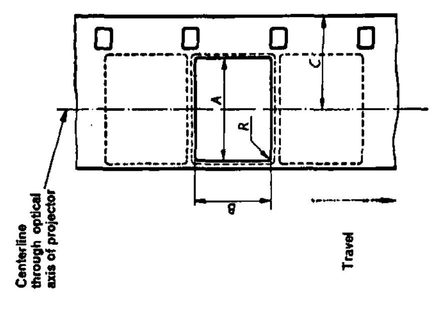
2. Projected image area



The projector aperture plate and the stopping position of the projector registration device should be so dimensionally related that the centerlines of the film image and plate aperture are coincident. (See Note 3.)

The angle between the vertical edges of the aperture and the edges of normally positioned film should be 0° ± ½°.

The angle between the horizontal edges of the aperture and the edges of normally positioned film should be 90° ± ½°.

Film as seen from inside projector, looking toward the lens.

Dimension	Millimeters	Inches	Observations
A	4.37 ± 0.025	0.172 ± 0.001	See Note 1
B	3.28 ± 0.025	0.129 ± 0.001	See Note 2
C	5.21 ± 0.050	0.205 ± 0.002	
R	0.25 max.	0.010 max.	

Note 1: Dimensions *A*, *B* and *R* apply to the portion of the image on the film that is to be projected; the actual opening in the aperture plate has to be slightly smaller. The exact amount of this difference depends on the lens used and on the separation of the emulsion and the physical aperture. To minimize the difference in size and make the image of the aperture as sharp as practicable on the screen, this separation *should be no larger* than is necessary to preclude scratching of the film.

When the reduction in size from the image to the actual aperture is being computed, it is suggested a 25 mm (1 in) f/1.6 lens be assumed, unless there is reason for doing otherwise.

Note 2: The limiting aperture is generally between the film and the light source so that it will give the maximum protection from heat. If other factors are more important, *it may be on the other side of the film.*

Note 3: It is customary to provide a framing movement of approximately 0.6 mm (0.025 in) above and below the nominal position of the film image.

standards and recommended practices

Proposed American Standards

A Proposed American Standard, PH22.117, Spectral Diffuse Density of Photographic Sound Record on Three-Component Subtractive Color Films, is published here for a three-month period of trial and comment.

In 1955, the Color Committee was asked to study the problem of standardizing methods for measuring the densities of color film and soundtracks. A subcommittee, chaired by Harry P. Brueggemann, was appointed to explore the needs of the motion-picture industry in the general field of color film densitometry. The proposal submitted by the subcommittee was revised and recirculated to the Color Committee four times before it was reviewed and approved by the Standards Committee.

Proposed American Standard Dimensions for 65mm Motion-Picture Film, KS-1870, PH22.118 and Dimensions for 70mm Motion-Picture Film, Perforated 65mm, KS-1870, PH22.119, have been approved by the Film Dimensions and Standards Committees. The proposals are published here for a three-month period of trial and criticism.

All comments should be addressed to Society Headquarters, attention of J. Howard Schumacher, Staff Engineer, prior to March 15, 1960. If no adverse comments are received, the proposals will be submitted to ASA Sectional Committee PH22 for further processing as American Standards.——*J.H.S.*

Proposed American Standard

Spectral Diffuse Density of Photographic Sound Record on Three-Component Subtractive Color Films

PH22.117

Supplement to PH2.19-1959 and PH2.1-1952

INTRODUCTION

The American Standard Spectral Diffuse Densities of Three-Component Subtractive Color Films, PH2.1-1952, which applies primarily to picture on color film, constitutes the basis for this standard, and Sections 2, 3 and 4 of that standard are to be considered part of the present standard.

The purpose of this standard is to supplement the American Standard Spectral Diffuse Densities of Three-Component Subtractive Color Films, PH2.1-1952, by specifying spectral conditions suitable for determining the sensitometric characteristics of photographic sound record on three-component subtractive color films. The conditions of this standard are intended for, and are applicable to, systems of sound reproduction using the S-1 photosurface, since this photosurface is in common use at the present time. It is recognized that there are other types of photosurfaces sometimes used for photographic sound reproduction that do not fall within the scope of this standard.

In three-component subtractive color films, dyes or color couplers are used to form the photographic image. These color materials are designed primarily for the visual region, but sound-record reproduction via the S-1 photosurface uses the infrared region of approximately 700 mμ (millimicrons) to 900 mμ, which is far enough away from the visual region so that the color materials cannot be used efficiently, but close enough so that they produce a measurable effect. The spectral characteristics of this effect depend on the type of light-absorbing material used for the sound record, and on the manner in which the sound record is processed. Therefore, in order to obtain uniformity of sound record densitometry among different films, and among the different density measuring instruments, it is necessary to specify the spectral conditions under which these density measurements are made. It is the aim of this standard to define these conditions sufficiently to insure reasonable uniformity of density measurements, yet not so rigidly as to make impractical the obtaining of such measurements.

