International Standardization

By HENRY KOGEL

Report on Second Meeting of ISO/TC 36—Cinematography

THE FIRST meeting of the International Standards Organization Technical Committee on Cinematography, ISO/TC 36, was held in New York City in June 1952. The accomplishments were appreciable, agreement having been reached to start the processing of 22 Draft ISO Proposals. (See the October 1952 *Journal* for the detailed report of that meeting.)

The second meeting of ISO/TC 36 was held June 11–16, 1955, in Stockholm and if anything, this meeting was even more successful than the first. Based on the previous experience, five working days were scheduled rather than three; there was a greater participation of the member nations; the existing proposed standards were reviewed and revised where necessary; new standards proposals were initiated; and Working Groups were established to continue discussion of the unresolved questions and to draft additional proposals.

A general review of the deliberations of the Stockholm meeting has been presented by D. R. White, head of the U.S. Delegation, at the Society's 78th Convention at Lake Placid, N.Y., and has been published in the November 1955 *Journal*. It is the intent of this report to present a more detailed picture of the meeting.

Participants

Ten nations, with a total of 48 delegates, participated in this meeting. The participants are listed in Appendix 1.

Status of 22 Draft ISO Recommendations

The first order of business, after the opening remarks, was a review of the status of the 22 standards initiated in 1952. The secretariat submitted a report which indicated that 10 of these standards were proceeding satisfactorily without criticism and that the other 12 required further consideration. Three ad hoc Working Groups were appointed to study 11 of these standards. The twelfth item, on safety film, was left for a more detailed analysis at a later time. Appendix 2 lists the number and title of the standards in each category and the composition of the Working Groups established to work on them.

A report prepared by Henry Kogel, SMPTE Staff Engineer, Secretary, ASA Sectional Committee PH22, and Technical Secretary, ISO/TC 36.

Agenda

An agenda consisting of six generalized concepts was approved as listed below:

1. Cutting and Perforating Dimensions for Motion-Picture Film
2. Definition and Markings of Motion-Picture Safety Film
3. Screen Luminance (Brightness)
4. Location and Dimensions of Magnetic Sound Records
5. Reproduce Characteristics of Magnetic Sound Records
6. Wide-Screen Motion Pictures

Drafting Committee on Resolutions

One marked variation from the procedures of the 1952 meeting was the appointment, at the outset, of a drafting committee charged to draft in resolution form the tentative agreements reached so that the final agreements of this meeting would be clear and unmistakable. This committee consisted of U.K. (Griffiths) Chairman, Belgium (Spinnox), France (Vivié), Germany (Wohlrab), Sweden (Smith).

Ad Hoc Working Groups

The three ad hoc Working Groups, appointed to review the standards in process, did a fine job and as a by-product demonstrated the advantage of this procedural form for undertaking all the agenda items. Ad hoc Working Groups were thereupon appointed for the consideration of each agenda item. The list of these Working Groups and their composition is given in Appendix 3.

Adopted Resolutions

Each Working Group prepared a report of its deliberations which was reviewed by the committee sitting in full session. Upon acceptance, these reports were used by the Resolutions Committee as a basis for preparing the draft resolutions. A total of 15 Resolutions were adopted in the last two days of this meeting, June 15 and 16, 1955. These 15 Resolutions are an embodiment, as it were, of the labor of those participating in this five-day meeting and represent the consensus of the meeting. The remainder of this report is therefore directed toward the presentation of this material in a clear and concise form.

1. *RESOLVED that*

a. Draft ISO Recommendation #71, Cutting and Perforating Dimensions for 35mm Motion-Picture Positive Raw Stock, be withdrawn.

b. A Working Group be appointed to prepare a comprehensive Draft ISO Proposal relating to the 35mm film specified in the American Standards listed below.

c. The constitution of this Working Group be U.K. (chairman), Belgium, France, Germany, Sweden, U.S.A., U.S.S.R.

