

CALL FOR PAPERS

122nd SMPTE Technical Conference and Equipment Exhibit

9-14 November 1980, New York Hilton Hotel, New York City

Program Chairman **Richard S. Marcus**, Rombex Productions Corp., in planning this year's program schedule and topics, has appointed **Michael Fisher** of ABC as Associate Chairman for Television papers; **Stephen C. Chamberlain** of the Astoria Motion Picture and Television Center Foundation as Associate Chairman for Historical papers; **C. Robert Paulson**, AVP Communication, as Associate Chairman for the Tutorial papers; and **Eric V. Knutsen** of Eastman Kodak Co. as Associate Chairman for the film papers.

Anyone wishing to submit a paper for consideration on the program should contact Mr. Marcus, Rombex Productions Corp., 245 W. 55 St., New York, NY 10019, telephone (212) 757-3681 or **Lynne Robinson** at SMPTE Headquarters, 862 Scarsdale Ave., Scarsdale, NY 10583, telephone (914) 472-6606 for the author's kit.

The April issue of the *Journal* will show the complete listing of topic breakdowns, topic chairmen, affiliations, and telephone numbers for anyone wishing to discuss a presentation.

Minutes of the Special Meeting of Voting Members of the SMPTE

Scarsdale, New York, 27 December 1979

The meeting was called to order by the Chairman at 10:30 a.m. The Executive Director having in his possession 1176 signed proxies, a quorum was declared to be present in person and by proxy.

The proposed amendment to the Bylaw was read, and the meeting proceeded to vote. The text of the amendment and the total votes follow:

SECTION AUTHORIZATION.

Bylaws, Article IX, Sec. 1. Section Authorization

Amend to read: Sections of the Society may be authorized in any locality where the number of members of Associate grade and above exceeds fifty. The geographic boundaries

of each Section shall be determined by the Board of Governors. Upon written petition for the authorization of a Section of the Society, signed by fifty or more members of the grade of Associate or above, the Board of Governors may grant such authorization.

For: 1111 Against: 65

There being no other business, the Chairman called for a motion to adjourn. A motion was made, seconded and passed, and the Chairman declared the meeting adjourned at 10:45 a.m.

Respectfully submitted,
Donald F. Breidt
Executive Director

Standards & Recommended Practices

Proposed American National Standards

Proposed revisions of two American National Standards are published here for a trial period and public review: PH22.28, Dimensions for 35- and 70-mm Motion-Picture Projection Lenses and Mounts; and PH22.35, Dimensions of Universal Intermittent Sprockets for 35-mm Motion-Picture Projectors.

PH22.28 reflects the modification of limiting space dimensions P and Q and the addition of dimensions for the clamping area. PH22.35 is a revision of the previous document and retains only the basic dimensions of the 16-tooth intermittent sprocket. Specifications for the round tooth sprocket (Type R) have been included.

Comments should be addressed to Alex E. Alden, Manager of Engineering Services, at Society Headquarters before 1 May 1980. The proposals have been submitted to American National Standards

Committee PH22. All comments received through *Journal* publication will be reviewed prior to conclusion of committee action.

Approved International Standard

The International Organization for Standardization (ISO) recently approved an International Standard, the technical content of which is published here for your information. ISO 4243-1979, Cinematography — Picture Image Area and Photographic Sound Record on 16-mm Motion-Picture Release Prints — Positions and Dimensions, is in agreement with American National Standards PH22.41-1975 and PH22.8-1969.

This material is reproduced with permission from the ISO and is copyrighted by the American National Standards Institute, 1430 Broadway, New York, NY 10018, from which complete copies are available. — Alex E. Alden, Manager of Engineering Services

Dimensions for 35- and 70-mm Motion-Picture Projection Lenses and Mounts

PH22.28
Revision of
PH22.28-1976

1. Scope

1.1 This standard specifies for lenses used in 35- and 70-mm motion-picture projectors the lens markings, focal length tolerances, mounting diameters, mechanical factors in mounting additional lens adapters to lenses, and the preferred value steps in focal lengths. (Focal length referred to in this standard is the equivalent focal length, commonly known as EFL.)

