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CINEMATOGRAPHY

DIMENSIONS OF DAYLIGHT LOADING SPOOLS FOR 16 mm MOTION-PICTURE FILM

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BRIEF HISTORY

The ISO Recommendation R 1019, *Cinematography – Dimensions of daylight loading spools for 16 mm motion-picture film,* was drawn up by Technical Committee ISO/TC 36, *Cinematography,* the Secretariat of which is held by the American National Standards Institute (ANSI).

Work on this question led to the adoption of a Draft ISO Recommendation.

In November 1966, this Draft ISO Recommendation (No. 1049) was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Belgium	Germany	Netherlands
Brazil	Greece	Romania
Bulgaria	Hungary	Sweden
Canada	Israel	Switzerland
Chile	Italy	U.A.R.
Czechoslovakia	Japan	United Kingdom
France	Korea, Rep. of	U.S.A.

No Member Body opposed the approval of the Draft.

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council which decided, in March 1969, to accept it as an ISO RECOMMENDATION.

ISO Recommendation | R 1019 | March 1969

CINEMATOGRAPHY

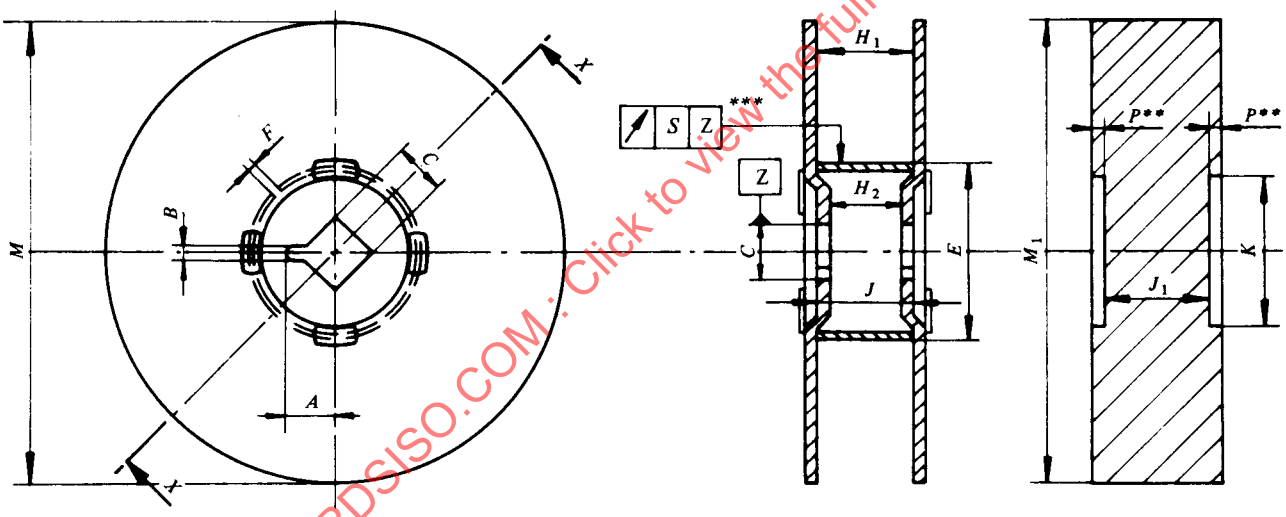
DIMENSIONS OF DAYLIGHT LOADING SPOOLS FOR 16 mm MOTION-PICTURE FILM

1. SCOPE

1.1 This ISO Recommendation specifies the dimensions and characteristics of general purpose spools of nominal capacities 15 m (50 feet), 30 m (100 feet), 60 m (200 feet), and 120 m (400 feet) for 16 mm motion-picture film.

The dimensions specified are in substantial agreement with those given for microfilm camera supply and take-up spools in ISO Recommendation R . . .*, *35 mm and 16 mm microfilms, spools and reels.* (See Annex.)

1.2 Spools for some high-speed cameras should be carefully balanced and are not necessarily covered by this ISO Recommendation.



Flange view | *Section X – X* | *Volume of rotation diagram*

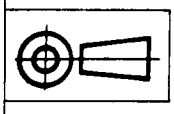


FIGURE – **Daylight loading spools for 16 mm motion-picture film**

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* At present, at the stage of a draft proposal.

