

ANSI Z136.5 – 2009

American National Standard

*American National Standard
for Safe Use of Lasers
in Educational Institutions*



**Laser Institute
of America**
Laser Applications and Safety



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Z136.5 – 2009
Revision of
ANSI Z136.5-2000

**American National Standard
for Safe Use of Lasers
in Educational Institutions**

**Secretariat
Laser Institute of America**

**Approved February 13, 2009
American National Standards Institute, Inc.**

**American
National
Standard**

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Foreword (This introduction is not a normative part of ANSI Z136.5-2009, *American National Standard for Safe Use of Lasers in Educational Institutions.*)

In 1968, the American National Standards Institute (ANSI) approved the initiation of the Safe Use of Lasers Standards Project under the sponsorship of the Telephone Group.

Prior to 1985, Z136 standards were developed by ANSI Committee Z136 and submitted for approval and issuance as ANSI Z136 standards. Since 1985, Z136 standards are developed by the ANSI Accredited Standards Committee (ASC) Z136 for Safe Use of Lasers. A copy of the procedures for development of these standards can be obtained from the secretariat, Laser Institute of America, 13501 Ingenuity Drive, Suite 128, Orlando, FL 32826 or viewed at www.z136.org.

The present scope of ASC Z136 is to protect against hazards associated with the use of lasers and optically radiating diodes.

ASC Z136 is responsible for the development and maintenance of this standard. In addition to the consensus body, ASC Z136 is composed of standards subcommittees (SSC) and technical subcommittees (TSC) involved in Z136 standards development and an editorial working group (EWG). At the time of this printing, the following standards and technical subcommittees were active:

SSC-1	Safe Use of Lasers (parent document)
SSC-2	Safe Use of Lasers and LEDs in Telecommunications Applications
SSC-3	Safe Use of Lasers in Health Care Facilities
SSC-4	Measurements and Instrumentation
SSC-5	Safe Use of Lasers in Educational Institutions
SSC-6	Safe Use of Lasers Outdoors
SSC-7	Eyewear and Protective Barriers
SSC-8	Safe Use of Lasers in Research, Development, and Testing
SSC-9	Safe Use of Lasers in Manufacturing Environments
SSC-10	Safe Use of Lasers in Entertainment, Displays, and Exhibitions
TSC-1	Biological Effects and Medical Surveillance
TSC-2	Hazard Evaluation and Classification
TSC-4	Control Measures and Training
TSC-5	Non-Beam Hazards
TSC-7	Analysis and Applications
EWG	Editorial Working Group

The six standards currently issued are:

ANSI Z136.1-2007, *American National Standard for Safe Use of Lasers* (replaces ANSI Z136.1-2000)

ANSI Z136.3-2005, *American National Standard for Safe Use of Lasers in Health Care Facilities* (replaces ANSI Z136.3-1996)

ANSI Z136.4-2005, *American National Standard Recommended Practice for Laser Safety Measurements for Hazard Evaluation* (first edition)

ANSI Z136.5-2009, *American National Standard for Safe Use of Lasers in Educational Institutions* (replaces ANSI Z136.5-2000)

ANSI Z136.6-2005, *American National Standard for Safe Use of Lasers Outdoors* (replaces ANSI Z136.6-2000)

ANSI Z136.7-2008, *American National Standard for Testing and Labeling of Laser Protective Equipment* (first edition)

This American National Standard provides guidance for the safe use of lasers and laser systems in educational institutions. The provisions of this standard are applicable to educational facilities ranging from grade school through college and university. In general, the methodology used in this standard is based upon procedures previously established in ANSI Z136.1. General procedures have been adapted for the unique environment of educational institutions. Engineering and administrative control measures appropriate for typical educational activities associated with lasers are supplied to assist users in establishing a sound laser safety program in the educational environment.

This standard has been published as part of the ANSI Z136 series of laser safety standards. The basic document is the ANSI Z136.1, *American National Standard for Safe Use of Lasers*. For the most part, this standard may be used independently of ANSI Z136.1; however, the user should be familiar with and have access to ANSI Z136.1. Instances where additional guidance contained in ANSI Z136.1 is required are noted in this document.

This standard is expected to be periodically revised as new information and experience in the use of lasers is gained. Future revisions may have modified methodology, and use of the most current document is highly recommended.

While there is considerable compatibility among existing laser safety standards, some requirements differ among state, federal, and international

standards and regulations. These differences may have an effect on the particulars of the applicable control measures.

Suggestions for improvements of the standard are welcome. They should be sent to ASC Z136 Secretariat, Laser Institute of America, 13501 Ingenuity Drive, Suite 128, Orlando, FL 32826.

This standard was processed and approved for submittal to ANSI by ASC Z136. Committee approval of the standard does not necessarily imply that all members voted for its approval.

Ron Petersen, Committee Chair
Sheldon Zimmerman, Committee Vice-Chair
Robert Thomas, Committee Secretary

Notice

(This notice is not a normative part of ANSI Z136.5-2009, *American National Standard for Safe Use of Lasers in Educational Institutions.*)

Z136 standards and recommended practices are developed through a consensus standards development process approved by the American National Standards Institute. The process brings together volunteers representing varied viewpoints and interests to achieve consensus on laser safety related issues. As secretariat to ASC Z136, the Laser Institute of America (LIA) administers the process and provides financial and clerical support to the committee.

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American National Standard for Safe Use of Lasers in Educational Institutions

1. General

1.1 Scope.

This standard addresses laser safety concerns and situations characteristic of the educational environment. This standard is not a substitute for ANSI Z136.1-2007, which is required for a full understanding of laser safety officer duties and laser hazard evaluation. Environments characteristic of educational institutions wherein lasers may be found include teaching laboratories, classrooms, lecture halls, science fairs, museums, and student projects on and off campus. This standard is intended for faculty and students using lasers at primary, secondary, and college levels of education excluding graduate level research laboratories (these laboratories should comply with the latest version of ANSI Z136.1). The wavelength range of interest includes the ultraviolet, visible, and infrared regions of the electromagnetic spectrum, specifically the wavelength range from 0.18 micrometer (μm) to 1 millimeter (mm).

1.2 Purpose.

The purpose of this standard is to provide reasonable and adequate guidance for the safe use of lasers in educational environments by evaluating and minimizing hazards associated with laser radiation. That educational environment excludes the graduate level research laboratory; graduate level research laboratories should comply with the latest version of ANSI Z136.1. The hazard evaluation procedure used in this standard is based on the classification (Class 1 through Class 4) of the laser or laser system, which is related to the ability of the laser beam to cause biological damage to the eye or skin during intended use. The amount of laser radiation emitted from Class 1 lasers and laser systems is considered to be non-hazardous; Class 4 lasers and laser systems possess the highest potential hazard.

1.2.1 Laser Classification. Lasers and laser systems are classified by their potential hazard in ANSI Z136.1-2007 by using a scheme of Class 1 through Class 4. The scheme is based on the laser beam's ability to cause biological damage to the eye and skin, and pose a fire hazard. Class 1 lasers and laser systems' beams are considered non-hazardous while Class 4 lasers possess the highest potential hazard. This laser hazard classification scheme is outlined in Section 3 and detailed in ANSI Z136.1-2007. Hazard controls relative to the class of the laser or laser system are discussed in Section 4 of this standard. Lasers placed into commerce after 1976 are classified by the manufacturer in accordance with the Federal Laser Product Performance Standard (FLPPS) 21 CFR Part 1040.10.

Classification of a laser or laser system that was either developed at the academic institution or has been modified such that the class may change is the responsibility of the laser safety officer (LSO) (see Section 1.2.2).