



Certified Medical Laser Safety Officer (CMLSO)

EXAM REFERENCE GUIDE

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INCLUDES:

- Test Taking Tips
- Detailed Breakdown of Exam Areas of Practice

Board of Laser Safety®
Certified Medical Laser Safety Officer™ Program

Examination Reference Guide

Table of Contents

General Information.....	1
Examination Information.....	2
Suggested Study References.....	2
Free Online Tutorials.....	3
Websites and Web Pages.....	3

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Examination Reference Guide

General Information

In achieving certification, the Certified Medical Laser Safety Officer (CMLSO) recognizes and assumes the responsibilities due to the practice of laser safety. As a requirement of being certified, such persons act professionally, safely and in accordance with the Code of Professional Conduct. Each certificand has a professional and ethical obligation to practice only in those areas of laser safety in which he or she is competent. The CMLSO has a commitment to remain professionally active in the field of laser safety by maintaining certification. As the industry and technology changes, so must the knowledge of the CMLSO.

This guide is intended to help candidates prepare for the CMLSO examination by giving them references to research and study. However, use of the guide by itself will not be adequate preparation for the exam.

The references given in this guide are intended to provide candidates with reference material related to the general topics covered in the exam. This does not mean to imply that study of these references, only, will ensure successful performance on the examination. This listing is by no means complete; candidates may need to consult additional reports, journals and textbooks for additional information not provided in the references below.

At the same time, not all of these references are necessary to successfully complete the examination. They are provided as a guide to the type of material that should be studied.

Information regarding requirements for certification, exam dates and locations, and applications and fees are available from:

Board of Laser Safety
13501 Ingenuity Drive, Suite 128
Orlando, FL 32826
407.985.3810 or 800.345.2737
FAX: 407.380.5588
Email: bls@lasersafety.org
Webpage: <http://www.lasersafety.org>

Caution - The information in this guide about the exam and other matters are believed to be correct at the time of publishing; however, the candidate is advised to review the current copy of the CMLSO Policies & Procedures Manual.

Examination Information

This examination is multiple-choice, consisting of 100 questions. Each question has a possibility of four (4) answers. Here are a few issues to consider prior to beginning the examination:

1. Allow yourself time to answer all questions.
2. Answer the questions you are sure of first, then go back and answer the remaining ones.
3. Answer all questions even if you are unsure of the answer. An educated guess is better than no guess at all.
4. If you are unsure of an answer, your first instinct is usually the correct one.

There are eight (8) areas of practice on the subject matter of laser safety. Each area of practice is broken down into tasks performed by an MLSO. To assist you in understanding the subject matter, the areas of practice and related tasks are provided here.

Area of Practice I – Lasers & Optics Fundamentals – 13%

- Task 1 – Definitions
- Task 2 – Properties of Laser Light
- Task 3 – Laser Output
- Task 4 – Laser Types & Wavelengths
- Task 5 – Electromagnetic Spectrum
- Task 6 – Laser Components & Delivery Systems
 - a. How Lasers Work

Area of Practice II – Laser Tissue Interactions – 13%

- Task 1 – Photoacoustic (Electromechanical)
- Task 2 – Photoablative
- Task 3 – Photothermal
- Task 4 – Photochemical

Area of Practice III – Laser Beam Hazards of Eye & Skin – 16%

- Task 1 – Effects on the Eye
 - a. Structure and Function of the Human Eye
 - b. Optical Gain of the Eye
 - c. Parameters Needed to Determine Maximum Permissible Exposure (MPE)
 - d. Retinal Effects
 - e. Corneal Effects
- Task 2 – Effects on the Skin
- Task 3 – Specular and Diffuse Reflections

Area of Practice IV – Non-beam Hazards Associated with Lasers – 11%

- Task 1 – Laser Generated Airborne Contaminants (LGAC)
- Task 2 – Compressed Gasses
- Task 3 – Laser Dyes and Solvents
- Task 4 – Electrical Hazards

- Task 5 – Fire Hazards
- Task 6 – Explosion Hazards

Area of Practice V – Regulations and Standards – 15%

- Task 1 – Knowledge of ANSI Z136.1 *American National Standard for Safe Use of Lasers*
- Task 2 – Working knowledge of ANSI Z136.3 *American National Standard for Safe Use of Lasers in Health Care*
- Task 3 – Regulatory Agencies
 - a. 1040.10 - 21 CFR Subchapter J – Federal Laser Product Performance Standard (FLPPS)
 - b. Occupational Safety & Health Administration (General Duty Clause)
 - c. Joint Commission on Accreditation of Healthcare Organizations (JCAHO)/Accreditation Association for Ambulatory Health Care (AAAHC)
- Task 4 – IEC 60825-1 Safety of Laser Products

