

ANSI Z80.1-2005

AMERICAN NATIONAL STANDARD



*for Ophthalmics –  
Prescription Ophthalmic Lenses–  
Recomendations*

Currently in preview, click buy full versi

Currently in preview, click buy full version

**ANSI®**  
**Z80.1-2005**  
(Revision of  
ANSI Z80.1-1999)

American National Standard  
for Ophthalmics –  
Prescription Ophthalmic Lenses –  
Recommendations

Secretariat  
**Optical Laboratories Association**

Approved December 19, 2005  
**American National Standards Institute, Inc.**

# American National Standard

Approval of an American National Standard requires review by ANSI that the requirements for due process, consensus, and other criteria for approval have been met by the standards developer.

Consensus is established when, in the judgement of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made towards their resolution.

The use of American National Standards is completely voluntary; their existence does not in any respect preclude anyone, whether he has approved the standards or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standards.

The American National Standards Institute does not develop standards and will in no circumstances give an interpretation of any American National Standard. Moreover, no person shall have the right or authority to issue an interpretation of an American National Standard in the name of the American National Standards Institute. Requests for interpretations should be addressed to the secretariat or sponsor whose name appears on the title page of this standard.

**CAUTION NOTICE:** This American National Standard may be revised or withdrawn at any time.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. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute.

## *Developed by*

The Accredited Committee Z80 for Ophthalmic Standards -

Optical Laboratories Association  
Z80 Secretariat  
11096 Lee Highway  
A101  
Fairfax, VA 22030-5039

## *Published by*

Optical Laboratories Association  
11096 Lee Highway  
A101  
Fairfax, VA 22030-5039

Copyright © 2006 by Optical Laboratories Association  
All rights reserved.

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without prior written permission of the publisher.

Printed in the United States of America

## Contents

|   | Page |
|---|------|
| Foreword .....  | ii   |
| <b>1</b> Scope and Purpose .....  | 1    |
| <b>2</b> Normative References .....   | 2    |
| <b>3</b> Definitions .....  | 3    |
| <b>4</b> Classification .....   | 11   |
| <b>5</b> Optical Requirements .....   | 11   |
| <b>6</b> Mechanical Requirements .....  | 17   |
| <b>7</b> Transmittance and Attenuation Requirements .....                                   | 17   |
| <b>8</b> Test Methods .....   | 18   |
| <b>9</b> Markings for Progressive Addition Lenses .....                                     | 26   |
| <b>10</b> Identification .....  | 27   |
| <b>Tables</b>   |      |
| <b>1</b> Tolerance on Distance Refractive Power (Single-Vision and Multifocal Lenses) ..... | 11   |
| <b>2</b> Tolerance on Distance Refractive Power (Progressive Addition Lenses) ..            | 11   |
| <b>3</b> Tolerance on Direction of Cylinder Axis .....                                      | 12   |
| <b>4</b> Tolerance on Addition Power of Multifocal and Progressive Addition Lenses .....    | 12   |
| <b>Figures</b>  |      |
| <b>1</b> Measuring Nonaspheric Multifocals .....  | 19   |
| <b>2</b> Locating the Prism Reference Point of an Edged, Unmounted Lens .....               | 20   |
| <b>3</b> Locating the Prism Reference Point of an Uncut Multifocal Lens .....               | 20   |
| <b>4</b> Horizontal Prism Tolerance Markings .....  | 22   |
| <b>5</b> Horizontal and Vertical Prism Tolerance Markings .....                             | 23   |
| <b>6</b> Progressive Addition Lens Markings .....   | 26   |
| <b>Annexes</b>  |      |
| <b>A</b> Technical Addendum to Impact Testing .....   | 29   |
| <b>B</b> Recommended System for Visually Inspecting Lens for Defects .....                  | 33   |
| <b>C</b> The Boxing System of Measurement .....   | 34   |
| <b>D</b> Optical and Mechanical Tolerances Summary .....                                    | 35   |
| <b>E</b> Bibliography .....   | 37   |

