

Measurement Method

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

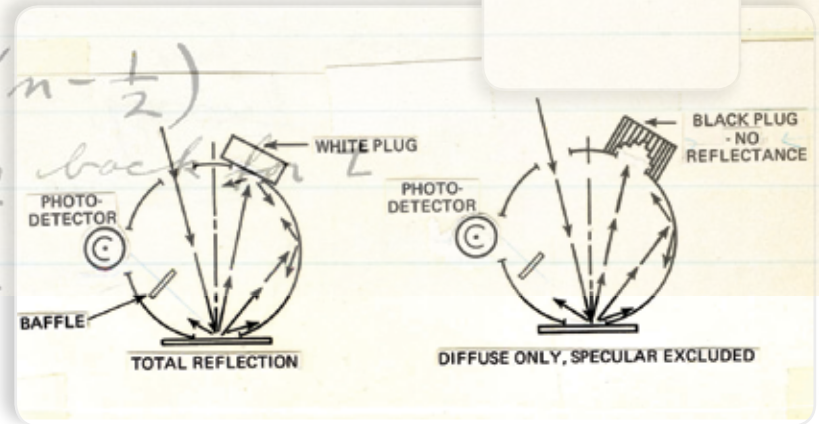
$$n\lambda = 2t + \frac{\lambda}{2}$$

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

substituting back for t

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

MM 5078.00



Measuring Plastic Pellets

with MiniScan® 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 MiniScan® EZ 45/0 LAV spectrophotometer can be used to measure the reflectance of plastic pellets using one of the methods outlined below. These methods are advocated by HunterLab for the measurement of plastic pellets if a LabScan® XE with UV control 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.

They 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 or pressed into a flat layer at the sample port 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 to small differences in the optical configuration of the instrument. Using 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.)

Note: *If inter-instrument agreement is a concern when measuring translucent pellets, 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

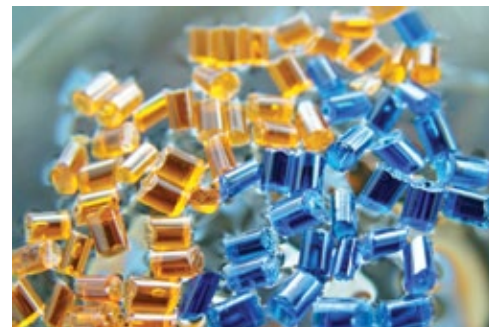
YI E313 for indication of yellowness

Recommended Illuminant/Observer

D65/10°. C/2° may also be used.



MiniScan® EZ



MEASUREMENT METHOD

Method #1:

Measuring Pellets Directly in a Cup.

This method has the advantage of measuring the pellet color directly, but is dependent on the operator making sure that the pellets are flush against the measurement port. A white cup, such as a Styrofoam or white plastic drinking cup, and the MiniScan® EZ nose cone with cover glass (HunterLab Part Number A02-1002-129) are required.

1. Configure your software or the instrument firmware to read using the desired color scale, illuminant, and observer.
2. Standardize the instrument with the glass port in place, first using the black glass to set the bottom of scale. Make sure the black glass is in solid contact with the port.
3. Complete the standardization using the calibrated white standard.
4. Fill the white cup with plastic pellets.
5. Place the nose cone with cover glass of the MiniScan® EZ into the pellets and read. The cover glass keeps the pellets from entering the measurement port and the thickness of the layer of pellets makes it effectively opaque. Dump, refill, 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.
6. Record the average color values for the sample batch.



MEASUREMENT METHOD

Method #2:

Measuring Pellets Directly in a Barrel or Container.

This method allows you to measure pellets directly in the shipping container but is dependent on the operator making sure that the pellets are flush against the measurement port.

The MiniScan® EZ nose cone with cover glass (HunterLab Part Number A02-1002-129) is required.

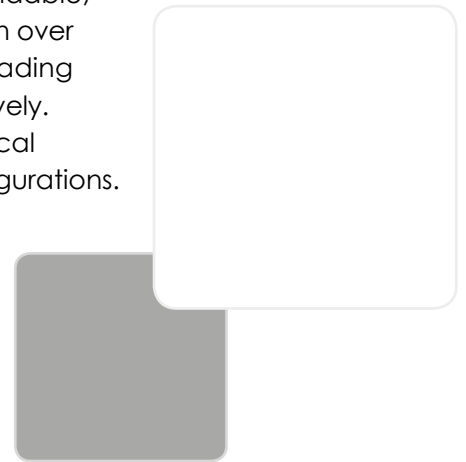
1. Configure your software or the instrument firmware to read using the desired color scale, illuminant, and observer.
2. Standardize the instrument with the glass port in place, first using the black glass to set the bottom of scale. Make sure the black glass is in solid contact with the port.
3. Complete the standardization using the calibrated white standard.
4. Place the MiniScan® EZ into a crate or large box filled with plastic pellets and read. The cover glass keeps the pellets from entering the measurement port and the thickness of the layer of pellets makes it effectively opaque.
5. After one measurement, lift the MiniScan® EZ, replace the instrument in a different spot, and read. Remove, replace, and remeasure the sample to a total of 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.
6. 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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