

near the low limit of acceptable screen illumination. Using a full wide screen of aspect ratio of the order of 2.2 and a height suitable for normal theater conditions would require significant increase in power to maintain an acceptable screen illumination. It is clear that he considers that these changes will come slowly but he urges that some of the advantages of wide-screen pictures can be obtained in existing theaters with changes that can be introduced economically and promptly. His conclusions include these points:

"Production of conventional variants of wide-screen pictures printed from anamorphic negatives does not appear the optimal solution of the problem either in the technical or the creative plans. Nevertheless, this process must be used in the transition period. For the improvement of technical quality of the conventional prints produced, it is necessary to meet specially strict requirements in the photographic parameters in the exposure

of the anamorphic negative. Moreover, it is expedient for the print of the conventional variant of the wide-screen films to be arranged for an aspect ratio of 1.66:1 instead of 1.37:1.

"It is rational to authorize and standardize a new type of wide screen with a width which is 31% greater than that of the conventional screen in present installations. For this use, the projectors are provided with projection lenses 1.5X longer than formerly and an anamorphic attachment with a coefficient of two, the projector aperture is enlarged to a height of 18.2 mm and the screen widened about one third

* * * * *

"New higher power types of equipment can gradually replace old equipment, in conformity with the production rate of the cine equipment factories and financial appropriations. This will permit in time installation of wide screens of larger dimensions."

It will be interesting to watch further developments in the USSR to see if the size and complexity of their market coupled with their centralization of the decision making process will come to conclusions different from those hammered out under the pressures of our competing entrepreneurs.

References

1. E. M. Goldovskii, "Certain questions in the development of wide screen cinematography in the USSR," *Tekhnika Kino i Telev.*, no. 4, 30-36, 1966.
2. L. E. Sokol'skii, "Problem number one," *Tekhnika Kino i Telev.*, 76-78, 1966.
3. E. M. Goldovskii, "Superscope and Techniscope," *Tekhnika Kino i Telev.*, no. 9, 21-28, 1965.
4. "New systems for exposure of films without anamorphic optics," *Tekhnika Kino i Telev.*, no. 6, 78, 1966.
5. "A system of wide-screen cine with truncated frames," *Tekhnika Kino i Telev.*, no. 3, 52-53, 1965.

standards and recommended practices

Proposed American Standards

Three Proposed American Standards are published here for a trial period and public review. Comments should be addressed to Alex E. Alden, Staff Engineer, at Society Headquarters prior to November 21, 1966. The proposals have been submitted to ASA Sectional Committee PH22. Consequently, all comments received through *Journal* publication will be reviewed prior to conclusion of action by that Committee.

These three proposals — PH22.149, Dimensions for 8mm Motion-Picture Film, Perforated Super 8, 1R-1667; PH22.150, Dimensions for 16mm Motion-Picture Film, Perforated Super 8, 2R-1667 (1-3); and PH22.151, Dimensions for 16mm Mo-

tion-Picture Film, Perforated Super 8, 2R-1664 (1-3) — specify the basic perforating and cutting dimensions for motion-picture films used in the super 8 system. — *A.E.A.*

American Standard Reaffirmed

American Standard PH22.76-1960, Threaded Lens Mounts for 16mm and 8mm Motion-Picture Cameras, was reviewed by the Society's 16mm and 8mm Committee and ASA Sectional Committee PH22 and was reaffirmed without change by the American Standards Association on June 9, 1966. The Standard was previously published in the February 1960 *Journal*. — *A.E.A.*

Proposed American Standard Dimensions for
**8mm Motion-Picture Film,
 Perforated Super 8, 1R-1667**

PH22.149

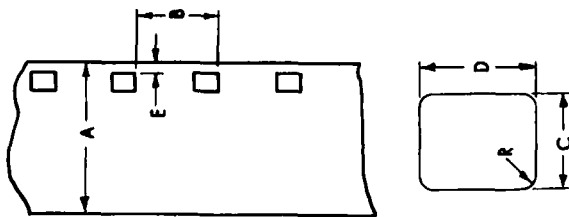
1. Scope

This standard specifies the cutting and perforating dimensions for 8mm motion-picture film with super 8 perforations along one edge and a perforation pitch of 0.1667 in.