** See clause 2.5 for explanation of *P*.

*** See clause 2.7. This symbol signifies the runout of the cylindrical surface of the core with respect to the Z axis in the manner prescribed in ISO Recommendation R 1101, *Tolerances of form and of position – Part I : Generalities, symbols, indications on drawings.*

TABLE – Dimensions for daylight loading spools
for 16 mm motion-picture film

Dimension	Nominal spool size				millimeters	inches
A	15 m	30 m	60 m	120 m	$7.6\ ^{+1.0}_{0}$	$0.30\ ^{+0.04}_{0}$
B	15 m	30 m	60 m	120 m	$3.1\ ^{+0.4}_{0}$	$0.12\ ^{+0.02}_{0}$
C (see clause 2.1)	15 m	30 m	60 m	120 m	$8.05\ ^{+0.15}_{0}$	$0.317\ ^{+0.006}_{0}$
E	15 m	30 m	60 m		32.0 ±0.5	1.26 ±0.02
				120 m	54.0 ±0.5	2.12 ±0.02
F	15 m	30 m	60 m	120 m	$0.7\ ^{+0.8}_{0}$	$0.03\ ^{+0.03}_{0}$
H_1	15 m	30 m	60 m	120 m	$16.05\ ^{+0.35}_{0}$	$0.632\ ^{+0.014}_{0}$
H_2	15 m	30 m	60 m	120 m	16.00 min.	0.630 min.
J and J_1	15 m	30 m	60 m	120 m	$18.5\ ^{0}_{-0.4}$	$0.73\ ^{0}_{-0.02}$
K	15 m	30 m	60 m		25.5 min.	1.00 min.
				120 m	38 min.	1.5 min.
M and M_1	15 m				$71.5\ ^{0}_{-1.0}$	$2.81\ ^{0}_{-0.04}$
		30 m			$92.0\ ^{0}_{-1.0}$	$3.62\ ^{0}_{-0.04}$
			60 m		$126.0\ ^{0}_{-1.0}$	$4.96\ ^{0}_{-0.04}$
				120 m	$169.0\ ^{0}_{-1.0}$	$6.65\ ^{0}_{-0.04}$
P (see clause 2.5)	15 m	30 m	60 m	120 m	0.50 max.	0.020 max.
S (see clause 2.7)	15 m	30 m	60 m	120 m	0.8	0.03

2. DIMENSIONS AND CHARACTERISTICS

2.1 The spindle and keyway holes shown in the Figure should be incorporated in both flanges* and should be aligned. (Some laboratories use 35 mm rewind equipment for winding 16 mm film; often the spindles on this equipment have long keys.) A second keyway, in the corner of the spindle hole opposite the required keyway, is optional, but if used, should be incorporated in both flanges.

2.2 If rivet heads or other fastening devices extend beyond the outer surfaces of the flanges, they should lie at a diameter larger than the minimum *K* diameter and should be within the boundaries defined by other portions of the volume of rotation diagram.

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* Some spools exist which have one flange with the construction recommended in clause 2.1, but the other flange with a round hole which has a diameter equal to dimension *C*. This older design is recognized temporarily, but is not recommended for future construction.

2.3 Dimension F refers to a slot in the spool core for attaching the film. The slot sides, starting immediately adjacent to each flange and running a minimum distance 6.0 mm (0.24 in) from each flange toward the other, should be straight, parallel and 0.7 to 1.5 mm (0.03 to 0.06 in) apart. The slot sides may diverge over remaining (central) portions of the slot.

2.4 Dimensions J and J_1 represent the thickness and effective thickness respectively of the spool within a K diameter area which is centered on the spindle hole axis of each flange.

2.5 A reference plane of rotation for each flange is defined by a plane perpendicular to the axis of the spindle and coincident with the surface of a flat 15.0 mm (0.59 in) diameter support which is in contact with the flange and centered on the spindle hole axis of the flange.

The dimension P is the distance measured outwardly from this reference plane* of rotation to the plane of rotation generated by the thickest and/or most eccentric point on the flange outside the K diameter area when the spool is rotated on an accurate, tight-fitting spindle. This includes rivets or other fastening devices, variations in flange thickness, flatness, and lateral runout of the flanges.

Selection of a dimension P value is dependent upon the thickness of the material used for the flanges. According to the flange material thickness

(*a*) the K diameter area may be depressed (with P greater than zero), or

(*b*) the outside surfaces of the flanges may be flat from spindle hole area to periphery (with P equal to zero), or

(*c*) in the case of flanges made of very thin material, the K diameter area may be raised rather than recessed (effectively, P less than zero).

2.6 The maximum effective thickness of spools (including all the characteristics mentioned in clause 2.5) outside the K diameter area has not been stated because it is a function of a spool's specific J_1 value between the 15.0 mm (0.59 in) diameter reference zones on each flange. The largest overall effective thickness, however, will be J_1 max. + 2 × P max. = 19.5 mm (0.77 in).

2.7 The eccentricity of the core with respect to the spindle hole axis, Z, should not exceed a *total* radius variation (total indicator reading) of 0.8 mm (0.03 in) for all spool sizes.

2.8 Flanges should be opaque and their surfaces should have low reflectance characteristics.

NOTE. – When the loaded camera is viewed from the side, with the lens to the left and the bottom of the housing downward (regardless of whether or not the spool loading mechanism is visible from that side), both the supply and take-up spools rotate in a clockwise direction.

* The reference plane from which P is measured is not necessarily coincident with all points within the K diameter area but only needs to be coincident with those which are in contact with the reference support which has a diameter smaller than K.