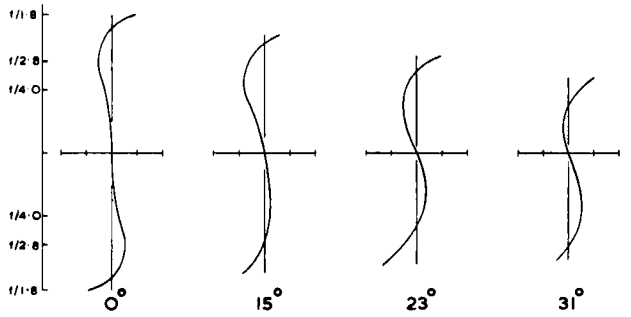


Fig. 7. Cooke Speed Panchro Series II 25mm f/1.8; meridional aberration in focal plane.

dicates the external glass surfaces of a normal type of lens and the widths of the axial and oblique beams that can be transmitted again show the vignetting limitations of this type of construction. The bottom diagram shows an inverted telephoto lens of the same focal length, relative aperture and angular field of view. Its rear collective component is at an increased distance from the film plane so as to yield the necessary increased clearance at the rear and to reduce the obliquity of beams of light forming off-axis images. The front dispersive component is large enough in diameter to accommodate the increased width of oblique beam that can be transmitted through the rear component. The diagram shows the increased oblique aperture of this type of lens and also that its viewpoint is extended forward from the conventional position. This more forward viewpoint is often advantageous in avoiding obstruction to image-forming beams of light caused by other longer focal length lenses on the camera turret.

If the front dispersive and rear collective components of inverted telephoto lenses are made sufficiently complex in construction, the designer has sufficient variables at his command with which to control all aberrations to the level demanded by the new standards of performance now being offered.

The aberration diagrams shown in Fig. 7 are representative of the type of performance now possible with inverted telephoto lenses. The uniformity of image illumination across the field of view is unusually high right out to the corners of the picture format whilst aberrations are stable and small in magnitude.

In the range of long focal length and telephoto camera lenses, similar advantages to be gained from new lens construction and design procedures result in improvements of equal significance. New standards of performance are therefore available for all applications of 35mm cinematography and similar improvements can be realized in lenses intended for use with other professional sizes of negative format.

Acknowledgment

Thanks are due to Taylor, Taylor & Hobson Ltd. for permission to publish this paper.

motion-picture standards

Published here are American Standards PH22.23-, PH22.109-, and PH22.110-1958, which were approved by the American Standards Association on June 26, 1958.

PH22.23–1958, 8mm Motion-Picture Projection Reels, is a revision of Z22.23-1941. The final version remains the same as that published for trial and comment in the September 1957 Journal.

PH22.109–1958, Dimensions for 16mm Motion-Picture Film, 1R-2994 and PH22.110–1958. Dimensions for 16mm Motion-Picture Film, 2R-2994, had their trial publication in the January 1957 Journal. During publication, comments were received concerning paragraph 2.3 and the proposals were returned to the initiating committee for resolution of the objections raised. As a result, modifications of both standards were approved and are incorporated in these final drafts. The changes involve the deletion of paragraph 2.3, addition of Appendix 5, correction of the millimeter conversion of Dimension L and addition of tolerances to Dimension R.—*J. Howard Schumacher*, Staff Engineer.

American Standard

8mm Motion-Picture Projection Reels

ASA
Reg. U.S. Pat. Off.
PH22.23-1958
Revision of
Z22.23-1941

*UDC 778.55

1. Scope

1.1 This standard specifies the dimensions for 8mm motion-picture projection reels having film capacities of 200, 400, 600 or 800 ft.

1.2 The note is a part of the standard.

2. Dimensions

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

2.2 Dimension C shall be measured between the inside faces of the two reel flanges. If spring fingers are used to engage the edges of the film, dimension C shall be measured with the fingers fully expanded.

2.3 The measurement of dimension G shall include any embossing.

2.4 Dimension H shall be measured at the core and shall include rivets, lugs and any other protrusions.

2.5 Dimension J shall apply within a circle of radius ½ in. (12.7mm) or more, centered on the spindle-hole axis.

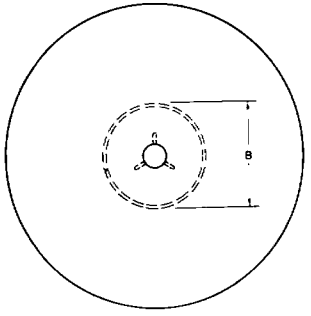
2.6 Dimension K shall be measured at the periphery of the reel.