2. Dimensions

- 2.1** The dimensions shall be as given in the figure and table.
- 2.2** These dimensions pertain to a safety film as defined in American Standard Specifications for Motion-Picture Safety Film, PH22.31-1958.
- 2.3** The dimensions apply to material immediately after cutting and perforating.
- 2.4** Dimension L represents the length of any 100 consecutive perforation pitch intervals.

Page 1 of 2 pages



Dimensions	Inches	Millimeters
A Film width	0.314 ± 0.002	7.98 ± 0.05
B Perforation pitch	0.1667 ± 0.0004	4.234 ± 0.010
C Film width	0.0960 ± 0.0004	0.914 ± 0.010
D Perforation width	0.0450 ± 0.0004	1.143 ± 0.010
E Perforation height	0.0270 ± 0.0002	0.51 ± 0.05
L 100 consecutive perforation pitch intervals	16.670 ± 0.017	423.42 ± 0.43
R Radius of perforation fillet	0.005 ± 0.001	0.13 ± 0.03

NOTE 1: The usual use of film stock described in this standard is for camera original film of the reversal type.

NOTE 2: 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

NOT APPROVED

Page 2 of 2 pages

of rows of perforations (1R, 2R, etc.), depending upon which is the significant factor, and the perforation pitch without the decimal point.

NOTE 3: The metric values in the table of dimensions

Appendix

(This Appendix is not a part of Proposed American Standard Dimensions for 8mm Motion-Picture Film, Perforated Super 8, 1R-1667, PH22.149, but is included to facilitate its use.)

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

A2. 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. The width of 8mm film is controlled by the shrinkage characteristics of the films involved. Thus, there have been standards for the width of film stock of the "usual" shrinkage and for stock of "low-shrinkage" characteristics. The purpose was to obtain films of approximately the same width regardless of the type of film base during their useful life. The control of film shrinkage becomes critical in films used in the production of prints because of the necessity of critical adjustment of perforation pitches for films duplicated on sprocket-type printers. Because the film described in this standard would not ordinarily be used as an original intended for the production of prints, the matter of film shrinkage therefore is not critical.

It is the common tendency of film to expand when exposed to high relative humidity. Allowance should be made for this factor in equipment design and in no case should the equipment design fail to accommodate a film of 0.318-in. width under the conditions of use.

PH22.149—NOT APPROVED

Proposed American Standard Dimensions for
16mm Motion-Picture Film, Perforated Super 8, 2R-1667 (1-3)

NOTE 2: The metric values in the table of dimensions are converted from the inch values in accordance with conversion principles outlined in American Standard Practice for Inch-Millimeter Conversion for Industrial Use, B48.1-1933 (Reaffirmed 1947).

NOTE 3: The title of this standard was established by the application of a nomenclature system developed for all film dimension standards. Each title provides an indication of the film width, a code designation for the perforation shape (BH, KS, DH, or CS) or the number of rows of perforations (1R, 2R, etc.), depending upon which is the significant factor, and the perforation pitch without the decimal point.

The numerals 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.

- 1—adjacent to the reference edge
- 2—on the reference side of center
- 3—on the non-reference side of center
- 4—adjacent to the non-reference side

when the film end is observed from the base side with the spool above and away from the point of observation.

There can be two different windings for the same numbered rows of perforations. This applies, however, only when the film is perforated in the 1-3 position and the designation of the film would be 1-3, regardless of winding. Winding could be A or B depending upon the location of the reference edge (See PH22.75-1953).

Appendix

(This Appendix is not a part of Proposed American Standard Dimensions for 16mm Motion-Picture Film, Perforated Super 8, 2R-1667 (1-3), PH22.150, but is included to facilitate its use.)

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

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

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

(2) the film thickness, and (3) the film shrinkage and the rate at which shrinkage occurs.

Maximum steadiness and definition are secured on a sprocket-type printer when the negative stock is somewhat shorter in pitch than the positive stock in the approximate proportion of the thickness of the film to the radius of curvature. For printing on a 72-tooth sprocket (circumference of about 12 in.) with film 0.0055 to 0.0065 in. thick, the optimum pitch differential is 0.3 percent. The use of the ideal pitch differential for the negative would minimize slippage between the positive stock and negative during the printing operation, thus reducing the amount of blurring and jumping of horizontal lines in the picture or sound image. (This error is to be differentiated from the jump caused by nonuniformity of successive pitches, Dimension 8.)

