SMPTE 173-2004
Revision of
SMPTE 173-1999

SMPTE STANDARD

for Motion-Picture Equipment (8-mm Type R) — Double 8-mm Camera Spools — 100-Ft Capacity

1 Scope

The dimensions shown in this standard are for double 8-mm type R motion-picture film spools with a nominal capacity of 100 ft (30 m). 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 SMPTE 231. The spindle holes in the spool are shown with splines which are intended to assist in ensuring correct orientation of the spool in the camera.

2 Dimensions

2.1 The dimensions shall be as given in figures 1 through 4 and table 1.

2.2 If rivet heads or other fastening devices extend beyond the outer surfaces of the flanges, they shall lie at a larger diameter than the minimum K diameter and within the boundaries defined by other portions of the volume of rotation diagram (see figure 1).

2.3 Dimension H_2 is the space between the flanges inside the core, but outside the D-diameter zone.

2.4 Dimension H_3 applies within a diameter of 0.38 in (9.7 mm) centered on the spindle hole of each flange.

2.5 Dimension J represents the thickness of the spool within the K-diameter area, which is centered on the spindle hole axis of each flange.

2.6 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, 0.615-in (15.62-mm) diameter support, which is in contact with the flange and centered on the spindle hole axis of the flange.

Dimension P is the distance measured outwardly from the reference plane of rotation to the farthest plane of rotation described by any point on the flange outside the K-diameter zone 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. (The reference plane from which P is measured is not necessarily coincident with all points within the K-diameter zone, but only with those which are in contact with the reference support which has a diameter smaller than K.)

Selection of a value for dimension P is dependent upon the thickness of the material used for the flanges. According to the flange material thickness, (1) the K-diameter area may be depressed (with P greater than zero), or (2) the outside surfaces of the flanges may be flat from the spindle hole area to the periphery (with P equal to zero), or (3) 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).

2.7 The maximum effective thickness of spools (including all the characteristics mentioned in 2.6) outside the K-diameter area has not been stated because it is a function of a spool's specific J value between the 0.615-in (15.62-mm) diameter reference zones on each flange. The largest overall effective thickness, however, will be J max + 2P max = 0.77 in (19.6 mm).

