standards and recommended practices

Recently Published American Standard

On August 20, 1962, the American Standards Association approved The American Standard Method for the Physical Measurement of Sound, S1.2-1962.

Developed by Sectional Committee S1, under the sponsorship of the Acoustical Society of America, as a revision of American Standard Test Code for Apparatus Noise Measurement, Z24.7-1950, it is part of a group of definitions, standards, and specifications for use in acoustical work.

S1.2 is not only concerned with the measurement of sound by determining the sound pressure levels as a function of frequency, but also with obtaining the sound power radiated by a device, machine, or apparatus as a function of frequency. Since equipment for the direct measurement of acoustic intensity is not available, the Standard presents several methods for computing the sound power from sound pressure level measurements.

Suggestions of improvement gained through use of the Standard are welcome and should be sent to the American Standards Association, 10 East 40th Street, New York 16, New York. Copies of the Standard are available from the ASA at a price of $1.80.—*A.E.A.*

Proposed American Standards

The five proposed standards published here for a trial period were approved by the SMPTE Engineering Committees and the Standards Committee. Comments should be addressed to Alex E. Alden, Staff Engineer, at Society Headquarters prior to April 1. If no adverse criticism is received by that date, the proposals will be submitted to ASA Sectional Committee PH22 for further processing.

Proposed American Standard Dimensions of 8mm Motion-Picture Camera Spools (25, 50 and 100-ft Capacity), PH22.107, is a new Standard, not a revision. The proposal was originally published in the December 1961 *Journal* and showed only the dimensions for the 25-ft. capacity spool. While the proposal was being reviewed by ASA Sectional Committee PH22, another proposed standard covering the 50- and 100-ft capacity sizes was approved by the Standards Committee, and it was decided to combine the two proposals under one number.

The remaining four proposals are proposed revisions of earlier issues which have been modified editorially to facilitate their use. There were, however, several technical changes introduced which reflect current engineering practices. These are as follows:

Proposed American Standard Dimensions of 16mm Motion-Picture Camera Image is a revision of Z22.7-1950. In this proposal the height of the image area has been increased 0.003 in. and the tolerances loosened; the fillet in the corner of the image areas has been reduced slightly and the reference to the registration device has been deleted.

Proposed American Standard Dimensions of 8mm Motion-Picture Camera Image, PH22.19, is a revision of Z22.19-1950. In this revision both the height and the width have been increased; the height by 0.007 in. and the width by 0.008 in. Reference to the registration device has been deleted.

Proposed American Standard Specifications for Camera Usage of Double Width 8mm Motion-Picture Film, Perforated 2R-1500, PH22.21, and Proposed American Standard Specifications for Projector Usage of 8mm Motion-Picture Film, Perforated 1R-1500, PH22.22, are proposed revisions of 1953 issues differing primarily in an editorial manner. It is important to note that these revisions reflect the currently accepted use of 18 frames per second as the silent operating speed. This projection rate has been in use for some time; consequently for proper action reproduction, the camera speed should obviously be the same.—*A.E.A.*

Proposed American Standard Dimensions of

16mm Motion-Picture Camera Image

PH22.7
Revision of
Z22.7-1950

1. Scope

This standard specifies the dimensions of the camera aperture image and its relative position to the reference edge and the perforations of 16mm motion-picture film. The location of the perforations is based on dimensions given in the following American Standards: Dimensions for 16mm Film, Perforated Two Edges, PH22.5-1953; Dimensions for 16mm Film, Perforated One Edge, PH22.12-1953; Dimensions for 16mm Motion-Picture Film, 1R-2994, PH22.109-1958 and Dimensions for 16mm Motion-Picture Film, 2R-2994, PH22.110-1958.

2. Dimensions

2.1 The dimensions shall be as given in the figure and table and shall apply to measurements of the image as formed on freshly exposed and processed film.