Experience has shown that the average pitch derived from Dimension 1 of the intermediate can vary ± 0.1 percent from the ideal pitch, which is 0.3 percent shorter than the positive stock, without blurring of picture and sound image being easily detected.

For many years this desired difference in pitch was caused by the shrinkage of the negative film during processing and aging. Current film bases shrink less than the earlier ones and hence a shorter initial pitch becomes desirable. To satisfy this requirement for picture- or sound-negatives, it is common manufacturing practice to aim for a pitch value 0.2 percent shorter

PH22.150—NOT APPROVED

1. Scope

This standard specifies the cutting and perforating dimensions for 16mm motion-picture film with super 8 perforations in positions 1-3 and a perforation pitch of 0.1667 in. The width of the 8mm strip after processing and slitting is also specified.

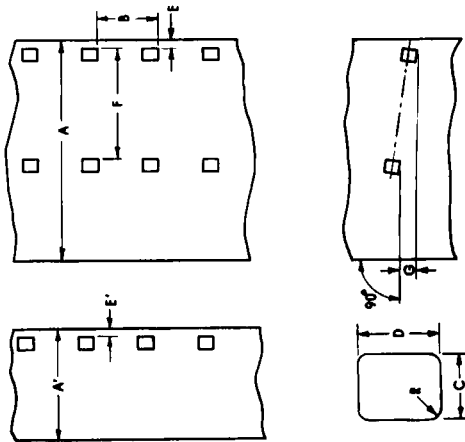
2. Dimensions

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 Standard Specifications for Motion-Picture Safety Film, PH22.31-1958.

2.3 Except for Dimensions A' and E', the dimensions apply to material immediately after cutting and perforating.

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



Dimensions	Inches	Millimeters
A	0.628 ± 0.001	15.95 ± 0.03
A'	0.314 ± 0.002	7.98 ± 0.05
B	0.1667 ± 0.0004	4.234 ± 0.010
C	0.0360 ± 0.0004	0.914 ± 0.010
D	0.0450 ± 0.0004	1.143 ± 0.010
E	0.020 ± 0.002	0.51 ± 0.05
E'	0.020 ± 0.002	0.51 ± 0.05
F	0.314 ± 0.001	7.98 ± 0.03
G	0.001 max	0.03 max
L	16.670 ± 0.017	423.42 ± 0.43
R	0.005 ± 0.001	0.13 ± 0.03

NOTE 1: The principal use of the film stock described in this standard is for the production of prints.

NOT APPROVED

A4. The width for 16mm film is controlled by the shrinkage characteristics of the films involved. Thus there have been standards for the width of 16mm stock of the "usual" shrinkage and for stock of "low-shrinkage" characteristics. The purpose was to obtain films of approximately the same width regardless of the type of film base during their useful life. This standard is based on the values adapted to "low-shrinkage" film base since nearly all films now manufactured in the U.S. meet the definition noted below.

For the purpose of choice of width, low-shrinkage film base is film base which, when coated with emulsion and any other normal coating treatment, perforated, kept in the manufacturer's normal commercial packings for six months at 65 to 75 F, exposed, processed, and stored exposed to air for a period not to exceed 30 days at 65 to 75 F and 50 to 60 percent relative humidity, shall have shrunk not more than 0.2 percent from its original dimension at the time of perforating.

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.

This definition of low-shrinkage film stock has been found by experience to be useful as a guide to film manufacturers in slitting their stock. Departure from this definition shall not be cause for rejection of the stock. Note that this definition of shrinkage differs from the criterion applying to the choice of longitudinal pitch, where greater periods of time are involved and where short-time tests can be deceptive.

Allowance has been made in arriving at these values for the common tendency of film to expand when exposed to high relative humidity. Allowance should be made for this factor in equipment design and in no case should the equipment design fail to accommodate a film of 0.630-in. width.

Proposed American Standard Dimensions for
**16mm Motion-Picture Film,
 Perforated Super 8, 2R-1664 (1-3)**

PH22-151

Page 1 of 3 pages

1. Scope

This standard specifies the cutting and perforating dimensions for 16mm motion-picture film with super 8 perforations in positions 1-3 and a perforation pitch of 0.1664 in.

