

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**



This is a preview of "ANSI/OEOSC OP1.002-2...". [Click here to purchase the full version from the ANSI store.](#)

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

Secretariat

Optics and Electro-Optics Standards Council

Approved on June 19, 2017

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American National Standard

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Table of Contents (Overview)

Foreword to the Third Edition	vi
American National Standard – for Optics and Electro-Optical Instruments - Optical Elements and Assemblies- Surface Imperfections	1
1 Introduction.....	1
2 Surface Imperfections	2
3 Edge Imperfections	9
4 Bulk Material Imperfections.....	11
5 Coating Imperfections	11
6 Cement Imperfections	11
7 Methods of Inspection	12
ANNEX A (Normative) Specifications for Visibility Comparison Artifacts.....	15
ANNEX B (Informative) Visibility of scratches and digs	16
ANNEX C (Informative) Example of Dimensional Artifacts	17
ANNEX D (Informative) Using Magnification to Assist the Human Eye	18
ANNEX E (Informative) Using Magnification with a Digital Camera.....	19
ANNEX F (Informative) Illustrations of Cosmetic Imperfections.....	21
ANNEX G (Informative) Bibliography	28

Table of Contents (Detailed)

Foreword to the Third Edition	vi
American National Standard – for Optics and Electro-Optical Instruments - Optical Elements and Assemblies- Surface Imperfections	1
1 Introduction.....	1
1.1 Scope	1
1.2 Order of Precedence	1
1.3 Reference to this Standard	1
1.4 Basic Conventions and definitions	1
2 Surface Imperfections	2
2.1 Scratches and Digs.....	2
2.2 Fractures At the Surface	8
2.3 Area Imperfections of the Surface.....	8
2.4 Surface Terminology and surface Requirements Unique to Prisms.....	8
3 Edge Imperfections	9
3.1 Definitions.....	9
3.2 Rim Edge Protective Chamfer Requirement.....	10
3.3 Chip limitations	10
3.4 Fractures.....	10
3.5 Special Restrictions for Edge Imperfections of Prisms and Mirrors.....	10
4 Bulk Material Imperfections	11
4.1 Bulk Material as a Surface	11
4.2 Scratch and Dig Tolerance.....	11
4.3 Fractures in the Bulk Material.....	11
5 Coating Imperfections	11
5.1 Coatings as Surfaces.....	11
5.2 Scratches and Digs.....	11
5.3 Spatter and Pinholes	11
5.4 Coating Crazing	11
5.5 Area Imperfections of a Coating.....	11
6 Cement Imperfections	11
6.1 Cemented Interfaces as Surfaces.....	11
6.2 Cement Imperfections Treated Like Scratches and Digs.....	11
6.3 Fractures in the Cemented Interface.....	11
6.4 Area Imperfections in the Cemented Interface.....	11
6.5 Edge Separations of the cemented surfaces.....	12
7 Methods of Inspection	12
7.1 Introduction.....	12
7.2 Critical Inspection Variables.....	12
7.3 Transmitted Light Inspection, Method 1	12
7.4 Transmitted Light Inspection, Method 2	13
7.5 Reflected Light Inspection.....	14
ANNEX A (Normative) Specifications for Visibility Comparison Artifacts.....	15
ANNEX B (Informative) Visibility of scratches and digs	16
ANNEX C (Informative) Example of Dimensional Artifacts	17
ANNEX D (Informative) Using Magnification to Assist the Human Eye	18
ANNEX E (Informative) Using Magnification with a Digital Camera.....	19
ANNEX F (Informative) Illustrations of Cosmetic Imperfections.....	21
ANNEX G (Informative) Bibliography	28

Table of Figures

Figure 1. Amici Roof Prism and its True Roof Surface.....	9
Figure 2. Surfaces and Rim Edges of a Round Lens Element.....	9
Figure 3. Arrangement for visual inspection in transmission, method 1.....	13
Figure 4. Arrangement for visual inspection in transmission, method 2.....	13
Figure 5. Arrangement for visual inspection in reflection.	14
Figure 6. Dimensional Comparison Plate.....	17

Table of Tables

Table 1. Grades for the Visibility Tolerancing of Scratches.....	4
Table 2. Grades for the Visibility Tolerancing of Digs	4
Table 3. Grades for the Dimensional Tolerancing of Scratches.....	5
Table 4. Grades for the Dimensional Tolerancing of Digs.....	5
Table 5. Settings for SIRA MIC corresponding to the standard scratch grades.	15
Table 6. Settings for SavvyInspector SIF-4 corresponding to the standard scratch grades.	15
Table 7. Sizes and tolerances of the dig comparison artifacts.	15
Table 8. Qualitative Intent of the Scratch Number Grades.....	16
Table 9. Qualitative Intent of the Dig Number Grades	16

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 Boulton, 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.

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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.