American National Standard

ANSI Z136.8 – 2021

American National Standard for Safe Use of Lasers in Research, Development, or Testing

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Revision of
ANSI Z136.8-2012

American National Standard for Safe Use of Lasers in Research, Development, or Testing

Secretariat
Laser Institute of America

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American National Standards Institute, Inc.

American National Standard

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Foreword

(This introduction is not a normative part of ANSI Z136.8-2021, *American National Standard for Safe Use of Lasers in Research, Development, or Testing.)*

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 have been developed by the standards committee ASC Z136 for Safe Use of Lasers and have been published by Accredited Standards Developer (ASD) and secretariat to ASC Z136, Laser Institute of America (LIA). A copy of the procedures for development of these standards can be obtained from the secretariat, LIA, 12001 Research Parkway, Suite 210, 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, or 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 eight 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 Z136.7-2020, *American National Standard for Testing and Labeling of Laser Protective Equipment*

ANSI Z136.8-2021, *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 is intended to ensure the safe use of lasers in research, development, or testing environments, and has been published as part of the ANSI Z136 series of laser safety standards. The base document of the series is the American National Standard for Safe Use of Lasers, ANSI Z136.1. The procedures and methodologies described in this standard are based on requirements previously established in ANSI Z136.1 and are intended to give more specific processes for accomplishing laser safety in research, development, or testing settings. The purpose of this standard is to give more specific user guidance for accomplishing laser safety for individuals with the potential for laser exposure in the research, development, or testing settings. It should be recognized that the scope of the ANSI Z136.8 includes all circumstances when people may be exposed to laser radiation as part of research, development, and testing applications. This standard includes policies and procedures to ensure laser safety in any area where research, development, and testing is performed, including Universities, product development labs, private and government research labs (e.g., National Laboratories), and product testing settings. In general, this standard may be used independently of ANSI Z136.1; however, instances where additional guidance contained in ANSI Z136.1 is required are noted in the text of this document. The body of this standard is a normative standard that applies to all research, development, and testing settings that use lasers. The appendices, excluding Appendix A, are informative providing examples and discipline specific supplementary information.

It is expected that this standard will be periodically revised as new information and experience in the use of lasers are gained. Future revisions may have modified content and the 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 the concurrence of a balance of interests. For this reason, the secretariat is not able to provide an instant response to interpretation requests except in those cases where the matter has previously received formal consideration. Requests for interpretations and suggestions for improvements of the standard are welcome. They should emailed to ASC Z136 Secretariat, Laser Institute of America (lia@lia.org).

This standard was developed by Standards Subcommittee 8 (SSC-8) "Safe Use of Lasers in Research, Development, or Testing" and approved by a consensus body balloting group made up of members of the ASC Z136. Committee approval of the standard does not necessarily imply that all members voted for its approval.

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C.D. Clak III, Committee Vice-Chair
Edward Early, Committee Secretary

Notice

(This notice is not a normative part of ANSI Z136.8-2021, American National Standard for Safe Use of Lasers in Research, Development, or Testing*.)*

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 and as an ASD, 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 Research, Development, or Testing

1. General

1.1 Scope.

This standard provides guidance and recommendations for the safe use of lasers and laser systems that operate at wavelengths between 180 nm ultraviolet (UV) and 1 mm (1000 μm) infrared (IR), used to conduct research, development, or testing predominantly in an indoor setting. Use of this standard requires an assigned laser supervisor or laser safety officer (LSO).

1.2 Application.

The objective of this standard is to provide reasonable and adequate guidance for the safe use of lasers and laser systems in research, development, and testing environments when requirements in the ANSI Z136.1[1, 2] standard may not be practical, for example, where safety controls required for commercial lasers may be either missing, nonexistent, or disabled. Similarly, in testing environments, lasers or laser systems may be operated in conditions or protocols different from normal operation, including access to levels of laser radiation higher than the accessible emission limits (AEL) for the assigned product class.

This is accomplished by first classifying the lasers and laser systems according to their relative hazards and then specifying control measures based upon their relative hazards and conditions of use. For most commercial lasers, this procedure eliminates the need for laser radiation measurements. For lasers and laser systems built by users, radiation measurements may be required to help classify the laser or laser system. For laser classification, the Federal Laser Product Performance Standard (FLPPS), US 21CFR1040.10 and 1040.11[3] should be followed.

1.2.1 ANSI Z136.1 Deviations. The ANSI Z136.1 (latest revision) standard supports this application-specific standard by providing the quantitative methods for hazard analysis and the maximum permissible exposure (MPE) values for optical radiation exposure. Other application-specific standards within the ANSI Z136 series may deviate from the requirements of this standard. It is the responsibility of the LSO to review and use the applicable standards in the series for their actual condition of use.

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[1] ANSI Z136.1, American National Standard for Safe Use of Lasers.

[2] When reference to a standard, regulation, or order is followed by a date, for example, Z136.1-2014, the reference is to that specific document. When the reference to a standard, regulation or order is not followed by a date, for example, Z136.2, FAA order JO 7400.2, it means the latest revision of that document.

[3] CFR Title 21, Chapter I (Food and Drug Administration, Department of Health and Human Services), Subchapter J (Radiological Health), Part 1040.10 (Laser Products), and Part 1040.11 (Specific Purpose Laser Products).