

Announcing A Special Issue of the Journal to Commemorate the 60th Anniversary of the SMPTE

The July 1976 *Journal* will commemorate the 60th anniversary of the Society's portentous founding. In July 1916, the Society of Motion Picture Engineers, created in the Raleigh Hotel in Washington, D.C., was destined to become one of the most influential forces in the motion-picture and television industries.

Under the auspices of the Archival Papers and Historical Committee, chaired by Dr. Roderick T. Ryan, information for articles to appear in the commemorative issue is still being assembled. "The issue, undoubtedly, has the potential of becoming a collector's item," Dr. Ryan said.

To make sure that this issue will be a success, the Archival Papers and Historical Committee is asking for assistance from all interested persons. You are invited to contribute materials, suggestions, and ideas to the Committee Chair-

man Dr. Roderick T. Ryan, Chairman Archival Papers and Historical Committee, c/o Eastman Kodak Co., 6706 Santa Monica Blvd., Hollywood, CA 90038.

Feature articles of enduring worth will include historically important biographical sketches of the individuals whose names are on the Society's Honor Roll. Of practical importance will be a list of Film and Television Archives open to the public. Plans also include old ads and brochures to be used as decorative items throughout the issue.

Other exciting plans include the reprinting of the first issue of the *Transactions of the SMPE* and the reprinting of letters (from *Transactions* No. 22) of letters from such great figures of the past as Thomas A. Edison, George Eastman and others who have made essential contributions to motion-picture history. All this will be in addition to the feature

articles to be prepared or obtained by members of the Archival Papers and Historical Committee—articles that will examine the growth of the motion-picture and television industries from various technological aspects.

Among the topics to be covered are Cinematography, Education, Instrumentation, Laboratory Practice, Sound, Standards, Projection and Television (Early, Contemporary and Video Recording). In addition a paper on the National Archives and their depositories of film is planned.

Members of the SMPTE and all other interested persons having information on any of the topics mentioned above, or who may have collections of old photographs relating to the Society, or old brochures or advertisements are urged to get in touch with Dr. Ryan.

Standards & Recommended Practices

Draft American National Standards

Four Draft American National Standards are published here for a trial period and public review: PH22.4, Dimensions of 35-mm Motion-Picture Projection Reels; PH22.147, Dimensions of Motion-Picture Projection Reels for Combination 70/35-mm Projectors; PH22.192, Dimensions of Shipping Reels for 35-mm Motion-Picture Prints; and PH22.193, Dimensions of Large-Capacity Reels for 35-mm Motion-Picture Projection. Two of these standards PH22.4 and PH22.147 are editorial revisions of earlier issues and do not reflect technical changes. PH22.4 has been modified to indicate clearly that the 2000-ft capacity reel is the only reel used for 35-mm theatrical projection although the 1000- and 3000-ft reels are generally used for television applications. PH22.192 and PH22.193 specify the two types of reels used in handling 35-mm release prints.

Comments should be addressed to Alex E. Alden, Staff Engineer, at Society Headquarters prior to 1 March 1976. The proposals have been submitted to American National Standards Committee PH22. All comments received through *Journal* publication will be reviewed before conclusion of action by that Committee.

Approved International Standards

The International Organization for Standardization (ISO) approved three International Standards, the technical content of which is published here for information.

ISO 162-1975, Cinematography — Recording and Reproducing Head Gaps for Three Magnetic Sound Records on

35-mm Motion-Picture Film Containing No Picture — Position and Width Dimensions, is an editorial revision of the original issue which agrees completely with PH22.86.

ISO 358-1975, Cinematography — Maximum Aspect Ratio of Projector Aperture for Projection of 35-mm Non-anamorphic Motion-Picture Film — Specifications, agrees in principle with USA practices and specifications given in PH22.58.

ISO 1793-1975, Cinematography — Reels for 16-mm Motion-Picture Projectors (Up to and Including 120 m Capacity: 18 cm Size) — Dimensions. This standard was approved over the USA objection because many dimensions are in conflict with those considered to be good engineering practices. Anyone concerned with international exchange of 16-mm reels should study this document carefully.

