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# The Hidden Stuff

## Why All Laser Eyewear Is Not Equal

By Tom MacMullin

### The Call for Help

So, you got that new laser or hired an additional technician and now you need to select and purchase laser safety eyewear. You likely know the wavelength of the laser and the required protection level such as “optical density” or “L-rating”. How will you go about finding something that fits, is comfortable, is built to last, and includes useful accessories or features? We hope you will find this guide useful in making your selection.

### The Basics (ODs and wavelengths)

With wavelength and protection requirement in hand, your next concern is whether you will be able to see enough of your workspace to work safely. There are often several filters, each of a different color or clarity, that will provide the protection you need at your wavelength; you should consider whether certain colors in the visible range critical to your work environment are absorbed more than is desirable. In the medical field, for example, some doctors complain that certain eyewear filter colors make it hard to see veins near the surface of the skin.

Then, consider “visible light transmission (VLT)”. This is an indicator from the eyewear manufacturer about how much of the visible range gets through. Of course, we would all like clear lenses, but this is next to impossible. You should know the following: 1) more visible light transmitted means more true color recognition in the work environment; 2) VLT numbers are not comparable between manufacturers due to different mea-

surement protocols; 3) VLT indicators within a single manufacturer’s product line are very informative; 4) VLT percentages do not tell you which visible colors are more or less transmitted but rather indicate what fraction of the entire visible range is transmitted; 5) higher protection levels (higher ODs) often require darker, lower VLT lenses.

### Which Standard? (A primer)

Laser safety eyewear falls under ANSI standard Z136. At present, Z136 does not call out Z87.1. The Z87.1 requirements, generally speaking, cover impact resistance and power or distortion of the viewing field. You need to know the following: not all laser safety eyewear is Z87.1 compliant. Further, some laser safety eyewear is assembled by eyewear manufacturers from purchased components which may include frames that have the Z87.1 mark on them. In our experience, not all products so assembled have actually been tested to this standard.

Laser safety eyewear is not laser tested for every wavelength that is marked. This, too, is next to impossible, but the best products have been laser tested at the critical wavelengths like 1064nm, 532nm, 810nm, and so on, to ensure there are no “bleaching” effects from laser radiation. The short explanation of bleaching is transmittance of energy at a particular wavelength that the product is designed to absorb due to extreme agitation of the absorbing materials. The laser absorbing dyes, after all, can only handle certain amounts

of energy. Testing with a spectrophotometer or similar low power device may not reveal wavelength regions with the potential for bleaching.

### Best in Class (A Benchmark)

Fit, style and even quality can be very personal choices. Here are some pointers that will guide you in finding the best solution for you:

- Best in class eyewear is adjustable: temples have adjustable length, temples have ratcheting pivot points at the joints to enable comfortable tilt or incline of the viewing lenses.

- Best in class eyewear comes with accessories: cleaning kit, retention strap, a protective storage case, use and care instructions should all be included.

- Best in class eyewear is built to last: lenses in spectacle models are installed evenly, no glue or fillers are evident anywhere on the product, curved lenses are installed in frames with curved fronts and not stuffed into frames designed for flat glass products, marks on the product are legible and durable.

- Best in class eyewear

looks good: there are no bubbles or pits in the laser filter materials, dyes and colorants are evenly dispersed in the laser filters and in the frame components.

Finally, consider the source: best in class laser safety eyewear is sold by the best in class companies. Choose a supplier who willingly addresses the issues raised in this article. The supplier should have a knowledgeable staff, provide you with multiple choices and guide you through the entire selection process. To ensure a comfortable and safe fit, the sales representative will ask about your application (For example: “Does your laser work require you to wear eyewear for extended periods of time?”) and may even ask some slightly personal questions about you (For example: “Do you have high cheek bones?”). The best in class laser safety eyewear supplier makes your laser safety his business. ✨

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