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>
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SMPTE RECOMMENDED PRACTICE

RP 65-2000
Revision of
RP 65-1995

Motion-Picture Enlargement/Reduction Ratios

1 Scope

This practice specifies the enlargement/reduction ratios to be used in copying motion pictures from one film size to another while maintaining the aspect ratio and composition of the original film.

This practice also specifies the dimensions of the projectable image area on the resulting copy, and gives the dimensions for a matte which produces an opaque border on the final projection copy. Also specified are dimensions for camera viewfinder marks which can be used in composing the original photography for the copy format.

2 Ratios and dimensions

The enlargement/reduction ratios and dimensions shall be as given in the tables. All table dimensions are in inches. The centers of the original image, the projectable image area, the matte, the viewfinder marks, and the copy image shall all be coincident with the center of the copy format as given in the appropriate referenced standard. When a matte dimension is not given, no matte is required in that direction since the copied image fills the standard image dimension of the copy format.

Table 1 – Reduction from 35-mm to 16-mm

From 35-mm projection format to 16-mm projection format		1.37:1 1.37:1	1.66:1 1.66:1	1.85:1 1.85:1
Reduction ratio		0.461 ± 0.002	0.461 ± 0.002	0.461 ± 0.002
Projectable image on 16-mm copy	Width Height	0.380 ref 0.278 nom	0.380 ref 0.229 nom	0.380 ref 0.206 nom
Matte on 16-mm copy	Height		0.229 $^{+\ 0.005}_{-\ 0.0}$	0.206 $^{+\ 0.005}_{-\ 0.0}$
Viewfinder marks for original	Width Height	0.825 ref 0.602 ref	0.825 ref 0.497 ref	0.825 ref 0.446 ref

Table 2 – Enlargement from 16-mm to 35-mm

From 16-mm projection format to 35-mm projection format		1.33:1 1.33:1
Enlargement ratio		2.105 ± 0.002
Projectable image on 35-mm copy	Width Height	0.800 nom 0.602 ref
Matte on 35-mm copy	Width	0.800 $^{+\ 0.010}_{-\ 0.0}$
Viewfinder marks for original	Width Height	0.380 ref 0.286 ref

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Table 3 – Enlargement from 35-mm to 70-mm

From 35-mm projection format to 70-mm projection format		1.85:1 1.85:1	2.39:1 anamorphic 2.39:1 flat
Enlargement ratio		1.951 ± 0.002	1.159 ± 0.002
Horizontal decompression			2.00 $^{+\ 0.0}_{-\ 0.03}$
Projectable image on 70-mm copy	Width Height	1.610 nom 0.870 ref	1.912 ref 0.800 nom
Matte	Width	1.610 $^{+\ 0.010}_{-\ 0.0}$	
	Height		0.800 $^{+\ 0.010}_{-\ 0.0}$
Viewfinder marks for original	Width Height	0.825 ref 0.446 ref	0.825 ref 0.690 ref

Table 4 – Reduction from 35-mm anamorphic to 16-mm anamorphic

From 35-mm projection format to 16-mm projection format		Anamorphic 2.39:1 anamorphic
Reduction ratio		0.414 ± 0.002[1)]
Projectable image on 16-mm copy	Width Height	0.342 nom 0.286 ref
Matte	Width	0.342 $^{+\ 0.005}_{-\ 0.0}$
Viewfinder marks for original	Width Height	0.825 ref 0.690 ref

[1)] Some reductions from 35-mm anamorphic to 16-mm anamorphic use the 35-mm to 16-mm reduction ratio given in table 1 (i.e., 0.461) and the 16-mm copy is projected using the standard 16-mm projectable area of 0.380 in by 0.286 in, thus projecting only 0.620 in of the vertical information rather than the usual 0.690 in projected in 35-mm. Such practice is, therefore, deprecated.

Annex A (informative)
Additional data

A.1 Choice of enlargement/reduction ratios

Enlargement/reduction ratios have been calculated, insofar as possible, to fit the entire projectable image area on the original film to the standard projectable image area of the copy format. By so doing, all of the image originally meant to be seen by the audience will be seen when projecting the enlarged or reduced copy. The aspect ratio and the size of the exposed image outside the projectable image area may differ in the original format and the copy format, resulting in images which do not completely fill the standard image areas of the copy format. These unfilled areas of the copy may occur at the image top and bottom, the sides, or both.

A.2 Projection aperture

Because the unfilled areas described in A.1 can occur, it is recommended that the projector used for showing the copy be fitted with a suitable projection aperture. The dimensions given for the projectable image area can be used as a reference to design a projector aperture suitable to the image size on the final projection copy.

A.3 Matte

It is recognized that the enlarged or reduced copy may not be projected with a projection aperture designed specifically for the image size on the copy. Additionally, clear film outside the projected area may cause flare in projection even with a proper aperture. Therefore, a matte of the dimensions given in the tables may be required at some point in the duplication process so as to produce an essentially opaque border surrounding the image area on the final projection copy. The matte is intended to be slightly larger than the appropriate projectable image area so that it will not be seen on the screen when the preferred projector aperture is used, but if the copy is projected without the preferred projector aperture, essentially the same projected image area will be seen.

Annex B (informative)
Bibliography

ANSI/SMPTE 152-1994, Motion-Picture Film (70-mm) — Projectable Image Area

ANSI/SMPTE 195-1993, Motion-Picture Film (35-mm) — Motion-Picture Prints — Projectable Image Area

ANSI/SMPTE 215-1995, Motion-Picture Film (65-mm) — Camera Aperture Image

ANSI/SMPTE 233-1998, Motion-Picture Film (16-mm) — Projectable Image Area and Projector Usage

SMPTE 7-1999, Motion-Picture Film (16-mm) — Camera Aperture Image and Usage

SMPTE 59-1998, Motion-Picture Film (35-mm) — Camera Aperture Images and Usage