2.2 The angle between the vertical edges of the image and the edges of normally positioned film shall be 0° ± 1/2°.

2.3 The angle between the horizontal edges of the image and the edges of normally positioned film shall be 90° ± 1/2°.

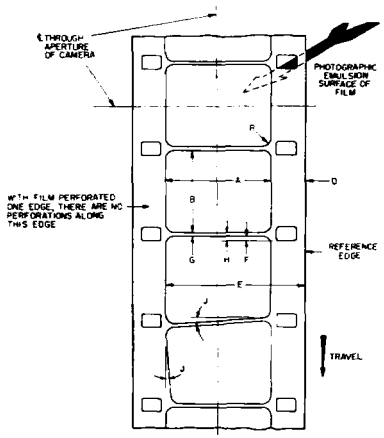


FIGURE SHOWS FILM AS SEEN FROM INSIDE OF CAMERA LOOKING TOWARD CAMERA LENS

Dimensions*	Inches	Millimeters
A	0.404 nom	10.26 nom
B	0.295 + 0.004 − 0.003	7.49 + 0.10 − 0.08
D	0.116 max	2.95 max
E	0.512 min	13.00 min
F	0.018 min	0.46 min
G	0.001 min 0.008 max	0.03 min 0.20 max
H	0.032 max	0.81 max
J	± 1/2°	± 1/2°
R	0.015 max	0.38 max

* See Notes.

NOTES

1. Dimension B, vertical height of aperture, must be maintained in order to ensure a real (unexposed) frameline in the projector. Close control of the tolerances given for Dimension B is necessary to enable Dimensions F and H to be held within satisfactory limits. These are the distances from the lower edge of the perforation and the horizontal edges of the framelines. Dimensions F and H represent the maximum conditions which can be tolerated due to misalignment of the horizontal centerline of the aperture opening and the optical centerline of the photographic lens. Dimensions B, F, G, and H shall be measured to lines that are at right angles to the reference edge of the film and through a point where the radius (Dimension R) is tangent to the horizontal framelines (see figure).

2. The centerlines of the aperture image are normally on the optical center of the camera. The "optical axis of the camera" is defined as the mechanical axis or centerline of the sleeve or other device for holding the camera lens. Except for manufacturing tolerances, it coincides with the optical axis of the lens.

3. Dimension J shows the limits by which the frameline may be out of square with the reference edge of the film but, at all times, this should be confined within the area designated by Dimension G.

APPENDIX

(This Appendix is not a part of Proposed American Standard Dimensions of 16mm Motion-Picture Camera Image, PH22.7, but is included to facilitate its use.)

A1. If the aperture plate is not in the plane of the emulsion, the physical dimensions of the aperture in the camera will be slightly different from the dimensions given in the figure. The exact amount of this difference will depend upon the f/value and focal length of the camera lenses used and upon the distance between the emulsion and the physical aperture. This separation should be no greater than is necessary to prevent scratching of the film.

A2. It is the intent of this standard to provide a camera image such that the exposed area will always be larger than the area of the projector aperture. This standard meets this objective without causing double exposure of the area between frames.

A3. Dimension G, the distance between adjacent framelines, has been limited carefully so as to make it possible to keep both framelines masked simultaneously by the projector aperture. In addition, Dimensions F and H have been established to limit the distance that any part of the frameline can depart from the bottom edge of the perforations. This is to minimize the necessity for frequent adjustment of the framing device on the projector.

Proposed American Standard Dimensions of

8mm Motion-Picture Camera Image

PH22.19
Revision of
Z22.19-1950

1. Scope

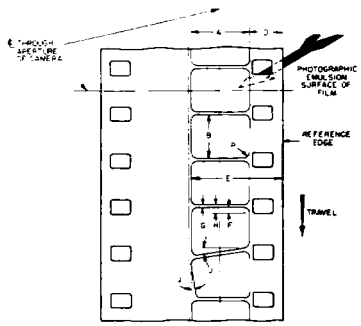
This standard specifies the dimensions of the camera aperture image and its relative position to the reference edge and the perforations of 8mm motion-picture film. The location of the perforations is based on dimensions given in American Standard Dimensions for 8mm Motion-Picture Film, PH22.17-1954.

2. Dimensions

2.1 The dimensions shall be as given in the figure and table and shall apply to measurements of the image as formed on freshly exposed and processed film.

2.2 The angle between the vertical edges of the image and the edges of normally positioned film shall be $0^\circ \pm {}^1/_2{}^\circ$.

2.3 The angle between the horizontal edges of the image and the edges of normally positioned film shall be $90^\circ \pm {}^1/_2{}^\circ$.