1.2 This standard also specifies the limiting or maximum available space for projector lens mounts where lenses of varying focal lengths and designs and attachments thereto are used.

2. Marking of Prime Lenses

The focal length of the lens shall be marked on the exterior of the lens barrel in a permanent manner in both English and metric values.

3. Focal Length of Prime Lenses

3.1 The actual focal length shall not differ from the value marked on the lens by more than ± 1 percent.

3.2 Preferred values of focal lengths shall be integral multiples of $\frac{1}{4}$ in (6 mm) nominal, over the range from 2 to 7 in (50 to 178 mm) inclusive for lenses designed to English units.

3.3 Preferred values of focal lengths shall be integral multiples of 5 mm (0.2 in) nominal, over the range of 50 to 150 mm (2 to 6 in) for lenses designed to metric units.

4. Lens Barrel Diameter

The barrel diameter (Dimension A) shall be as specified in the figure and Table 1. It is expected that in most projectors the lens mount will either clamp onto the lens barrel or provide a mechanical lens holder which will clamp onto the lens barrel at the specified diameter.

5. Limiting Space Dimensions

The limiting volume within which the lens, set at infinity, shall mount and perform its function, as intended, shall be as specified in Table 1. These are not necessarily the dimensions of any lens but specify the limits beyond which there may be physical interference with the projector mechanism.

6. Optical Conversion Lenses

Anamorphic attachments and other optical converters to be mounted to the objective lens specified or to be mounted in turret, swing-away or other separate mounting, must fit within the limiting space dimensions (see Dimension D).

7. Lens Thread

The internal threads for holding attachments, such as anamorphic units, shall be located at Dimension P within Dimension A and shall have dimensions as specified in Table 2.

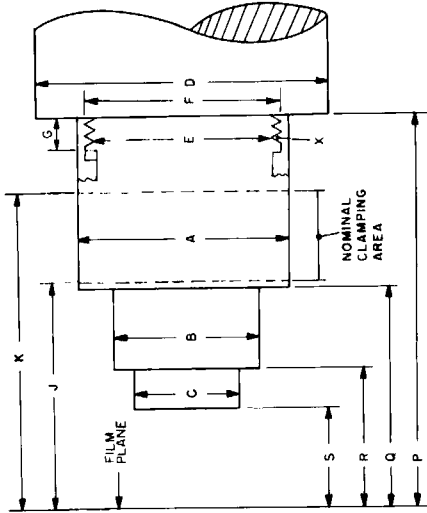


Table 1

Dimensions	Small Lenses		Large Lenses ¹	
	Inches	Millimeters	Inches	Millimeters
Barrel Diameter				
A	2.782 \pm 0.000	70.66 \pm 0.00	3.990 \pm 0.005	101.35 \pm 0.13
Limiting Space				
B ²	2.25 max	57.2 max	2.25 max	57.2 max
C	1.90 max	48.3 max	1.90 max	48.3 max
D ³				
D ⁴	7.50 min	190.5 min	7.50 min	190.5 min
E	3.75 min	95.2 min	3.75 min	95.2 min
F	4.25 max	108.0 max	4.25 max	108.0 max
G	1.50 min	38.1 min	1.50 min	38.1 min
H	1.20 min	30.5 min	1.20 min	30.5 min
Nominal Clamping Area				
J	4.00 min	101.6 min	4.00 min	101.6 min
K	6.00 max	152.4 max	6.00 max	152.4 max

¹All large-lens dimensions apply to 70-mm projection units.

²Dimension B may be as large as 3.25 in (82.6 mm) for projectors manufactured since 1960. For 70-mm projection units, Dimension B is 3.25 in. Some European projectors have a lens mount diameter of 2.46 in (62.5 mm) in which case Dimension B is equal to 2.46 in.

³There is no restriction on the limiting space beyond distance P from the film plane; however, because of the practice of clamping lenses and/or their attachments by the section identified by Dimension D, it is recommended that this dimension be held to 3.125 \pm 0.002 in (79.38 \pm 0.05 mm).

