Proposed Revisions, PH22.17, —.36 and —.58 Related to 8mm and 35mm Low-Shrink Film and Aperture for 35mm Sound Motion-Picture Projectors

THREE PROPOSED REVISED American Standards are published on the following pages for three-month trial and criticism. All comments should be sent to Henry Kogel, SMPTE Staff Engineer, prior to October 1, 1953. If no adverse comments are received, the three proposals will then be submitted to ASA Sectional Committee PH22 for further processing as American Standards.

The basic change in PH22.17 is one which makes allowance for the further decrease of the shrinkage characteristics of safety film. This question arose first in the review of the two standards on 16mm Film Dimensions, PH22.5 and PH22.12. The revisions made in those standards, and reasons therefor, are virtually the same as for the present revision of this 8mm standard. Refer to Dr. Carver's statement, in the December 1952 *Journal*, p. 527, for the Committee's detailed thinking on this subject.

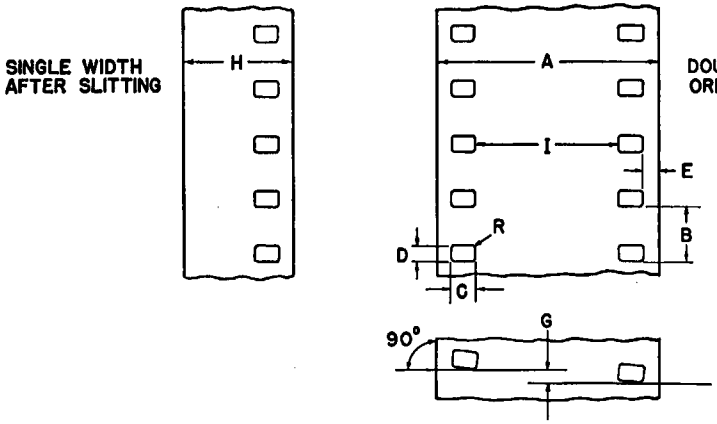
On PH22.36, only a minor revision is involved, affecting the method of indicating dimension G. This new method provides for the measure of both the linear and angular misalignment of any pair of perforations and brings this proposal in accord with international practice.

In reviewing PH22.58, the Film Projection Practice Committee came to the conclusion that the camera centerline should be deleted as well as dimension H which specified the 6-mil differential between camera and projector centerlines. The 6-mil differential was originally inserted to make allowance for film shrinkage so that the release print, after shrinking its normal amount, would have the image centered in the projector aperture. The decrease in the shrinkage characteristic of film eliminates the need for this differential, and now permits the use of the projector aperture centerline for both the projector and camera. In addition, the corner radius has been decreased to be in accord with present practice of essentially square corners.—*H.K.*

Proposed American Standard

Dimensions for 8mm Motion-Picture Film

PH22.17
Revision of Z22.17–1947



Dimensions	Inches	Millimeters
*A	0.629 ± 0.001	15.98 ± 0.03
†B	0.150 ± 0.0005	3.810 ± 0.013
C	0.072 ± 0.0004	1.83 ± 0.01
D	0.050 ± 0.0004	1.27 ± 0.01
*E	0.036 ± 0.002	0.91 ± 0.05
G	Not > 0.001	Not > 0.025
H	0.314 ± 0.002	7.98 ± 0.04
I	0.413 ± 0.001	10.490 ± 0.025
‡L	15.000 ± 0.015	381.00 ± 0.38
R	0.010	0.25

These dimensions and tolerances apply to negative and positive raw stock immediately after cutting and perforating.

* For low shrink film as defined in Appendix 2, A shall be 0.628 ± 0.001 and E shall be 0.0355 ± 0.0020.

† In any group of four consecutive perforations, the maximum difference of pitch shall not exceed 0.001 inch and should be as much smaller as possible.

‡ This dimension represents the length of any 100 consecutive perforation intervals.

NOT APPROVED

Appendix 1. Uniformity of Perforations

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 owing to the fact that film is a plastic material, the dimensions of the slit and perforated film never agree exactly with the dimensions of the punches and dies. Shrinkage of the film, due to change in moisture content or loss of residual solvents, invariably results in a change in these dimensions during the life of the film. This change is generally uniform throughout the roll.

The uniformity of perforation is one of the most important of the variables affecting steadiness of projection.

Variations in pitch 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 that is important. This is one of the reasons for the method of specifying uniformity in dimension B.

Appendix 2. Shrinkage Characteristics

In the early days of 16mm film the safety base used for this film had the characteristic of shrinking very rapidly to a certain fairly definite amount and then not shrinking much more. Although this film tended to swell at high humidities, nevertheless the shrinkage that occurred in the package before the user received the film was always at least as great as any swell that might occur due to high humidities at the time of use. This meant that the user never encountered film, even at high humidities, that had greater width than that specified in the standards. This meant that camera and projector manufacturers seldom ran into trouble so long as their film gates would readily pass film at the upper limit of the slitting tolerances, namely 0.630 inch.

Within the past few years, however, a safety base with lower shrinkage characteristics began to be used. Although this film was less susceptible than the previous film to swelling at high humidities, nevertheless the shrinkage characteristics were low enough so that this shrinkage did not always compensate for the swell at high humidities. For this reason film slit at the mid point of the tolerance for width, namely 0.629 inch, would occasionally swell at high humidities to such an extent that it would bind in film gates designed to pass film with the width of 0.630 inch. The manufacturers, therefore, were compelled to slit at the lower edge of the tolerance permitted by the American Standard. Variations in their slitting width, however, sometimes produced film slit below the limits of the standard.