This standard defines a primary condition which shall be the ideal method of taking density measurements of sound record on subtractive color films. This standard also defines a practical condition by means of which it is expected that most density measurements will be made.

If the accuracy required is less than that provided by the practical condition, it does not seem economical to use an instrument designed specifically for sound record. An instrument which measures in the visual region, perhaps with minor modifications to favor the general infrared region, will suffice.

1. Purpose and Scope

1.1 The principal purpose of this standard is to supplement American Standard Diffuse Transmission Density PH2.19-1959, and, further, to supplement American Standard Spectral Diffuse Densities of Three-Component Subtractive Color Films, PH2.1-1952.

1.2 This standard defines conditions suitable for integral spectral density measurement of photographic sound record on three-component subtractive color films.

1.3 It is recognized that there are other useful types of photographic sound-record density measurements that do not fall within the scope of this standard.

2. American Standard Diffuse Density

2.1 The following sections of the American Standard Diffuse Density PH2.19-1959, are part of the American Standard Spectral Diffuse Density of Photographic Sound Record on Three-Component Subtractive Color Films:

2. General Definition of Density

3. Totally Diffuse Density

4. American Standard Diffuse Density

3. American Standard Spectral Diffuse Densities of Three-Component Subtractive Color Films

3.1 The following section of the American Standard Spectral Diffuse Densities of Three-Component Subtractive Color Films, PH2.1-1952, is part of the American Standard Spectral Diffuse Density of Photographic Sound Record on Three-Component Subtractive Color Films:

2. Terminology Used in the Densitometry of Color Film

4. Terminology Used in the Densitometry of Photographic Color Sound Records

4.1 *Peak Response.* The peak response of a densitometer is the wavelength to which the densitometer has the greatest response, including such factors as the spectral emission of the light source, the combined spectral transmission of all optical filters in the light path, and the spectral sensitivity of the photosensitive receptor.

4.2 *Bandwidth.* The bandwidth of a densitometer is the range of wavelengths to which the densitometer is sensitive. In a practical densitometer this range of wavelengths is not sharply defined; but for the purposes of this standard, the bandwidth shall be considered to lie between those wavelengths which excite, in the photosensitive receptor, one-half the current which is excited at the wavelength of peak response. These limiting wavelengths are to be measured or computed using the light source, all operating optical filters, and the photosensitive receptor of the densitometer.

4.3 *Overall Response.* The overall response of a densitometer is the integrated response of the densitometer to all wavelengths, including such factors as the spectral emission of the light source, the combined spectral transmission of all optical filters in the light path, and the spectral sensitivity of the photosensitive receptor.

5. Potassium Infrared Diffuse Density

5.1 Potassium infrared diffuse density is diffuse density measured with energy concentrated in the spectral doublet of wavelengths 766.5 and 769.9 mμ of a potassium arc.

6. American Standard Spectral Density of Photographic Sound Record on Three-Component Subtractive Color Films

6.1 American Standard spectral diffuse density of photographic sound record on three-component subtractive color films is American Standard diffuse transmission density measured in any practical instrument with any practical condition which is proven by test to yield densities not significantly different from potassium infrared diffuse density, providing that the peak response of such a practical instrument is 768 ± 5 mμ, that the bandwidth of such an instrument is 20 mμ or less, and that the response of such instrument within the band from 758 to 778 mμ is at least 80 percent of the overall response.

Proposed American Standard

Dimensions for 65mm Motion-Picture Film, KS-1870

PH22.118

1. Scope

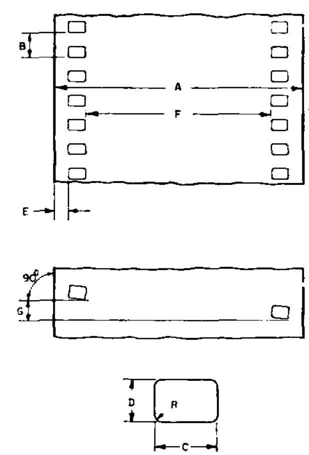
1.1 This standard specifies the cutting and perforating dimensions of 65mm motion-picture film.

2. Dimensions

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

2.2 These dimensions apply to material immediately after cutting and perforating.

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



Dimensions	Inches	Millimeters
A Film width	2.558 ± 0.002	64.97 ± 0.05
B Length pitch	0.1870 ± 0.0005	4.750 ± 0.013
C Perforation width	0.1100 ± 0.0004	2.794 ± 0.010
D Perforation height	0.0780 ± 0.0004	1.981 ± 0.010
E Edge to perforation	0.117 ± 0.003	2.95 ± 0.08
F Width between perforations	2.104 ± 0.003	53.44 ± 0.08
G Perforation skewness	0.002 max	0.05 max
L Length pitch (100 consecutive pitch intervals)	18.700 ± 0.015	474.98 ± 0.38
R Radius of perforation fillet	0.020 ± 0.001	0.51 ± 0.03

NOTES

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, the perforation shape (BH, KS, DH or CS) or the number of rows of perforations (1R, 2R or 4R), depending upon which is the significant factor, and the perforation pitch without the decimal point.

