American National Standard

ANSI Z136.5 – 2020

American National Standard for Safe Use of Lasers in Educational Institutions

ANSI®
Z136.5 – 2020
Revision of
ANSI Z136.5-2009

American National Standard for Safe Use of Lasers in Educational Institutions

Secretariat

Laser Institute of America

Approved May 19, 2020

American National Standards Institute, Inc.

American National Standard

An American National Standard implies a consensus of those substantially concerned with its scope and provisions. An American National Standard is intended as a guide to aid the manufacturer, the consumer, and the general public. The existence of an American National Standard does not in any respect preclude anyone, whether or not he or she has approved the standard, from manufacturing, marketing, purchasing, or using products, processes or procedures not conforming to the standard. American National Standards are subject to periodic review and users are cautioned to obtain the latest editions.

CAUTION NOTICE: This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken periodically to reaffirm, revise, or withdraw this standard no later than five years from the date of publication. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute.

Published by

Laser Institute of America
13501 Ingenuity Drive, Suite 128
Orlando, FL 32826

ISBN: 978-1-940168-21-0

Printed in the United States of America.

Foreword

(This introduction is not a normative part of ANSI Z136.5-2020, *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
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, Training, and Laser Safety Programs
TSC-5	Non-Beam Hazards
TSC-7	Analysis and Applications
EWG	Editorial Working Group

The seven standards currently issued are:

ANSI Z136.1-2014, *American National Standard for Safe Use of Lasers*

ANSI Z136.2-2012, *American National Standard for Safe Use of Optical Fiber Communication Systems Utilizing Laser Diode and LED Sources*

ANSI Z136.3-2018, *American National Standard for Safe Use of Lasers in Health Care*

ANSI Z136.5-2020, *American National Standard for Safe Use of Lasers in Educational Institutions*

ANSI Z136.6-2015, *American National Standard for Safe Use of Lasers Outdoors*

ANSI Z136.8-2012, *American National Standard for Safe Use of Lasers in Research, Development, or Testing*

ANSI Z136.9-2013, *American National Standard for Safe Use of Lasers in Manufacturing Environments*

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.

It is expected that this standard will 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.

Occasionally, questions may arise regarding the meaning or intent of portions of this standard as it relates to specific applications. When the need for an interpretation is brought to the attention of the secretariat, the secretariat will initiate action to prepare an appropriate response. Since ANSI-approved Z136 standards represent a consensus of concerned interests, it is important to ensure that any interpretation has also received formal consideration. Requests for interpretations and 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 developed by Standards Subcommittee 5 (SSC-5) "Safe Use of Lasers in Educational Institutions" and approved by ASC Z136. Committee approval of the standard does not necessarily imply that all members voted for its approval.

Sheldon Zimmerman, Committee Chair
C.D. Clark III, Committee Vice-Chair
Edward Early, Committee Secretary

Notice

(This notice is not a normative part of ANSI Z136.5-2020, *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 Accredited Standards Developer (ASD) and secretariat to ASC Z136, the Laser Institute of America (LIA) administers the process and provides financial and clerical support to the committee.

The LIA and its directors, officers, employees, members, affiliates, and sponsors, expressly disclaim liability for any personal injury, property, or other damages of any nature whatsoever, whether special, indirect, consequential, or compensatory, directly or indirectly resulting from the publication, use of, or reliance on this document or these standards. The LIA's service as ASD and secretariat does not constitute, and LIA does not make any endorsement, warranty, or referral of any particular standards, practices, goods, or services that may be referenced in this document. The LIA also makes no guarantee or warranty as to the accuracy or completeness of any information published herein. The LIA has no power, nor does it undertake to police or enforce compliance with the contents of this document.

In issuing and making this document available, the LIA is not undertaking to render professional or other services for or on behalf of any person or entity. Nor is the LIA undertaking to perform any duty owed by any person or entity to someone else. Anyone using this document should rely on his or her own independent judgment or, as appropriate, seek the advice of a competent professional in determining the exercise of reasonable care in any given circumstances.

Participants At the time it approved this standard, ASC Z136 had the following members:

Organization Represented	*Name of Representative*
Academy of Laser Dentistry	Scott Benjamin
Altos Photonics, Inc.	Lucian Hand
American Glaucoma Society	Michael Berlin
American Industrial Hygiene Association	Stephen Hemperly
American Society for Laser Medicine & Surgery	Rebecca Sprague Macrene Alexiades (Alt)
American Society of Safety Engineers	Steven Ramiza (Alt)
American Veterinary Medical Association	Kenneth Sullins
American Welding Society	Paul Denney
Association of periOperative Registered Nurses (AORN)	Patti Owens
Association of Surgical Technologists	Kevin Frey Wanda Folsom (Alt)
Buffalo Filter	Joseph Lynch
Camden County College	Fred Seeber
Daniel Laser Safety	Paul Daniel, Jr.
Exponent Inc.	Erwin Lau
SAIC Corp.	Edward Early
Fort Hays State University	C.D. Clark III
Health Physics Society	Ken Barat Thomas Johnson (Alt)
High-Rez Diagnostics	Richard Hughes
International Council on Surgical Plume	Penny J. Smalley
International Laser Display Association (ILDA)	Patrick Murphy
Johns Hopkins University, WSE	Nathaniel Leon Dan Kuespert (Alt)
L*A*I International	Thomas Lieb
Laser Institute of America	Gus Anibarro
Laser Product Safety, LLC	Peter Boden
Lawrence Berkeley National Laboratory	Greta Toncheva Robert Fairchild (Alt)
Lawrence Livermore National Laboratory	Jamie King
Los Alamos National Laboratory	Joanna Casson
National Aeronautics and Space Administration	Angel Plaza Kurt Geber (Alt)
National Institute of Standards and Technology (NIST)	Joshua Hadler
NoIR LaserShields	David Bothner
North American Association for Photobiomodulation Therapy (NAALT)	Raymond Lanzafame

