

Health Care Laser Safety Programme Highlights

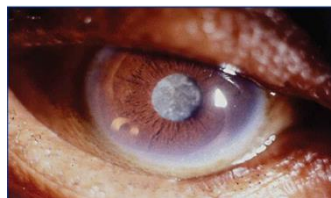
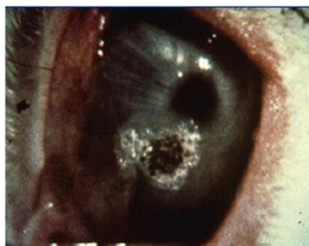
CSA Z386-14

Injuries can result from the unsafe use of lasers, especially in health care and aesthetic/cosmetic applications.

Laser-induced skin injuries



Laser-induced eye injuries



In general, the operation of lasers in these settings is provincially regulated. In British Columbia, depending on the application and personnel involved, the standard which applies, for the safe use of lasers, may be either:

- CSA Z386 *Safe use of lasers in health care* (Canadian Standards Association), or
- ANSI Z136.3 *Safe use of lasers in health care* (American National Standards Institute) in conjunction with ANSI Z136.1 *Safe use of lasers*

This brief guide is a selection of highlights from CSA Z386-14 *Safe use of lasers in health care*, published in 2014. While there are exceptions, for the majority of safety elements, being fully compliant with CSA Z386-14 would satisfy ANSI Z136.3 (2011). This guide is not a substitution of the actual standard; it is not a comprehensive summary of all elements prescribed by standards.

Personnel Training and Education¹

All facilities where lasers are used to irradiate the human body shall appoint a Laser safety officer (LSO). An LSO is knowledgeable in the evaluation and control of laser hazards and has responsibility for oversight of the control of laser hazards.²

The education and training for the LSO shall include, but not be limited to:³

- principles of laser science and tissue interactions
- risk assessment
- evaluation and selection of PPE
- facility policies, procedures, and applicable standards and regulations for laser safety
- wavelength-specific applications
- laser set-up, testing, and shutdown procedures
- monitoring the environment and equipment during laser use
- emergency procedures (e.g., in case of fire)

Laser safety and education programmes for all personnel are conducted at a minimum of every two years.⁴ All laser users, operators, and associates shall meet the qualifications and credentials for a given clinical setting and application. Qualification and credentials may be addressed by applicable federal, provincial and municipal laws and regulations.⁵

Patient Protection⁶

- Prior to the procedure, patients should be provided with thorough information and materials, including information describing the risks associated with the laser procedure and the patient protective measures that will be taken.
- Patient shall be fitted with protection, e.g., padding, eye cups, glasses, etc., appropriate to the procedure, wavelength, and power levels being used.

Risk Assessment

“A risk assessment is a thorough analysis of potential risks and hazards associated with the use of health care lasers. A risk assessment shall be performed before policies and procedural guidelines are developed to determine engineering and procedural control measures.”⁷

¹ CSA Z386-14 Safe use of lasers in health care - Section 6 Responsibilities, education, training, and credentials

² CSA Z386-14 Safe use of lasers in health care – Section 3 Definitions

³ CSA Z386-14 Safe use of lasers in health care – Section 6.3.1.4.1 LSO - Education and training

⁴ CSA Z386-14 Safe use of lasers in health care – Section 6.3.1.4 Education and training

⁵ CSA Z386-14 Safe use of lasers in health care – Section 6.3 Laser-specific personnel

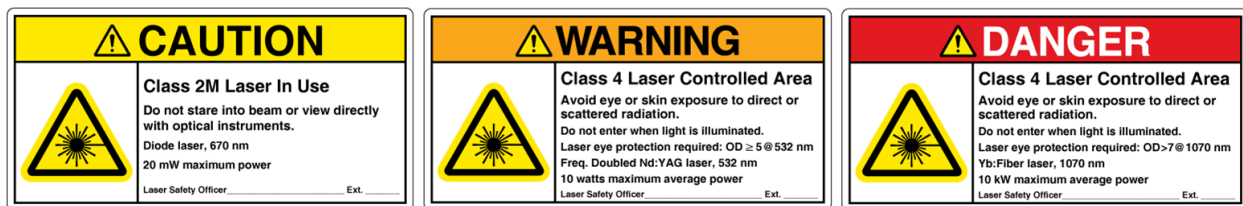
⁶ CSA Z386-14 Safe use of lasers in health care – Section 9 Patient protection guidance

Hazards⁸

- Ocular (eye)
- Skin
- Fire and explosion
- Plume and laser generated air contaminant (LGAC)
- Infection
- Gases, dyes, and liquid coolants

Engineering Control Measures and Facility Environment

- Nominal ocular hazard area (NOHA) delimitation⁹
- Laser-controlled area¹⁰
- Heating, ventilation, and air conditioning considerations¹¹
- Laser equipment and delivery systems – calibration, testing, security, and inspections¹²
- Signage, labels, and entryway warnings¹³
- Barriers and facility design



ANSI Z136.1 Safe use of lasers – Figures (2014); ANSI Z535.2

Personal Protective Equipment (PPE) and Eyewear¹⁴

- All protective eyewear and filters shall be selected with an optical density (OD) sufficiently high to protect against the wavelengths of the laser in use in the NOHA.
- Appropriate protective eyewear shall be made available at each point of access to the laser controlled area.
- The protective eyewear shall be permanently labelled with applicable optical densities (OD) and wavelengths.

⁷ CSA Z386-14 Safe use of lasers in health care – Section 5.1 Risk assessment

⁸ CSA Z386-14 Safe use of lasers in health care – Section 5 Risk assessment — Hazards, risks, and control measures

⁹ CSA Z386-14 Safe use of lasers in health care – Section 8.1 Nominal ocular hazard area (NOHA) delimitation

¹⁰ CSA Z386-14 Safe use of lasers in health care – Section 8.2 Laser-controlled area

¹¹ CSA Z386-14 Safe use of lasers in health care – Section 8.3 Heating, ventilation, and air conditioning considerations

¹² CSA Z386-14 Safe use of lasers in health care – Section 8.4 Laser equipment; 8.5 Laser delivery devices; 8.6 Laser instruments

¹³ CSA Z386-14 Safe use of lasers in health care – Section 8.7 Warning signs

¹⁴ CSA Z386-14 Safe use of lasers in health care – Section 5.3.1.3 Ocular control measures

Personal Protective Equipment (PPE) and Eyewear

Factors in selecting protection eyewear include:¹⁵

- Laser power and/or pulse energy
- Wavelength(s) of laser output
- Radiant exposure or irradiance levels at worst-case scenario
- Exposure time/duration
- Maximum permissible exposure (MPE)
- Optical density required (OD)
- Angular dependence
- Visible luminous transmission (how much visible light gets through)
- Material strength¹⁶



Administrative Control Measures¹⁷

- Audits/inspections shall be conducted annually; reports submitted to LSO.
- Operating procedures and laser safety checklist
- Laser utilisation records
- Service and maintenance
- Education and training
- Hazard analysis and risk assessment
- Installation and shutdown procedures and records

This guide is not a substitution of the actual standard; it is not a comprehensive summary of all elements prescribed by standards. It is provided as awareness information and is not a formal professional consultative document.

¹⁵ ANSI Z136.1 (2014) Safe use of lasers – Section 4.4.4.2.2

¹⁶ ANSI/ISEA Z87.1-2015 Occupational and Educational Eye and Face Protection Devices

¹⁷ CSA Z386-14 Safe use of lasers in health care – Section 7 Administrative controls