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American National Standard

*American National Standard
for Testing and Labeling of
Laser Protective Equipment*



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Revision of
ANSI Z136.7-2008

**American National Standard
for Testing and Labeling of
Laser Protective Equipment**

Secretariat

Laser Institute of America

Approved July 28, 2020

American National Standards Institute, Inc.

**American
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Standard**

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Foreword (This introduction is not a normative part of ANSI Z136.7-2020, *American National Standard for Testing and Labeling of Laser Protective Equipment*.)

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. In 1985, the Committee became the Accredited Standards Committee (ASC) Z136.

Today, Laser Institute of America (LIA) is recognized as the ANSI-Accredited Standards Developer (ASD) of Z136 standards and is responsible for managing the implementation of the consensus process that Z136 standards are subject to. ASC Z136 is the consensus body that approves/disapproves the content of Z136 standards. The present scope of ASC Z136 is to protect against hazards associated with the use of lasers and optically radiating diodes. A copy of the procedures for development of these standards and a copy of the current ASC Z136 member roster can be obtained from LIA by emailing lia@lia.org.

Standards subcommittees (SSC) and technical subcommittees (TSC) are involved in the development of the content of Z136 standards and an editorial working group (EWG) provides editorial comments. 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	Testing and Labeling of Laser Protective Equipment
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 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 Z136.8-2012, *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 testing and labeling of laser protective equipment such as laser eye protection, filters, windows, and barriers for use with lasers and laser systems. Emphasis is given to ensuring adequate testing of laser protective eyewear (e.g., absorptive, interference/reflective, and hybrid filter technologies).

This standard has been published as part of the American National Standard Z136 series. This document is the American National Standard Z136.7. This document may be used independently of ANSI Z136.1 in the determination of required retinal angular protection/coverage. Where applicable, tables from ANSI Z136.1 are included. Instances where additional guidance contained in ANSI Z136.1 is required are noted and referenced in the appropriate sections of 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.

The content of this standard was developed by SSC-7 “Testing and Labeling of Laser Protective Equipment” 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
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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.

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American National Standard for Testing and Labeling of Laser Protective Equipment

1. General

1.1 Scope.

This standard provides recommendations for testing and labeling laser protective materials and protective equipment such as eye protection, barriers, and windows designed for use with lasers and laser systems that operate at wavelengths between 180 nm and 10^6 nm. All appendices are informative.

NOTE 1—This standard does not include personal protective equipment (PPE) for high energy lasers (HEL) that require an optical density (OD) greater than seven (7).

NOTE 2—This standard may not be adequate for very high pulse or continuous wave (CW) power lasers.

1.2 Application.

The objective of this standard is to provide reasonable, rational, and adequate guidance regarding the test methods, protocols and specifications for devices used to provide eye protection from lasers and laser systems. The test procedures are provided to ensure that eyewear, windows, and barriers maintain their specified level of protection throughout the life cycle of the products.

Such protective devices include laser protective eyewear, instrument filters, window filters, area protective barriers, and screens or beam blocking curtains. Depending on the protective device, type of laser, temporal mode of operation and wavelength(s), different test methods may be required.

Other standards, such as ANSI/ISEA Z87.1:2020 *Occupational and Educational Personal Eye and Face Protection Devices*, will need to be used in conjunction with this standard to provide complete testing of laser protective materials. The recommended ordered approach for using this standard is as follows:

- a) Determine the type of protective equipment: eyewear, barrier, or window.
- b) Determine the filter technology used: absorptive dye or glass, reflective, or hybrid (combination of dye and reflective).
- c) Determine the material type of the protective equipment under study: metal, plastic, glass, or hybrid.
- d) Determine the wavelength(s) or wavelength band of the laser protection.
- e) Determine the pulse duration: continuous wave (CW), Q-switched, sub-nanosecond, or some combination of pulse durations.