



# AMERICAN NATIONAL STANDARD

*Occupational and Educational  
Personal Eye and Face  
Protection Devices*

ANSI Z87.1-2003



AMERICAN SOCIETY OF  
SAFETY ENGINEERS

**American National Standard  
Occupational and Educational  
Personal Eye and Face  
Protection Devices**

Secretariat

**American Society of Safety Engineers**  
1800 East Oakton Street  
Des Plaines, Illinois 60018-2187

Approved June 19, 2003

**American National Standards Institute, Inc.**

Effective August 19, 2003

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Published by

**American Society of Safety Engineers  
1800 East Oakton Street, Des Plaines, Illinois 60018-2187**

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Printed in the United States of America

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## Foreword

(This Foreword is not a part of American National Standard Z87.1-2003)

The history of Z87 began with the first edition of the Z2 standard for head and eye protection and was developed from a set of safety standards originally prepared cooperatively by the War and Navy Departments and the National Bureau of Standards.

The second edition of Z2 was developed by a standards committee organized under the American Standards Association and was published in 1922 as the National Bureau of Standards Handbook H2.

In 1938, Z2 was revised to include respiratory protection and was published as the National Bureau of Standards Handbook H24.

In 1946, Z2 was revised to include advances in safety equipment technology such as the use of plastics for eye protection. Three subcommittees were organized. A subcommittee on eye protection was organized under the supervision of the National Bureau of Standards. A subcommittee on respiratory protection was organized under the supervision of the U.S. Bureau of Mines and a subcommittee for head protection was organized under the Department of the Navy. In 1959, Z2 was approved as the American Standard Safety Code for Head, Eye and Respiratory Protection, Z2.1-1959.

On November 24, 1961, the Standards Safety Board approved to divide the Z2 project into three separate standards: Z87 - Industrial Eye Protection; Z88 - Industrial Respiratory Protection; Z89 - Industrial Head Protection. The Z87.1 Standards Committee under the procedures of the USA Standards Institute, formally the American Standards Association, revised the 1959 version, which was approved on September 18, 1968 as the USA Standard Z87.1 - 1968. The USA Standards Institute changed its name in October 1969 to the American National Standards Institute and the Z87.1 Standard became the American National Standard for Occupational and Educational Eye and Face Protection, ANSI Z87.1 - 1968.

In the Z87 Standards Committee, membership was reconstituted and broadened in 1973 to include all organizations with a substantial interest in the design or use of eye and face protection. The Committee revised the 1968 version, which was approved on February 27, 1979 as the American National Standard for Occupational and Educational Eye and Face Protection, ANSI Z87.1 - 1979.

In 1980 the Z87 Standards Committee reconvened to begin their update of the 1979 version. In order to better accommodate advancements in safety equipment technology more emphasis was placed on developing performance oriented standards. A Bureau of Labor Statistics study revealed that most eye injuries to those wearing protectors were caused by insufficient angular protection. Therefore, angular impact testing requirements were included. In 1983, an American Welding Society study was used to update and improve the transmittance requirements for filter lenses. The standard was approved on February 2, 1989 as the American National Standard Practice for Occupational and Educational Eye and Face Protection, ANSI Z87.1-1989. The standard was subsequently reaffirmed by the Z87 Committee per ANSI procedure in 1998 and is still cited by reference by the U.S. Occupational Safety and Health Administration, (OSHA).

This newest edition of the Z87 Standard is considered by the committee members to be significant, as it will strengthen the impact resistance requirements of the standard while still allowing for future technologies and science. This standard once again while voluntary also offers an enhanced user selection chart, which indicates a system of selecting eyewear appropriate to identified hazards. Of importance to users is the knowledge that different types of products, (spectacles, goggles, and face shields) are tested to different levels of impact resistance, thus, it is incumbent upon the user to select a product being tested to the hazard being exposed to.

Suggestions for improvement of this standard are welcome. They should be sent to the American Society of Safety Engineers, 1800 East Oakton Street, Des Plaines, IL 60018 - 2187.

This standard was processed and approved for submittal to ANSI by the Accredited Standards Committee on Safety Standards for Eye Protection, Z87. Committee approval of the standard does not necessarily imply that all committee members voted for its approval. At the time it approved this standard, the Z87 Committee had the following members:

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 Daniel Torgersen, Vice-Chairman  
 Timothy R. Fisher, CSP, ARM, CPEA, Secretary  
 Patrick Arkins, Assistant Secretary