Schedule

(1) PH22.1-1953, Dimensions for 35mm Motion-Picture Film Alternate Standards for Either Positive or Negative Raw Stock
(2) Z22.34-1949, Cutting and Perforating Dimensions for 35mm Motion-Picture Negative Raw Stock
(3) PH22.36-1954, Dimensions for 35mm Motion-Picture Positive Raw Stock
(4) PH22.93-1953, Dimensions for 35mm Motion-Picture Short-Pitch Negative Film
(5) PH22.102 (Proposed), 35mm Motion-Picture Alternate Standard for Positive Raw Stock

2. *RESOLVED that*

The Secretariat prepare a Draft ISO Proposal for the screen luminance of matte screens used in the projection of 35mm film, this proposal to include the following concepts and values:

a. Luminance values be expressed in nit units.

b. Luminance level be 35 nit + 15 − 5 (10.1 ft-L + 4.5 − 1.3). These values be valid for measurements at the center of the screen taken from any point in the theater.

c. The minimum value of luminance at the edges of the screen be 65% of the value of luminance at the center of the screen. The points of measurement be determined in the horizontal axis at a distance from the edges equal to 5% of the width of the screen.

d. Measurement of the luminance be with a photometer having an acceptance angle not greater than 2° and a spectral sensitivity equivalent to that of a normal observer as specified by the C.I.E. in 1931.

3. *RESOLVED that*

a. A Working Group be established to study questions related to the luminance of metallized screens for the projection of 35mm film and to prepare a Draft ISO Proposal.

b. The constitution of this Working Group be France (chairman), Germany, U.K., U.S.A.

4. *RESOLVED that*

a. A Working Group be appointed to prepare a Draft ISO Proposal specifying the reproduce characteristics of magnetic sound on perforated film.

b. The constitution of this Working Group be U.S.A. (chairman), France, Germany, Netherlands, Sweden, U.K.

c. The Secretariat prepare a preliminary proposal for use by this Working Group to include the following specifications:

(1) For 35mm fully coated film with tracks "100 mils" or wider, A_1 is the basic curve and may be used with or without de-emphasis in accordance with B_1, B_2 or both, at the option of the recording studio. Provision should be made for marking or otherwise identifying film using a characteristic other than A_1.

(2) For 35mm film with soundtracks having a width of "50 mils" or less the replay chain is to have a characteristic which is the sum of curves A_1, B_1 and B_2.

(3) For 16mm fully coated film with tracks "100 mils" and wider, A_2 is the basic curve and may be used with or without de-emphasis in accordance with B_1, B_2 or both, at the option of the recording studio. Provision should be made for marking or otherwise identifying film using a characteristic other than A_2.

(4) For 16mm films having a magnetic stripe on the same film as the picture, the replay chain is to have a characteristic which is the sum of A_2, B_1 and B_2.

The Following Tabulation of Values Identifies the Curves Referred to Above (Tabular Data in db Units):

f c/s	50	100	200	500	1000	1600	2000	4500	5000	10000
A_1	39.1	33.1	27.0	19.1	13.3		7.9	+3	+2.6	+0.8
A_2	30.1	24.1	18.1	10.5	5.5	+3	2.1		0.4	0.1
B_1	−6.0	−3.5	−1.3	−0.1	0		0		0	0
B_2	0	0	0	0	0		0		−1	−4

d. The Working Group study at an appropriate time the following items for further standardization efforts and arrange for the exchange of experimental data leading to such standardization:

(1) Magnetic replay characteristics for 8mm film.

(2) Establishment of standard methods for the absolute measurement of reference level of magnetic sound records.

(3) Reduction of the number of different standard replay characteristics for fully coated 35mm and 16mm film.

5. *RESOLVED that*

a. Draft ISO Recommendations #69 and 70 be amended as scheduled below.

b. The ISO General Secretariat circulate the revised Draft Recommendations to all member countries for approval.

Schedule of Amendments

(1) Dimension E be changed from 0.91 mm (0.036 in.) to 0.90 mm (0.0355 in.).

(2) Tolerance on dimension A in No. 69 be corrected from ±0.01 in. to ±0.001 in.

(3) Tolerance on mm values for dimension A be amended to ±0.025 mm.