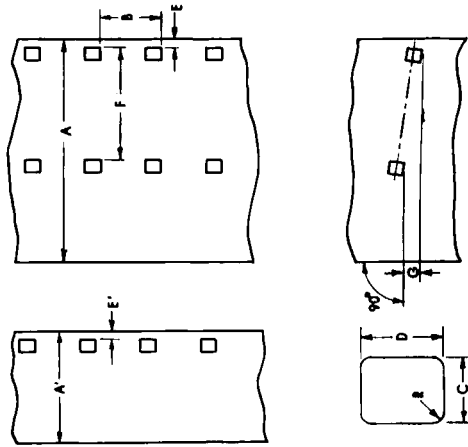
2. Dimensions

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 Standard Specifications for Motion-Picture Safety Film, PH22-31-1958.

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

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



Dimensions	Inches	Millimeters
A	0.628 ± 0.001	15.95 ± 0.03
B	0.1664 ± 0.0004	4.227 ± 0.010
C	0.0360 ± 0.0004	0.914 ± 0.010
D	0.0450 ± 0.0004	1.143 ± 0.010
E	0.020 ± 0.002	0.51 ± 0.05
F	0.314 ± 0.001	7.98 ± 0.03
G	0.001 max	0.03 max
L	16.640 ± 0.017	422.70 ± 0.43
R	0.005 ± 0.001	0.13 ± 0.03

NOTE 1: The principal use of the film stock described in this standard is as an intermediate film in the production of prints.

PH22.150-NOT APPROVED

NOT APPROVED

NOTE 2: The metric values in the table of dimensions are converted from the inch values in accordance with conversion principles outlined in American Standard Practice for Inch-Millimeter Conversion for Industrial Use, B48.1-1933 (Reaffirmed 1947).

NOTE 3: The title of this standard was established by the application of a nomenclature system developed for all film dimension standards. Each title provides an indication of the film width, a code designation for the perforation shape (BH, KS, DH, or CS) or the number of rows of perforations (1R, 2R, etc.), depending upon which is the significant factor, and the perforation pitch without the decimal point.

The numerals 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.

The perforation rows shall be numbered starting at the reference edge. The reference edge is that edge of the strip nearest to the perforations which is retained on one of the slit prints that is not discarded in any subsequent slitting. The designation 1 through 4 of 16mm films indicates that the perforations are in row:

- 1—adjacent to the reference edge
- 2—on the reference side of center
- 3—on the non-reference side of center
- 4—adjacent to the non-reference side

When the film end is observed from the base side with the spool above and away from the point of observation.

There can be two different windings for the same numbered rows of perforations. This applies, however, only when the film is perforated in the 1-3 position and the designation of the film would be 1-3, regardless of winding. Winding could be A or B depending upon the location of the reference edge. (See PH22.75-1953).

Appendix

(This Appendix is not a part of Proposed American Standard Dimensions for 16mm Motion-Picture Film, Perforated Super 8, 2R-1664 (1-3), PH22.151, but is included to facilitate its use.)

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

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

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

than the positive stock onto which they will be printed. The additional shrinkage that occurs during processing and the aging that takes place before the release prints are made then bring the pitch differential close to the optimum and desired value of 0.3 percent. Accordingly, the pitch chosen for the negative or intermediate stock is 0.1664 in.

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

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. The width for 16mm film is controlled by the shrinkage characteristics of the films involved. Thus there have been standards for the width of 16mm stock of the "usual" shrinkage and for stock of "low-shrinkage" characteristics. The purpose was to obtain films of approximately the same width, regardless of the type of film base during their useful life. This standard is based on the values adapted to "low-shrinkage" film base since nearly all films now manufactured in the U.S. meet the definition noted below.

For the purpose of choice of width, low-shrinkage film base is film base which, when coated with emulsion and any other normal coating treatment, perforated, kept in the manufacturer's normal commercial packings for six months at 65 to 75 F, exposed, processed, and stored exposed to air for a period not to exceed 30 days at 65 to 75 F and 50 to 60 percent relative humidity, shall have shrunk not more than 0.2 percent from its original dimension at the time of perforating.

This definition of low-shrinkage film stock has been found by experience to be useful as a guide to film manufacturers in slitting their stock. Departure from this definition shall not be cause for rejection of the stock. Note that this definition of shrinkage differs from the criterion applying to the choice of longitudinal pitch, where greater periods of time are involved and where short-time tests can be deceptive.

Allowance has been made in arriving at these values for the common tendency of film to expand when exposed to high relative humidity. Allowance should be made for this factor in equipment design and in no case should the equipment design fail to accommodate a film of 0.630-in. width.