

## Measurement Method

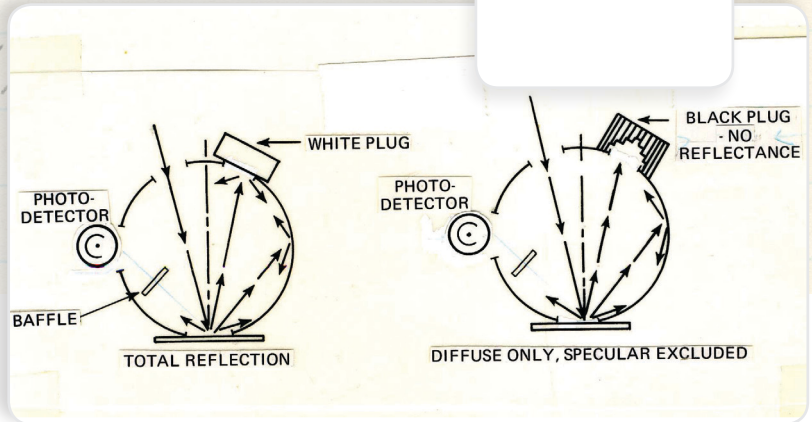
*Change of phase of*  
 $\Delta = 2t + \frac{\lambda}{2}$  (must equal a whole number of  $\lambda$  for a bright fringe or

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

*substituting*

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

MM 5100.00



## Measuring Loose Powder with ColorFlex® EZ

The color of powders that are used in manufacturing, such as limestone or raw pigment powders, is often measured to evaluate how the manufacturing process is proceeding or to estimate the color of the final product. In other cases, a powder may be the final product itself, such as cosmetic facial powder or baking powder. Color measurement of these types of products is often necessary to ensure lot-to-lot color consistency before they are shipped to the end user.

A HunterLab ColorFlex® EZ spectrophotometer in the port-up orientation can be used to measure the reflectance of powders held in a glass sample cup. This is the method advocated by HunterLab for the measurement of finely-ground material if a LabScan® XE with UV control is not available.

## THE APPLICATION

Powders have several non-uniform characteristics that require compensating preparation and presentation techniques in order to ensure a repeatable sample measurement.

Powders come in the form of fine particulates - not a solid sample - and must be measured through the bottom of a clear glass sample cup in order to be effectively made into a solid.

Powders exhibit light trapping between the particles and will be sensitive to ambient light and to small differences in the optical configuration of the instrument. Using a sufficient sample thickness will minimize these effects.

Powders may be slightly fluorescent, which means that they will be sensitive to the UV content of the light source. Install the 1.25-inch UV port insert (HunterLab Part Number CMR-3120 or CMR-3156) during standardization and measurements if this is a concern.

*Note:* If inter-instrument agreement is a concern when measuring powders, all the instruments used for these measurements MUST be the same model to minimize measurement differences.

Recommended Color Scale

**CIE L\*a\*b\* as a full color descriptor**

Recommended Single-Number Indices

**YI E313, WI E313 for indication of yellowness and/or whiteness, Y Brightness**

Recommended Illuminant/Observer

**D65/10. C/2 may also be used.**

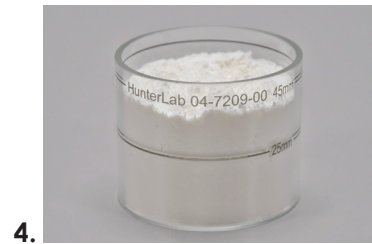


ColorFlex® EZ



## MEASUREMENT METHOD

1. Configure your software or the product setup to read using the desired color scale, illuminant, observer and any averaging.
2. Orient the ColorFlex® EZ with the port facing up. Replace the regular port insert with the special port insert for the sample cup (HunterLab Part Number 04-6622-00).
3. Standardize the instrument using the black and calibrated white standards that come with the instrument.
4. Scoop up powder from the sample batch and fill the glass sample cup (HunterLab Part Number 04-7209-00) to the top. The 2-inch (50 mm) sample thickness makes the translucent powder effectively opaque for reflectance measurement.
5. Tap the sample cup once on a hard surface to settle the loose powder and then place the sample cup in the port insert so that the powder will be read through the glass bottom of the cup.  
*Note: Be careful to keep the powder out of the instrument port.*
6. Cover the sample cup with the opaque cover (HunterLab Part Number 04-4000-00). The cover minimizes the possibility of ambient light reaching the detector through the powder sample when the instrument is in the port-up orientation. *(This is less of a concern with the ColorFlex® EZ pulse xenon lamp, however best practice is to use the cover.)*
7. Take a single color reading of the powder through the bottom of the sample cup. Remove the sample cup from the instrument port, dump and refill it, and read the powder at least three times from the same batch. Average the three color readings for a single color measurement representing the color of the batch. Averaging multiple readings minimizes measurement variation associated with non-uniform samples.
8. Record the average color values for the sample batch.



## 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**

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