(4) A footnote relating to dimensions A and E be added as follows:
These dimensions are for low-shrink film base as defined in Appendix 1. For film base with higher shrinkage characteristics A shall be 15.98 mm ± 0.025 (0.629 in. ± 0.001) and E shall be 0.91 mm ± 0.05 (0.036 in. ± 0.002).

(5) An appendix be inserted as follows:
For the purpose of this specification, low-shrink film base is film base which, when coated with emulsion and any other normal coating treatment, perforated, kept in the manufacturer's sealed container for six months, exposed, processed and stored exposed to air having a temperature of 18 C to 24 C and a relative humidity of 50% to 60% for not more than 30 days, and measured under like conditions of temperature and humidity, shall have shrunk not more than 0.2% from its original dimension at the time of perforating.

6. *RESOLVED that*

a. Draft ISO Recommendation #72 be amended as scheduled below.

b. The ISO General Secretariat circulate the revised Draft Recommendation to all member countries for approval.

Schedule of Amendments

(1) The tolerance of dimension F be increased to ±0.05 mm (±0.002 in.) to bring it into conformity with the tolerance on the related dimension D.

(2) In the diagram, those dimensions and notes which relate to the area scanned by the reproducer be lowered so that they are separated from the illustrations above, because the center lines represented by the letters D and F are not identical.

7. *RESOLVED that*

Draft ISO Recommendation #76 be withdrawn to be replaced by a more comprehensive Draft ISO Proposal as provided by Resolution 11.

8. *RESOLVED that*

a. Draft ISO Recommendations #77, 78, 81, 82 be amended as scheduled below.

b. The ISO General Secretariat circulate the revised Draft Recommendations to all member countries for approval.

Schedule of Amendments

No. 77

(1) Delete the dimensions and indications referring to *a* and *b* in the diagram.

(2) Insert "max" after value for dimension E.

(3) Change R from 0.8 mm max (0.03 in. max) to 0.15 mm max (0.006 in. max).

(4) Add subscript p (projector) so that dimension C is indicated as C_p.

(5) To clarify dimension D, add an editorial note explaining that D is the distance between lines 1 and 5.

No. 78

(1) Amend the note referring to full hole pilot pins to read: "If full hole pilot pins are used they should engage with this row of perforations."

(2) Add subscript c (camera) so that dimension C is indicated as C_c.

Nos. 81 and 82

(1) Delete the figure on the left of the diagram.

(2) Complete the diagram on the right by full lines for the right-side edge and for the perforations of the film and by dotted lines for the complete image contours above and below the principal image.

9. *RESOLVED that*

a. A Working Group be appointed to revise Draft ISO Recommendations #79 and 80, taking note of the suggested revisions given below.

b. The constitution of this Working Group be Belgium (chairman), France, Sweden, U.K., U.S.A.

c. The ISO General Secretariat circulate the revised Draft Recommendations to all member countries for approval.

Suggested Revisions

No. 79

(1) Correct typographical error in English title so that the phrase "projected image area" becomes "image produced by camera aperture."

(2) To the righthand edge of the film, add the designation "reference edge."

(3) If (2) is adopted, transfer dimension C from the centerline through the optical axis of the camera to the reference edge at the righthand (perforated) side of the film.

(4) Change dimension B to 7.37 mm + 0.23 − 0, 0.29 in. + 0.009 − 0.

(5) Delete the figure on the lefthand side of the diagram.

(6) Change par. 1 of Note 1 to read as follows:
Dimensions A, B and R apply to the size of the image at the plane of the emulsion; the camera aperture has to be slightly smaller. The exact amount of this difference depends on the lens used (whether of short focal length and/or large diameter) and on the separation of the emulsion and the aperture plate. This separation should be no larger than is necessary to preclude scratching of the film.

(7) Alter par. 2 of Note 1 to read as follows:
The dimension B of a 16mm image obtained by optical reduction at a ratio of 2.15/1 from a 35mm negative will be 7.44 mm + 0.10 − 0 when the width of the image is 5.11 mm + 0.20 − 0.