Complete copies of all International Standards are available from the American National Standards Institute, 1430 Broadway, New York, NY 10018.

ISO is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees.

The International Standards published here were developed by Technical Committee 36 on Cinematography. The work of this Committee is administered by the Engineering Department of the SMPTE which functions as the Secretariat in ANSI's name. A report of the last meeting of the Committee was published in the February 1974 *Journal of the SMPTE*. The next meeting is scheduled for the spring of 1976 in Paris, France. — Alex E. Alden, *Staff Engineer*

Dimensions of 35-mm Motion-Picture Projection Reels

PH22.4
Revision of
PH22.4-1965

1. Scope

1.1 This standard specifies the dimensions of three capacities of 35-mm motion-picture projection reels for motion-picture and television applications.

1.1.1 For theatrical application, the 2000-ft (610-m) capacity reel shall be standard.

1.1.2 For television application, the 3000-ft (914-m) capacity reel shall be standard.

1.1.3 The 1000-ft (305-m) capacity reel is in general use for laboratory and television applications.

1.2 The standard does not apply to shipping reels.

Dimensions	Inches	Millimeters
A (2000 ft)	15.00 + 0.00 - 0.05	381.0 + 0.0 - 1.3
A (3000 ft)	16.90 + 0.00 - 0.05	429.3 + 0.0 - 1.3
A (1000 ft)	9.90 + 0.00 - 0.20	251.5 + 0.0 - 5.1
B (2000 ft)	3.00 ± 0.10	127.0 ± 2.5
B (3000 ft)	5.00 ± 0.10	127.0 ± 2.5
B (1000 ft)	1.95 ± 0.10	49.5 ± 2.5
C	1.530 + 0.075 - 0.030	38.86 + 1.90 - 0.76
C ₁	1.885 + 0.075 - 0.030	47.88 + 1.90 - 0.76
C ₂	1.625 + 0.075 - 0.030	41.28 + 1.90 - 0.76
D	0.317 + 0.002 - 0.000	8.05 + 0.05 - 0.00
E	0.150 ± 0.010	3.81 ± 0.25
F	2.25 min	57.2 min
G	0.265 ± 0.002	6.73 ± 0.05
H	0.782 nom	19.86 nom
J	0.375 nom	9.52 nom
K	0.505 + 0.003 - 0.000	12.83 + 0.08 - 0.00
L	0.035 nom	0.89 nom
M	0.75 min	19.0 min

0.13 mm) and driven by a drive pin of 0.250-in (6.35-mm) nominal diameter, engaging in one of the four driving holes.

2.5 Figure 4 illustrates the standard spindle hole for use with 5/16-in spindles.

NOTE: Dimensions of other reels are specified in Draft American National Standard Dimensions of Motion-Picture Projection Reels for Combination 70/35-mm Projectors, Revision of PH22.147-1966; Dimensions of Shipping Reels for 35-mm Motion-Picture Prints, PH22.192 and Dimensions of Large-Capacity Reels for 35-mm Motion-Picture Projection, PH22.193.

2. Dimensions

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

2.2 Dimension F defines the area over which the reel thickness, specified by Dimension C₁, applies.

2.3 Dimension M in Fig. 3 indicates a clearance for the driving pin in the reel hub.

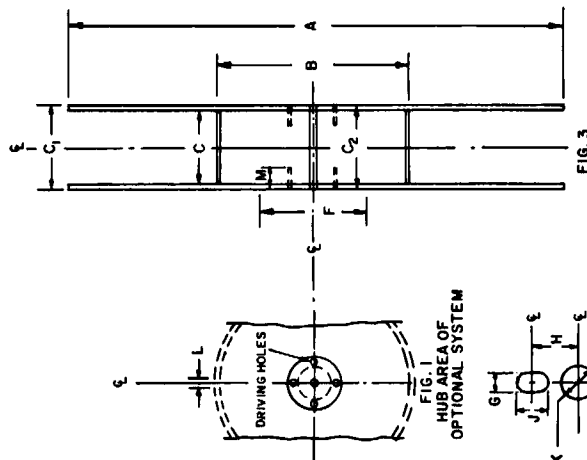
2.4 Figures 1 and 2 illustrate an optional spindle hole as used with larger reels and the four driving holes intended for use on spindles whose diameter is 0.500 + 0.000 - 0.005 in (12.70 + 0.00 -

