (7.605 or 7.620 mm). The width of the 16-mm strip after processing and slitting is also specified.

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 (R1973).



	Dimensions	Inches	Millimeters
A	Film width	1.377 ± 0.001	34.975 ± 0.025
A′	Film width after processing and slitting	0.627 ± 0.002	15.93 ± 0.05
B	Perforation pitch (long)	0.3000 ± 0.0004	7.620 ± 0.010
B′	Perforation pitch (short)	0.2994 ± 0.0004	7.605 ± 0.010
C	Perforation width	0.0720 ± 0.0004	1.829 ± 0.010
D	Perforation height	0.0500 ± 0.0004	1.270 ± 0.010
E	Reference edge to first perforation row	0.0355 ± 0.0020	0.902 ± 0.051
E′	Edge to perforation after processing and slitting	0.0355 ± 0.0020	0.902 ± 0.051
G	Perforation misalignment	0.001 max	0.03 max
L	100 consecutive perforation pitches	30.00 ± 0.03	762.0 ± 0.8
L′	100 consecutive perforation pitches	29.94 ± 0.03	760.5 ± 0.8
M	Reference edge side of first perforation row to second perforation row	0.628 ± 0.001	15.95 ± 0.03
N	Reference edge side of first perforation row to third perforation row	1.234 ± 0.001	31.34 ± 0.03
R	Radius of perforation fillet	0.010 ± 0.001	0.25 ± 0.03

2.3 Except for Dimensions A′ and E′, the dimensions apply at the time of cutting and perforating for film adjusted to a temperature of 23 ± 1°C (nominally converted to 73 ± 2°F) and a relative humidity of 50 ± 2 percent. The manufacturer may indicate other nominal temperature and humidity conditions under which the dimensions apply. Dimensions A′ and E′ apply immediately after slitting.

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, or the perforation pitch without the decimal point.

The numerals (1-3-0) have been added to the title of this standard to specify how the rows of perforations are placed on the film. This designation is necessary only when the film stock is wider than its end use and more than one combination of perforation rows is possible. For 16 mm-type perforations on 35 mm-width film, a maximum of four usable rows of perforations is possible. The perforation rows shall be numbered starting at the reference edge. The reference edge is the edge nearest to that row of perforations which is retained in one of the 16 mm strips that may be generated by appropriate slitting of the parent 35 mm film. A row of perforations which is discarded will always be given the number 0. Negative or intermediate films which are not slit may contain a 0-numbered row of perforations if that perforated row corresponds to the discard row of perforations on the subsequent print stock. For all films with non-symmetrical perforation rows, there could be two different windings for the same numbered rows of perforations. Film perforated 1-0 would be 1-0 regardless of winding, but depending on the location of the reference edge, the winding would be A or B, according to American National Standard Designation of A and B Windings for Motion-Picture Raw Stock, PH22.75-1969, which has been expanded to include all non-symmetrically perforated film.

NOTE 2: The perforations in the 0-numbered discard row are provided with a visible means of identification.

NOTE 3: Dimension A′ represents the film width and Dimension E′ the edge-to-perforation distance after slitting a nominal 16 mm strip from the exposed and processed parent 35 mm-width film. In deriving the dimension of 0.627 in (15.93 mm), the specified film shrinkage characteristics described in Appendix A2 have been taken into account.

NOTE 4: The dotted lines in the figure indicate the edge of the 16 mm cuts after slitting.

NOTE 5: The metric values in the table of dimensions are converted from the inch values in accordance with conversion principles outlined in American National Standard Metric Practice Guide, Z210.1-1973. The metric conversion of Dimension A is purposely chosen and shown to three decimal places to prevent the maximum width dimension from exceeding 35 mm.

Appendix

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

A1. The user is reminded that, as a plastic, film can change dimensions temporarily due to moisture or temperature, or permanently due to solvent loss or strain effect.

A2. Film for positive use has a longitudinal pitch 0.2 percent longer than its companion negative. Shrinkage of the negative during aging and processing prior to printing will generally not exceed 0.2 percent. Thus, the negative stock is expected to be 0.3 ± 0.1 percent shorter than the positive. This difference will minimize slippage between the two on the 12-inch (305-mm) circumference sprocket of the printer, assuming a film thickness of 0.0055 to 0.0065 in (0.140 to 0.165 mm).

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.

A4. For historical background on the development of this standard, refer to A. J. Miller and A. C. Robertson, "Motion-picture film—its size and dimensional characteristics," Jour. SMPTE, 74: 3-11, Jan. 1965.