Approved
November 8, 2004

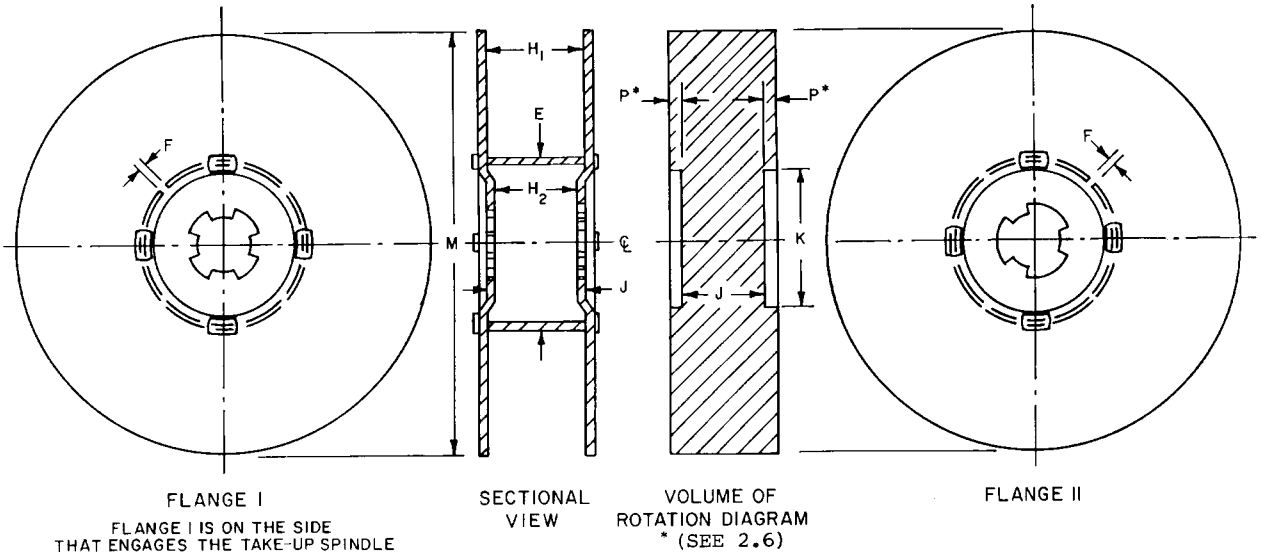

Figure 1 – Flanges, sectional view and volume of rotation

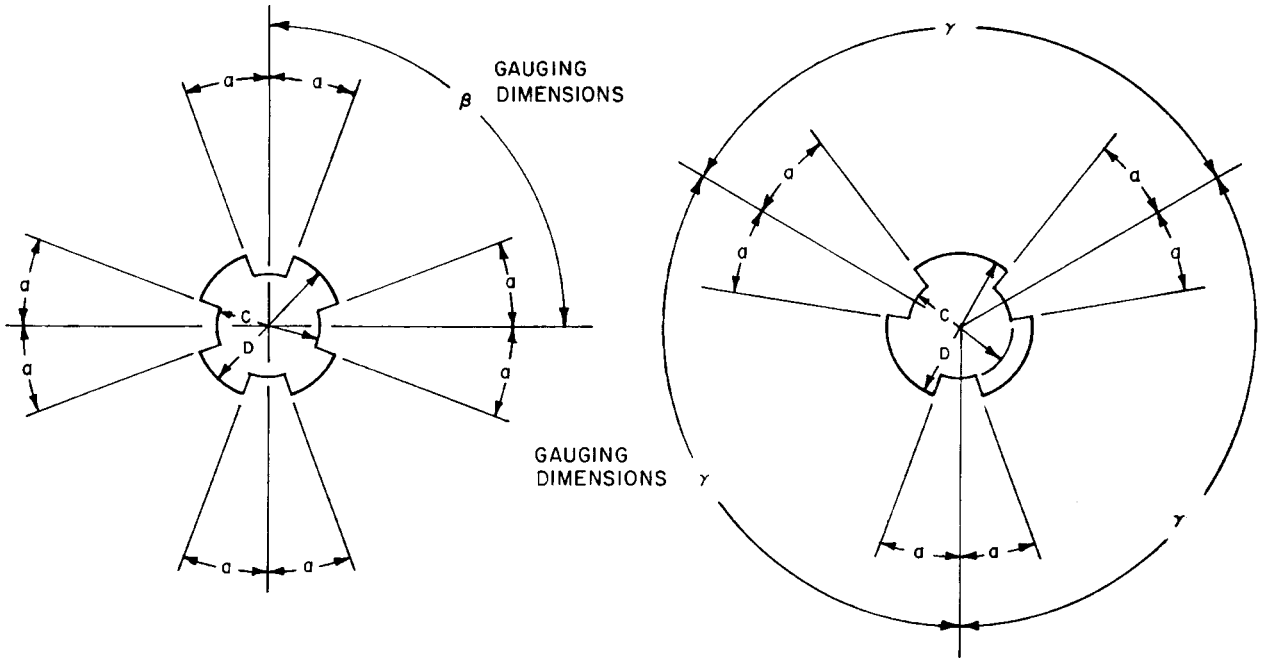

Figure 2 – Enlarged view of splined holes

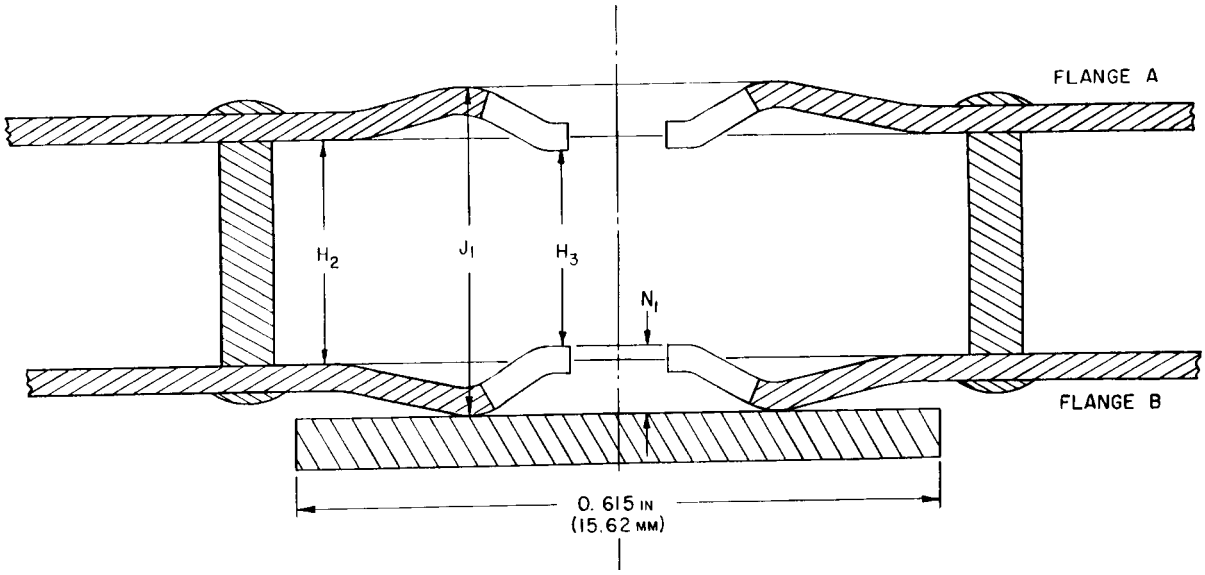

Figure 3 – Enlarged section for dimension N_1

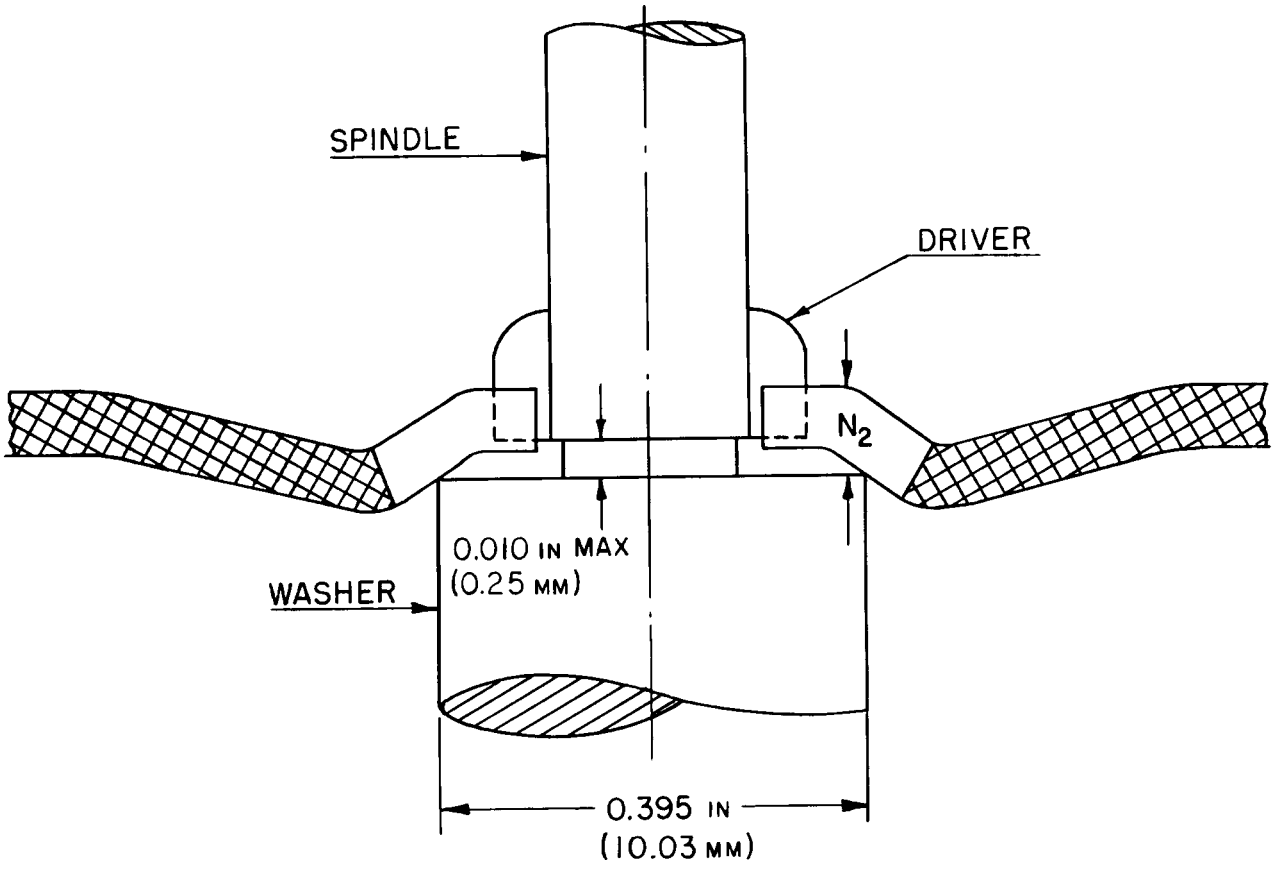

Figure 4 – Spindle and spool relationships

Table 1 – Specifications

Dimensions	Inches		Millimeters	
C	0.287	+ 0.008 – 0.000	7.29	+ 0.20 – 0.00
D	0.384	min	9.75	min
E (See 2.9)	0.750	± 0.015	19.05	± 0.38
F	0.035	± 0.020	0.89	± 0.51
H_1	0.632	+ 0.014 – 0.000	16.05	+ 0.36 – 0.00
H_2	0.630	min	16.00	min
H_3	0.622	min	15.80	min
J	0.73	+ 0.00 – 0.02	18.5	+ 0.0 – 0.5
K	0.615	min	15.62	min
M	3.62	+ 0.00 – 0.04	91.9	+ 0.0 – 1.0
N_1	0.038	min	0.97	min
N_2	0.025	min	0.64	min
P (See 2.6)	0.020	max	0.51	max
	Degrees			
α	20 + 0 – 1			
β	90			
γ	120			

2.8 The eccentricity of the core with respect to the spindle hole axis should not exceed a total radius variation (total indicator reading) of 0.03 in (0.8 mm).