Appendix

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

A1. Specifications for the reels are based on good engineering design of film winding equipment and on minimum tension variation between hub and rim. Film tension in the projector feed and take-up mechanism should be kept low to avoid perforation damage. In order to maintain low tension where a constant-torque clutch device is used, it is necessary to keep the quotient B/A (hub diameter B divided by flange diameter A) as large as possible. The ratio for the 2000-ft capacity reel is 3:1 maintaining a low initial film tension to final film tension.

A2. In designing reels of the size and weight described in this standard, it is the practice to chamfer the spindle hole to facilitate placing the reel on the spindle. The degree of chamfer should be in accordance with good engineering practice, and should not reduce the bearing surface of the spindle hole on the spindle to the point of endangering reel stability.



Dimensions of Motion-Picture Projection Reels for Combination 70/35-mm Projectors

PH22.147
Revision of
PH22.147-1966

2. Dimensions

- 2.1 The dimensions of the reels shall be as given in the figures and table.
- 2.2 Fig. 2 indicates the location and size of the spindle hole and the four driving holes which appear on both flanges.
- 2.3 Dimension M in Figure 3 indicates a clearance for the driving pin in the reel hub.

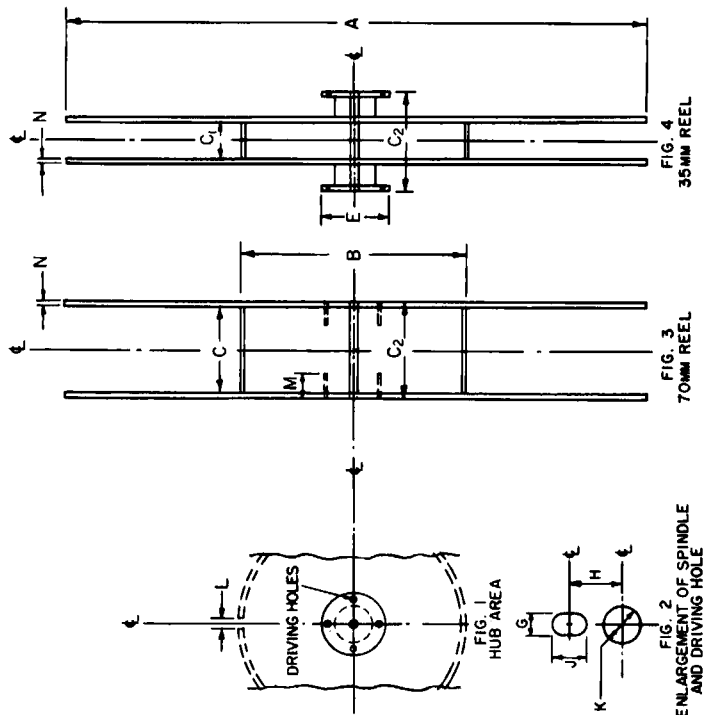
2.4 The reels are intended to be used on spindles whose diameter is 0.500 ± 0.000 — 0.005 in (12.70 ± 0.00 — 0.13 mm) and to be driven by a drive pin of 0.250 -in (6.35 -mm) nominal diameter, engaging in one of the four driving holes.

2.5 The centerlines indicated for Figs. 3 and 4 are coincident.

1. Scope

1.1 This standard specifies the dimensions of 35- and 70-mm motion-picture projection reels intended for use on combination 70/35-mm projectors and rewinds.