No. 80

(1) Transfer dimension C from the centerline through the optical axis of the camera to the reference edge at the righthand (perforated) side of the film.
(2) Delete the figure on the lefthand side of the diagram.
(3) Delete the dimensions and indications referring to *a* and *b* in the diagram.

10. *RESOLVED that*

a. Draft ISO Recommendation #83 be withdrawn.
b. A Working Group be appointed to prepare a Draft ISO Proposal on Definition and Marking of Motion-Picture Safety Film.
c. The constitution of this Working Group be Belgium (chairman), France, Germany, Italy, U.K., U.S.A.
d. The Draft ISO Proposal be based upon ISO/TC 42 (USA-1) 32, Specification For Safety Photographic Film, PH1.25, with the revisions suggested below.
e. The Secretariat circulate the Draft ISO Proposal to the members of TC 36.

Suggested Revisions

(1) Add the following footnote to par. 1.1: "This specification excludes fully coated magnetic films."
(2) In par. 3, change the thickness from 0.8 mm to 0.08 mm.
(3) Consider the method of measurement specified in British Standard 850:1955 as an alternative method to the one specified in par. 3.2.
(4) In par. 3.2.1, substitute for "16mm" (3rd line) the phrase, "narrower than 35mm" and replace the 4th line with "and its full width may be tested."
(5) Change par. 4 as follows:
(a) Insert "nitrate" before "nitrogen" in the title of the paragraph and in the definition.
(b) Complete the definition by adding this sentence: "The total nitrate nitrogen content of the complete film should not be more than this limit."
(c) Delete the footnote and the reference to the U.S. formula.
(d) Include the Schulze Tieman test (B.S. 850) as an alternative method.
(e) Delete the specification under the heading of "Marking," par. 6, and replace with "Safety film should be suitably marked as such."

11. *RESOLVED that*

The Secretariat prepare four Draft ISO Proposals as scheduled below:

a. 4-Track Magnetic Recording on Fully Coated 35mm Film. (See Appendix 4)
(1) Dimension the magnetic heads as a group and give only one dimension from each group to the edge of the film.
(2) Locate this system of dimensioning between the design of the film and the indication of the magnetic heads.
(3) Specify the width of the recording heads rather than the sound records.

b. 3-Track Magnetic Recording on Fully Coated 35mm Film. (See Appendix 5)
(1) The scope of this proposal is to include single- and double-track recording on 35mm film as well as single-track recording on 17½mm film.
(2) The method of dimensioning is to be the same as indicated for the 4-track proposal above.
(3) Use the text of Draft ISO Recommendation #76 as the basis for this proposal.
(4) Change the last line of the text to read, "track #3" instead of "#2."

c. Magnetic Coating of 16mm Film Perforated Along Both Edges. (See Appendix 6)
(1) Use Proposed American Standard, PH22.101, Magnetic Coating of 16mm Film Perforated Along Both Edges, as the basis for this proposal.
(2) Indicate the dimensions in letters and prepare a table of values in millimeters and inches.

d. Magnetic Recording on Fully Coated 16mm Film Perforated Along One or Both Edges. (See Appendix 7)
(1) If film is perforated along both edges, use the German Proposal 15 656 to specify the sound record in the center of the film.
(2) If the film is perforated along one edge only, specify the center sound record as in (1) above as well as an optional sound record on the nonperforated side.
(3) Inasmuch as the dimension of the optional track on the nonperforated side is in question, the Secretariat is to delay the circulation of this proposal until this question is resolved.
(4) The magnetic coating is on the side of the film toward the lamp of a projector arranged for direct projection on a reflection-type screen.

12. *RESOLVED that*

a. A Working Group be appointed to review all questions relating to the location and dimensions of magnetic sound records on perforated film.
b. The constitution of this Working Group be Germany (chairman), France, Sweden, U.K., U.S.A.
c. This Working Group prepare a Draft ISO Proposal on the magnetic striping of 16mm motion-picture film containing picture and sound. (See Appendix 8)
d. American Standard PH22.87-1953 be the basis for this Draft ISO Proposal but modified as follows:
(1) Locate the sound 28 frames ahead of the corresponding picture.
(2) Specify an optional balance stripe of magnetic or another material of the same thickness outside the perforation.
(3) Review the width of the stripe since 100 mils has been questioned as being too large. (It was stated that the clearance between the stripe and the edge of the picture gate in the camera becomes too small when the tolerances add in an unfavorable direction.)