Draft American National Standard

Dimensions of Plastic Reels for ½-inch Video Magnetic Tape

C98.14

1. Scope

This standard specifies for nominal 5⅛ and 7⅛ x ½ inch (130 and 181 x 12.7 mm) plastic reels the dimensions which are considered essential for successful interchange among equipments designed for home, industrial and institutional video recording applications.

2. Dimensions

2.1 The dimensions of the reels shall be as specified in the figures and table.

2.2 Flange holes shall be optional as well as their number, size and shape, when provided. Their position and number shall be chosen to maintain static balance about the axis of rotation.

2.3 Reels shall be constructed so that any profile section taken through the center axis of the reel, when it is rotated on its center axis, will fall within the cross-hatched envelope shown in Figure 1. This includes warpage and lateral runout of the flanges. Bosses, ribs and other raised designs shall be permitted on the outside of the flange surfaces provided they do not extend beyond the cross-hatched envelope.

2.4 Reels shall have one or more drive holes whose size and location with respect to the center hole are such that both will fit simultaneously upon the drive hole gauge shown in Figure 3.

2.5 To ensure proper mounting, reels shall be nonsymmetrical with drive holes and key slots on one side only.

2.6 The outside cylindrical hub surface (Dimension C) shall be concentric to the center diameter (Dimension U_1) within 0.010 inch (0.25 mm) total indicator runout (TIR), and the flange rim (Dimension B) shall be concentric to the center diameter within 0.020 inch (0.51 mm) TIR.

2.7 The outside cylindrical hub surface (Dimension C) shall have a taper no greater than 0.003 inch (0.08 mm) measured with respect to a lateral mounting surface.

2.8 The lateral mounting surfaces, defined by M for Dimension L, shall be parallel within 0.0025 inch per inch (0.064 mm per mm) of their diameter.