1.2 This standard does not apply to shipping reels.



Dimensions	Inches	Millimeters
A (4000-ft [1219-m] capacity)	21.75 ± 0.03	552.4 ± 0.8
B (4000-ft [1219-m] capacity)	8.00 ± 0.03	203.2 ± 0.8
C	2.87 ± 0.03	72.9 ± 0.8
C ₁	1.50 ± 0.00 $- 0.03$	38.1 ± 0.0 $- 0.8$
C ₂	3.41 ± 0.03	86.6 ± 0.8
E	2.50 min	63.5 min
G	0.265 ± 0.002	6.73 ± 0.05
H	0.782 nom	19.86 nom
J	0.375 nom	9.52 nom
K (diameter)	0.505 ± 0.002	12.83 ± 0.05
L (threading slot)	0.060 nom	1.52 nom
M	0.75 min	19.0 min
N (flange thickness)	0.27 nom	1.8 nom

NOTE: Dimensions of other reels are specified in Draft American National Standard Dimensions of 35-mm Motion-Picture Projection Reels, Revision of PH22.4-1965;

Dimensions of Shipping Reels for 35-mm Motion-Picture Prints, PH22.192 and Dimensions of Large-Capacity Reels for 35-mm Motion-Picture Projection, PH22.193.

Appendix

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

A1. Specifications for the reels are based on good engineering design of film winding equipment and on minimum tension variation between hub and rim. For the usual uncompensated, constant torque slip take-up, complete interchangeability may require some adjustment in the take-up and hold-back tensions of the projector when changing between 70- and 35-mm films to maintain the 5:4 ratio in running speeds.

hole to facilitate placing the reel on the spindle. The degree of chamfer should be in accordance with good engineering practice, and should not reduce the bearing surface of the spindle hole on the spindle to the point of endangering reel stability.

A2. In designing reels of the size and weight described in this standard, it is the practice to chamfer the spindle

A3. A 2400-ft (732-m) capacity reel having an overall flange diameter of 16.87 ± 0.03 in (428.5 ± 0.8 mm) and a hub diameter of 5.00 ± 0.03 in (127.0 ± 0.8 mm) is also in general use.

NOTE: Dimensions of other reels are specified in Draft American National Standard Dimensions of 35-mm Motion-Picture Projection Reels, Revision of PH22.4-1965; Dimensions of Motion-Picture Projection Reels for Combination 70/35-mm Projectors, Revision of PH22.147-1966 and Dimensions of Large-Capacity Reels for 35-mm Motion-Picture Projection, PH22.193.

The use of shipping reels with small hubs (those resulting in a flange-to-hub ratio of 3:1 or greater) on projectors already adjusted for reels with large hubs (flange-to-hub ratio of 3:1 or less) can subject film tension to drastic increases which may result in perforation damage by the hold-back sprocket.

Appendix

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

Draft American National Standard

Dimensions of Shipping Reels for 35-mm Motion-Picture Prints

PH22.192

Page 1 of 2 pages

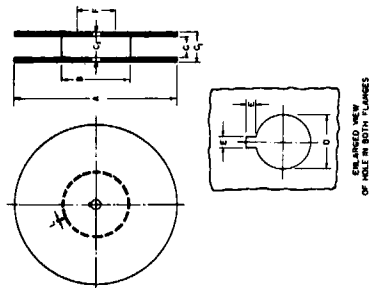
1. Scope

This standard specifies the dimensions of shipping reels for 35-mm motion-picture prints having a nominal film capacity of 1000 and 2000 ft (305 and 610 m).

2. Dimensions

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

2.2 Dimension F defines the area over which the reel thickness, specified by Dimension C₂, applies.



Dimensions	Inches	Millimeters
A 1000 ft (305 m)	9.90 + 0.00 - 0.20	251.5 + 0.0 - 5.1
A 2000 ft (610 m)	14.50 ± 0.03	368.3 ± 0.8
B 1000 ft (305 m)	1.95 ± 0.10	49.5 ± 2.5
B 2000 ft (610 m)	4.10 + 0.00 - 0.15	104.1 + 0.0 - 3.8
C	1.53 ± 0.03	38.9 ± 0.8
C ₁	1.885 ± 0.030	47.88 ± 0.76
C ₂	1.625 + 0.115 - 0.030	41.28 + 2.92 - 0.76
D	0.317 + 0.002 - 0.000	8.05 + 0.05 - 0.00
E	0.150 ± 0.010	3.81 ± 0.25
F	2.25 min	57.2 min
L	0.035 nom	0.89 nom