**Foreword** (This foreword is not part of American National Standard ANSI Z80.1-2005.)

The Z80 Standards Committee for Ophthalmic Lenses was organized in 1956. Three separate standards were drafted, two relating to the manufacture of lenses and one to the fabrication of ophthalmic lenses into prescription eyewear. A standard relating mainly to lenses, but containing additional tolerances for a mounted pair, was issued in 1964. The tolerances were based largely upon an analysis of measured parameters in typical single-vision, mass-produced lenses assembled into conservatively styled and sized mountings. The standard represented the state-of-the-art for such lenses and a set of quality goals for lenses surfaced in the ophthalmic laboratory on an individual basis.

At the beginning of 1970, the Standards Committee Z80 was reorganized with the Optical Society of America, its former sponsor, serving as Secretariat. In 1972, the committee's scope was broadened to include lenses other than prescription glass ophthalmic lenses in recognition of the importance of plastic ophthalmic materials and the increased use of sunglasses and fashion eyewear. In the 1972 revision, certain tolerances for plastic and heat-treated lenses were relaxed in response to Federally mandated impact-resistant requirements for all ophthalmic lenses.

The 1979 revision reflected a shift in utilization from mass-produced lenses to a basic dependence upon custom-processed lenses at the laboratory level. It was an attempt to define the state-of-the-art in the manufacturing laboratory by recognizing the fact that, while individual tolerances may be reliably met, it is often not possible to achieve all requirements simultaneously. The Standard expressed desirable technical concepts that provide a framework for safety and effectiveness. The title was changed from a "requirement" to a "recommendation" to reflect the committee's intent.

In 1982, the Optical Laboratories Association assumed the responsibilities of the Secretariat. In 1985, the Z80 Committee became an Accredited Standards Committee.

The 1995 revision attempted to write the Z80.1 standard to be consistent with ISO standards. It was subsequently found that applying the ISO power tolerance method to custom fabricated eyewear resulted in unacceptably high rejection rates.

This 2005 revision corrects the change in power tolerancing methodology and brings the tolerance in line with the current "state-of-the-art." The difference in refractive power tolerance between progressive addition lenses and single-vision and multifocal lenses reflects the fact that the tolerance on base curve for progressive addition lenses in ISO standards is looser than the tolerance on single-vision and standard multifocals. The tolerance for cylinder axis uses as its basis the amount of axis error that would be needed to result in an error of 0.12 D, (the tolerance for cylinder refractive power). Additionally, the clause on the lens measurement method has been rewritten to include automatic focimeters and better describe the method for measuring D.M.

The standard remains a recommendation. Therefore, it is the specific intent of the Z80 Committee that this standard not be used as a regulatory instrument.

This standard contains five informative annexes, which are not considered part of the standard.

Suggestions for improvement of this standard will be welcome. They should be sent to the Optical Laboratories Association, 11096 Lee Highway, A101, Fairfax, VA 22030-5039, USA.

This standard was processed and approved for submittal to ANSI by the Accredited Standards Committee on Ophthalmics, Z80. Committee approval of this standard does not necessarily imply that all committee members voted for its approval. At the time it approved this standard, the Z80 Committee had the following members:

Thomas C. White, M.D., Chairman  
 Guido Cappelli, Vice-Chairman  
 Robert Rosenberg, O.D., Secretary