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American Gas Association	Phillip Bennett
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<b>Contents</b>	TOPIC	PAGE
	<b>FORWARD</b> .....	2
<b>1</b>	<b>Preface</b> .....	9
<b>2</b>	<b>Scope, Purpose, Application, Exceptions, Interpretations</b> .....	9
2.1	Scope .....	9
2.2	Purpose .....	9
2.3	Application .....	9
2.4	Exceptions .....	10
2.5	Interpretations .....	10
<b>3</b>	<b>Eye Incident Injury Data/History</b> .....	10
<b>4</b>	<b>Definitions</b> .....	10
<b>5</b>	<b>Referenced Publications</b> .....	13
<b>6</b>	<b>Selection, Use and Maintenance of Protectors</b> .....	14
6.1	Protectors .....	14
6.2	Hazard Assessment and Protector Selection .....	18
<b>7</b>	<b>Spectacles</b> .....	22
7.1	Introduction .....	22
7.2	Spectacle Frame Tests .....	22
7.3	Basic Impact Lens Requirements .....	22
7.4	Plano Spectacle Lens Requirements .....	23
7.5	Non-Plano Spectacle Lens Requirements .....	24
7.6	Flammability .....	24
7.7	Corrosion Resistance .....	25
7.8	Cleanability .....	25
7.9	Replacement Spectacle Lenses .....	25
7.10	Marking .....	25
<b>8</b>	<b>Goggles</b> .....	26
8.1	Introduction .....	26
8.2	Impact Testing Requirements .....	26
8.3	High Impact Testing Requirements .....	27
8.4	Optical Requirements for Plano Goggle Lenses .....	27
8.5	Optical Requirements for Non-Plano Goggle Performance .....	28
8.6	Flammability .....	28
8.7	Corrosion Resistance .....	28
8.8	Cleanability .....	28
8.9	Ventilation Requirements .....	28
8.10	Transmittance of Non-Lens Areas .....	28
8.11	Replacement Goggle Lenses .....	28
8.12	Marking .....	29

<b>Contents</b>	TOPIC	PAGE
<b>9</b>	<b>Faceshields</b> .....	29
9.1	Introduction .....	29
9.2	Impact Testing Requirements .....	30
9.3	High Impact Testing Requirements .....	30
9.4	Optical Requirements for Plano Faceshield Windows .....	31
9.5	Requirements for Wire-Screen Windows .....	31
9.6	Flammability .....	31
9.7	Corrosion Resistance .....	31
9.8	Cleanability .....	32
9.9	Replacement Faceshield Windows .....	32
9.10	Marking .....	32
<b>10</b>	<b>Welding Helmets and Handshields</b> .....	33
10.1	Introduction .....	33
10.2	Impact Testing Requirements .....	33
10.3	High Impact Testing Requirements .....	34
10.4	Optical Requirements for Plano Welding Helmet Lenses .....	34
10.5	Optical Requirements for Non-Plano Welding Helmet Lenses .....	35
10.6	Flammability .....	35
10.7	Corrosion Resistance .....	35
10.8	Cleanability .....	35
10.9	Non-Lens Area Transmittance and Light Tightness .....	35
10.10	Replacement Welding Helmet Lenses .....	35
10.11	Marking .....	36
10.12	Transmittance Requirement, Automatic Darkening Welding Filter Lenses .....	36
10.13	Cover Lenses .....	37
<b>11</b>	<b>Respirators</b> .....	37
11.1	Introduction .....	37
11.2	Full Facepiece Respirators .....	37
11.3	Loose Fitting Respirators .....	37
11.4	Full Facepiece Welding Respirators .....	37
11.5	Loose Fitting Welding Respirators .....	37
<b>12</b>	<b>Transmittance Requirements for Clear Lenses, Filter Lenses and Automatic Darkening Filter Lenses</b> .....	37
12.1	Formulae .....	38
12.2	Transmittance Requirements .....	39
12.3	Switching Index Requirements .....	41
<b>13</b>	<b>Instructions, Use and Maintenance</b> .....	42
13.1	General Requirements .....	42
13.2	Instructions .....	42
13.3	Inspections .....	42
13.4	Maintenance .....	42
13.5	Care .....	42
13.6	Training .....	42