FILM AS SEEN FROM INSIDE OF CAMERA LOOKING TOWARD CAMERA LENS

Dimensions*	Inches		Millimeters	
A	0.192	nom	4.88	nom
B	0.145	+ 0.003 − 0.002	3.68	+ 0.08 − 0.05
D	0.113	max	2.87	max
E	0.297	min	7.54	min
F	0.018	min	0.46	min
G	0.002	min	0.05	min
	0.007	max	0.18	max
H	0.032	max	0.81	max
J		$\pm {}^1/_2{}^\circ$		$\pm {}^1/_2{}^\circ$
R	0.010	max	0.25	max

* See Notes.

NOTES

1. Dimension B, vertical height of aperture, must be maintained in order to ensure a real (unexposed) frameline in the projector. Close control of the tolerances given for Dimension B is necessary to enable Dimensions F and H to be held within satisfactory limits. These are the distances from the lower edge of the perforation and the horizontal edges of the framelines. Dimensions F and H represent the maximum conditions which can be tolerated due to misalignment of the horizontal centerline of the aperture opening and the optical centerline of the photographic lens. Dimensions B, F, G, and H shall be measured to lines that are at right angles to the reference edge of the film and through a point where the radius (Dimension R) is tangent to the horizontal framelines (see figure).

2. The centerlines of the aperture image are normally on the optical center of the camera. The "optical axis of the camera" is defined as the mechanical axis or centerline of the sleeve or other device for holding the camera lens. Except for manufacturing tolerances, it coincides with the optical axis of the lens.

3. Dimension J shows the limits by which the frameline may be out of square with the reference edge of the film but, at all times, this should be confined within the area designated by Dimension G.

APPENDIX

(This Appendix is not a part of Proposed American Standard Dimensions of 8mm Motion-Picture Camera Image, PH22.19, but is included to facilitate its use.)

A1. If the aperture plate is not in the plane of the emulsion, the physical dimensions of the aperture in the camera will be slightly different from the dimensions given in the figure. The exact amount of this difference will depend upon the f/value and focal length of the camera lenses used and upon the distance between the emulsion and the physical aperture. This separation should be no greater than is necessary to prevent scratching of the film.

A2. It is the intent of this standard to provide a camera image such that the exposed area will always be larger than the area of the projector aperture. This standard meets this objective without causing double exposure of the area between frames.

A3. Dimension G, the distance between adjacent framelines, has been limited carefully so as to make it possible to keep both framelines masked simultaneously by the projector aperture. In addition, Dimensions F and H have been established to limit the distance that any part of the frameline can depart from the bottom edge of the perforations. This is to minimize the necessity for frequent adjustment of the framing device on the projector.

Proposed American Standard Specifications for

Camera Usage of Double Width 8mm Motion-Picture Film, Perforated 2R-1500

PH22.21
Revision of
PH22.21-1953

1. Scope

This standard specifies the position of the emulsion, the rate of exposure, and the orientation of the area being exposed for 8mm film as used in a motion-picture camera.

2. Position of the Emulsion

Except for special processes, the emulsion shall be toward the camera lens as shown in the figure.

3. Rate of Exposure

The normal rate of exposure shall be 18 frames per second for silent film and 24 frames per second for sound film.

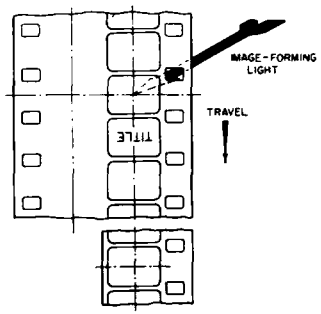


Figure shows film as seen from inside the camera, looking toward the camera lens

APPENDIX

(This Appendix is not a part of Proposed American Standard Specifications for Camera Usage of Double Width 8mm Motion-Picture Film, Perforated 2R-1500, PH22.21, but is included to facilitate its use.)

American Standard Specifications for Projector Usage of 8mm Motion-Picture Film, Perforated 1R-1500, PH22.22, indicates a normal projection rate of 18 frames per second for silent films. This projection rate has been in use for some time and is recognized by the current standard. In order that action may be reproduced at normal speed, the camera frame rate should be the same as that of the projector. Accordingly, this revision of PH22.21 raises the silent frame rate from 16 frames per second to the 18 frames per second rate in actual use at the time of this revision.