Area of Practice VI – Laser Hazard Classification & Controlled Areas – 13%

- Task 1 – Laser Hazard Classification
- Task 2 – Nominal Hazard Zone
- Task 3 – Laser Treatment Control Area (LTCA)

Area of Practice VII – Procedural Control Measures – 12%

- Task 1 – Personal Protective Equipment (PPE)
- Task 2 – Controlled Access
 - a. Laser Warning Signs & Labels
 - b. Laser Protective Barriers and Curtains
 - c. Authorized Personnel
- Task 3 – Test Firing/Calibration
- Task 4 – Control of Fire Hazards
- Task 5 – Standby and Emergency Off Controls
- Task 6 – Footpedal Controls
- Task 7 – Key Control
- Task 8 – Smoke Evacuation
- Task 9 – Electrical Hazard Controls

Area of Practice VIII – Administrative Control Measures – 7%

- Task 1 – Policies and Procedures
 - a. Airway Management Protocols
 - b. Service and Maintenance
- Task 2 – Education & Training
- Task 3 – Laser Audits
- Task 4 – Accident Investigation
- Task 5 – Documentation
- Task 6 – Duties and Responsibilities of an LSO

Suggested Study References

A prerequisite to taking this exam is completion of a Medical Laser Safety Officer (MLSO) course. If it has been a few years since you took the MLSO course, you are encouraged to consider taking an Advanced Medical Laser Safety Officer training course or Medical Laser Safety Officer Online course for review purposes.

In general, there are two (2) main references necessary for anybody interested in taking this exam. This exam is based on these publications and they contain information included in most, or all, of the areas of practice:

1. *ANSI Z136.1 (2007), American National Standard for Safe Use of Lasers*, Laser Institute of America, Orlando, FL.
2. *ANSI Z136.3 (2011), American National Standard for Safe Use of Lasers in Health Care Facilities*, Laser Institute of America, Orlando, FL.

This reference manual is comprised of some very informative websites, web pages, web tutorials, training modules, journal papers and articles written about lasers and laser safety. If, while studying for this exam, you come across a useful reference that is not listed here, please let us know. We will review the source and possibly include it in future revisions of this document.

Free Online Tutorials

1. Indiana University-Purdue University Indianapolis: *Online Laser Safety Training* (guest registration required)
http://www.ehs.iupui.edu/lasersafetypro/safety_home.asp
2. Princeton University: *Laser Safety Training Guide*
<http://web.princeton.edu/sites/ehs/laserguide/index.htm>
3. The Physics Classroom: *Anatomy of the Eye*
<http://www.physicsclassroom.com/Class/refrn/U14L6a.html>
4. The Physics Classroom: *Specular vs. Diffuse Reflection*
<http://www.physicsclassroom.com/Class/refln/U13L1d.html>
5. University of North Carolina: *Laser Safety Training*
http://ehs.unc.edu/training/self_study/laser/

Websites and Web Pages

1. AAPM Report No. 73: *Medical Lasers: Quality Control, Safety Standards, and Regulations*
(Note: this report is from 2001; both the Z136.1 and the Z136.3 have been revised since its publication.)
http://www.aapm.org/pubs/reports/rpt_73.pdf
2. Food and Drug Administration: 21 CFR 1040.10.
<http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm>

3. National Council on Laser Certification
<http://www.lasercertification.org/StudyMaterials/default.html>
4. Occupational Safety and Health Administration: *Laser hazards*
<http://www.osha.gov/SLTC/laserhazards/>
5. Sam's Laser FAQ: *Laser Safety*
<http://www.repairfaq.org/sam/lasersaf.htm#saftoc>
6. Sam's Laser FAQ: *What is a Laser and How Does It Work?*
<http://www.repairfaq.org/sam/laserfaq.htm#faqwil>
7. U.S. Army CHPPM: *Lasers and Their Effects on the Human Eye*
<http://chppm-www.apgea.army.mil/laser/Publications/Fact%20Sheets/250130498.pdf>



The mission of the Board of Laser Safety is to provide a means for the recognition of laser safety professionals through certification.

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