⁴Projectors with small (2.782 in / 70.66 mm) lens mounts, including clamps outside the projector case, are 10.00 in (254.0 mm) minimum.

Table 2

Small Diameter Lenses

Dimensions	Inches		Millimeters	
E	Minor diameter	2.630 max	66.80	max
F	Major diameter	2.668 min	67.77	min
G	Thread length	0.219 \pm	5.56	\pm 0.25
X	Thread size	36 tpi	0.706	pitch

Proposed American National Standard

Dimensions of Universal Intermittent Sprockets for 35-mm Motion-Picture Projectors

PH22.35
Revision of
PH22.35-1962

Page 1 of 2 pages

1. Scope

1.1 This standard specifies film advancement dimensions of two types of 16-tooth intermittent sprockets for 35-mm motion-picture projectors. Other dimensions and definitions are given in the Appendix.

2.1 Type S is the standard square tooth that is used internationally and known as the CS sprocket tooth.

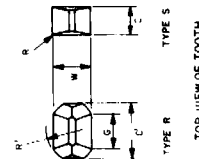
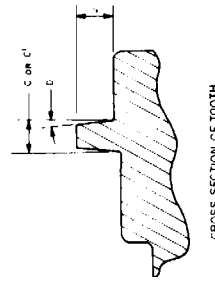
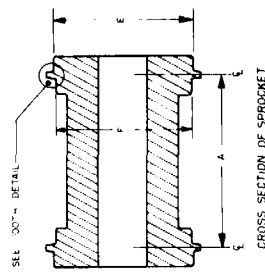
2.2 Type R is the round tooth that eliminates sharp corners on film contacting surfaces.

3. Dimensions

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

3.2 The sprocket tooth pitch is measured at the midpoint of 0.006 in (0.15 mm) film thickness:

$$\frac{\text{Diameter } E \pm 0.006 \text{ in} \pm \text{Number of Teeth}}$$



2. Sprocket Tooth Types

2.1 Type S is the standard square tooth that is used internationally and known as the CS sprocket tooth.

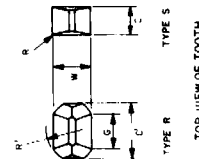
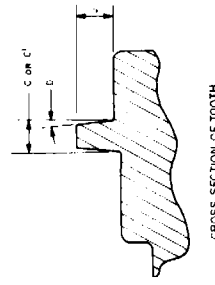
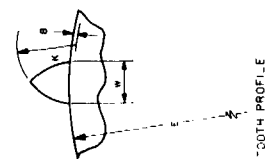
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3.2 The sprocket tooth pitch is measured at the midpoint of 0.006 in (0.15 mm) film thickness:

$$\frac{\text{Diameter } E \pm 0.006 \text{ in} \pm \text{Number of Teeth}}$$



	Dimensions	Inches	Millimeters
A	Tooth centerline to centerline	1.125 ± 0.001	28.58 ± 0.03
B	Center point of tooth arc	0.004 ± 0.001	0.10 ± 0.03
C	Square tooth lateral width	0.040 ± 0.001	1.02 ± 0.05
C'	Round tooth lateral width	0.072 ± 0.002	1.83 ± 0.05
D	Lead angle at tooth sides	7°-30' max	
E	Root (film supporting) diameter	0.950 ± 0.001	24.13 ± 0.03
F	Inner diameter	0.010 less than E	0.25 less than E
G	Bearing surface	0.046 ± 0.002	1.17 ± 0.05
J	Tooth height above E	0.050	1.27
K	Tooth arc	0.077 ± 0.002	1.96 ± 0.05
R	Square tooth corner radius	0.005 max	0.13 max
R'	Round tooth corner radius	0.043 ± 0.001	1.09 ± 0.03
W	Horizontal tooth width	0.055 ± 0.002	1.40 ± 0.05

Appendix

(The Appendix is not a part of this American National Standard, but is included for information purposes only.)