13. *RESOLVED that*

a. The Secretariat prepare a Draft ISO Proposal for the maximum image ratio and the location of the image for the projection of wide-screen pictures from normal format images (no lateral compression).
b. This proposal specify the following:
(1) A maximum aspect ratio of 1.85:1.
(2) The upper edge of the projector aperture be 1.7 mm (0.067 in.) below the upper edge (in the direction of film travel) of the printed image on the film.

14. *RESOLVED that*

a. The Secretariat prepare a Draft ISO Proposal based on American Standard PH22.17-1954, Dimensions for 8mm Motion-Picture Film and containing the amendments scheduled below.
b. This proposal be then circulated to the Working Group established under Resolution #1 for this Group to incorporate an appendix defining low-shrink film base and to establish a tolerance for dimension E.

Schedule of Amendments

(1) Delete "negative and positive" from line reading: "Those dimensions apply — perforating."
(2) Add "in raw stock manufacture" to the caption "single width after slitting."
(3) Change dimension H from 7.98 to 7.975 mm.
(4) Change the tolerance on dimension A from ±0.03 to ±0.025 mm.
(5) Change dimension A to 15.95 mm (0.628 in.).
(6) Change dimension E to 0.90 mm (0.0355 in.).
(7) Add the following footnote:
These dimensions are for low-shrink film base as defined in the appendix. For film base with higher shrinkage characteristics A shall be 15.98 mm ± 0.025 (0.629 in. ± 0.001) and E shall be 0.91 mm ± 0.05 (0.036 in. ± 0.002).

15. *RESOLVED that*

a. A Working Group be appointed to prepare Draft ISO Proposals on wide-screen motion pictures, these proposals to include the position and dimensions of picture area and sound records.
b. The composition of this Working Group be Sweden (chairman), France, Germany, Italy, U.K., U.S.A.
c. This Working Group consider as its first order of business a proposal for release prints with one optical and two magnetic sound records.

Addendum

Subsequent to the meeting, the Secretariat assigned letter symbols to the continuing Working Groups appointed per the above resolutions as a convenient means of referring to these Working Groups. These are listed below for ready reference:

Resolution	*Working Group*	*Subject*
1	A	Film Dimensions
3	B	Luminance of Screens
4	C	Reproduction Characteristics of Magnetic Sound on Perforated Film
9	D	Image Areas for 16mm Projector and Camera Apertures
10	E	Definition and Marking of Safety Motion-Picture Film
12	F	Perforated Films with Magnetic Striping
15	G	Wide-Screen Pictures

In January 1956, the U.S.S.R. asked the Secretariat to add her as a member of all the newly organized Working Groups. The Secretariat has complied with this request and all the Working Groups have been notified of this addition.

Appendix 1. Delegates Participating in the Meeting.

BELGIUM
Raymond Spinnox

CZECHOSLOVAKIA
František Vymyslický

FRANCE
Robert Alla
Albert Barbier-St. Hilaire
Joseph Cordonnier
Louis Didiée
Jean Ferrière
Robert G. Ivonnet
Henri Renard
Jean Vivié

GERMANY
Werner Behrendt
Karl-Otto Freilinghaus
Karl-Erik Gondesen
Herman Heidenreich
Arthur Laufmann
Paul Lindau
L. Mayer
Albert Meister
Kurt Neitzel
Armin Sonnenfeld
H. Tümmel
Fritz Wilken
Hans-Christoph Wohlrab

ITALY
Clinio Cuccolini
Libero Innamorati

NETHERLANDS
N. A. J. Voorhoeve

SWEDEN
Arvid Ahlin
K. G. Helmer Bäckström
Harry Dahlqvist
Stellan Dahlstedt
Harry Enequist
Sixten Lingheim
Holger Marcus
Kai Smith

UNION OF SOVIET SOCIALIST REPUBLICS
K. Spasskij
V. Volodin

UNITED KINGDOM
G. J. Craig
H. L. Griffiths
Leslie Knopp
O. K. Kolb

UNITED STATES
W. F. Kelley
Motion Picture Research Council
Marion E. Russell
Eastman Kodak Co.
Malcolm G. Townsley
Bell & Howell Co.
Deane R. White
E. I. du Pont de Nemours & Co.

