



High-visibility clothing is essential for maintaining safety in dangerous conditions. Image Source: Unsplash user Ricardo Gomez Angel

Workers across the nation depend on high-visibility safety clothing every day when they get up and go to their job site. Highway workers, construction workers, airport runway personnel, firefighters, some factory workers, and telephone linemen all rely on fluorescent clothing to be seen by other in order to prevent accidents. Practically everywhere that workers perform their duties in dangerous areas with low visibility, safety clothing is an essential element of their daily gear. High-visibility clothing can be important in civilian life as well, for bikers, hunters, or anyone outdoors during hunting season.

While it's common sense that garment manufacturers have a stake in the correct coloration of their products, in the case of high visibility safety clothing, correct coloration has actually been codified into law. According to the U.S. Occupation Safety and Health Administration, workers performing dangerous tasks requiring high visibility, such as roadside workers, must wear garments that conform to the requirements established in ANSI/ISEA 107-2015.<sup>1</sup> The ANSI standards require that a garment's material must be tested by an accredited laboratory and certified by the manufacturer with a Declaration of Conformity.<sup>2</sup> Without proper testing and the ability to guarantee that their products meet ANSI standards, manufacturers cannot sell high-visibility safety clothing without exposing themselves to a high degree of risk. In order to compete in the safety clothing marketplace, manufacturers must invest in color quality control instruments and processes, including spectrophotometers.



Firefighters wear high-visibility clothing to stay safe while on the job. Image Source: Unsplash user Benjamin Kerensa

#### Spectrophotometers Ensure High-Visibility Color Quality Standards Are Met

[Color measurement instruments](#) that ascertain the exact color of opaque materials by measuring reflected light are known as reflectance spectrophotometers. Manufacturers of high-visibility safety clothing depend on these spectrophotometers to ensure their clothing meets the color standards prescribed in ANSI 107. The extraordinary degree of color measurement accuracy offered by reflectance spectrophotometers makes them essential to determining the color of these garments, and a standard part of safety testing.<sup>3</sup>

Even when relying on a third-party laboratory to certify garments, manufacturers can use a spectrophotometer on premises as part of their own quality control processes. In doing so, they can ensure that their products will pass inspection and not lose any valuable time or materials by manufacturing and shipping improperly colored garments.

Manufacturers can ensure that their colors exactly match the prescribed standard by using the [color measurement software that comes with](#) modern spectrophotometers. This software interprets color as a [series of numerical values](#), allowing it to measure exact shades with decimal accuracy. By programming the software with the desired shades specified by the ANSI requirements, manufacturers can know for certain whether or not their garments meet the standard before they are passed to the lab or shipped to the distributor. [These standards can be saved](#) in the instrument's memory, so technicians can quickly select the standard they need when testing different batches of clothing.



Spectrophotometric measurement of high-visibility clothing ensures accurate coloration for optimal efficacy. Image Source: Unsplash user Aidan Bartos

#### Common Causes of Inaccurate Measurements or Incorrect Coloration

[Color quality assurance is an essential aspect](#) of production in part due to the inherent potential for variation presented by fluorescent dyes, which are often used for their high-visibility properties. When using fluorescent dye, the substrate makes an enormous difference.<sup>4</sup> Dyes that work well on polyester or nylon demonstrate lackluster colorfastness on cotton. Further, different dye colors demonstrate varying degrees of colorfastness themselves. For each new dye color or blend used, a manufacturer must make alterations to their process. Slight differences in dye length, temperature, and raw substrate material can all throw off a batch's final color, as can any contamination or residue from earlier batches. Resultantly, each batch must be tested to ensure the dyeing process has achieved the desired color.

No matter how perfectly a batch of materials is dyed, if they are tested inaccurately, they will not pass. Spectrophotometers are fairly simple to use. However, due to the unique properties of fabric, technicians must properly prepare samples to ensure the instrument is able to take an accurate reading. Occasionally, fabric materials can bend and pillow into the measurement port, throwing off the instrument's sensors. To prevent this, an appropriate amount of the material should be secured in the measurement port before readings are taken. Also, certain fabric weaves can allow light to pass through. To be certain that this translucency does not alter the values of the reading, a backing material should be placed behind the fabric sample. This same backing material must be used for all subsequent measurements.

#### The HunterLab Difference

With over 65 years of experience [developing color measurement instruments and software](#) to meet rigorous industry standards, HunterLab has a vast bank of institutional knowledge to pull from when

designing color measurement solutions. Having worked with [numerous textile companies](#) manufacturing garments with specific neon and other high-visibility requirements, we understand the complexities of the dyeing and measuring process. We are happy to work with your team to find the ideal instrument for your color measurement needs. [Contact us](#) to learn more about our renowned instruments and how we can help you find the tools you need for the highest level of color quality control.

1. "Workzone Hazards Awareness", 2008, [https://www.osha.gov/dte/grant\\_materials/fy08/sh-17795-08/workzone\\_hazards\\_awareness\\_english.pdf](https://www.osha.gov/dte/grant_materials/fy08/sh-17795-08/workzone_hazards_awareness_english.pdf)
2. "ANSI/ISEA 107-2015", 2015, <https://safetyequipment.org/ansiisea-107-2015/>
3. "American National Standard for High Visibility Safety Apparel and Headwear" [http://www.brimguard.com/assets/pdf/ansi\\_isea\\_107-2010.pdf](http://www.brimguard.com/assets/pdf/ansi_isea_107-2010.pdf)
4. "The Perils and Pitfalls of Dyeing Neon Colors", 2012  
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