ANSI/OEOSC OP1.002-2017
(Revision of ANSI/OEOSC OP1.002-2009)

American National Standard

For Optics and Electro-Optical Instruments – Optical Elements and Assemblies – Surface Imperfections

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For Optics and Electro-Optical Instruments –

Optical Elements and Assemblies – Surface Imperfections

Secretariat
Optics and Electro-Optics Standards Council

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American National Standard

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Foreword to the Third Edition

(This foreword is not part of American National Standard OP1.002-2017)

The third edition of OP1.002 strives to comprehensively cover non-performance quality specifications used to tolerance imperfections of optical components. Many times, these kinds of tolerances are called “cosmetic” or “appearance” specifications. OP1.002 may be used to tolerance the quality of optical components designed and manufactured for any application in any part of the spectrum.

The third edition of this Standard also strives to correct a widespread, persistent misunderstanding about the meaning of the grade numbers used to classify a scratch or dig’s visibility to the human eye. It retains the parallel systems of scratch and dig specification introduced in the second edition: a Visibility Tolerancing System and Dimensional Tolerancing System.

Many aspects of this standard are derived from the military standards that once served as *de facto* national standards in this field: MIL-O-13830A, MIL-PRF-13830B, MIL-C-48497A and MIL-F-48616.

Suggestions for improvement of this standard are welcome. They should be sent to the Optics and Electro-Optics Standards Council, 439 Monroe Avenue, Rochester, NY 14607 and/or emailed to allenk@oeosc.org.

Hal Johnson, Chairman of ASC OP

Allen Krisiloff, Secretary of ASC OP

Gordon Boultbee, Leader of Task Force 2, Surface Imperfections

This standard was processed and approved for submittal to ANSI by the OEOSC Committee on Optics and Electro-Optical Instruments, ASC OP. Committee approval of the standard does not necessarily imply that all committee members voted for its approval. At the time it approved this third edition of the standard, the OP Committee had the following members:

† A member of the Task Force 2, Surface Imperfections, that prepared this standard.

Organization Represented	Name of Representative
4D Technology Corp.	Stephen Martinek
AMP Optics, LLC	Adam Phenis
APOMA†	Walter Czajkowski
Brookhaven National Lab.	Dr. Peter Takacs
Corning Tropel	Paul Dewa
Davidson Optronics, Inc.†	Don Pearson II
E. R. Precision Optical.	Jason Hess Brian Weinberg, alternate
Edmund Optics†	Jay Nelson
Gage-Line Technology, Inc.†	Frank Dombrowski
HELM Dynamics	Jonathan McGuire
IEEE/LEOS†	Dr. Marla Dowell
Individual†	Gordon Boultbee
Individual†	Charles Gaugh
Individual†	William Royall
Irradiance Glass, Inc.	Dave Musgraves
JML Optical†	Hal Johnson
Lacroix Optical Co. (Observer)	Raymond A. LaCroix, Jr.
Lattice Materials, LLC	Mike Foster
Lawrence Berkeley National Lab.	Valeriy V. Yashchuk
Leiner Optics	Dennis Leiner
Lightworks Optical Systems	Melissa Stout Douglas Hibbard, alternate

Organization Represented	Name of Representative
Lockheed Martin Missiles and Fire Control†	Daniel Palmari Robert Murphy, alternate Gary Wiese, alternate
M^3 Measurement Solutions, Inc.	Erik Stover Jim Grimes, alternate
National Institute of Standards and Technology†	Dr. Marla Dowell Dr. Leonard Hanssen, alternate
Nikon Research Corporation of America	Dr. Brian Stamper
Northrop Grumman Electronic Systems†	Donna Howland John Hamilton, alternate Christopher Svec, alternate
Ophir-Photon, LLC (Observer)	Jeffrey Guttman
Ophir-Spiricon, LLC.	Jed Simmons
Optical Imaging Association (Observer)	Clark Mulligan
Optical Perspectives Group, LLC (Observer)	Dr. Robert Parks
Optical Society of America (Observer)	David Jenkins
Optimax Systems, Inc.†	Mike Mandina Pat Augino, alternate Dr. Jessica DeGroote Nelson, alternate Rick Plympton, alternate
Opto-Alignment Technology, Inc.	Sasha Pearlman
QED Technologies	Dr. Paul Murphy Dr. Greg Forbes, alternate Chris Supranowitz, alternate
Quantel USA	Jason Yager
R.A.Smythe, LLC	Robert Smythe
Ray Williamson Consulting†	Ray Williamson
Research Electro-Optics, Inc.†	Trey Turner
Riyo LLC	Dr. Richard N. Youngworth
Rochester Precision Optics, LLC	John Deegan Nicholas Smith, Alternate
Savvy Optics Corp.†	David Aikens
Spica Technologies	Michael Thomas
SPIE	Bob Hainsey Peter Hallett, Alternate
Triptar Lens Co., Inc.†	Allen Krisiloff
University of Central Florida (CREOL) (observer).	Dr. Kathleen Turner
University of North Carolina, Charlotte	Dr. Chris Evans
Viavi Solutions†	Maria Light Doug Wilgis, alternate

American National Standard – for Optics and Electro-Optical Instruments - Optical Elements and Assemblies- Surface Imperfections

1 INTRODUCTION

1.1 SCOPE

This Standard establishes uniform practices for stating and interpreting tolerances and for conducting inspections of transmissive and reflective optical elements and cemented components for scratch, dig, edge, coating, and optical cement imperfections. Default specifications for bubbles and inclusions are also included.

This standard provides two entirely different systems for specifying scratches and digs. A numerical notation indicates the allowable visibility of scratches and digs under specific viewing conditions and is modeled on MIL-PRF-13830B. An alphabetical notation indicates the allowable size of scratches and digs and is modeled on MIL-C-48497A and MIL-F-48616. For the scratch and dig specification on a particular surface, the designer may choose the visibility system, the dimensional system, or a combination of the two.

This standard does not address the impact of imperfections on the quantitative performance of elements or systems.

1.2 ORDER OF PRECEDENCE

In the event of a conflict between this standard and the applicable documents cited herein, the text of this standard takes precedence. In the event of conflict between the requirements of this document and the applicable technical drawing(s) for an optical element, the applicable customer approved drawing(s) shall govern.

1.3 REFERENCE TO THIS STANDARD

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

1.4 BASIC CONVENTIONS AND DEFINITIONS

1.4.1 Unaided Eye

The phrase “unaided eye” means the human eye used alone or with any combination of corrective spectacle lenses, contact lenses, or artificial intra-ocular lenses.

1.4.2 Clear Aperture

All specifications for or references to optical surfaces apply only to the clear aperture unless otherwise specified or defined explicitly in this Standard or on the drawing.

1.4.3 Default Clear Aperture

On optical surfaces where no clear aperture is specified, the default clear aperture is defined by the boundary of the entire optical surface.

1.4.4 Zones

A zone is a region on a surface. Zones may be defined with special annotations and specified with different tolerances. Tolerances apply to an entire zone. Each zone is treated separately and independently of every other zone, unless otherwise indicated within this Standard or on the drawing.

1.4.5 Visibility

The visibility of an imperfection covered by this Standard means the visibility when observed and evaluated with the inspection methods prescribed in Section 7 Methods of Inspection.