A1. The figures describe the tooth shapes which recognize the following factors: (1) smooth disengagement of sprocket teeth and transfer of driving forces from perforation to perforation; (2) shrinkage and dimensional changes in motion-picture film; and (3) elastic deformation of the perforation edge induced by the drive forces on the perforation edge.

A2. In current practice, the upper sprocket is usually a feed sprocket while the lower sprocket may function as a holdback sprocket or simply as an idler. These sprockets have dimensional values identical to those shown in the table except for root diameter E. Diameter E is nominally 0.943 in (23.95 mm) on a 16-tooth feed sprocket or 0.940 in (23.88 mm) on those serving as holdback sprockets. 24-tooth feed sprockets have E diameters ranging from 1.413 to 1.424 in (35.89 to 36.17 mm) and holdback sprockets are nominally 1.413 in (35.89 mm) with some variation from manufacturer to manufacturer.

A3. As stated in Sec. 1.2, this standard specifies sprockets designed to accommodate films with either KS or CS perforations which have different specifications insofar as perforation size and positioning are concerned. This requirement affects the centerline-to-centerline dimension (A) and the tooth width (C). The tooth width specified in the table as Dimension C (square tooth) is the dimension covered by the former standard, PH22.35-1962. The value specified for C' (round tooth) is an alternative design permitting a greater tooth width and a relatively large break at each tooth corner which avoids contact of the tooth corner with the fillet radii in the perforation corners, thus limiting the possibility of the tooth damaging the film. Elimination of square tooth corners also minimizes abrasion of the perforation edge. In special instances where a projector is to be used only with films

having one type of perforation, it may be advantageous to use sprockets made specifically for that type of perforation. For example, projectors to be used only with films having CS perforations might have a tooth centerline-to-centerline dimension (A) at 1.125 in (28.58 mm) and a tooth width dimension (C) of 0.048 in (1.22 mm) maximum driving face. A projector intended only for use with films having KS perforations might have sprockets with a tooth centerline-to-centerline at 1.109 in (28.17 mm) and a tooth width of 0.065 in (1.65 mm) maximum driving face.

A4. Definitions:

Feed Sprocket: A feed sprocket is used to advance the film against a restraining force. The force is applied to the leading edge of the film perforation (viewed in the direction of film motion). The sprocket rotates at a nominally constant velocity and tends to keep the film in motion. It is also called an advancing or drive sprocket and is usually lightly loaded.

Intermittent Sprocket: An intermittent sprocket is a feed sprocket used to advance the film periodically (frame by frame). The sprocket is usually completely at rest during the intervals between advances. It is normally heavily loaded during a portion of its motion since it must accelerate the film from zero velocity and achieve an average rate of film advance. The root diameter is usually larger than that of a feed sprocket because of greater perforation distortion.

Holdback Sprocket: The holdback sprocket is used to restrain the film against a tension force. The force is applied to the trailing edge of the film perforation (viewed in the direction of film motion) and the sprocket rotates at a nominally constant velocity. It is also called a retarding or restraining sprocket.

Cinematography — Picture image area and photographic sound record on 16 mm motion-picture release prints — Positions and dimensions

1 Scope and field of application

- 1.1 This International Standard specifies positions, dimensions and location of image and photographic sound record on 16 mm release prints.
- 1.2 It also specifies the width and lateral position of the sound record scanning beam and its relative displacement with respect to the corresponding picture image frame.

3 Dimensions

- 3.1 The dimensions shall be as shown in the figure and given in the table.
- 3.2 The sound recording and reproducing slit images shall be positioned at an angle of $90^\circ \pm 5'$ with respect to the reference edge of the film.
- 3.3 Dimensions are given relative to unshrunk safety film.

4 Picture sound displacement

The recording of sound on the film shall precede the corresponding picture frame in the direction of film travel in normal projection. The distance between the horizontal centre line of the picture frame and its corresponding sound record shall be $26 \text{ frames} \pm 1 \text{ frame}$, and preferably $26 \text{ frames} \pm 0.5 \text{ frame}$.

