

## Measurement Method

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

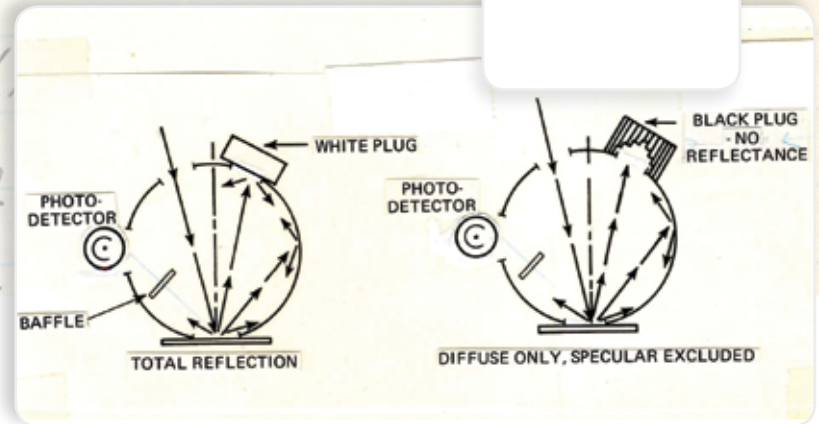
$$n\lambda = 2t + \frac{\lambda}{2}$$

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

substituting

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

MM 5101.00



## Measuring Plastic Pellets

with ColorFlex® EZ

In the plastics industry, the color of plastic pellets is often measured before the pellets are extruded, or molded, into a final product. Plastic pellets are typically translucent and non-uniform in size. Therefore, special accessories and presentation techniques are required to provide repeatable results. In general, a sampling of a number of plastic pellets should be measured together in order to obtain an overall average of the color for the batch. Several readings of the group should be averaged for the final result, preferably with replacement of the sample between measurements.

A HunterLab ColorFlex® EZ spectrophotometer can be used to measure the reflectance of plastic pellets in a glass sample cup. This is the method advocated by HunterLab for the measurement of plastic pellets if a LabScan® XE is not available.

### THE APPLICATION

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

Plastics come in the form of pellets, granules, or chips — 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.

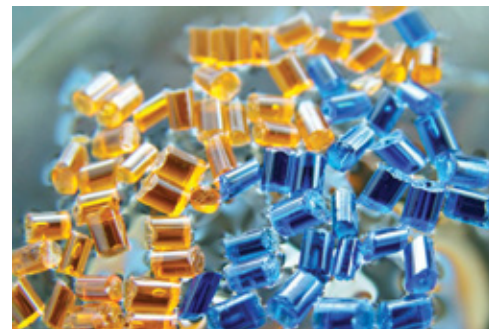
Pellets are irregular in size and shape, requiring the averaging of several readings with replacement.

Pellets are translucent — not opaque — and will be sensitive to ambient light and small differences in the optical configuration of the instrument. Using a sufficient sample thickness and an opaque cover will help minimize these effects.

Pellets may be slightly fluorescent, which means that they will be sensitive to the UV content of the light source. If this is the case, consideration should be given to using an instrument with a UV control option. (LabScan® XE.)



ColorFlex® EZ



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.**

## MEASUREMENT METHOD

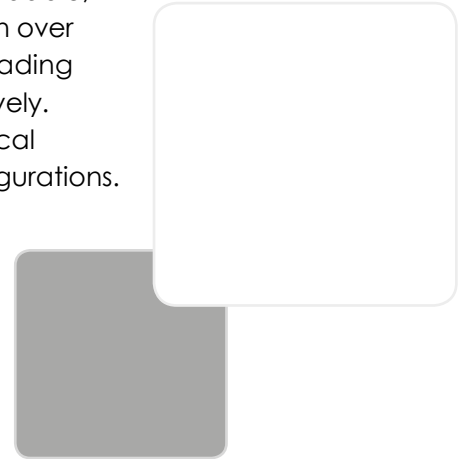
1. Configure your software or the product setup to read using the desired color scale, illuminant, observer and any averaging.
2. Orient the ColorFlex® EZ with the port facing up. Replace the regular port insert with the special port insert for the sample cup (HunterLab Part Number 04-6622-00).
3. Standardize the instrument using the black glass and calibrated white standards that come with the instrument.
4. . Scoop up pellets 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, irregular pellets effectively opaque for reflectance measurement.
5. Place the sample cup in the port insert so that the pellets will be read through the glass bottom of the cup.
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 pellets through the bottom of the sample cup. Remove the sample cup from the instrument port, dump and refill it, and read the pellets at least five times from the same batch. Average the five 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**

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

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