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# ANSI Z136.1 *Safe Use of Lasers* (2014)



## Review of Updates

*Presented by:*



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# ANSI Z136 Standards

ANSI Standard	Latest Publication Date	Previous Publication Dates (and Notes)
Z136.1	2014	1973, 1976, 1980, 1986, 1993, 2000, 2007
Z136.2	2012	1977, 1988, 1997
Z136.3	2011	1988, 1996, 2005
Z136.4 (RP)	2010	2005
Z136.5	2009	2000
Z136.6	2005	2000
Z136.7	2008	
Z136.8	2012	
Z136.9	2013	
Z136.10		



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# American National Standard Z136 Series



Z136.2



Z136.3



Z136.4



Z136.5



Z136.6



Z136.7



Z136.8

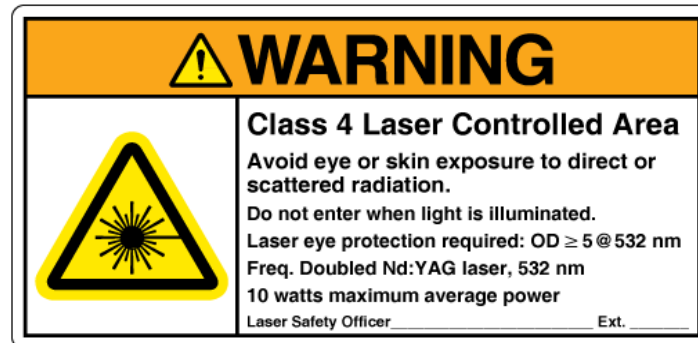


Z136.9

## Vertical Standards- Application Areas



### Z136.1 *Safe Use of Lasers*



**Horizontal  
Standard-  
Fundamental  
Information**



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# 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  $\mu\text{m}$  to 1,000  $\mu\text{m}$ ).



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# ANSI Z136.1-2014

- New maximum permissible exposure limits (MPEs)
  - Significant increase in allowed exposure levels for wavelengths between 1.2  $\mu\text{m}$  and 1.4  $\mu\text{m}$ .
  - Light decrease in exposure limits for pulses shorter than approximately 10  $\mu\text{s}$  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.



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# 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).



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# 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;  $t_{\min}$ ; troland; visible luminous transmission (VLT); and visual interference effects.

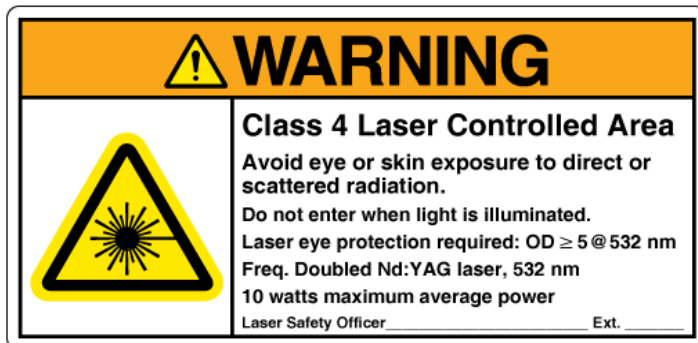


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# Changes in Z136.1-2014



## 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



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