

Laser Safety Subgroup

Comparison/Evaluation of
Z136.1 and Z136.8

Jamie J. King – Vice Chair

ANSI Z136.1/Z136.8 Comparison

- ▶ A working group to investigate was requested by the Laser Safety Subgroup
 - ▶ Jamie King, LLNL – Chair
 - ▶ Mendy Brown, Sandia
 - ▶ Joanna Casson, LANL
 - ▶ Gary DeWinkle, PNNL
 - ▶ Mike Woods, SLAC
- ▶ Most facilities use Z136.1(2000) while some are using Z136.1(2007)
- ▶ Task was to compare the (2000) and (2007) to the new Z136.8(2012)
 - ▶ Will only show Z136.1(2007) to Z136.8(2012) comparison in this presentation
 - ▶ Individual Facilities will most likely adopt either the .8 or the next rev of the .1 (2014?)



Project

- ▶ Each member was tasked with reviewing an assigned section of the Z136.1(2000) and determine its coverage in both .1(2007) and .8(2012)
- ▶ Excel spreadsheet was used for the template
- ▶ All information was collected into one document

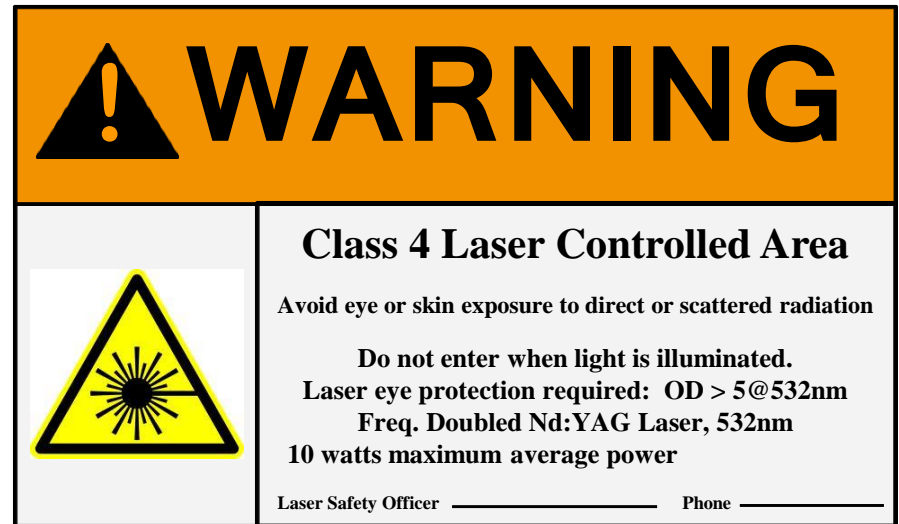


- ▶ Final report will be published to EFCOG Laser Safety webpage
 - ▶ Disclaimer – May not have covered all material 100%



“Big Picture” Findings

- ▶ Standards utilize basically same layouts (mostly same numbering)
- ▶ Most sections were identical and easy to cross reference
- ▶ Some sections have been moved from the body to the appendix
- ▶ MPEs not in the Z136.8
- ▶ Use of color illustrations



New items in Z136.8

- ▶ Introduces types of laser use areas (3.4)
 - ▶ Unrestricted, Restricted, Controlled, Exclusion, Inaccessible
- ▶ Adds **shall** require and approve an SOP for Class 3B lasers (4.3.1)
 - ▶ Exempts visible wave lasers $\leq 15\text{mW}$
- ▶ The LSO **should** review the need and use of alignment eyewear (4.3.5)
- ▶ Confirmation of vendor/manufacture training may be in the form of a safety plan (4.3.6)
- ▶ Written and approved SOP required (**shall**) for visitors/spectators in Class 3B/4 LCA. (4.4.1)
 - ▶ Also expands on controls required prior to entry authorization.



New items in Z136.8 (cont.)

- ▶ Class 3B/4 fibers requiring a tool for removal equivalent to interlock (4.4.3.2)
 - ▶ Fiber Optic Safety guidelines (4.4.3.3)
- ▶ Adds section on Export Controls (4.4.5)
- ▶ Visible Luminous Transmission(4.5.2.6)
- ▶ Includes European Norm (EN) labeling criteria for eyewear (4.5.2.7)
- ▶ For continuous wave lasers the alignment OD **shall** reduce irradiance to a Class 2 to Class 3R level. For pulse lasers the alignment OD **shall** be no more than 1.4 less than the full protection OD. (4.5.2.10)
- ▶ Limitations of Laser Eyewear (4.5.2.11)
 - ▶ Use of High Power Lasers (4.5.11.1)
 - ▶ LSO **shall** ensure that the potential for saturable absorption is evaluated (4.5.11.2)



New items in Z136.8 (cont.)

- ▶ Allows Use of Warning Sign for 3B and some Class 4 (4.6.3.4)
 - ▶ Also used for unattended operations and open beam crossing aisles
- ▶ New section calls OJT Training “essential” (5.3)
- ▶ LSO **shall** be required to complete refresher training (5.5)
- ▶ OJT training **shall** be required for all personnel likely to encounter exposure levels above the Class 3R MPE (5.6)
 - ▶ Training **shall** include safety procedures for applicable non-beam hazards associated with laser systems in use.
- ▶ Chronically exposed individuals to UV radiation **should** receive annual skin cancer screening (6.5)



Items Moved

- ▶ **Items moved to appendix are non-normative (not part of the standard's requirements.**
 - ▶ Non-Beam hazards moved to Appendix F
 - ▶ Protective Housing(4.3.1) moved to Appendix H
 - ▶ Remote Interlock Connector(4.3.7) moved to Appendix H
 - ▶ Warning Logotype Label for Equipment (All Classes Except Class I) (4.3.14.1) moved to Appendix H
 - ▶ Protective Housing Equipment Label (All Classes) (4.3.14.2) moved to Appendix H
 - ▶ Chemical Agents (7.3) moved to Appendix F
 - ▶ Biological Agents (7.4) moved to Appendix F
 - ▶ Human Factors (7.5) moved to Appendix F



Items Removed

- ▶ Requirement for CPR training removed (5.6)
- ▶ Multi-wavelength laser classification (3.2.1)
- ▶ Substitution of Alternate Control Measures (4.2)
 - ▶ “...which provides equivalent protection”
- ▶ Laser Pointers (4.1.5)
- ▶ Beam Stop or Attenuator(4.3.8)
- ▶ Long Distance Beam Conduit Label (All Classes Except Class I) (4.3.14.3)
- ▶ Laser Demonstrations Involving the General Public (4.5.1)
- ▶ Criteria for Exposures of Eye and Skin(8) reduced to paragraph
- ▶ Measurements (9) Totally removed



Discussion Panel

- ▶ Bill Ertle, Rockwell Laser Industries
- ▶ Bob Fairchild, LBNL
- ▶ Karen Kelley, University of Maryland
- ▶ Mike Woods, SLAC