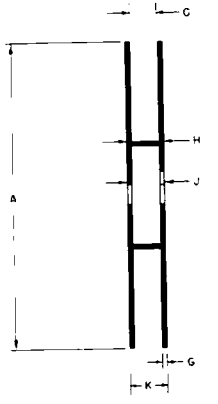
2.7 The maximum flange and core eccentricity shall be 0.010 in. (0.25mm). The total maximum deviation may be 0.020 in. (0.51mm), measured from the spindle-hole centerline.

2.8 Lateral runout, dimension L, is the maximum departure of any point on a flange of the reel from the *intended* plane of rotation of that point, when the reel is rotated on an accurate and tightly fitted shaft. This departure can be in either direction from the plane; therefore, the total excursion can be twice the numerical value shown.

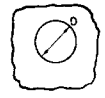
NOTE

The drive side of the reel shall have one or more keyways, but preferably an odd number. There shall be no driving keyways in the other side of the reel.

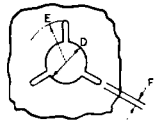




SECTIONAL VIEW



ENLARGED VIEW OF HOLE IN LEFT FLANGE



ENLARGED VIEW OF HOLE IN RIGHT FLANGE

Approved June 26, 1958, by the American Standards Association, Incorporated
Sponsor: Society of Motion Picture and Television Engineers

*Universal Decimal Classification

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ASA¾M858

Price, 25 Cents

TABLE 1

Capacity of Reel			Inches		Millimeters	
Feet	Meters	Dimension	Max	Min	Max	Min
200	61	A	5.031	5.000	127.79	127.00
		B	2.000	1.500	50.80	38.10
		L	0.057		1.45	
400	122	A	7.031	7.000	178.59	177.80
		B	2.500	1.500	63.50	38.10
		L	0.080		2.03	
*600	183	A	9.031	9.000	229.39	228.60
		B	3.531	3.469	89.69	88.11
		L	0.103		2.62	
*800	244	A	10.531	10.500	267.49	266.70
		B	4.906	4.844	124.61	123.04
		L	0.120		3.05	

*See Appendix f

TABLE 2

Dimension	Inches	Millimeters
C	0.350 ± 0.030	8.89 ± 0.76
D	0.319 Max	8.10 Max
	0.316 Min	8.03 Min
E	0.312 ± 0.005	7.93 ± 0.13
F	0.070 Max	1.78 Max
	0.060 Min	1.52 Min
G	0.091 Max	2.31 Max
	0.025 Min	0.64 Min
H	0.562 Max	14.28 Max
J	0.450 Max	11.43 Max
K	0.562 Max	14.28 Max

APPENDIX

(This Appendix is not a part of American Standard 8mm Motion-Picture Projection Reels, PH22.23-1958, but is intended to facilitate its use.)

a. Dimension D was chosen to give sufficient clearance between the reels and the largest spindles normally used on 8mm projectors.

b. The nominal value of C was chosen to provide proper lateral clearance for the film. The channel is narrow enough to prevent the film from wandering laterally too much as it is coiled, a condition which causes loose winding and excessively large rolls.

c. It is recommended that the driven flange have at least three driving slots so that it will not be necessary to turn the reel more than 120 degrees in order to engage it with the driving key of the spindle. An odd number of slots is suggested so that the keyway cannot come into alignment with the spring that normally latches the reel on the spindle and thus allow the reel to move along the spindle.

d. When the ratio of reel flange diameter (A) to core diameter (B) is small, there tends to be less variation in the tension to which film is subjected by the take-up mechanism throughout the projection of a roll of film. This is particularly true if a constant torque device is used. In this standard, the outside diameters of the flanges (A) were made as large as practicable commensurate with past practice in the design of projectors, reel containers, rewind units, and similar equipment. This made it possible to specify relatively large cores (which are desirable) and to attain reasonably small flange-to-core ratios.

e. For 200 and 400-ft reels, rather large tolerances are given for B in order to include reels of current manufacture which have given reasonably satisfactory service. When new reels are designed, or when present reels are re-tooled, the cores for the 200 and 400-ft reels should be made in accordance with the maximum values shown in the table. If this is done, it may be possible to have future issues of this standard show tolerances on core diameter similar to those specified for 600 and 800-ft reels.

f. 600-ft and 800-ft reels are not in use at this time. The specifications are provided so that a standard will be available should these reels come into use.

American Standard

Dimensions for 16mm Motion-Picture Film, 1R-2994

ASA
Reg. U.S. Pat. Off.
PH22.109-1958
*UDC 771.531.1/.3:531.7

1. Scope

1.1 This standard specifies the cutting and perforating dimensions of 16mm motion-picture film with perforations along one edge.