5 Emulsion orientation

The preferred emulsion orientation of 16 mm sound motion picture prints is toward the projection lens when the film is threaded for direct front projection.

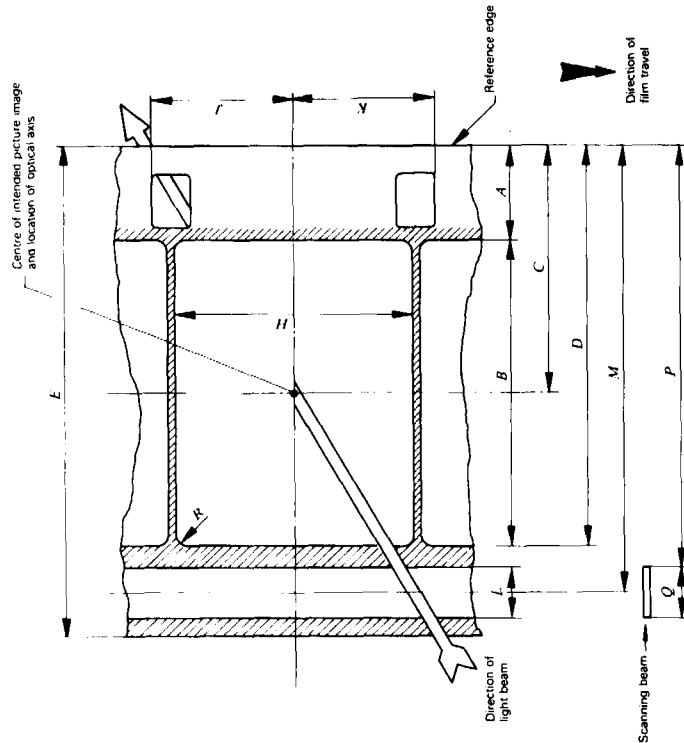
NOTE — 16 mm motion picture prints may be made with the emulsion side either towards the projection lens or towards the light source. There should not be different emulsion orientation in the same reel. The position should be indicated in the leader, or on the container.

6 Reproducing speed

The recording shall be made so that the sound record will reproduce properly at 24 perforations per second (approximately 11 m (36 ft) per minute or 18.3 cm (7.2 in) per second). This equivalent to the projection speed of the picture film of 24 frames per second.

2 References

- ISO 26, *Cinematography — Camera usage of 16 mm motion-picture film* — Specifications.
- ISO 26, *Cinematography — Projector usage of 16 mm motion-picture film for direct front projection* — Specifications.
- ISO 69, *Cinematography — 16 mm motion picture raw stock film — Cutting and perforating dimensions*.
- ISO 71, *Cinematography — 16 mm negative photographic sound record on 16 mm, 35, 16 mm and 35, 32 mm motion-picture film* — Position and dimensions.
- ISO 359, *Cinematography — Projectable image area on 16 mm motion-picture prints* — Dimensions and location.
- ISO 466, *Cinematography — Image produced by 16 mm motion-picture camera aperture* — Position and dimensions.
- ISO 490, *Cinematography — Magnetic stripes and magnetic recording head gaps for sound record on 16 mm motion-picture film perforated along one edge (Type 1)* — Positions and width dimensions.



Dimension	mm	in
A max.	2.95	0.116
B min.	10.05	0.396
C nom.	7.98	0.314
D	$13.00^{+0.15}_0$	$0.512^{+0.006}_0$
E ref.	15.96	0.628
H	$7.42^{+0.15}_0$	$0.292^{+0.006}_0$
L ₁ (See note 1)	$1.52^{+0.10}_0$	$0.060^{+0.004}_0$
L ₂ (See note 2)	2.03 ± 0.08	0.080 ± 0.003
M (See note 3)	14.48 ± 0.08	0.570 ± 0.003
P	13.98 ± 0.03	0.556 ± 0.001
Q	1.80 ± 0.03	0.071 ± 0.001
R max.	0.50	0.020

$J = K$ (nom.)

NOTES

- For variable area and matted variable density sound record.
- For variable density sound record.
- To the centre line of the variable area or the variable density sound record.