Proposed American Standard Specifications for

Projector Usage of 8mm Motion-Picture Film, Perforated 1R-1500

PH22.22
Revision of
PH22.22-1953

1. Scope

This standard specifies the position of the emulsion, the rate of projection, and the orientation of the image area for 8mm film as used in an 8mm motion-picture projector.

2. Position of the Emulsion

The majority of 8mm films are projected emulsion to the screen as shown in the figure. There are, however, several processes producing prints that project base to the screen.

3. Rate of Projection

The normal rate of projection shall be 18 frames per second for silent film and 24 frames per second for sound film.

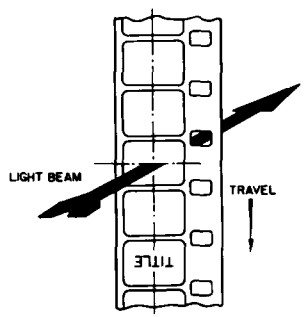


Figure shows film as seen from the light source in the projector

APPENDIX

(This Appendix is not a part of Proposed American Standard Specifications for Projector Usage of 8mm Motion-Picture Film, Perforated 1R-1500, PH22.22, but is included to facilitate its use.)

Modern 8mm projection practice is primarily confined to the amateur field. The equipment is usually portable and the available screen sizes are frequently limited to screens of small size and high gain. Many of the projectors also have a high output. Under these conditions, it has been observed that very high screen brightnesses are often obtained and audiences are usually aware of flicker before they are aware of changes in the pictorial quality of the projected pictures. For this reason, it has been industry practice to extend the flicker threshold by choosing as high a projection rate (and, therefore, as high a flicker frequency) as practicable. A projection rate of 18 frames per second and a corresponding flicker frequency of 54 cycles per second (obtained with a three-blade shutter) has been found by experience to be an acceptable compromise.

Proposed American Standard Dimensions of

8mm Motion-Picture Camera Spools (25, 50 and 100-ft Capacity)

PH22.107

1. Scope

1.1 The dimensions shown in this standard are for 8mm motion-picture film spools with a nominal capacity of 25, 50 and 100 ft. These spools are used in cameras of the type in which each roll of film is passed through the camera twice for exposure in accordance with American Standard 8mm Motion-Picture Film, Usage in Camera, PH22.21-1953. The spindle holes in the spool are shown with splines which are intended to assist in assuring correct orientation of the spool in the camera.

1.2 This standard does not specify the relative orientation of the splines in the two spindle holes (or of the core slot).

2. Operation in Camera

2.1 When the spool is on the supply spindle, the flange with the 3-splined spindle hole, flange A (Fig. 1), shall be on the left-hand side (as seen from the lens).

2.2 The half of the film adjacent to the flange with the 3-splined hole, when the spool is on the supply spindle, shall be in line with the camera lens.

2.3 When the spool is on the take-up spindle, the flange with the 4-splined spindle hole, flange B (Fig. 3), shall be on the lefthand side (as seen from the lens).

2.4 When the loaded camera is viewed from the side, with the lens to the left, both the supply and take-up spools shall rotate in a clockwise direction.

3. Dimensions

3.1 The dimensions shall be as given in the figures and table.

3.2 If rivet heads or other fastening devices extend beyond the outer surface of the flange, they shall lie within the zone indicated by diameters K and L (Fig. 3). It is not intended that this standard prescribe the nature or number of these fastening devices.

3.3 Dimension H_1 (Fig. 2) is the space between the flanges outside the core. It is measured from a point on the inner surface of one flange to the corresponding point on the opposite flange. The measurement shall be made with an instrument which does not distort the flanges.

3.4 Dimension H_2 (Figs. 2, 4) is the space between the flanges just inside the core. This space shall be sufficient to permit maximum width film of 0.630 in. (16.00mm) to fit freely into the film slot. The space between the inner surfaces of the splines, Dimension H_3 (Fig. 4), within a diameter of 0.384 in. (9.75mm), Dimension D (Figs. 1, 3), shall not be less than 0.622 in. (15.80mm).

3.5 Dimension J_1 (Fig. 4) is the overall thickness of the spool within a 0.615-in. (15.62-mm) diameter zone at the center of each flange.

