



Loss Control TIPS

Technical Information Paper Series

Innovative Safety and Health SolutionsSM

Safe Use of Lasers in Educational Institutions

Introduction

Lasers are being used more frequently in industry, medicine, communications, business, and entertainment. What may not be so well known is that the rate of use of laser systems in higher education is astonishing. More Class 2, 3, and 4 devices are used in universities, colleges, and technical schools than in any other setting. Every day, many students and teachers are exposed to laser use in chemistry, physics, engineering, medical, earth, and physical science course work, including labs, field work, demonstrations, teaching, and research. Lasers can even be found in elementary and secondary educational settings.

What Are the Issues?

The difficulty with this increased activity is that many educational facilities have not assigned laser safety officers (LSOs) or established standard operating procedures where Class 3 or 4 lasers are in use. While there is ample guidance for the safe use of lasers in industry, medicine, and communications; there is no specific standard for safe use in educational institutions.

Though the ANSI standard (ANSI Z136.1, *Safe Use of Lasers*) can provide guidance, it is not focused on the needs or environment found in academia, and is usually overlooked for the usefulness it could provide. The ANSI Z136 Executive Committee has recently begun the preparation of a draft (Z136.5) proposal more focused for educational settings. However, until a completed document is agreed upon and published, the ANSI Z136.1 standard is the applicable standard of record.

Understanding Laser Class Levels

All lasers are labeled regarding exposure, and are referred to by class level: 1, 2, 3a, 3b, or 4, with Class 1 being the least powerful and Class 4, the most. (Note: Class 1 is considered eye safe under any viewing conditions.)

Visible laser beams of sufficient power (some Class 3 devices; all Class 4 devices) can damage the unprotected, sensitive, interior retina of the eye (given sufficient exposure) before they will injure the skin. Some Class 2 and most Class 3 devices are capable of causing injury if viewed through light-gathering optics (e.g., microscopes, binoculars, telescopes, etc.).



The Laser Safety Officer (LSO)

Because most schools do not have an LSO or have not assigned LSO responsibilities, training, development of standard operating procedures, and appropriate use of PPE are not likely to be standardized, if they exist at all. The LSO should inspect all laser use areas and should review new system installations. He or she must be given administrative authority to oversee the multiple user environment, and must have a mandate to discontinue or postpone unsafe operations. The LSO is the one person who can determine nominal hazard zones for various lasers and requirements for the users in those zones.

What Users and Observers Need to Know

What essential information should users and observers in academic institutions be aware of regarding safe use of lasers in these settings? The following information should be made available through staff and student training:

1. The basic workings and requirements for the devices they are using
2. Possible biological effects
3. Basic safety precautions, practices, and personal protective equipment (PPE) rated for the devices
4. Hazard recognition and steps for correction of deficiencies
5. Accident procedures
6. Standard operating procedures for the device in use
7. Appropriate engineering controls (i.e., beam stops, shutters, interlocks, enclosures)

Schools must answer “yes” to at least four questions to be considered at low risk in their use of lasers:

1. Do you have a laser safety program with an identified LSO (full or part time)?
2. Do you have written procedures for each laser device?
3. Have you provided verifiable training for faculty and students?
4. Do you perform audits (at least annually) to validate the effectiveness of your laser safety program?

Summary

When you think of the exposures typically present at an educational facility, laser hazards don't readily come to mind. However, there are serious workers' compensation and liability issues involving the unsafe use of lasers in the academic setting, particularly since many users are first-time users. Educational institutions that fail to establish substantive laser safety programs and standard practices are at greater risk of loss and injury to both staff and students. Any facility using Class 3 or 4 laser instruments should readily answer "yes" to each of the four questions listed earlier. A significant increase of incidents (nearly doubled, by some measures) has underscored the need for taking proactive protection steps now.

References

1. ANSI Z136.1-1993 *American National Standard for the Safe Use of Lasers*.
2. "On Horizon: Controlling Laser Safety Hazards" *Journal of Laser Applications*, December 1995.

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