Review of Updates

Presented by:

Laser Institute of America
Laser Applications and Safety
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American National Standard Z136 Series

Z136.1 Safe Use of Lasers

WARNING

Class 4 Laser Controlled Area
Avoid eye or skin exposure to direct or scattered radiation. Do not enter when light is illuminated. Laser eye protection required: OD ≥ 5 @ 532 nm Freq. Doubled Nd:YAG laser, 532 nm 10 watts maximum average power
Laser Safety Officer

Horizontal Standard - Fundamental Information

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Distribution A: Approved for public release; distribution unlimited. PA Case No: TSRL-PA-14-0012
ANSI Z136.1-2014

- Move towards Z136.1 as horizontal standard for all Z136 (vertical) standards.
  - Guidance in vertical standards “shall have precedence within the scope of that standard.”

- Section 4 (control measures), 7 (non-beam hazards) and Appendix B (Example Calculations) reorganized and rewritten.

- Expanded tables for clarity and ease of use.

- Includes Optics Transmission in Hazard Classification.

- Units changed to nanometers for all wavelengths shorter than 2,999 nm (180 nm to 2,999 nm) and microns for longer wavelengths (3 µm to 1,000 µm).
ANSI Z136.1-2014

- New maximum permissible exposure limits (MPEs)
  - Significant increase in allowed exposure levels for wavelengths between 1.2 µm and 1.4 µm.
  - Light decrease in exposure limits for pulses shorter than approximately 10 µs and longer than 150-200 ps.
  - Slight decrease in exposure limit for pulses < 150-200 ps.
  - The metric used to describe the maximum size of a laser source to be considered in calculations (alpha-max) has been altered to be dependent upon exposure duration.
  - The analysis of multiple pulses has changed significantly, now there are three rules only for large source sizes; small sources use only two rules to determine MPE.
 ANSI Z136.1-2014

- In Section 8 updated section on “special qualifications” for medical-related exposures to include MPEs expressed in terms of illuminance (expressed in terms of unit of Troland).
ANSI Z136.1-2014

• Added 19 definitions, deleted 9 definitions.

• Added: administrative control measure; beam divergence; beam waist; conduit; control measure; engineering control measure; laser controlled area; crossover pulse-repetition frequency; hot spot; illuminance; laser target interaction radiation (LTIR); personal protective equipment (PPE); photopic luminous efficiency; procedural control measure; saturable absorption; $t_{\text{min}}$; troland; visible luminous transmission (VLT); and visual interference effects.
Changes in Z136.1-2014

Signs & Equipment Labels:

Now ANSI Z535.2 Compliant

- **DANGER Signs**
  - Extremely high power or high pulse energy Class 4 with exposed beams

- **WARNING Signs**
  - Class 3R, 3B, and most Class 4

- **CAUTION Signs**
  - Class 2, 2M

- Three panel design, can be “portrait” instead of “landscape” format as shown.

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Summary

- Overview of structure of Z136 ANSI laser safety standards
- ANSI Z136 series moving to 1 horizontal standard with 9 vertical standards
- Significant changes to Z136.1
  - Important exposure limit changes