THIS PROPOSAL IS PUBLISHED FOR COMMENT ONLY

Dimensions of Large-Capacity Reels for 35-mm Motion-Picture Projection

PH22.193

Nominal Capacity	Flange Diameter	Dimensions	Inches	Millimeters
4300 ft (1300 m)	21 in (533 mm)	A	21.00 ± 0.06	533.4 ± 1.5
		B	7.00 ± 0.03	177.8 ± 0.8
5600 ft (1700 m)	24 in (610 mm)	A	23.70 ± 0.06	602.0 ± 1.5
		B	8.00 ± 0.03	203.2 ± 0.8
5800 ft (1775 m)	24½ in (622 mm)	A	24.50 ± 0.06	622.3 ± 1.5
		B	8.00 ± 0.03	203.2 ± 0.8
		C	1.530 ± 0.030	38.86 ± 0.76
		C ₁	1.885 ± 0.030	47.88 ± 0.76
		C ₂	1.625 ± 0.175	41.28 ± 4.44
		F	2.25 min	57.2 min
		G	0.265 ± 0.002	6.73 ± 0.05
		H	0.782 nom	19.86 nom
		J	0.375 nom	9.52 nom
		K	0.505 ± 0.003	12.83 ± 0.08
		L	0.035 nom	0.89 nom
		M	0.75 min	19.0 min

Appendix

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

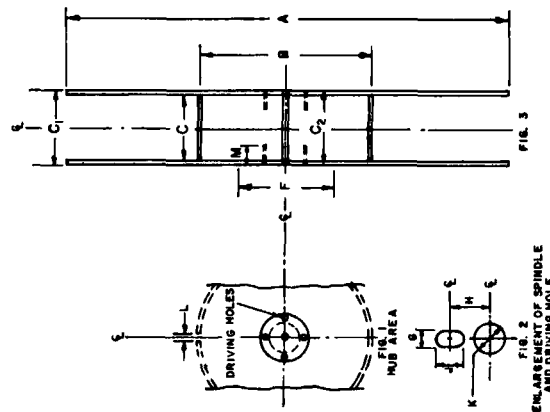
A1. Specifications for the reels are based on good engineering design of film winding equipment and on minimum tension variation between hub and rim. Film tension in a projector-feed and take-up mechanism should be kept low to avoid perforation damage. In order to maintain low tension where a constant-torque clutch device is used, it is necessary to keep the quotient B/A (hub diameter B divided by flange diameter A) as large as possible. In this standard, the quotient is 0.333, which maintains the initial film tension to final film tension within the 3:1 ratio.

A2. In designing reels of the size and weight described in this standard, it is the practice to chamfer the spindle

hole to facilitate placing the reel on the spindle. The degree of chamfer should be in accordance with good engineering practice, and should not reduce the bearing surface of the spindle hole on the spindle to the point of endangering reel stability.

A3. Although this standard does not preclude reels of other diameters or design, the rim-to-hub ratio referred to in A1 remains a factor of consideration for any projector with an uncompensated constant-torque clutch in the feed or take-up mechanism.

A4. To minimize perforation damage, projector operators using large-capacity reels are cautioned against allowing film slack to accumulate.



1. Scope

1.1 This standard specifies the dimensions of large-capacity 35-mm motion-picture projection reels having nominal film capacities of at least 4300 ft (1300 m).

1.2 The standard does not apply to shipping reels.

2. Dimensions

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

2.2 Dimension F defines the area over which the reel thickness, specified by Dimension C₂, applies.

2.3 Dimension M in Fig. 3 indicates a clearance for the driving pin in the reel hub.

2.4 The reels are intended to be used on spindles whose diameter is 0.500 ± 0.000 — 0.005 in (12.70 ± 0.00 — 0.13 mm) and to be driven by a drive pin of 0.250-in (6.35-mm) nominal diameter, engaging in one of the four driving holes.