For this reason an alternate standard has been adopted for this low-shrink film in order that the manufacturers may slit within the standard and still produce film which does not exceed 0.630 inch even at high humidities.

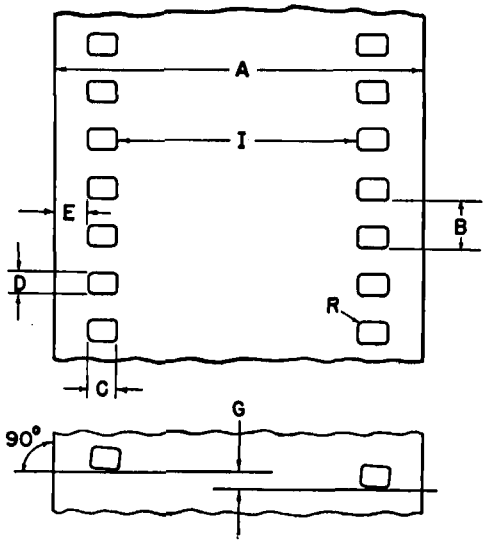
For the purpose of this specification, low-shrink film base is film base which, when coated with emulsion and any other normal coating treatment, perforated, kept in the manufacturer's sealed container for 6 months, exposed, processed, and stored exposed to air not to exceed 30 days at 65° to 75° and 50 to 60% relative humidity 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.

This definition of low-shrink film is to be used as a guide to film manufacturers, and departure therefrom shall not be cause for rejection of the film.

Proposed American Standard

Dimensions for 35mm Motion-Picture Positive Raw Stock

PH22.36
Revision of Z22.36–1947



Dimensions	Inches	Millimeters
A	1.377 ± 0.001	34.98 ± 0.03
B	0.1870 ± 0.0005	4.750 ± 0.013
C	0.1100 ± 0.0004	2.794 ± 0.01
D	0.0780 ± 0.0004	1.98 ± 0.01
E	0.079 ± 0.002	2.01 ± 0.05
*G	Not > 0.001	Not > 0.025
I	0.999 ± 0.002	25.37 ± 0.05
‡L	18.70 ± 0.015	474.98 ± 0.38
R	0.020	0.51

These dimensions and tolerances apply to the material immediately after cutting and perforating.

This film is used for motion picture prints and sound recording.

‡ This dimension represents the length of any 100 consecutive perforation intervals.

* Method of indicating G is the main change from Z22.36–1947.

NOT APPROVED

Appendix

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 owing to the fact that film is a plastic material, the dimensions of the slit and perforated film never agree exactly with the dimensions of the punches and dies. Shrinkage of the film, due to change in moisture content or loss of residual solvents, invariably results in a change in these dimensions during the life of the film. This change is generally uniform throughout the film.

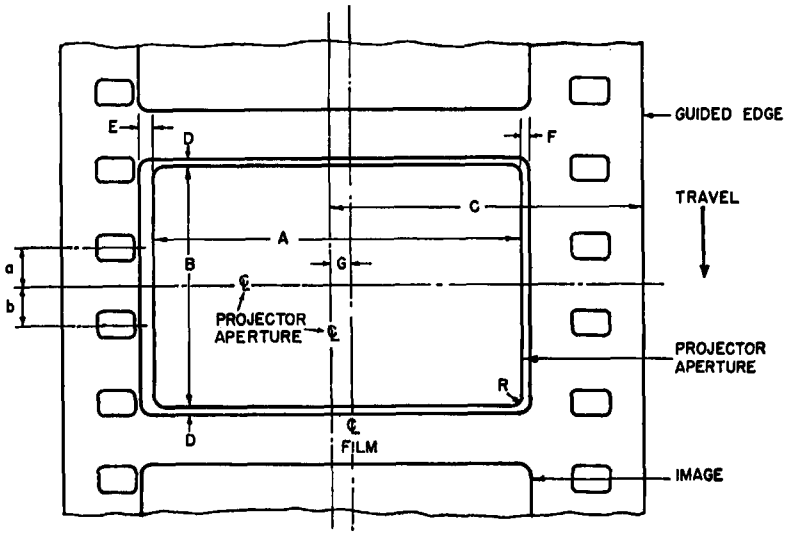
The uniformity of perforation is one of the most important of the variables affecting steadiness of projection.

Variations in pitch 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 that is important.

Proposed American Standard

Aperture for 35mm Sound Motion-Picture Projectors

PH22.58
Revision of Z22.58–1947



Dimension	Inches	Millimeters
A	0.825 ± 0.002	20.95 ± 0.05
B	0.600 ± 0.002	15.25 ± 0.05
C	0.738 ± 0.002	18.74 ± 0.05
D	0.0155	0.394
E	0.028	0.71
F	0.015	0.38
G	0.049	1.24
R	Not > 0.005	Not > 0.13
a = b = ½ longitudinal perforation pitch.		

These dimensions and locations are shown relative to unshrunk raw stock.

Note: The aperture dimensions given result in a screen picture having a height-to-width ratio of 3 to 4 when the projection angle is 14 degrees.

NOT APPROVED