Organization Represented	*Name of Representative*
Photon Manufacturing	Roberta McHatton
Power Technology, Inc.	William Burgess
Rockwell Laser Industries	William Ertle
Salem Veterans Affairs Medical Center	Damien Luviano
SLAC National Accelerator Laboratory	Michael Woods
Underwriters Laboratories, Inc.	Winn Henderson
University of Chicago, School of Dentistry	Michael Colvard
University of Texas, Southwestern Medical Center	John Hoopman
University of New South Wales Canberra	Trevor Wheatley Andrew Lambert (Alt)
U.S. Department of Health and Human Services, Center for Devices and Radiological Health	William Vogt (Alt)
U.S. Department of Labor, Occupational Safety & Health Administration	Jeffrey Lodwick
U.S. Department of the Air Force, Air Force Research Laboratory	Benjamin Rockwell Robert Thomas (Alt)
U.S. Department of the Air Force, Surgeon General's Office	Edward Kelly Bret Rogers (Alt)
U.S. Department of the Army, Army Public Health Center	Shawn Sparks Stephen Wengraitis (Alt)
U.S. Department of the Navy, Naval Air Systems Command	James Sheehy
U.S. Department of the Navy, Naval Sea Systems Command	Sheldon Zimmerman
U.S. Naval Air Warfare Center Aircraft Division Vision Lab	Christine Stanley Adam Carlisle (Alt)
Wellstar Health System	Evangeline Dennis

Individual Members
Robert Aldrich
Richard Crowson
Jerome Dennis
David Dewey
Ben Edwards
Mark Festenstein
John Flores-McLaughlin
Penelope Galoff
Joseph Greco
Donald Haes
Jennifer Hunter
Ami Kestenbaum
David J. Lund
Martin Mainster

Individual Members cont'd	Wesley Marshall Daniel Palmerton Jay Parkinson Randolph Paura Jeffrey Pfoutz William P. Roach David H. Sliney Daniel Seaman Bruce Stuck Paul Testagrossa Thomas Tierney Antonio Triventi Karl Umstadter Anthony Zmorenski
Emeritus Members	Prem Batra Robert Handren R. Timothy Hitchcock James Smith Robert Weiner Myron Wolbarsht

The various subcommittees that participated in developing this standard had the following members:

Safe Use of Lasers in Educational Institutions SSC-5

Fred Seeber, Chair
Randolph Paura, Vice-Chair
Thomas Cellucci, Secretary
Ritchie Buschow
Ahsan Chowdary
C.D. Clark III
William Ertle
Kevin Frey
Myung Chul Jo
Jeffrey Lodwick
Wesley Marshall
Leon McLin
Randolph Paura
David Sliney
Julio Soares
Robert Thomas
Thomas Tierney
Karl Umstadter
Trevor Wheatley
Sheldon Zimmerman

Laser Bioeffects, TSC-1

Brian Lund, Chair
David Sliney, Vice-Chair
Bruce Stuck, Secretary
Robert Aldrich
Ernest Brumage
C.D. Clark III
Jerome Dennis
Michael Denton
John Flores-McLaughlin
Penelope Galoff
Ramona Gaza
Yuliya Henes
Jennifer Hunter
Robert Kang
Edward Kelly
Erwin Lau
David J. Lund
Damien Luviano
Martin Mainster
Wesley Marshall
Roberta McHatton
Leon McLin
John O'Hagan
Jeffrey Oliver
Jay Parkinson
Randolph Paura
Jeffrey Pfoutz
William Roach
Benjamin Rockwell
Karl Schulmeister
James Sheehy
David Sliney
Shawn Sparks
Woody Strzelecki
Robert Thomas
Stephen Trokel
Trevor Wheatley
Sheldon Zimmerman
Joseph Zuclich

Hazard Evaluation & Classification, TSC-2

Randolph Paura, Chair
Karl Umstadter, Vice-Chair
Robert Aldrich
Ahsan Chowdary
Darvis Cosper
Jerome Dennis
Edward Early
Penelope Galoff
Edward Kelly
Wesley Marshall
Leorrorne Roque
Kurt Schuster
David Sliney
Paul Szajowski
Robert Thomas
Xiaowei Yan
Sheldon Zimmerman