

## Applications Note

$\Delta = 2t + \frac{\lambda}{2}$  (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

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

AN 1105



## Measuring the Color of Highway Signs

**Many highway signs have a microprismatic sparkle at 45 degrees from the angle of incidence. . .**

### Abstract

Highway signage material is very optically complex. The non-uniform characteristics of these materials include: Translucency, visible Fluorescence and prismatic sparkle. This measurement method looks at the ColorFlex 45/0 and 0/45 geometry to serve this industry.

The non-uniform characteristics of these materials include:

- **Translucency:** Many signage samples are translucent coatings or plastic sheets. Some specifications require standardizing on an aluminum sheet painted with matte black paint of less than 4% reflectance to minimize background variation, but this requirement is not universally applied. Color values of translucent sheets will be influenced by their backgrounds.
- **Visible Fluorescence:** The fluorescence of highly chromatic colors like safety orange is activated by light within the visible range of the electromagnetic spectrum, and these signs are normally coated with a UV absorber to minimize UV weathering. This means that the fluorescence effect is stimulated by the absolute spectral radiance of the visible spectrum at the measurement port of the instrument, rather than the relative radiance as is the case for most color measurements. There has been a movement within the highway signage industry to try to standardize this by requiring a spectral radiance as close as possible to the D65 illuminant, but most highway specifications do not yet include this requirement.
- **Prismatic Sparkle:** Many highway signs have a microprismatic sparkle at 45 degrees from the angle of incidence (illumination) that can cause a higher signal than usual to be collected at that angle. Instruments with a larger field of sample view (sample port) tend to average this microprismatic sparkle better than those with smaller fields of view. Also, depending on the prismatic nature of the sample, an annular  $45^{\circ}/0^{\circ}$  geometry may work better than a  $0^{\circ}/45^{\circ}$  circumferential geometry for minimizing the sparkle variation collected by the detector.



These three characteristics are not currently addressed adequately in most highway signage specifications. In addition, the x, y tolerance box used in most specifications is dependent on the optical characteristics of the reference instrument(s) used to establish the initial specification, not necessarily taking other types of instruments into account.

The Agera is appropriate and suitable for measuring fluorescent samples. Its large 1.75- inch (44-mm) area of sample view and UV control option make it very suitable for fluorescent textiles and plastics applications, particularly for UV-activated whites and chromatics. The  $0^{\circ}/45^{\circ}$  circumferential geometry of the Agera allows illumination of multiple sample sizes with lots of energy incident on the sample plane.

However, in the specialized case of prismatic, visible fluorescent highway signage, the ColorFlex 45/0 may agree more closely with previously established specifications. The annular 45°/0° collection angles of this instrument appear to minimize prismatic sparkle. The spectral power of the ColorFlex xenon lamp (different from that of the Agera) appears to more closely match that of the reference instrument(s) used to establish many published specifications. If you would like to use a portable instrument, the MiniScan EZ 45/0 LAV has the same optical path, lamp, features, and firmware as the ColorFlex EZ.

### **About HunterLab**

HunterLab is the technology leader in color measurement solutions, providing instruments, software, knowledge and service to a wide variety of industries. With over 5 decades of experience in more than 65 countries, HunterLab applies our leading edge technology to your products helping you measure and communicate color simply and effectively.

© Hunterlab

12/2023

