

## Measurement Method

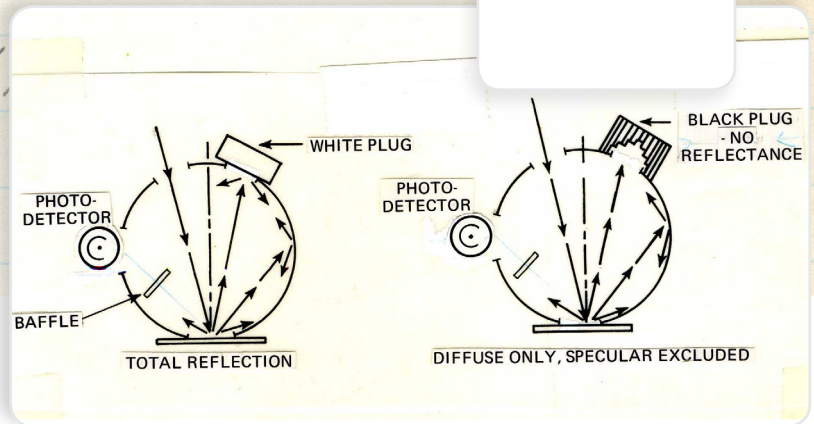
Change of phase of  $\lambda/2$  on reflection  
 $\Delta = 2t + \frac{\lambda}{2}$  (must equal a whole number of  $\lambda$  for a bright fringe or

$$n\lambda = 2t + \frac{\lambda}{2}$$
$$t = \frac{n\lambda - \frac{\lambda}{2}}{2} = \frac{\lambda}{2} \left( n - \frac{1}{2} \right)$$

substituting

$$D^2 = 2r \left[ \frac{\lambda}{2} \left( n - \frac{1}{2} \right) \right]$$

MM 5046.00



## Measuring Flat, Translucent Solids

with UltraScan® VIS

Lot-to-lot or piece-to-piece color consistency is an important indicator of quality for many colored items. Flat, translucent items can be easily measured at the reflectance port of a benchtop sphere instrument such as the UltraScan® VIS.

A HunterLab UltraScan® VIS diffuse/8° spectrophotometer can be used to measure the reflectance of flat, translucent solids that are placed over the reflectance port and either backed by the sample clamp or an uncalibrated white tile or folded or stacked into multiple layers until opaque. This method is recommended by HunterLab for the measurement of flat, translucent solids, including such items as paper and plastic plaques.

### THE APPLICATION

Flat, translucent solids may have several non-uniform characteristics that require compensating preparation and presentation techniques in order to ensure a repeatable sample measurement.

As they are not opaque, translucent samples exhibit light trapping, and will be sensitive to ambient light and to small differences in the optical path of the instrument. Backing the sample or folding or stacking layers will make the sample effectively opaque and provide a constant background for the measurement. Using a larger port size than area of view (if possible) will cause all the light scattered by the sample to be reflected back through the sample and measured.

The samples may be directional, requiring the averaging of several readings with rotation.

The samples (particularly white ones) may be fluorescent, which means that they will be sensitive to the UV content of the light source. Use of the UV control option is recommended.

Recommended Color Scale

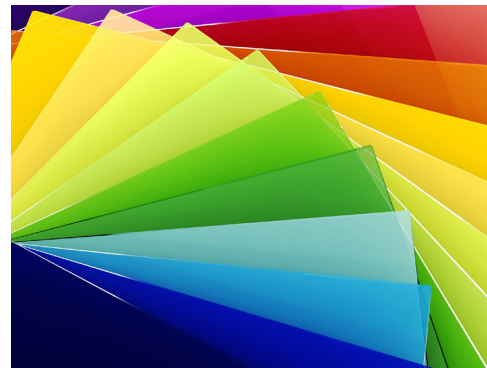
**CIE L\*a\*b\* or CIE L\*C\*h as a full color descriptor, Yellowness Index and Whiteness Index often used for white samples.**

Recommended Illuminant/Observer

**D65/10°. C/2° may also be used.**



UltraScan® VIS



## MEASUREMENT METHOD

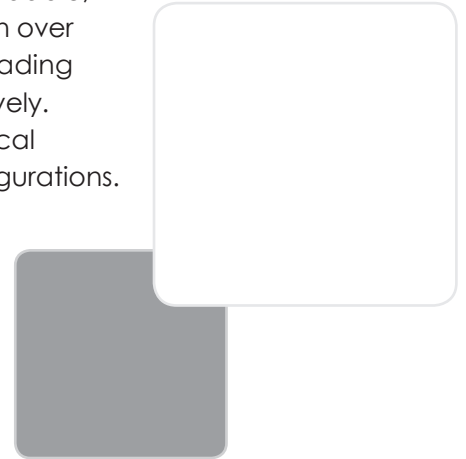
1. Configure your software to read using the desired color scale, illuminant, and observer.
2. Standardize the instrument in Reflectance - Specular Included mode for the largest port size possible for which the sample can completely cover the hole in the port plate and a smaller area view than that port size (if the small area view option is available). (For instance, use the 1.0-inch port plate and indicate the 0.390/0.375-inch area view to the software.) First standardize on the light trap, then the white tile.
3. Center the sample to be measured over the reflectance port and back it using the white disk on the sample clamp or an uncalibrated white tile (HunterLab Part Number 11-0108-50). Make sure that the area of the sample to be measured faces the port and completely covers the port. Alternately, fold the sample (for paper) or stack a set number of layers (for plaques) at the sample port.
4. Take a single color reading of the sample. Rotate the sample 90° and read it at least once more. Average the multiple color readings for a single color measurement representing its color. Averaging multiple readings with rotation between readings minimizes measurement variation associated with non-uniformity or texture.
5. Record the average color values.



## ABOUT HUNTERLAB

HunterLab, the first name in color measurement, provides ruggedly dependable, consistently accurate, and cost effective color measurement solutions. With over 6 decades of experience in more than 65 countries, HunterLab applies leading edge technology to measure and communicate color simply and effectively. The company offers both diffuse/8° and a complete line of true 45°/0° optical geometry instruments in portable, bench-top and production in-line configurations. HunterLab, the world's true measure of color.

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**More Information about  
Measurement Methods at**

*[hunterlab.com](http://hunterlab.com)*

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