NOTE: Dimensions of other reels are specified in Draft American National Standard Dimensions of 35-mm Motion-Picture Projection Reels, Revision of PH22.4-1965; Dimensions of Motion-Picture Projection Reels for Com-

bination 70/35-mm Projectors, Revision of PH22.147-1966 and Dimensions of Shipping Reels for 35-mm Motion-Picture Prints, PH22.192.

Cinematography — Recording and reproducing head gaps for three magnetic sound records on 35 mm motion-picture film containing no picture — Positions and width dimensions

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies the location and dimensions of the sound record and the recording and reproducing head gaps for recording three magnetic sound records on 35 mm and one magnetic sound record on 17,5 mm motion-picture film. It also relates the placement of the magnetic coating on the film to the direction of film travel.

2 REFERENCES

ISO 491, *Cinematography — 35 mm motion-picture film — Cutting and perforating dimensions*.
ISO 1189, *Cinematography — Recorded characteristic for magnetic sound records on 35 mm motion-picture film — Specifications*.

3 LOCATION AND DIMENSIONS

3.1 The location and dimensions of the three recording and reproducing head gaps shall be as shown in the figure and given in the table.

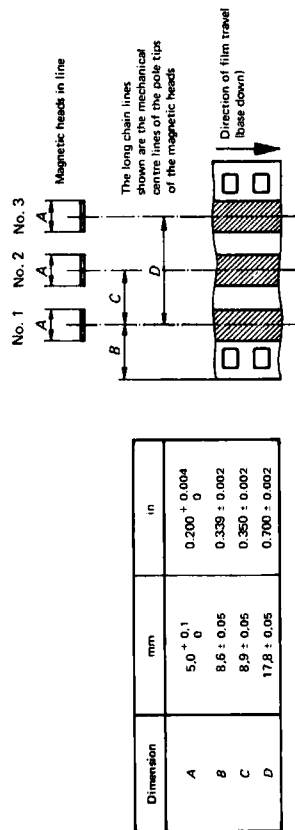
3.2 Magnetic head No. 1 shall be used when recording a single record on 35 mm film or on 17,5 mm film.

4 MAGNETIC COATING

With the direction of film travel as shown in the figure, the magnetic coating shall be on the upper face of the film base.

5 ALIGNMENT OF HEADS

The recording or reproducing gaps in the magnetic head assemblies shall be in line at an angle of $90^\circ \pm 5'$ to the direction of film travel.



NOTE — The metric dimensions in the table are based upon the practice of countries using the metric system, and similarly the inch dimensions follow the practice of those countries using the inch system. In some instances, the values are not exact conversions; the differences are small and magnetic head assemblies made to either system of dimensions will, for all practical purposes, be interchangeable.

Cinematography — Maximum aspect ratio of projector aperture for projection of 35 mm non-anamorphic motion-picture film — Specifications

1 SCOPE AND FIELD OF APPLICATION

1.1 This International Standard specifies the maximum aspect ratio for projector apertures for the projection of non-anamorphic motion-pictures from 35 mm film with normal format images (camera image 21,95 mm X 16 mm, 0.864 in X 0.630 in).

1.2 The position of the projector aperture relative to the image printed on the film is also specified.

1.3 This International Standard excludes anamorphic techniques.

2 REFERENCES

ISO 2906, *Cinematography — 35 mm motion-picture film — Image area produced by camera aperture*.
ISO 2907, *Cinematography — 35 mm motion-picture film — Projectable image area*.
ISO 2938, *Cinematography — Picture image area and photographic sound record on 35 mm motion-picture release prints — Positions and dimensions*.

3 SPECIFICATIONS

The maximum aspect ratio of the projector aperture should be 1,85 : 1 (see note below).

NOTE — This ratio will represent the proportions of the picture on the screen only when projection is at right angles to the screen.