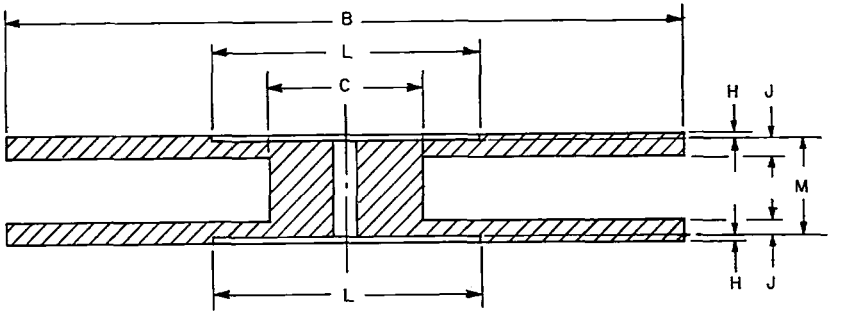


Figure 1
Reel Profile Envelope

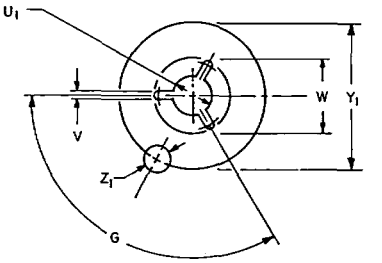


Figure 2
Reel Center and Drive Holes

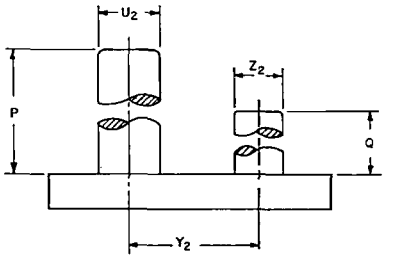


Figure 3
Drive Hole Gauge

	Dimensions	Inches 5⅛	Inches 7⅛	Millimeters 130	Millimeters 182
B	Rim diameter of flange	5.118 ± 0.020	7.165 $^{+0.020}_{-0.060}$	130.00 ± 0.51	181.99 $^{+0.51}_{-1.52}$
C	Outside hub diameter (without friction ring)	1.732 $^{+0.020}_{-0.040}$	2.362 $^{+0.020}_{-0.100}$	43.99 $^{+0.51}_{-1.02}$	59.99 $^{+0.51}_{-2.54}$
G	Gauge angle for key slots	120 ± 0.5°			
H	Tolerance space for lateral runout	0.050 max		1.27 max	
J	Dimension to inside flange in respect to reel mounting surface	0.110 max		2.79 max	
L	Mounting zone diameter	2.250 min		57.15 min	
M	Center zone overall thickness	0.787 ± 0.012		19.99 ± 0.30	
P	Height of spindle stud	1.181 min		30.00 min	
Q	Height of driving stud	0.590 min 0.630 max		15.00 min 16.00 max	
U_1	Spindle hole diameter	0.319 $^{+0.004}_{-0.002}$		8.10 $^{+0.10}_{-0.05}$	
U_2	Spindle stud diameter	0.3165 ± 0.0004		8.040 ± 0.010	
V	Width of key slots	0.079 ± 0.004		2.00 ± 0.10	
W	Key slot zone diameter	0.630 ± 0.012		16.00 ± 0.30	
Y_1	Drive hole locating diameter	See Sec. 2.4 and Dimension Y_2			
Y_2	Distance between centers of gauge studs	0.6300 ± 0.0004		16.000 ± 0.010	
Z_1	Drive hole diameter	See Sec. 2.4 and Dimension Z_2			
Z_2	Driving stud diameter	0.3149 ± 0.0004		8.000 ± 0.010	

Cinematography — Recorded characteristic for magnetic sound records on 35 mm motion-picture film — Specifications

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies the recorded characteristic for magnetic sound records on 35 mm motion-picture film with magnetic striping when used at the nominal speed of 24 frames (45,6 cm or 18 in) per second or 25 frames (47,5 cm or 18.7 in) per second.

NOTE – This International Standard and relevant portions of Recommendations No. 265-2 of the CCIR have substantially the same technical content.

2 RECORDED CHARACTERISTIC

2.1 With constant sine-wave signal applied to the input of the recording system, the nominal characteristic of the short circuit magnetic flux versus frequency shall fall with increasing frequency in conformity with the impedance of a parallel combination of a capacitance and resistance having a time constant $t = 35\ \mu s$.

The curve defined above is represented by :

$$N \text{ (in decibels)} = -10 \log (1 + 4\pi^2 f^2 t^2)$$

where

f is the frequency, in hertz;

t is the time constant, in seconds.

The approximate numerical values are given in the table.

2.2 The corresponding reproducing characteristic is that which gives a flat response when reproducing a sound track recorded with the relative short circuit flux levels stated in 2.1.

TABLE

Frequency Hz	N dB
40	– 0,00
50	– 0,00
63	– 0,00
80	– 0,00
100	– 0,00
125	– 0,00
160	– 0,01
200	– 0,01
250	– 0,01
315	– 0,02
400	– 0,03
500	– 0,05
630	– 0,08
800	– 0,13
1 000	0,21
1 250	– 0,32
1 600	– 0,51
2 000	– 0,77
2 500	– 1,15
3 150	– 1,70
4 000	– 2,49
5 000	– 3,44
6 300	4,65
8 000	6,12
10 000	7,66
12 500	9,32
16 000	– 11,26

3 TOLERANCES

Magnetic sound records on 35 mm films shall be recorded to the characteristic specified in 2.1 within the tolerances given in the figure.

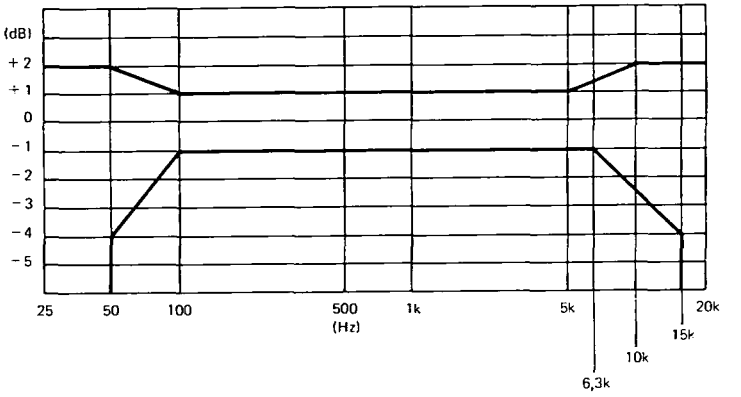


FIGURE – Tolerance on recorded levels

April 1975 Journal of the SMPTE Volume 84

Cinematography — Recording and reproducing head gaps for six-track 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 six-track 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 recording and reproducing head gaps shall be as given in the figure and table.