<b>Contents</b>	TOPIC	PAGE
<b>14</b>	<b>Test Methods</b> . . . . .	42
14.1	High Mass Impact Test . . . . .	43
14.2	High Velocity Impact Test . . . . .	43
14.3	Tests for High Impact Prescription Lenses . . . . .	44
14.4	Drop-Ball Impact Test . . . . .	45
14.5	Penetration Test . . . . .	46
14.6	Flammability Test . . . . .	47
14.7	Corrosion Resistance Test . . . . .	47
14.8	Cleanability Test . . . . .	47
14.9	Prismatic Power Test . . . . .	48
14.10	Refractive Power, Resolving Power and Astigmatism Tests . . . . .	48
14.11	Haze Test . . . . .	49
14.12	Transmittance Test . . . . .	49
14.13	Switching Index Test . . . . .	49
14.14	Light Tightness Test . . . . .	50
<b>15</b>	<b>Warning Label</b> . . . . .	51
15.1	Purpose . . . . .	51
15.2	Label or Tag Requirements . . . . .	51
 <b>TABLES</b>		
	Table 1 - Transmittance Requirements for Clear and Filter Lenses . . . . .	40
	Table 2 - Transmittance Requirements for Special-Purpose Lenses . . . . .	41
	Table 3 - Switching Index Requirements for Automatic Darkening Welding Filter Lenses . . . . .	41
 <b>FIGURES</b>		
	Figure 1 – Spectacles . . . . .	14
	Figure 2 – Temples . . . . .	14
	Figure 3 – Fronts . . . . .	14
	Figure 4 – Bridges . . . . .	15
	Figure 5 - Side Protection . . . . .	15
	Figure 6 - Life-front spectacles . . . . .	16
	Figure 7 – Goggles . . . . .	16
	Figure 8 – Faceshield . . . . .	17
	Figure 9 - Welding Helmets . . . . .	18
 <b>ANNEXES</b>		
	Annex A - Spectral Factor Tables (normative) . . . . .	52
	Annex B - Test Apparatus (normative) . . . . .	56
	Annex C - Test Apparatus (informative) . . . . .	58
	Annex D - Calibration of Test Telescope (informative) . . . . .	60
	Annex E - Sources for Test Apparatus (informative) . . . . .	61
	Annex F - Referenced Publications (informative) . . . . .	62
	Annex G - Required Marks and Marking Locations by Product Category (informative) . . . . .	63
	Annex H - Eye Injury Report Form (informative) . . . . .	64
	Annex I – Selection Chart . . . . .	67



## **Explanation of Standard**

American National Standard Z87.1-2003 uses a column format to provide both specific requirements and supporting information.

Operating rules (safe practices) are not included, unless they are of such a nature as to be vital safety requirements, equal in weight to other requirements, or guides to assist in compliance with the standard.

**The information and materials contained in this publication have been developed from sources believed to be reliable. However, the American Society of Safety Engineers (ASSE) as secretariat of the ANSI accredited Z87 Committee or individual committee members accept no legal responsibility for the correctness or completeness of this material or its application to specific factual situations. By publication of this standard, ASSE or the Z87 Committee does not ensure that adherence to these recommendations will protect the safety or health of any persons, or preserve property.**

# American National Standard Occupational and Educational Personal Eye and Face Protection Devices

## 1 Preface

This standard for personal eye and face protective devices (hereinafter referred to as protectors) is, as far as possible, designed to be performance oriented. Every effort was made to develop requirements that are consistent with, or more stringent than, ANSI Z87.1-1989(R-1998). This standard recognizes the Bureau of Labor Statistics<sup>1</sup> study that revealed the need for angular protection, in addition to frontal protection, in eye and face protectors worn in the occupational setting.

Protectors do not provide unlimited protection. In the occupational and educational environment, protectors are not substitutes for machine guards and other engineering controls. Protectors alone should not be relied on to provide complete protection against hazards, but should be used in conjunction with machine guards, engineering controls, and sound safety practices. Every effort should be made to eliminate eye and face hazards in occupational and educational settings.

In 1992, the Occupational Safety and Health Administration began regulating occupational exposure to bloodborne pathogens and, as a result, now require employers to provide personal protective equipment (PPE) including eye and face protection for employees exposed to these hazards. At the time of the publication of this standard, no standards existed for eye and face protection intended to provide protection from bloodborne pathogens. Nevertheless many employers have elected to provide their employees with PPE conforming to the requirements of ANSI Z87. These products may or may not provide adequate protection against bloodborne pathogens.

<sup>1</sup> "Accidents Involving Eye Injuries," U.S. Department of Labor, Bureau of Labor Statistics, April 1980, Report 597.

Extreme caution must be exercised in the selection and use of personal protective equipment in applications for which no performance requirements or standardized testing exists.

## 2 Scope, Purpose, Application, Exceptions, and Interpretations

### 2.1 Scope

This standard sets forth criteria related to the description, general requirements, testing, marking, selection, care, and use of protectors to minimize or prevent injuries, from such hazards as impact, non-ionizing radiation and chemical type injuries in occupational and educational environments including, but not limited to, machinery operations, material welding and cutting, chemical handling, and assembly operations.

### 2.2 Purpose

This standard provides minimum requirements for protectors including selection, use, and maintenance of these protectors as devices to minimize or prevent eye and face injuries.

### 2.3 Application

**2.3.1** The requirements of this standard apply to protectors when first placed in service.

**2.3.2** Protectors bearing the marking Z87 or represented in any way as being in compliance with this standard, shall meet all requirements of this standard in their entirety. All components of eye and face protective devices shall comply with the requirements of this standard.

**2.3.3** Compliance with this standard cannot always be assured when replacement components are used. End users shall exercise extreme care in the selection and installation of replacement components to ensure compliance with this standard.