UNITED STATES (Secretariat)
Axel G. Jensen
Bell Telephone Laboratories
J. W. McNair
American Standards Association
Boyce Nemec
Society of Motion Picture and Television Engineers

Appendix 2. Ten Draft ISO Recommendations Processed Without Criticism.

Related Am. Stds.	*Draft ISO Rec. No.*	*Title*
PH22.2-1954	60	Emulsion and Sound Record Positions in Camera for 35mm Sound Motion-Picture Film
.3-1954	61	Emulsion and Sound Record Positions in Projector for 35mm Sound Motion-Picture Film
.9-1956	62	Emulsion Position in Camera for 16mm Silent Motion-Picture Film
.10-1956	63	Emulsion Position in Projector for Direct Front Projection of 16mm Silent Motion-Picture Film
.15-1955	64	Emulsion and Sound Record Positions in Camera for 16mm Sound Motion-Picture Film
.21-1953	65	Emulison Position in Camera for 8mm Silent Motion-Picture Film
.22-1953	66	Emulsion Position in Projector for Direct Front Projection of 8mm Silent Motion-Picture Film
.36-1954	71	Cutting and Perforating Dimensions for 35mm Motion-Picture Positive Raw Stock
.69-1953	74	Sound Records and Scanning Area of Double-Width Push-Pull Sound Prints, Normal Centerline Type
.70-1953	75	Sound Records and Scanning Area of Double-Width Push-Pull Sound Prints, Offset Centerline Type
Twelve Draft ISO Recommendations Requiring Further Consideration.		
.5-1953	69	Cutting and Perforating Dimensions for 16mm Silent Motion-Picture Negative and Positive Raw Stock
.12-1953	70	Cutting and Perforating Dimensions for 16mm Sound Motion-Picture Negative and Positive Raw Stock
.40-1950	72	Sound Records and Scanning Area of 35mm Sound Motion-Picture Prints
.41-1946	73	Sound Records and Scanning Area of 16mm Sound Motion-Picture Prints
.86-1953	76	Magnetic Sound Tracks on 35mm and 17.5mm Motion-Picture Film
.58-1954	77	35mm Film Projected Image Area
.59-1954	78	35mm Film Image Produced by Camera Aperture
.7-1950	79	16mm Film Image Produced by Camera Aperture
.8-1950	80	16mm Film Projected Image Area
.19-1950	81	8mm Film Image Produced by Camera Aperture
.20-1950	82	8mm Film Projected Image Area
.31-1946	83	Definition for Motion-Picture Safety Film

Three Ad Hoc Working Groups.

Film Dimensions — On Draft ISO Recommendations #69 and 70
U.K. (Craig) Chairman, France (Renard), Sweden (Dahlstedt), U.S.A. (Russell)
Sound Records — On Draft ISO Recommendations #72, 73 and 76
Germany (Tümmel) Chairman, France (Ivonnet), U.K. (Kolb), U.S.A. (Townsley)
Film Image Area — On Draft ISO Recommendations #77–82
Belgium (Spinnox) Chairman, France (Alla), Sweden (Enequist), U.K. (Knopp), U.S.A. (Kelley)

Appendix 3. Ad Hoc Working Groups.