4 POSITION OF PROJECTOR APERTURE

For all wide-screen aspect ratios up to the maximum of 1,85 : 1, the edge of the projector aperture which corresponds to the upper edge of the picture as seen on the screen should be 1,70 mm (0,067 in) from the edge of the normal format image printed on the film.

Cinematography — Reels for 16 mm motion-picture projectors (up to and including 120 m capacity : 18 cm size) — Dimensions

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies the dimensions and characteristics of 16 mm motion-picture film projection reels with nominal flange diameters of 7 cm (3 in.), 10 cm (4 in.), 13 cm (5 in) and 18 cm (7 in).

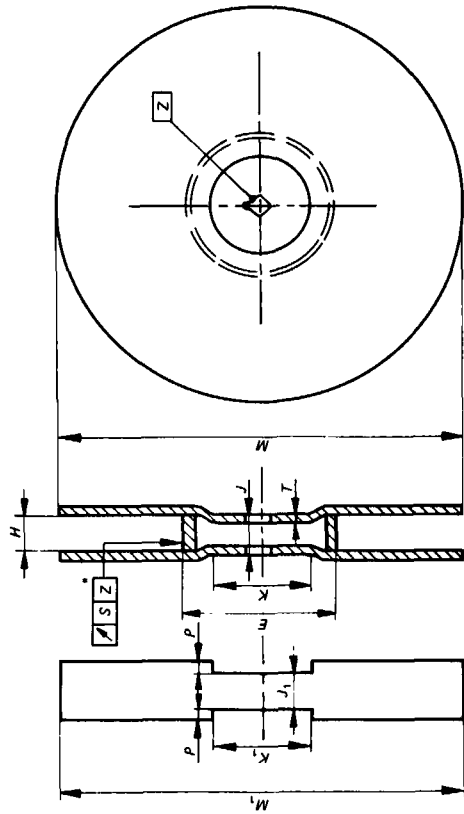
2 REFERENCES

- ISO 1019, *Cinematography — Spools, daylight-loading type for 16 mm motion-picture cameras — Dimensions.*
- ISO 1116, *Microcopying — 35 mm and 16 mm microfilms, spools and reels — Specifications.*
- ISO 3647, *Cinematography — Spindles for 16 mm motion-picture camera spools and projector reels — Dimensions.*
- ISO . . . , *Cinematography — Reels for 16 mm motion-picture projectors (over 120 m capacity) — Dimensions.¹⁾*

3 DIMENSIONS

- 3.1 The dimensions shall be as shown in the figures and given in the tables.
- 3.2 The tip of the keyway, if rounded as shown in figure 2, may have a minimum radius of $B/2$. If, instead, the tip of the keyway is made square as illustrated by the chain line, the square tip still shall observe the limits of A .
- 3.3 Dimension J_1 applies within the zone of diameter K which is centred on the spindle hole axis. It is not intended to imply, however, that this zone must be a depressed area. Depending upon the values selected for J_1 and P , the entire flange might be flat or the zone of diameter K might even be slightly raised.
- 3.4 The outside surfaces of the flanges which lie outside the zone of diameter K shall fall between the planes defined by $J_1 + 2P$.
- 3.5 Dimension P is the distance measured outwardly from the reference plane to the plane of rotation generated by the thickest and/or most eccentric point on the flange

¹⁾ In preparation.



* This symbol signifies the radial run-out of the hub with respect to the Z-axis in the manner prescribed in ISO/R 1101.

