



Color measurement accuracy is important for traffic signs because drivers need to quickly see information while traveling at fast speeds. Image Source: MaxPixel user Nikon D90

No matter where you are in the world, the color of a traffic sign can instantly tell you roughly what that sign means, even if you're unable to read the symbols and text written on it.<sup>1</sup> Seeing a flash of red on the side of the road up ahead almost always signals to the driver that a full stop is coming up. Meanwhile, a green sign tells you to proceed; a yellow sign tells you to slow down; an orange sign urges extreme caution; and blue signs tell you where you are. Nearly every sign in the world adheres to the same basic color language so that drivers can easily follow the rules and stay safe on the road.

Yet in order for these color rules to [translate across languages and countries](#), traffic sign manufacturers need to ensure color measurement accuracy for every sign they install. Failure to accurately match the color of the sign to the official standard set by transportation departments could result in confusion for drivers, and even potential road accidents. To prevent these issues and ensure that transportation departments can always turn to you for the most accurate, reliable traffic signs, you need to invest in a spectrophotometer that is capable of measuring sign color with a great degree of accuracy.



The reflective nature of some traffic signs can make it difficult to accurately measure color. Image Source: Unsplash user Kyle Glenn

#### Spectrophotometers Ensure Accurate Traffic Sign Coloration

A stop sign is usually a shade of deep tomato red, whereas an orange sign placed next to a construction zone will be far brighter, [and nearly fluorescent](#), in color. When colored correctly, these two signs look very different from one another. However, if the red colors that you use to make your signs lean too heavily toward the orange end of the color scale, drivers may mistake the sign for a caution symbol, rather than a full stop. Similarly, orange construction signs that appear too deep red in color may look like stop signs when, in fact, drivers merely need to slow down. Incorrect variations in sign color could dramatically impact [how drivers perceive a traffic sign](#), causing confusion, and sometimes resulting in unnecessary traffic congestion or accidents.

Using modern color measurement technologies like spectrophotometers in your production process can prevent these problems. Spectrophotometers create an objective basis for color analysis that avoids the inherent subjectivity of vision-based assessment. This is because there are biological differences in human color vision that may impact how color is perceived; one person's idea of orange may appear more red to another person. Inconsistent lighting conditions and variations in background color can also affect color perception—a dark background may make an orange sign appear more bright and fluorescent than if you viewed the same color against a light, or white, background. The level of color contrast tricks the human eye.

Additionally, the human eye innately struggles to differentiate between colors that are close together on a standard color wheel, [like orange and red](#). Orange shades fall in a wavelength between 585 and 620 nanometers, whereas red shades fall between 630 and 740 nanometers.<sup>2</sup> It can be all but impossible for the human eye to accurately detect the difference between an orange shade approaching 620 nanometers compared to a red shade in the 630 nanometer range. Using a

spectrophotometer, you can measure obtain accurate numerical coordinates for each color to determine whether the color of your sign meets your color standard. In other words, you can guarantee that your orange signs will be true oranges, and your red signs will be true reds.

### Analyzing Reflective Surfaces

One of the challenges associated with measurement of traffic sign color is that some signs are designed to be reflective. This is essential for allowing drivers to see them even at night. However, without the right spectrophotometer for your needs, it can be more difficult to obtain the data you need from these materials, as the reflected light could make the signs appear lighter in color than they actually are. HunterLab's 45/0 geometry is accepted as the best to use to measure retroreflective material.



Tools like spectrophotometers can help you create consistent signs and earn the trust of safety departments around the world. Image Source: MaxPixel user Canon EOS 550d

### Analyzing the Durability of Traffic Sign Color

Another challenge that traffic sign manufacturers face is that paint or other colored materials can fade over time, which will negatively impact how the signs are perceived by drivers. For example, studies have found that after just one or two years on the road, stop signs have a great degree of variability in retroreflectivity and color depending on the quality of the materials used.<sup>3</sup> On average, most stop signs made with [quality reflective materials](#) and colors could last about 10 years in the field without requiring repairs or replacements. This means that, in order to meet department of transportation expectations, you should test that your signs can withstand the elements and last for a minimum of 10 years.

While you won't be able to wait 10 years to test whether the color of your signs stays true, you can use a spectrophotometer to test your signs for initial durability after being exposed to the elements or employ artificial aging environments to simulate prolonged exposure to stressors. A portable spectrophotometer can help you test samples of your signs outdoors or in artificial environments, allowing you to see whether premature color fading occurs. If the longevity of your signs is

determined to be inadequate, you can use this information to improve your manufacturing methods and enhance durability.

#### HunterLab Accuracy

In the traffic sign industry, trust and reliability are absolutely essential. Because traffic signs are vital tools for keeping drivers safe on the road, traffic sign manufacturers need reliable color measurement methods to optimize the performance of their products. For more than 60 years, HunterLab has provided [the highest quality spectrophotometers](#) on the market for manufacturers in the safety industry. Our tools are capable of quantifying color with the highest degree of accuracy, ensuring that every traffic sign meets the exacting standards set by transportation departments around the world. [Contact us](#) today to find out more about our innovative technologies and let us help you select the perfect instrument for your company's needs.

1. "How to Read Traffic Signs", July 4, 2012, <https://www.dmv.org/articles/how-to-read-traffic-signs-recognizing-shapes-and-colors/>
2. "Shades of Orange", [https://en.wikipedia.org/wiki/Shades\\_of\\_orange](https://en.wikipedia.org/wiki/Shades_of_orange)
3. "Traffic Sign Life Expectancy", <http://www.dot.state.mn.us/materials/docs/SignRetroTAPFeb2013.pdf>