3.6 When the spool is rotated on an accurate, tight-fitting spindle, the maximum outward deviation from the *intended plane of rotation* for any point on the flange outside the 0.615-in. (15.62mm) diameter zone shall not exceed 0.015 in. (0.38mm). This 0.015-in. (0.38mm) tolerance includes fastening devices, variations in flange thickness, flatness and lateral runout of the flanges.

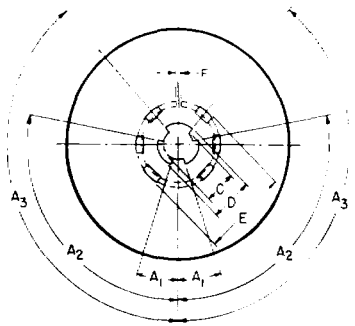


Fig. 1

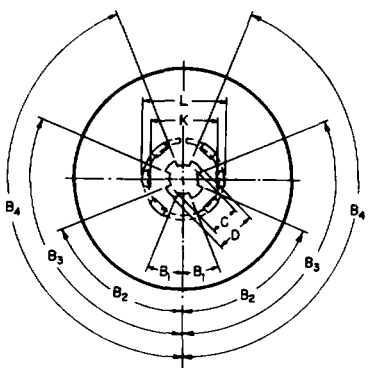


Fig. 3

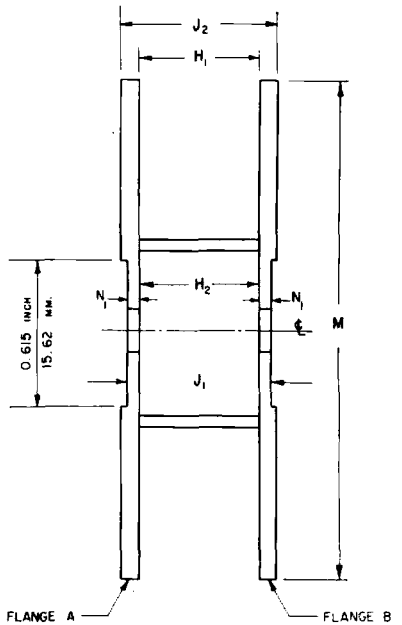


Fig. 2

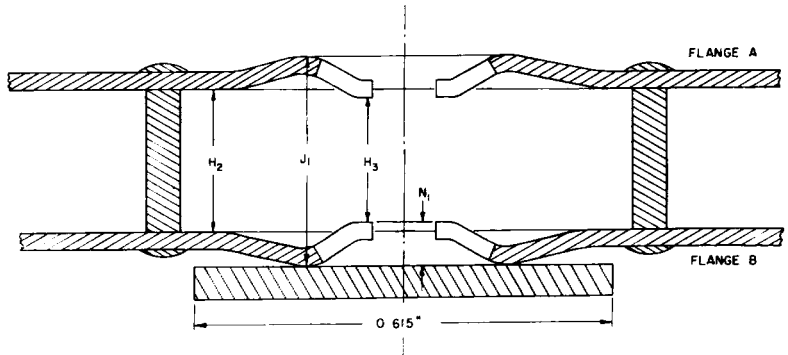
Dimensions	Degrees	Dimensions	Inches	Millimeters
A_1	$19^1/_4 \pm 1$	C (bore for spindle)	0.288 + 0.007 − 0.004	7.32 + 0.18 − 0.10
A_2	$100^3/_4 \pm 1$	D	0.384 min	9.75 min
		E (core diameter)	0.750 ± 0.015	19.05 ± 0.38
A_3	$139^1/_4 \pm 1$	F	0.035 ± 0.020	0.89 ± 0.51
		H_1 (see 3.3)	0.631 min	16.03 min
		H_2 (see 3.4)	0.630 min	16.00 min
B_1	$19^1/_4 \pm 1$	H_3 (see 3.4)	0.622 min	15.80 min
		J_1 (see 3.5)	0.720 ± 0.020	18.29 ± 0.51
B_2	$70^3/_4 \pm 1$	J_2 (see 3.7)	0.760 max	19.30 max
		K (see 3.2)	0.615 min	15.62 min
B_3	$109^1/_4 \pm 1$	L (see 3.2)	0.812 max	20.62 max
		M_1 (25-ft capacity)	2.031 ± 0.015	51.59 ± 0.38
		M_2 (50-ft capacity)	2.802 ± 0.030	71.17 ± 0.76
		M_3 (100-ft capacity)	3.630 ± 0.030	92.20 ± 0.76
B_4	$160^3/_4 \pm 1$	N_1 (see 3.9)	0.038 min	0.97 min
		N_2 (see A4)	0.025 min	0.64 min

The *intended plane of rotation* is defined as a plane perpendicular to the axis of the spindle and coincident with the surface of a flat support centered on the spindle axis and having a diameter of 0.395 in. (10.03mm).