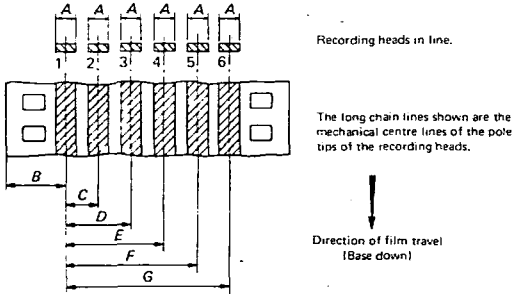


FIGURE — **Location and dimensions of the magnetic sound recording head gaps**

TABLE

Dimension	mm	in
A	2,54 ± 0,05	0.100 ± 0.002
B	7,34 ± 0,05	0.289 ± 0.002
C	4,06 ± 0,05	0.160 ± 0.002
D	8,12 ± 0,05	0.320 ± 0.002
E	12,18 ± 0,05	0.480 ± 0.002
F	16,24 ± 0,05	0.640 ± 0.002
G	20,30 ± 0,05	0.800 ± 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.

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° ± 3′ to the direction of film travel.

April 1975 Journal of the SMPTE Volume 84

Cinematography — Motion-picture camera cartridge, 8 mm Type S, Model II — Film load position

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies the location for the film loaded in 8 mm Type S, Model II, motion-picture camera cartridges.

2 REFERENCES

ISO 2863, *Cinematography — Motion-picture camera cartridge, 8 mm Type S, Model II — Run length of film — Dimensions and specifications.*

ISO 3641, *Cinematography — Motion-picture camera cartridge, 8 mm Type S, Model II — Cartridge fit and take-up core drive — Dimensions and specifications.*[1]

ISO 3646, *Cinematography — Motion-picture camera cartridge, 8 mm Type S, Model II — Slots and projection for film speed, cartridge hole and projection for film identification and colour-balancing filter — Dimensions and positions.*[1]

3 DIMENSIONS

3.1 The dimensions shall be as specified in the figure and table when measured immediately after manufacturing.

3.2 Dimensions *A* and *B* apply where the film enters and leaves the cartridge (the space provided for the camera film guide, aperture and pressure plate) and are measured to the emulsion side edge of the film, respectively.

NOTE — The edges of the film are specified because film curl would have to be taken into account if dimension *B* applied at other locations. However, the film plane is parallel within the tolerance of dimension *B*.

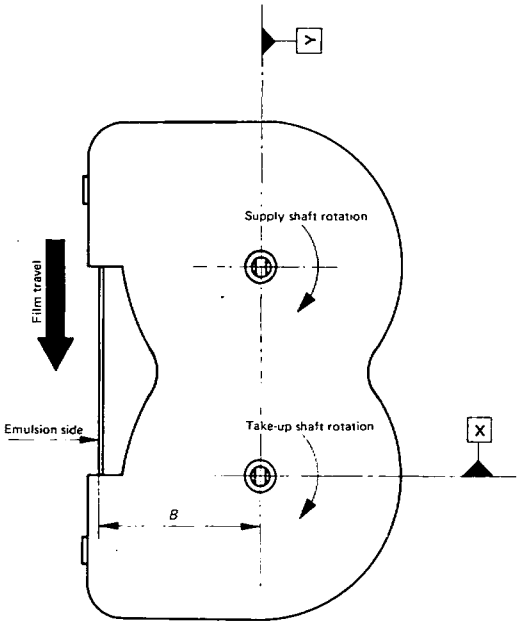
3.3 Datum planes used for dimensioning are coincident with the surfaces that engage mating camera parts when the cartridge is properly aligned in the camera. The datum planes are mutually perpendicular.

3.3.1 Datum plane **Z** (primary) is established from the extremities of the three seating bosses (lugs).

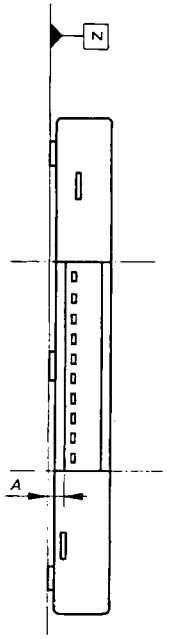
3.3.2 Datum plane **Y** (secondary) is established coincident with the axes of the cartridge take-up core opening, and the supply core opening.

3.3.3 Datum plane **X** (tertiary) is also established coincident with the axis of the cartridge take-up core opening.

1) At present at the stage of draft.



Film identification side



Front view

Dimension	mm	in*
A	2,6 ± 0,1	0.102 ± 0.004
B	33,0 ± 0,5	1.30 ± 0.02

* Inch dimension intentionally carried to one additional decimal place.