Agenda Item	*Composition*	
	Chairman	*Members*
1. Cutting and Perforating Dimensions for Motion-Picture Film	U.K. (Craig)	Belgium (Spinnox), France (Didiée), Germany (Behrendt), U.S.A. (White)
2. Definition and Markings of Motion-Picture Safety Film	Belgium (Spinnox)	France (Didiée), Germany (Behrendt), Italy (Cuccolini), U.K. (Knopp), U.S.A. (Russell)
3. Screen Luminance	France (Alla)	Germany (Wilken), U.K. (Knopp), U.S.A. (Kelley)
4. Location and Dimensions of Magnetic Sound Records	Germany (Wohlrab)	France (Ivonnet), Sweden (Smith), U.K. (Kolb), U.S.A. (Kelley)
5. Reproduction Characteristics of Magnetic Sound Records	U.S.A. (Townsley)	France (Ivonnet), Germany (Gondesen), Sweden (Marcus), U.K. (Kolb)
6. Wide-Screen Motion Pictures	Sweden (Dahlstedt)	Sweden (Enequist), France (Alla, Cordonnier, Vivié), Germany (Heidenreich, Tummel), Italy (Innamorati), U.K. (Griffiths), U.S.A. (Kelley)

Appendix 4. Four Magnetic Sound Records on 35mm Motion-Picture Film.

1. SCOPE

1.1 This standard specifies the location and dimensions of four magnetic sound records on fully coated 35mm motion-picture film.

2. SOUND RECORDS

2.1 The four sound records shall be recorded in accordance with the diagram and table of dimensions provided.

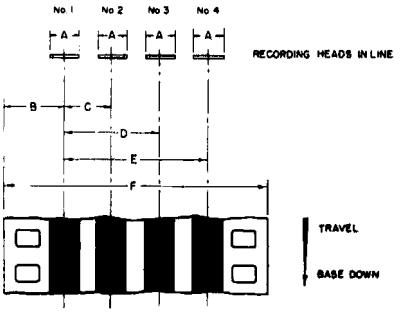
3. FILM BASE

3.1 The film base shall be of the low-shrinkage, safety type.

3.2 With the direction of travel as shown in the diagram the magnetic material is coated on the upper side of the film base.

3.3 The cutting and perforating dimensions of the film shall be those specified in Draft ISO Recommendation No. 71, Cutting and Perforating Dimensions for 35mm Motion-Picture Positive Raw Stock, or the latest revision thereof.

Dimension	*Millimeters*	*Inches*
A	$3.8\ ^{+0.1}_{-0.0}$	$0.150\ ^{+0.004}_{-0.000}$
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
F	35 nominal	1.378 nominal



Appendix 5. Three Magnetic Sound Records on 35mm Motion-Picture Film; One Magnetic Sound Record on 17½mm Motion-Picture Film.

1. SCOPE

1.1 This standard specifies the location and dimensions of up to three magnetic sound records on 35mm motion-picture film and of one sound record on 17½mm motion-picture film.

2. DIMENSIONS

2.1 The dimensions shall be as specified in the diagram and table provided.

3. PREFERRED TRACK POSITION

3.1 Track No. 1 is the preferred position for single-track recording on 35mm film and is the standard position for sound recording on 17½mm film. When the film is turned end for end, track No. 3 occupies the position of track No. 1.

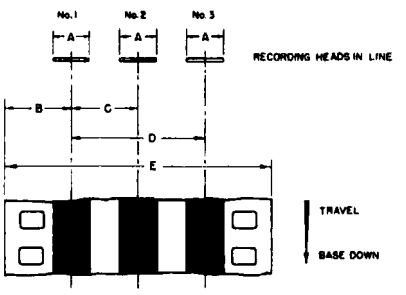
4. FILM BASE

4.1 The film base shall be of the low-shrinkage, safety type.

4.2 With the direction of travel as shown in the diagram the magnetic material is coated on the upper side of the film base.

4.3 The cutting and perforating dimensions of the film shall be those specified in Draft ISO Recommendation No. 71, Cutting and Perforating Dimensions for 35mm Motion-Picture Positive Raw Stock, or the latest revision thereof.

Dimension	*Millimeters*	*Inches*
A	$5.0\ ^{+0.1}_{-0.0}$	$0.200\ ^{+0.004}_{-0.000}$
B	8.6 ± 0.05	0.339 ± 0.002
C	8.9 ± 0.05	0.350 ± 0.002
D	17.8 ± 0.05	0.700 ± 0.002
E	35 nominal	1.378 nominal



Appendix 6. Magnetic Striping of 16mm Film Perforated Along Both Edges.

