

Don't be in the Dark about Measuring Screen Luminance

What's Your Screen Luminance?

If you ask most projectionists or theatre managers whether their screens have the proper screen luminance, they'll reply that they are "on standard" or "it looks okay," and quickly try to change the subject. When you ask what "on standard" is, they usually answer with a question "Isn't the standard 16 foot - something's or other?" and sheepishly add "maybe we're a bit low on a few of the screens," as they furtively look to see if you have a meter to measure it. Boldly asking when the screens were last measured, the reply might be, "When the service technician was here last summer," or "When the theatre was built." Ask, "Do you own a meter to check screen luminance?" and the answer might be "Why do we need one, when the service tech checks it several times a year?"

Why Measuring Screen Luminance is Important

The above scenario plays out in too many theatres. All too many screens are poorly illuminated. The importance of proper screen luminance is not fully appreciated and the infrequent measurement is left to "the experts." Theatre personnel are familiar with some of the terminology, but often don't fully understand what it means or why it is so important. They rarely have access to an accurate photometer for measuring screen luminance, which should be done routinely on a regular basis and especially after maintenance such as changing a xenon lamp or adjusting lamphouse alignment.

What is Screen Luminance?

Simply put, screen luminance is the amount of light reflected from the screen, as seen by the audience. Every theatre should have a copy of standard ANSI/SMPTE 196M, "Indoor Theatre and Review Room Projection - Screen Luminance and Viewing Conditions." It specifies the "screen luminance level, luminance distribution, and spectral distribution (color temperature) of the projection light . . . to achieve the tone scale, contrast, and pictorial quality of the projected print that will be of the quality intended during its production." Most people remember the figure of 16 footlamberts, which is the nominal aim screen luminance. But ANSI/SMPTE 196M specifies much more and describes the measurement procedure.

First, the standard specifies the operating conditions for measuring screen

luminance: the projector should be in normal operation with the shutter running, lens at normal focus position, and with no film in the gate. Measurements should be made for all formats (e.g., scope and flat).

The standard specifies a spot photometer with an acceptance angle of two degrees or less, the spectral luminance response of the standard observer, a capacity for integrating over the shutter flicker. In other words, the meter should measure *reflected* light from a small portion of the screen as the human eye would, and not be fooled by the 48 or 72 cycle flicker of the shutter.

The standard specifies that the primary screen luminance measurement should be taken from the center of the seating area at approximately the eye level of a seated person. Additional measurements should be taken from the center and from each end of the middle row in the theatre. For theatres with wide viewing angles or stadium seating, even more measurements are recommended.

The nominal screen luminance at the center of the screen should ideally be 16 footlamberts (55 cd/m₂). The standard allows a range of 12 to 22 footlamberts (41 to 75 cd/m₂) for theatres. Luminance at the sides of the screen should be between 75 to 90 percent of the center luminance, and never less than 10 footlamberts (34 cd/m₂).

Obtaining Copies of SMPTE Standards

Copies of standards like ANSI/SMPTE 196M and test films can be ordered from the Society of Motion Picture and Television Engineers. The web site is www.smpte.org/smpte_store/standards/.

Screen Luminance Meters

In the next issue, we'll discuss the professional screen luminance meters that are available, including the Minolta Luminance Meter LS-100, the SpectraCine CineSpot Spotmeter Model SC-600, and the Ultra Stereo Labs PSA-200 Projection Screen Analyzer. We'll also look at how less expensive meters or even an adjustable camera can be used to check if screen luminance is correct.

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