| <i>Organization Represented</i>                                | <i>Name of Representative</i>  |
|--|--|
| AR Council .....   | Nick Mileti<br>Lee K. Anderson (Alt.)<br>John W. Quinn (Alt.)  |
| Advance Medical Technologies Association .....                 | Douglas J. Ferraro<br>Carolyn Jones (Alt.)<br>Glenn Davies (Alt.)<br>Stanley J. Bogjaski (Alt.)                            |
| American Academy of Optometry .....                            | David S. Hoshin  |
| American Academy of Ophthalmology .....                        | Thomas C. White<br>Gerhard Cibis (Alt.)<br>Paul F. Vinger (Alt.)   |
| American Ceramic Society .....                                 | Yvonne Gleek   |
| American Optometric Association .....                          | Herbert Hoover (Alt.)<br>Donald G. Pitts<br>William J. Benjamin (Alt.)<br>Robert Rosenberg (Alt.)<br>Jeffrey Weaver (Alt.) |
| American Society of Cataract and Refractive Surgery .....      | Stephen Klyce<br>Jack T. Holladay (Alt.)<br>Stephen H. Johnson (Alt.)  |
| Contact Lens Institute .....                                   | Ed Schilling   |
| Contact Lens Manufacturers Association .....                   | Guido Cappelli   |
| Food & Drug Administration .....                               | David Whipple<br>Donald Calogero (Alt.)<br>Robert Landry (Alt.)  |
| National Association of Contact Lens Fitters & Opticians ..... | Arthur Newman  |
| National Academy of Opticianry .....                           | Diane L. Finisecy  |
| Optical Laboratories Association .....                         | Daniel Torgersen<br>Henry A. Hart (Alt.)<br>Susie Leshar (Alt.)<br>Jonathan Schwartz (Alt.)                                |
| Optical Society of America .....                               | Richard A. Phillips  |
| Opticians Association of America .....                         | Kathie St. Clair<br>Tina M. Schott (Alt.)  |
| Prevent Blindness .....  | Christine Bradley<br>Jeff Todd (Alt.)  |
| Sunglass Association of America .....                          | Kenneth L. Frederick<br>Thomas Loomis (Alt.)<br>James Pritts (Alt.)<br>Rick Van Arnam (Alt.)                               |
| US Leader to ISO TC 172/SC7 .....                              | Charles E. Campbell  |
| Veterans Administration .....                                  | John Townsend<br>Sharon R. Atkin (Alt.)  |
| Vision Council of America .....                                | Kenneth O. Wood<br>Steve Drake (Alt.)<br>Darryl Meister (Alt.)<br>Greg Chavez (Alt.)<br>Dick Whitney (Alt.)                |

The Subcommittee on Prescription Ophthalmic Lenses, which developed this standard, had the following members at the time of approval:

Daniel Torgersen, Chair

Dean Bancroft  
William Brown  
Steven Drake  
Kenneth Frederick  
Herbert Hoover  
Susie Leshner  
Darryl Meister

Nick Mileti  
Arthur Newman  
Dale Pfriem  
Donald Pitts  
Neil Roche  
Robert Rosenberg  
Richard Phillips

Jonathan Schwartz  
Richard Waido  
Richard Whitney  
Kenneth Wood  
John Young

Currently in preview, click buy full version

American National Standard  
for Ophthalmics –

## Prescription Ophthalmic Lenses – Recommendations

### 1 Scope and Purpose

#### 1.1 Scope

This standard applies to the processing of all prescription ophthalmic spectacle lenses in edged or assembled form. It is a processing guideline for optical laboratories applicable to prescription eyewear prior to transfer for dispensing, and for the dispenser prior to the delivery of the finished eyewear to the patient. Relevant optical specifications and tolerances of this standard should apply also to uncut lenses supplied by an optical laboratory to be used in filling a specific prescription.

This standard does not apply to products covered by *American National Standard for Ophthalmics – Nonprescription Sunglasses and Fashion Eyewear - Requirements*, ANSI Z80.3-2001.

#### 1.2 Purpose

This standard reflects the shift in utilization from mass-produced lenses to a basic dependence upon custom-processed lenses at the laboratory level. It does not represent tolerances that describe the state-of-the-art of the ophthalmic laboratory, but provides quality goals for new pristine lenses prepared to individual prescription. The individual performance parameters listed in this standard can be achieved reliably. However, it is difficult to meet all of the requirements simultaneously in any given lens or mounted pair. The fact that, under rigorous application of this standard, a significant number of spectacles (approximately 25%, based upon industry data) will not achieve all parameters simultaneously, must be accepted as a reflection of the state-of-the-art (see Annex E – *Optical Index*). As such, this standard expresses desirable technical concepts that provide a frame of reference for safety and effectiveness and is not designed as a regulatory instrument.