3.7 Dimension J_2 (Fig. 2) is the overall thickness of the spool *outside* the 0.615-in. (15.62-mm) zone which is centered on each flange. J_2 is a composite dimension covering all of the spool characteristics described in 3.6.

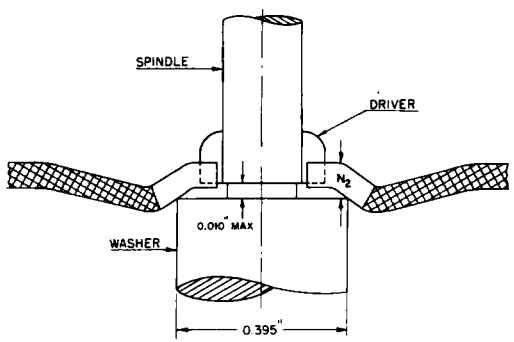
3.8 Dimension F (Fig. 1) specifies the width of the slot in the core for attaching the end of the film.

3.9 Dimension N_1 (Fig. 4) is the effective thickness of the 4-splined webs which engage most camera drivers. It is measured from a plane perpendicular to the axis of the spindle and coincident with the surface of a flat support having a diameter of 0.615 in. (15.62mm).



ENLARGED SECTION FOR DIMENSION N_1

Fig. 4



SPINDLE AND SPOOL RELATIONSHIPS

Fig. 5

APPENDIX

(This Appendix is not a part of Proposed American Standard Dimensions of 8mm Motion-Picture Camera Spools (25, 50 and 100 ft Capacity), PH22.107, but is included to facilitate its use.)

A1. Since the maximum value of H_1 (Fig. 2) does not affect the interchangeability of the spool, no limit is specified. However, the maximum is an important quality characteristic and it is expected that every spool manufacturer will hold H_1 within the narrowest limits that his design and manufacturing process permits.

A2. The angular dimensions and tolerances for the width of the tongues in the splined spindle holes are in accord with current practice for new spools and with the requirements of existing cameras. However, there are in existence and use spools of older design with tongues slightly wider by 1° to 2° on each edge of each tongue.

A3. Camera spindles should allow for a radius of not more than 0.015 in. (0.38mm) at each corner of each tongue.

A4. For a number of years, the effective thickness of the 4-splined webs which engage most camera drivers, Dimension N_1 (Fig. 4), was the stock thickness, nominally 0.040 in. (1.02mm). Recently, spools have been made from thinner materials which require embossing to maintain Dimension J_1 (Fig. 4) and to enable the splines to engage the camera drivers, some of which have a clearance approaching 0.025 in. (0.64mm).

As outlined in 3.9, Dimension N_1 (Fig. 4) is normally measured to a flat support having a diameter of 0.615 in. (15.62mm). Many cameras have spool support washers with diameters considerably less than 0.615 in. (15.62mm). In order to assure proper operation with such cameras, the dimension from the inside of the 4-splined flange to the plane of a flat support 0.395 in. (10.03mm) in diameter centered on the flange, Dimension N_2 (Fig. 5), shall be at least 0.025 in. (0.64mm).

The enlarged section for Dimension N_1 (Fig. 4) illustrates one method of shaping the splines in the 4-splined flange so they will engage the camera driving spindle when the flange thickness is less than 0.025 in. (0.64mm).

Camera spindles engaging the 4-splined flange of the spool should not have a gap greater than 0.010 in. (0.25mm) between the bottom of the spindle driving spline and the top of the spindle shoulder or washer that supports the spool.

It is recommended that, in newly designed cameras, the diameter of the supporting spindle shoulder or washer be not less than 0.500 in. (12.70mm) and no greater than 0.615 in. (15.62mm).