2.9 A dimension of 1.26 in ± 0.02 in (32.0 mm ± 0.5 mm) should be considered for the diameter of the core. All future design should be directed toward this dimension to aid in the design of metering devices.

2.10 When thin material is used for flanges, annexes A.3 and A.4 should be taken into account.

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

NOTES

1 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 the take-up spools rotate in a clockwise direction.

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

3 Spool capacity is based on a film thickness of approximately 0.006 in (0.15 mm).

Annex A (informative)
Additional data

A.1 It is expected that every spool manufacturer will hold H_1 within the narrowest limits that his design and manufacturing process permits.

A.2 Camera spindles should allow for a radius of not more than 0.015 in (0.38 mm) at each corner of each tongue.

A.3 Figures 3 and 4 represent special examples of how the needs of certain dimensions critical to proper performance in some cameras can be met by appropriate shaping or embossing of the spool stock if spools are made of a thin-gage material (much less than 0.040 in [1.02 mm]). For a number of years, the effective thickness of the four-spindled webs which engage most camera drivers, dimension N_1, was the stock thickness, nominally 0.040 in (1.02 mm). Recently, spools have been made from thinner materials which required embossing to maintain dimension J in order to enable the splines to engage the camera drivers, some of which have a clearance approaching 0.025 in (0.64 mm). Dimension N_1 normally is measured to a flat support having a diameter of 0.615 in (15.62 mm). Many cameras have spool support washers with diameters considerably less than 0.615 in (15.62 mm). In order to ensure proper operation with such cameras, the dimension from the inside of the four-spindled flange to the plane of a flat support 0.395 in (10.03 mm) in diameter centered on the spindle hole axis of the flange, dimension N_2 (figure 4), shall be at least 0.025 in (0.64 mm).

The enlarged section for dimension N_1 (figure 3) illustrates one method of shaping the splines in the four-splined flange so they will engage the camera driving spindle when the flange thickness is less than 0.025 in (0.64 mm).

A.4 Camera spindles engaging the four-splined flange of the spool should not have a gap greater than 0.010 in (0.25 mm) 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 (12.70 mm) and no greater than 0.615 in (15.62 mm).

A.5 To facilitate the distinction between a roll of film which has been exposed along only the first side (one-half width) and a roll of film which has not been exposed at all or has been exposed along both the first and second sides (both one-half widths), it is recommended that the flanges of spools be marked prominently as follows:

	Raw stock spools	Camera accessory spools	
	Numeral	Numeral and/or phrase	
Flange with four-splined spindle hole	1	2	No phrase (or numeral) necessary if phrase shown below is included on other flange.
Flange with three-splined spindle hole			Phrase or equivalent as follows: Film on this spool is half exposed.

Attention is called to the fact that if a camera accessory spool wound with the first exposure run of film is removed from the camera, identification of the film exposure status is more obvious if the spool has been marked with a phrase instead of (or in addition to) numerals. Some camera accessory spools have identical four-splined holes in each flange. (Supply spindles of such cameras have one small lug or none.) Both flanges of such accessory spools should be marked with the phrase suggested above. To ensure proper orientation for the second exposure in this case, in addition to the phrase, it is helpful to have the numeral 1 on one flange and the numeral 2 on the other.

A.6 Neither this standard nor SMPTE 231 restricts the perforation type of double-perforated 8-mm film that can be supplied with the spools. Generally, these spools are used only with conventional 8-mm motion-picture films; i.e., those cut and perforated 16-mm 2R-1500. Double super 8 motion-picture films (16-mm 2R-1664 or 1667) are usually supplied on 16-mm camera spools having square spindle holes aligned as specified in ANSI/SMPTE 174.

Annex B (informative)
Bibliography

ANSI/SMPTE 174-1994 (R2003), Motion-Picture Equipment (16-mm) — Camera Spools — 50- to 400-Ft Capacity

SMPTE 231-2004, Motion-Picture Film (8-mm Type R) — Camera Aperture Image and Usage