2. The dimensions in the inch system are the fundamental standard. The dimensions in the metric system are practical approximations based on American Standard Inch-Millimeter Conversion for Industrial Use, B48.1-1933, reaffirmed in 1947, providing a conversion factor of 1 inch = 25.4 millimeters.

NOT APPROVED

APPENDICES

(These Appendices are not a part of American Standard Dimensions for 65mm Motion-Picture Films, KS-1870, PH22.118, but are included to facilitate its use.)

APPENDIX 1

The dimensions given in this standard represent the practice of film manufacturers in that the dimensions and tolerances are for film 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 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.

APPENDIX 2

The uniformity of pitch, margin and hole size (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 sprocket hole to the next. Actually it is the maximum variation from one sprocket hole to the next within any small group of consecutive perforations that is important.

APPENDIX 3

Film of this size is generally used as a camera negative. There are two advantages in using this larger size. One is the possibility of producing large prints by contact printing for exhibition in special theaters designed to provide the audience with a large viewing angle. The other purpose is to serve as an original from which 35mm prints can be produced by reduction with less grain and better definition than is obtained by making contact prints from 35mm negatives.

Prints may be made on 70mm film. The appropriate film is described in Proposed American Standard Dimensions for 70mm Motion-Picture Film, Perforated 65mm, KS-1870, PH22.119. Note that the 70mm film used with 65mm negative differs in its dimensions from the two earlier films described by American Standard Dimensions for 70mm Unperforated and Perforated Film for Cameras Other Than Motion-Picture Cameras, PH1.20-1956, Type I and Type II. The perforations of the related 70mm film have the same size and pitch as those described by PH1.20-1956, Type II, but the margin and distance between perforations are different. Consequently Dimension F is the same in both the 65mm, KS-1870 film, and the 70mm, perforated 65mm, KS-1870. The increased space provided by a larger margin E is used to make room for magnetic soundtracks.

Note that the image usually placed on this film is five pitches high. The manufacture of the film is based on this idea and best results accrue from using this format. The pitch of the negative is nominal since the printing of film of this size is currently done by the use of step printers.

PH22.118—NOT APPROVED

Proposed American Standard

Dimensions for 70mm Motion-Picture Film, Perforated 65mm, KS-1870

PH22.119

1. Scope

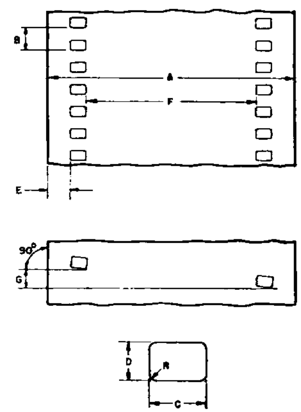
1.1. This standard specifies the dimensions of 70mm motion-picture film, perforated 65mm.

2. Dimensions

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

2.2 These dimensions apply to material immediately after cutting and perforating.

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



Dimensions	Inches	Millimeters
A Film width	2.754 ± 0.002	69.95 ± 0.05
B Length pitch	0.1870 ± 0.0005	4.750 ± 0.013
C Perforation width	0.1100 ± 0.0004	2.794 ± 0.010
D Perforation height	0.0780 ± 0.0004	1.981 ± 0.010
E Edge to perforation	0.215 ± 0.003	5.46 ± 0.08
F Width between perforations	2.104 ± 0.003	53.44 ± 0.08
G Perforation skewness	0.002 max	0.05 max
L Length pitch (100 consecutive pitch intervals)	18.700 ± 0.015	474.98 ± 0.38
R Radius of perforation fillet	0.020 ± 0.001	0.51 ± 0.03

NOTES

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, the perforation shape (BH, KS, DH or CS) or the number of rows of perforations (1R, 2R or 4R), depending upon which is the significant factor, and the perforation pitch without the decimal point.

2. The dimensions in the inch system are the fundamental standard. The dimensions in the metric system are practical approximations based on American Standard Inch-Millimeter Conversion for Industrial Use, B48.1-1933, reaffirmed in 1947, providing a conversion factor of 1 inch = 25.4 millimeters.

NOT APPROVED

APPENDICES

(These Appendices are not a part of American Standard Dimensions for 70mm Motion-Picture Film, Perforated 65mm, KS-1870, PH22.119, but are included to facilitate its use.)

APPENDIX 1

The dimensions given in this standard represent the practice of film manufacturers in that the dimensions and tolerances are for film 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 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.

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The uniformity of pitch, margin and hole size (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 sprocket hole to the next. Actually it is the maximum variation from one sprocket hole to the next within any small group of consecutive perforations that is important.

APPENDIX 3

Film described in this standard is used in making prints from 65mm film described in Proposed American Standard Dimensions for 65mm Motion-Picture Film, KS-1870, PH22.118. Note that this film differs from the other 70mm films described in American Standard Dimensions for 70mm Unperforated and Perforated Film for Cameras Other Than Motion-Picture Cameras, PH1.20-1956, Types I and II.

PH22.119—NOT APPROVED