1.2 These dimensions pertain to a safety film with low-shrinkage characteristics as defined in Appendix 1.

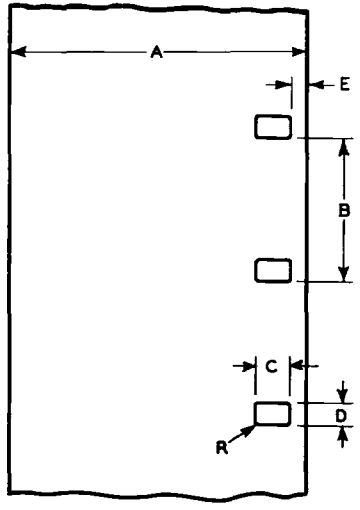
1.3 The notes are a part of the standard.

2. Dimensions

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

2.2 These dimensions apply to raw stock immediately after cutting and perforating.

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



Dimensions	Inches	Millimeters
A	0.628 ± 0.001	15.95 ± 0.03
B	0.2994 ± 0.0005	7.605 ± 0.013
C	0.0720 ± 0.0004	1.829 ± 0.010
D	0.0500 ± 0.0004	1.270 ± 0.010
E	0.0355 ± 0.0020	0.902 ± 0.051
L	29.94 ± 0.03	760.5 ± 0.8
R	0.010 ± 0.001	0.25 ± 0.03

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*Universal Decimal Classification

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NOTES

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

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

3. This standard differs from American Standard Dimensions for 16mm Film, Perforated One Edge, PH22.12-1953, primarily in the values for dimensions A, B and L which are specified there respectively as 0.629 ± 0.001 in., 0.3000 ± 0.0005 in. and 30.00 ± 0.03 in. (See Appendices 2 and 4.)

APPENDICES

(These Appendices are not a part of American Standard Dimensions for 16mm Motion-Picture Film, 1R-2994, PH22.109-1958, but are included to facilitate its use.)

APPENDIX 1

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 65 F to 75 F, 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.

APPENDIX 2

Experience shows that it is common for 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 width of 16mm, 0.630 in.

APPENDIX 3

To comply with 1.2, this film is made on safety base complying with American Standard Specifications for Safety Photographic Film, PH1.25-1956.

APPENDIX 4

Films which after processing are intended to pass through a continuous contact printer in which the exposure is made over a cylindrical surface do not yield prints of maximum steadiness unless the actual pitch of the film curved to the smaller radius (the "negative") is slightly less than that of the film curved to the larger radius (the "print stock"). Since positive films in general are perforated to a nominal 0.3000 in. pitch and since negative-type films with low-shrinkage characteristics do not shrink enough for optimum pitch relationship with such positive films, the nominal 0.2994 in. pitch was developed for films to be used primarily as negatives for the subsequent production of prints. They also find other specialized uses.

APPENDIX 5

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.

American Standard

Dimensions for 16mm Motion-Picture Film, 2R-2994

ASA
Reg. U.S. Pat. Off.

PH22.110-1958

*UDC 771.531.1:3:531.7

1. Scope

1.1 This standard specifies the cutting and perforating dimensions of 16mm motion-picture film with perforations along two edges.

1.2 These dimensions pertain to a safety film with low-shrinkage characteristics as defined in Appendix 1.

1.3 The notes are a part of the standard.

2. Dimensions

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

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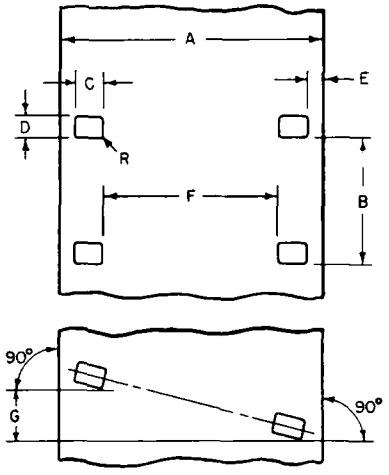

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G	0.001 max	0.025 max
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3. This standard differs from American Standard Dimensions for 16mm Film, Perforated Two Edges, PH22.5-1953, primarily in the values for dimensions A, B and L which are specified there respectively as 0.629 ± 0.001 in., 0.3000 ± 0.0005 in. and 30.00 ± 0.03 in. (See Appendices 2 and 4.)

APPENDICES

(These Appendices are not a part of American Standard Dimensions for 16mm Motion-Picture Film, 2R-2994, PH22.110-1958, but are included to facilitate its use.)

APPENDIX 1

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 65 F to 75 F, 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.

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