

for D-Cinema Quality — Screen Luminance Level, Chromaticity and Uniformity



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1 Scope

This standard specifies the absolute luminance level, white point chromaticity, and luminance uniformity of the reflected screen light for the presentation of motion pictures by projectors with digital light engines in review rooms and commercial cinemas. It is the purpose of this specification to achieve the tone scale and contrast in the projected image that will correspond to that intended during the mastering process.

2 Normative reference

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below.

ISO/CIE 10527-1991, Colorimetric Observers

3 Performance classes

It should be recognized that different applications within the industry have varying requirements for tolerances, or the precision of the target specifications attained in any particular installation. For example, greater precision may be required for a system in a mastering suite than in a commercial cinema theatre. In order to simplify communication, two levels or classes of precision are defined herein as follows:

Review Room intended as the highest practical precision, for the most critical colorimetry applications, recommended for the mastering activities of color timing and color matching.

Theater intended as the minimum level for commercial cinema presentations.

Performance criteria for each class are defined in section 5.

4 Measurement criteria

4.1 Projector conditions

Measurements shall be made with the projector in normal operation, with its lens(es) set at optimal focus position, set for the format covering the largest area of the screen, and a 100% white signal being displayed on the screen (either the entire screen or as a minimum the five zones consisting of the screen center and four corner locations defined in section 4.2). The 100% white signal is defined as the digital code values assigned to the maximum color-neutral white level allowed in the input signal standard of interest.

4.2 Measurement locations on the screen

Measurements of light levels shall be taken at screen locations consisting of the geometric center of the screen and the four sides in theaters, and those measurements with the addition of the four corners in review rooms. The side and corner locations are inset $5\% \pm 1\%$ of the screen width from both of the adjacent screen edges.

4.3 Measurement locations in the auditorium

All screen measurements shall be performed at the center of the seating row closest to the geometric center of the seating area. All readings shall be taken at a height of approximately 1.1 m (43 in) above the floor to simulate the eye height of an audience member.

4.4 Photometer type

Screen luminance shall be measured with a spot photometer having the spectral luminance response of the standard observer (photopic vision), as defined in ISO/CIE 10527. The acceptance angle of the photometer shall be 2° or less. The photometer shall have an accuracy of $\pm 0.5 \text{ cd/m}^2$ ($\pm 0.2 \text{ fL}$) or better. The photometer response to luminance variation over time shall be to properly integrate any such variation occurring at frequencies at or above 24 Hz and display the arithmetic mean value.

4.5 Spectroradiometer type

Screen chromaticity shall be measured with a spot spectroradiometer with an acceptance angle of 2° or less. It shall report values in CIE x, y coordinates, with an accuracy of ± 0.002 or better for both x and y.

NOTE – As there are meters available that measure both luminous flux and chromaticity, this may physically be the same meter defined in section 4.4.

5 Specifications

Measurements taken from each location specified in section 4.3 shall be within the limits given in this section.

5.1 Luminance, absolute

The absolute luminance is that value measured at the screen center as taken with a meter meeting the criteria of section 4.4. The nominal value for screen luminance is 48.0 cd/m^2 (14.0 fL). The allowable variation for each performance class is given in table 1.

5.2 Luminance, uniformity

The screen luminance shall be symmetrically distributed about the geometric center of the screen, and shall exhibit no abrupt changes. The luminance value at the sides and corners defined in section 4.2 is expressed as a percentage of the value at the screen center. The meter used shall meet the criteria of section 4.4. The allowable variation for each performance class is given in table 1.

5.3 White point chromaticity

The white point chromaticity is that value measured in the center of the screen as taken with a meter meeting the criteria of section 4.5. The white light reflected from the screen shall have a nominal chromaticity value of $x = .314$, $y = .351$. The allowable variation for each performance class is given in table 1.