

of daylight that has a correlated color temperature of 5000 Kelvin. Supposedly, one of the reasons D_{50} was picked originally was that, of the available CIE daylight illuminants, it comes closest to having equal energy in the blue, green, and red portions of the spectrum. It was kept in the current standard because it is the reference for most viewing booths in use today.

Unfortunately, there are no real lamps that exactly match CIE Illuminant D_{50} . Manufacturers use various combinations of phosphors in fluorescent lamps and filters to create D_{50} simulators. Therefore, the standard must specify how closely a real viewing booth illuminator (a D_{50} simulator) matches the theoretical D_{50} . In the prior standards the basic definition of the “goodness of the match” to D_{50} was a CIE procedure called Color Rendering Index or CRI. This compares the color of a set of standard samples under theoretically perfect D_{50} with their color under the actual illuminant. The degree to which they match is used as the index parameter.

This is fine if we are dealing with colors that have nice smooth reflectance curves and if UV brighteners are not an issue—which is where we were back in 1975 when the previous draft of the ISO standard was written. This is not the case today.

Today, color imaging and proofing systems are using a host of new technologies to create images. Dye sublimation, thermal transfer, inkjet, and electrophotography are all producing an ever-increasing gamut of color. Many of these technologies achieve a color match to photography or ink on paper by using combinations of “cleaner” dyes that have much more abrupt transitions in their reflectance curves than the color that they are matching. This is called a metameric match (how that works is another whole article by itself). However, one of the side effects is that they are more sensi-

tive to changes in the nature of the illumination. The real impact of this is that just using CRI is not enough anymore.

The new standard keeps the same CRI criteria but also introduces two new criteria called the visible and UV metamerism indexes. They are based on a CIE standard called CIE Publication No. 51, 1981—*A method for assessing the quality of daylight simulators for colorimetry*. The indexes use more complex matching criteria, one for the visible and one for the UV portion of the spectrum, to further restrict the allowable differences between the actual spectral output of the D_{50} simulator and CIE Illuminant D_{50} .

This means that viewing equipment meeting the new standard will provide more consistent viewing conditions and will be less susceptible to problems caused by either the new materials or fluorescence in the paper or inks. Fortunately, preliminary practical tests indicate that most of the better viewing equipment that meets the old standard will also meet the new standard. Earlier equipment that was marginal may have problems and need updating—it

Just what is 2000 lux— or any other level of lux?

The definition of lux involves luminous flux incident in lumens per square meter. While the definition is technically precise, it is not very friendly in terms of a practical interpretation.

For a much less precise but more user-friendly calibration, take a typical 100-watt frosted light bulb (turned on!). The light intensity 9 inches away from the center of the bulb is about 2000 lux. The light intensity 18 inches away is about 500 lux. The 64 lux specified as the maximum for monitor situations is about 48 inches away, and 32 lux is about 78 inches away.

Remember, that 100 watt frosted bulb is not the correct color temperature—all we are calibrating on is light level, which doesn't care about color temperature.



The GATF/RHEM Light Indicator.

is too soon to tell what specific models will be acceptable and which will require additional work.

A GATF/RHEM Light Indicator gives a visual warning when color evaluations are taking place under lighting conditions that are inappropriate. The convenience of affixing this device directly to the proof makes it a positive reminder of the need to check viewing conditions. It is important to remember that the GATF/RHEM Light Indicator will not, and cannot, verify that the lighting conditions are proper—it is not sensitive enough for that purpose.

Intensity Levels

The new standard introduces two levels of illumination, a high level (P1) of 2000 ± 500 lux for critical evaluation and comparison and a lower level (P2) of 500 ± 25 lux for appraising the tone scale of an image under illumination levels similar to those under which it will be finally viewed. The higher level, which is the level included in the previous standards, is essential when making critical evaluations and comparisons, for example when comparing original artwork with proofs or when evalu-