

Laser Safety in the Dental Office

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As lasers become more and more popular as an adjunct therapy for the non-surgical management of periodontal disease, dentists and hygienists are searching for quality education to ensure they are maximizing the benefit of lasers while ensuring the safety of the patient and the dental team. A key component to all introductory, basic proficiency or advanced proficiency laser education courses is laser safety education compliant with the American National Standards Institute (ANSI) approved standards, ANSI Z136.1-2014 Safe Use of Lasers and ANSI Z136.3 - 2011 Safe Use of Lasers in Health Care.

The American National Standards Institute (ANSI) approves that the process under which the general and clinical standards that define the requirements for the safe use of all types of lasers (Z136.1) and the safe use of lasers specific to healthcare facilities (Z136.3) was conducted in a fair and open manner following due process safeguards. The Laser Institute of America (LIA) serves as the secretariat for ANSI Accredited Standards Committee, Z136 and publishes the required laser standards and documents. Although ANSI provides laser safety recommendations they do not have any regulatory powers to enforce these guidelines. These standards are voluntary in nature but OSHA can cite the general duty clause, with dependence on these standards (Z136.1 and Z136.3). OSHA has general authority to regulate workplace safety and relies on the recommendations described in ANSI Z136.1 Safe Use of Lasers and ANSI Z136.3 Safe Use of Lasers in Health Care. The objective of the Standards is to provide reasonable and adequate guidance for the safe use of lasers and laser systems in general and also specifically in healthcare facilities such as the dental office. Understanding and adhering to these guidelines will keep everyone safe during the use of class 4 lasers in the dental practice.

The ANSI Z136 standards seek to first classify lasers and laser systems according to their relative hazards and then to specify appropriate controls for each classification (Figure 1).

Class	Control Measures	Training	Laser Safety Officer (LSO)	Engineering Controls
1	Not Required	Not Required	Not Required	Not Required
1M	Required	Application Dependent	Application Dependent	Application Dependent
2	Not Required	Not Required	Not Required	Not Required
2M	Required	Application Dependent	Application Dependent	Application Dependent
3R	Not Required	Not Required	Not Required	Not Required
3B	Required	Required	Required	Required
4	Required	Required	Required	Required

Figure 1

Lasers used in dentistry for bacterial decontamination or ablation techniques are considered to be class 4 lasers. In compliance with ANSI Z136 standards, all facilities where class 4 lasers are in use require a Laser Safety Officer (LSO) to oversee the laser safety program. The LSO is an individual who has been trained in laser safety, but does not necessarily have to be a clinician. An office manager or a back office assistant can perform the duties of a laser safety officer as long as they have had the required training. The LSO's primary responsibility is to ensure the safe use of class 4 lasers within the dental office by complying with the established guidelines set forth in the ANSI Z136.3 standard. Some states require that all class 4 lasers and associated laser safety officers be registered with the state. Compliance with these regulations is extremely important, but it does not have to be complicated. As part of the LSO responsibility, it is important to note that all dental office personnel, where a class 4 laser is in use, must have basic laser safety training. This includes back office staff as well as front office administrative staff.

Class 4 lasers or laser systems are considered high-powered and can pose a hazard to the eye or skin from direct beam exposure. The ANSI Z136.3 standard defines key safety protocols to be followed to keep all laser operators, auxiliary staff and patients safe. Understanding how to maintain and control a Nominal Hazard Zone, how to identify appropriate laser safety eye wear, how to manage the laser plume or laser generated air contaminates (LGAC) and how to minimize the potential for fire is key to the safe use of class 4 lasers in the dental office.

The Nominal Hazard Zone (NHZ) is defined as the area within which the level of direct, reflected or scattered radiation (working wavelength of the laser), during normal operation, poses a hazard to the skin and eyes. Simply put, it is the area around the patient where proper safety protocols, including the use of appropriate laser safety eyewear, must be followed. The NHZ differs for all lasers dependent upon laser wavelength, laser fiber size and beam divergence. Information relative to a laser's specific NHZ can be found in the manufacturer's laser manual or Information for Use. The NHZ should be

restricted to only the patient and necessary personnel. All people within the NHZ must wear appropriate laser safety eyewear, specific to the laser in use. Laser safety eyewear is labeled with its optical density and the wavelengths the particular glasses will protect against (Figure 2). For most lasers the entire dental operatory becomes the NHZ. Compliant with ANSI standards, every entrance to the NHZ must be marked with an appropriate sign. In January 2014, ANSI adopted an updated design for the laser safety sign that is now orange in color, states "Warning" (Figure 3) and defines the laser classification, laser wavelength, maximum power and necessary optical density of the required laser safety eyewear. The new signage is specific to the laser in use and is generally provided by the laser manufacturer with the purchase of a laser. Older signs do not need to be switched to be compliant.