FIGURE 1 — Projection reel and maximum volume of rotation

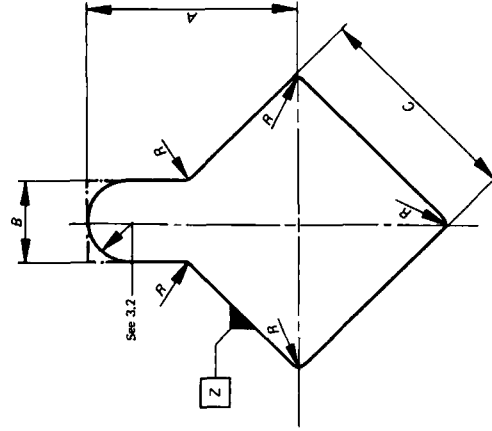


FIGURE 2 — Enlarged view of spindle hole area

TABLE 1 - Dimensions not common to the four reel sizes

Reel size designation**	Dimension	mm	in	Nominal reel capacity
7	M and M ₁	75.0 ⁰ _{-1.0}	2.95 ⁰ _{-0.04}	15 50
	E	32.5 ± 0.5	1.28 ± 0.02	
	P*	0.9 max.	0.035 max.	
10	M and M ₁	100.0 ⁰ _{-1.0}	3.94 ⁰ _{-0.04}	30 100
	E	45.5 ± 0.5	1.79 ± 0.02	
	P*	1.1 max.	0.04 max.	
13	M and M ₁	128.0 ⁰ _{-1.0}	5.04 ⁰ _{-0.04}	60 200
	E	45.5 ± 0.5	1.79 ± 0.02	
	P*	1.5 max.	0.06 max.	
18	M and M ₁	180.0 ⁰ _{-3.0}	7.09 ⁰ _{-0.12}	120 400
	E	60.5 ± 0.5	2.38 ± 0.02	
	P*	2.0 max.	0.08 max.	

* See 3.5.
 ** The reel size is the nominal flange diameter in centimetres; the corresponding inch sizes are 3, 4, 5 and 7.

ANNEX

A.1 SPINDLE-REEL FIT

Loose fit between a projector spindle and a reel spindle hole can contribute flange excursion not measured in the axial run-out measurement of sub-clause 3.4. This can be minimized by incorporating a support surface of not less than 16 mm (0.63 in) and preferably of 25 mm (0.98 in) diameter at the base of the spindle and by locking the K diameter area of the reel flange flush against this support.

A.2 REEL-LOCKING DEVICE

A few existing spindle designs have detent reel-locking means which act against the inside wall near the spindle hole of the flange which is placed closest to the base of the spindle. Thus, dimension T has been specified to ensure satisfactory performance on the spindles.

The value of dimension T should be 1.5⁰_{-0.8} mm (0.06⁰_{-0.03} in).

To provide correct fastening of the reels, dimension T is considered to be necessary within the zone of diameter K, but for future spindle designs and construction, it has been recommended in ISO Spindles for double 8 mm and 16 mm cameras and for 8 mm and 16 mm projectors*, that all locking means act against the full width J₁. Thus, eventually, the need for specifying T might be obviated.

A.3 PLASTIC RETURN REELS

Dimension T would require an unobstructed space within the hubs near those portions of the inside surfaces of both flanges which are near the spindle hubs. It is recognized, however, that most moulded "return" reels (those supplied by processors for return of film to customer) and most very large capacity reels (not listed in this International Standard) have spindle holes in the form of a solid-walled shaftway passing completely from one flange to the other.

* In preparation.

TABLE 2 - Dimensions common to all 16 mm projection reels

Dimension	mm	in
A*	7.6 ^{+0.5} ₀	0.30 ^{+0.02} ₀
B	3.1 ^{+0.4} ₀	0.12 ^{+0.02} ₀
C**	8.06 ^{+0.10} ₀	0.317 ^{+0.004} ₀
H	17.0 ^{+1.5} ₀	0.67 ^{+0.05} ₀
J and J ₁	20.0 ± 0.5	0.79 ± 0.02
K and K ₁	25.5 min.	1.00 min.
R	0.2 max.	0.008 max.
S	0.8 max.	0.03 max.
T (See clauses A.2 and A.3)		

* See 3.2.
 ** If the reel or reel hub is made from plastics or other dimensionally unstable material, the spindle hole diameter C (for the 15 and 30 m reels) should be so adjusted that at least the minimum dimension is maintained through the normal use range of temperature and relative humidity.

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\$78 00 list.

POWERING MODULE
\$79 00 list.

SHOTGUN HEAD
\$108 00 list.

 **SENNHEISER**
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*Unbalanced version also available