American National Standard

For Optics and Electro-Optical Instruments – Optical Glass

American National Standard –
for Optics and Electro-Optical Instruments –
Optical Glass

Secretariat

Optics and Electro-Optics Standards Council

Approved March 11, 2008

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 he has approved the standard or not, 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CAUTION NOTICE: This American National standard may be revised or withdrawn at any time.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 to reaffirm, revise, or withdraw this standard no later than five years from the date of publication. Purchasers of American National Standards my receive current information on all standards by calling or writing the American National Standards Institute.

Published by

The Optics and Electro-Optics Standards Council
P.O. Box 25705
Rochester, NY 14625-0705

Printed in the United States of America

Foreword

[This Foreword is not part of ANSI/OEOSC OP3.001-2001 (R2008)]
This Standard provides documented methods for specifying optical glass that is used to fabricate lenses and other optical elements. Methods for rating characteristics including Abbe Value, Homogeneity of Refractive Index, Spectral Transmittance, Stress Birefringence, Striae, and Inclusions are specified. Suggested test methods for striae and inclusions are presented.

There are two informative appendices that are not a part of this standard.

Suggestions for improvement of this standard are welcome. They should be sent to the Optics and Electro-Optics Standards Council, P.O. Box 25705, Rochester, NY 14625-0705.

This standard was processed and approved for submittal to ANSI by OEOSC Committee for Optics and Electro-Optical Instruments, OP. 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 OP Committee had the following members:

Harvey Pollicove, Chairman
Gene Kohlenberg, Secretary

Organization Represented	Name of Representative
CREOL/ University of Florida	Kathleen Richardson
Eastman Kodak Company	William E. Royall
	Walter Czajkowski (Alt.)
Endelman Enterprises	Lincoln Endelman
Harold Johnson Optical Lab	Hal Johnson
Hinds Instruments, Inc.	C. Owen J. Griffiths
IEEE/LEOS	Thomas R. Scott
NIST	Jonathan Hardis
OCLI	Gordon Boultbee
Ohara Corporation	Sieglinde Wallis
Schott Glass Technologies, Inc	Jackson S. Stroud
	Ronald A. Klimek (Alt.)
Thermawave	David Aikens

Subcommittee OP3 on Optical Materials and Components, which was responsible for the development of this standard, had the following members:

Harvey Pollicove, Chairman
Jackson S. Stroud, Task Force Leader

Gordon Boultbee
Lincoln Endelman
Kathleen Richardson
William E. Royall
Thomas R. Scott

Contents

American National Standard – for Optics and Electro-Optical Instruments – Optical Glass

1 Scope

1.1 General

This Standard establishes uniform practices for stating and interpreting specifications, tolerances, and functional requirements for optical glass that is used to fabricate lenses and other optical elements, such as prisms, windows, light pipes, etc., used in optical assemblies, systems, instruments, or other related uses.

1.2 Reference to this Standard

Drawings based on this Standard shall note this fact on the drawing or in a document referenced on the drawing.

1.3 Application Caution and Precedence

This Standard does not purport to address the legal, safety, or health issues, if any, associated with its use, or the raw materials and processes used to produce glass or the final optical product. It is the responsibility of the users of this Standard to establish appropriate health and safety practices, as well as to determine the applicability of regulatory limitations. Nothing in this Standard shall be construed to exempt the user from or supersede applicable laws or government regulations.

2 Definitions

The following terms are defined as their use applies in this Standard.

2.1 Abbe Value (ν_d)

The Abbe value (ν_d), sometimes referred to as the Abbe number, for the helium d-line (587.6 nm) is:

$$\nu_d = (n_d - 1)/(n_F - n_C)$$

where n_d, n_F and n_C are the refractive indices of the glass at the wavelengths 587.6 nm, 486.1 nm, and 656.3 nm respectively. The quantity $(n_F - n_C)$ is called the *principal dispersion*.

2.2 Homogeneity of Refractive Index

Homogeneity is a measure of the refractive index variation within a single piece of optical glass. It is the difference between the maximum and minimum values of the refractive index within the optical glass.

2.3 Melt Data

Melt Data is a general industry term that is defined as data, such as refractive index and dispersion values, that specifically represents a quantity of glass material that was produced in the same ‘melt’ or batch.

2.4 Spectral Transmittance

The spectral transmittance (T_λ) is the ratio of the transmitted power (I_λ) to the incident power $(I_{0\lambda})$ of a collimated, monochromatic beam that passes, at normal incidence, through a plane parallel polished plate.

$$T_\lambda = I_\lambda / I_{0\lambda}$$

Caution: The spectral transmittance (T_λ) *varies with wavelength.*

2.5 Spectral Internal Transmittance

The spectral internal transmittance $(\tau_{i\lambda})$ is the ratio of the power that reaches the inside of the exit surface to the power just inside the entrance surface of a plane parallel polished plate. The relation between T_λ and $\tau_{i\lambda}$ is:

$$\tau_{i\lambda} = T_\lambda / P_\lambda$$

where the reflection factor (P_λ) accounts for losses at the surfaces (refer to Appendix A).