Figure 2

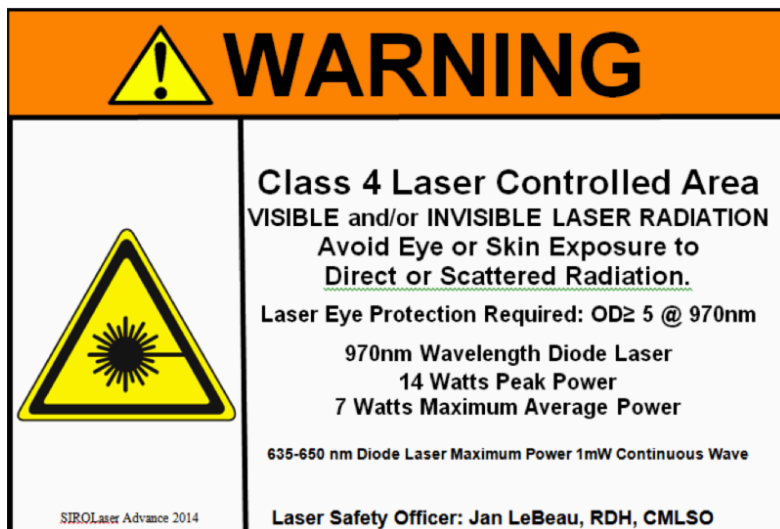


Figure 3

Other safety considerations include potential fire hazards and management of the laser plume. Combustible materials, such as alcohol, should never come in contact with the working beam of the laser. If general anesthesia is employed with the use of a laser, non-combustible gases for general anesthesia must be used. Nitrous oxide can be used in conjunction with a laser as long as there is an appropriate scavenger system. The laser plume, sometimes referred to as laser generated air contaminates (LGAC) is a visible or invisible biologic hazard of gas fumes created when tissue is ablated or vaporized. Proper management of laser plume is imperative as the laser plume has the ability to carry viruses, bacteria and other organisms that can be hazardous to the laser operator and assisting personnel. High volume evacuation is required when the laser is in use and surgical mask should be worn.

Control of the NHZ, laser safety eyewear and plume control are all necessary for the safe use of class 4 lasers, however, perhaps the most important consideration for the safe use of lasers in the dental office would be appropriate training for clinicians and dental office staff. "Clinicians (dentists and dental hygienists) using lasers need specific training at the standard proficiency certification level that is device specific. [Standards that supplement this standard provide that] properly trained and licensed dental professionals use lasers within their scope of practice and in a manner where the procedure is safe, effective and consistent with the clinician's education, training and experience." Clause C11.3, Appendix C of Z136.3-2011.

There are several organizations that offer different levels of training for implementation of lasers in the dental practice. I highly suggest that a clinician seeking out a "laser certification" course consider a course that is didactic, hands-on and device-specific, such as [ALD's Standard Proficiency Dental Laser Certification course](#). Online introductory courses that do not allow for hands-on experience simply do not meet the standard of education necessary for a clinician to achieve a basic proficiency in the use of a laser. Additionally, many state boards specify [training guidelines](#) and proficiency levels, as well as, organizations recognized to teach laser education.

As with the adoption of any new technology, it is incumbent upon all clinicians to seek the education for proper use and safety, compliant with state and national guidelines. Check with your state board for guidelines around education specific to the state you practice in. If your state does not have education guidelines, be sure you select a [basic proficiency course](#) for the use of a soft tissue laser that includes laser safety guidelines along with didactic and hands-on education. Assign the position of Laser Safety Officer to an engaged employee and then provide them with the necessary training to ensure your laser program is safe, efficient and productive.

Resources

1. American National Standards Institute. <http://www.ansi.org>
2. Laser Institute of America <http://www.lia.org>

3. Laser Safety Committee, Academy of Laser Dentistry. Sweeny C, Coluzzi DJ, Parker P SPA, Sulewski JG, White JM. Laser safety in dentistry: A position paper. J Laser Dent 2009;17(1):39-49
4. Advanced Integration and Mentoring, Dr. Scott Benjamin DDS
5. Academy of Laser Dentistry Conference [Laser Safety Training Program](#).