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# SMPTE STABLE DOCUMENT

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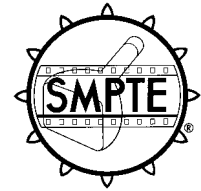
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# SMPTE STANDARD

**ANSI/SMPTE 243M-1993**

Revision of  
ANSI/ SMPTE 243-1989

## for Motion-Picture Equipment — 35- and 70-mm Projection Lenses and Mounts



Page 1 of 3 pages

### 1 Scope

**1.1** This standard specifies the lens markings, focal length tolerances, mounting diameters, mechanical factors in mounting additional lens adaptors to lenses, and the preferred value steps in focal lengths for lenses used in 35- and 70-mm motion-picture projectors. (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 a nondetachable part of the lens barrel in a permanent manner in metric values on a surface other than that identified by dimension A. (English units are optional.)

### 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  $\pm 1\%$ .

**3.2** Preferred values of focal lengths shall be integral multiples of 5 mm (0.2 in) nominal, over the range 45 mm to 150 mm (1.75 in to 6 in). If English units are also shown, they shall be in decimals. Other values over 150 mm shall be in 10-mm steps, and those less than 45 mm can be as is practical for the lens maker. Multicoated lenses shall be so marked or indicated with the abbreviation MC. Lenses made for 70-mm film use shall be so marked in a permanent manner.

### 4 Lens barrel diameter

The barrel diameter shall be 70.66 mm (2.782 in) (see dimension A and figure 1) for standard projectors. Some European projectors require lenses of 62.5 mm (2.46 in) which can be provided by lens makers at their discretion. Older large lenses have been made at 101.35 mm (3.990 in). It is expected that in most projectors the lens mount will either clamp directly 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 the turret, swing away, or other separate mountings, 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 within dimension A, and shall have dimensions as specified in table 2.

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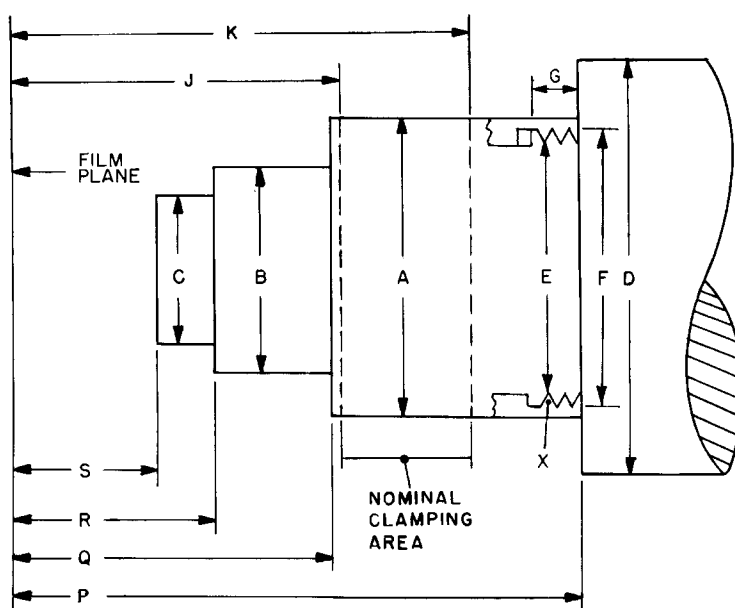


Figure 1 – Lens barrel

Table 1 – Dimensions

	Standard lenses				Large lenses			
	Millimeters		Inches		Millimeters		Inches	
Barrel diameter								
A	70.66	+ 0.00 – 0.13	2.782	+ 0.000 – 0.005	101.35 ± 0.13		3.990 ± 0.005	
Limiting space								
B <sup>1)</sup>	70.66	max	2.782	max	82.6	max	3.25	max
C	48.3	max	1.90	max	48.3	max	1.90	max
D <sup>2)</sup>	check with projector manufacturer				check with projector manufacturer			
P <sup>3)</sup>	190.5	min	7.50	min	190.5	min	7.50	min
Q	95.2	min	3.75	min	95.2	min	3.75	min
	108.0	max	4.25	max	108.0	max	4.25	max
R	38.1	min	1.50	min	38.1	min	1.50	min
S	30.5	min	1.20	min	30.5	min	1.20	min
Nominal clamping area								
J	101.6	min	4.00	min	101.6	min	4.00	min
K	152.4	max	6.00	max	152.4	max	6.00	max

## NOTES

<sup>1)</sup> Historically, dimension B was held to 57.2 mm max (2.25 in max) for projectors manufactured before 1960. In addition, some European projectors have a lens mount of 62.5 mm (2.46 in), in which case dimension B is 62.5 mm (2.46 in).

<sup>2)</sup> The space of dimension D is beyond the lens barrel and outside the front of the projector face to accommodate enlarged wide-angle lenses and anamorphic and magnifying attachment lenses.

<sup>3)</sup> Historically, dimension P for certain projectors made before 1960 was 254.0 mm (10.00 in).

**Table 2 – Standard diameter lenses**

Dimensions		Millimeters		Inches	
E	Minor diameter	66.80	max	2.630	max
F	Major diameter	67.77	min	2.668	min
G	Thread length	5.56	± 0.25	0.219	± 0.010
X	Thread size	0.706	pitch	36	tpi

**Annex A (informative)****General information**

Because of types of glass and tolerances of anti-reflection coatings, lenses can cause a shift in color temperature. Using a reliable color temperature meter, the light through the lens as compared to the raw light without the lens should

shift less than 400 K. Matched lenses are those which shift the color temperature, one as compared to another, by less than 200 K. (Light readings should be taken with the shutter stopped.)