

INTERNATIONAL STANDARD

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Cinematography — Screen luminance for the projection of motion-picture prints in indoor theatres and review rooms

*Cinématographie — Luminance des écrans de projection des copies
cinématographiques dans les salles d'exploitation et les salles de vision*



Reference number
ISO 2910:1990(E)

Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 2910 was prepared by Technical Committee ISO/TC 36, *Cinematography*.

This second edition cancels and replaces the first edition (ISO 2910:1974), as well as ISO 2895:1974.

Annex A of this International Standard is for information only.

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International Organization for Standardization

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Cinematography — Screen luminance for the projection of motion-picture prints in indoor theatres and review rooms

1 Scope

1.1 This International Standard specifies the screen luminance level and chromaticity, as seen by a seated viewer, for theatrical projection of 70 mm, 35 mm and 16 mm motion-picture prints at 24 frames per second in indoor theatres and review rooms used in judging the quality of prints for international distribution.

For the purposes of this International Standard, the term "screen" is the screen-picture area appropriate to the film format and projection system in use.

1.2 It is also recommended that this International Standard be followed for non-theatrical presentation of 70 mm, 35 mm and 16 mm motion-picture prints intended for projection at 24 frames per second.

2 Measurement of luminance

2.1 Main conditions

The luminances specified are measured with the projector operating at a nominal projection speed of 24 frames per second with the shutter running and without film in the gate.

NOTE 1 Measured luminance is affected by the lens in use, and other optical components.

2.2 Measuring device

The screen luminance shall be measured with a photometer having an acceptance angle not greater than 2° (recommended value $1,5^\circ$), having the spectral sensitivity of a Standard Observer,¹⁾ agreed to by the International Commission on Illumination in

1924, and adopted in 1933 by the International Committee of Weights and Measures.

2.3 Position of measuring device in theatres

In theatres, the measurements shall be taken with the photometer located approximately 1 m above the floor on the longitudinal axis of the theatre in the centre of the main seating area. To ensure satisfactory performance in all parts of the theatre, measurements shall also be taken with the photometer located approximately 1 m above the floor at two points on a transverse line across the theatre at a position two-thirds of the distance from the screen to the back row of seats (measured from the screen), and at a distance of one-third of the theatre width to each side of the longitudinal axis of the theatre.

2.4 Position of measuring device in review rooms

In review rooms, the measurements shall be taken with the photometer located approximately 1 m above the floor on the centre-line of the review room, at the viewing location(s) where print quality decisions are normally made.

3 Luminance level of screen centre

3.1 For review rooms used in judging prints for international distribution, the luminance level of the screen centre shall be $50 \text{ cd/m}^2 \pm 7 \text{ cd/m}^2$ for each format in use.

3.2 For indoor theatres, the luminance level of the screen centre shall be $50 \text{ cd/m}^2 \pm 15 \text{ cd/m}^2$ for each format in use (see annex A).

1) Publication CIE No. 15.2, *Colorimetry*, 2nd edition, 1983.

4 Luminance distribution

4.1 Measurement of screen edges

The luminance of the screen edges shall be measured on the horizontal centre-line of the screen at a distance from the screen edges equal to 10 % of the width of the screen. When measured from the points specified in 2.3 and 2.4, the two edge measurements shall be within 10 % of each other and not less than 50 % and not more than 85 % of that at the centre, with a recommended value of 75 %.

4.2 Evenness of luminance distribution

Over the complete screen area, the luminance shall appear to be even, and substantially symmetrical about the screen centre. This should be checked from multiple positions of the seating area, especially along the extremes (sides and balconies) when using "high gain" screens.

5 Spectral distribution

When using xenon or carbon-arc light sources, the light reflected from the screen shall have a spectral distribution comparable to that of a black body at a colour temperature of $5\,400\text{ K} \pm 400\text{ K}$.

NOTE 2 Certain special 35 mm prints and some 16 mm prints are made for projection with incandescent tungsten source illuminants. Such prints should be clearly labelled as intended for tungsten illuminants.

6 Multiple projector adjustment

6.1 Luminance match for projector units of same formats

The luminance resulting from all projectors intended for use in the continuous viewing of material of the same format shall not vary by more than 7 cd/m^2 at the screen centre.

6.2 Luminance match for projector units of different formats

The luminance resulting from projectors intended for use in the sequential viewing of materials of different formats shall not vary by more than 14 cd/m^2 at the screen centre.

6.3 Colour temperature match

The difference in correlated colour temperature of the light reflected from the screen when using projectors intended for sequential operation shall not be more than 400 K. For 16 mm projection with sources having a correlated colour temperature of 3 500 K or less, the range shall be limited to 7 % or 200 K, whichever is the greater.

7 Stray light

7.1 No stray light or illuminated source with a luminance in excess of $3,5\text{ cd/m}^2$ shall be visible from the standard observing area of a review room.

7.2 Light on the screen from stray light or flare shall be kept as low as possible. In review rooms, stray light on the screen shall not exceed 0,4 % of the screen luminance from the projector. In theatres, the stray light shall not exceed 1,0 %.

Annex A

(informative)

Acceptable limits of screen luminance

The range of screen luminance acceptable for indoor theatres is based on practical experience and limitations. It should be understood that the nominal light level in review rooms has been established at 50 cd/m² for all formats (3.1). Therefore, it follows that in order to reproduce the pictorial qualities seen in the review room, the value for theatres should also be 50 cd/m². However, satisfactory performance can be obtained within the stated limits. The

lower limit of 35 cd/m² is dictated by the need to maintain sufficient luminance to perceive colour and detail, especially in dark scenes. The upper limit of 65 cd/m² is the maximum before significant perception of flicker occurs (assuming 48 interruptions per second by the projector shutter).

For non-theatrical use, a lower limit of 25 cd/m² may be dictated by light output limitations of portable projection equipment, especially 16 mm.

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