1. SCOPE

1.1 This standard specifies the location and dimensions of the magnetic coating material when applied to 16mm motion-picture film with perforations along both edges to be used for both picture and sound.

2. DIMENSIONS

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

2.2 The magnetic coating is on the side of the film toward the lamp on a projector arranged for direct projection on a reflection-type screen.

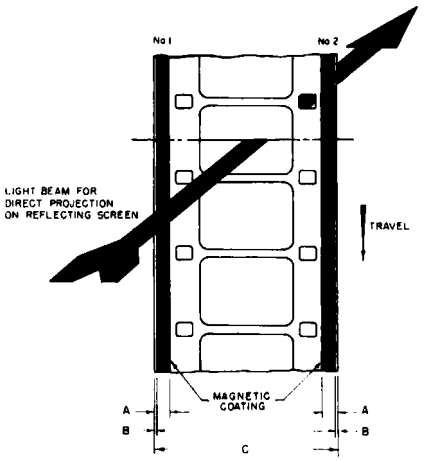
3. SOUND RECORD

3.1 The sound record shall be placed on track No. 1.

3.2 Track No. 2 is used as a balance stripe.

Note: The balance stripe may be used for a second sound record.

Dimension	*Millimeters*	*Inches*
A	$0.80 \begin{smallmatrix}+0.00\\-0.10\end{smallmatrix}$	$0.031 \begin{smallmatrix}+0.000\\-0.003\end{smallmatrix}$
B	0.05 max	0.002 max
C	16 nominal	0.628 nominal



Appendix 7. Magnetic Sound Records on Fully Coated 16mm Film Perforated Along One or Both Edges.

1. SCOPE

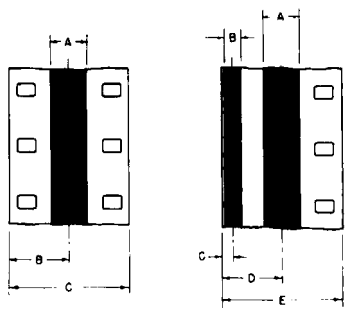
1.1 This standard specifies the location and dimensions of the magnetic sound record/records on fully coated 16mm motion-picture film with perforations along either one or both edges.

2. DIMENSIONS

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

2.2 The magnetic coating is on the side of the film toward the lamp of a projector arranged for direct projection on a reflection-type screen.

Dimension	*Millimeters*	*Inches*
A	$5.00 \begin{smallmatrix}+0.10\\-0.00\end{smallmatrix}$	$0.197 \begin{smallmatrix}+0.004\\-0.000\end{smallmatrix}$
B	8.00 ± 0.05	0.315 ± 0.002
C	16 nominal	0.628 nominal
D	$2.60 \begin{smallmatrix}+0.10\\-0.00\end{smallmatrix}$	$0.102 \begin{smallmatrix}+0.004\\-0.000\end{smallmatrix}$
E	1.30 ± 0.05	0.051 ± 0.002



Appendix 8. Magnetic Striping of 16mm Motion-Picture Film Perforated Along One Edge.

1. SCOPE

1.1 This standard specifies the location and dimensions of the magnetic stripes on 16mm motion-picture film with perforations along one edge to be used for both picture and sound.

2. DIMENSIONS

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

2.1 The magnetic coating is on the side of the film toward the lamp of a projector arranged for direct projection on a reflection-type screen.

3. PICTURE – SOUND SEPARATION

3.1 The magnetic sound record on the film shall precede the center of the corresponding picture by a distance of 28 frames.

Note: The balance stripe is optional and may be a magnetic coating or another material of the same thickness.

Dimensions	*Millimeters*	*Inches*
A	$2.5 \begin{smallmatrix}+0.1\\-0.0\end{smallmatrix}$	$0.100 \begin{smallmatrix}+0.005\\-0.000\end{smallmatrix}$
B	$0.1 \begin{smallmatrix}+0.0\\-0.1\end{smallmatrix}$	$0.005 \begin{smallmatrix}+0.000\\-0.005\end{smallmatrix}$
C	16 nominal	0.628 nominal