

American National Standard

for Optics and Electro-Optical Instruments –
Preparation of drawings for optical elements and systems–
Part 12: Aspheric surfaces

Secretariat
Optics and Electro-Optics Standards Council

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American National Standards Institute, Inc.



ANSI/OEOSC OP1.0110-12:2014 [ISO 10110-12:2007(E) MOD]

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Foreword to the American National Standard edition

This national standard establishes uniform practices for indications on drawings of aspheric optical surfaces. It is based entirely on the international standard, ISO 10110-12:2007.

In its implementation as a national standard, there are no accommodations necessary for standard practice in the United States. One addition, however, has been made, to facilitate the specification of Forbes aspheres, both Q_m^{con} and Q_m^{bfs} , as described in:

G.W. Forbes, "Shape specification for axially symmetric optical surfaces," Opt. Express 15(8), 5218–5226 (2007).

When using this standard to specify a Forbes asphere, the same process is used as for the general polynomial form, however the equation is given as indicated in the ANS note. Q_m^{con} and Q_m^{bfs} are polynomials of order m described in the above reference.

As with other parts of ISO 10110, there are several references to other parts of ISO 10110 for which there is an analogous American National Standard. The following table shows the OP equivalent standards for the parts of ISO 10110. Where possible, it is recommended that the OP standards be used. As of this writing, not all of the OP standards are available, and suitable equivalent ISO standards should be employed.

ISO Standard	OP Equivalent	Subject
ISO 10110-1	OP 1.0110-1	Drawing notation, general
ISO 10110-2 thru 4	OP 3.001	Glass tolerances
ISO 10110-5 and ISO 10110-14	OP 1.0110-5 OP 1.0110-14	Surface wavefront, transmitted wavefront
ISO 10110-6	OP 1.0110-6	Centering
ISO 10110-7	OP 1.002	Surface imperfections
ISO 10110-8	OP 1.0110-8	Surface texture
ISO 10110-9	OP 1.0110-9	Coatings
ISO 10110-10	OP 1.0110-10	Tabular notation
ISO 10110-11	OP 1.0110-11	Non-toleranced Data
ISO 10110-12	OP 1.0110-12	Aspheric surfaces
ISO 10110-17	Under review	Laser Damage

In the interests of facilitating the use of this standard, the original text of ISO 10110-12 has not been modified except for US spelling and the substitution of the decimal point for the decimal comma. Instead, the changes which differentiate the American National Standard version from the ISO version have been identified with a note following each section requiring modification. These notes are marked "ANS Note" so that they are not confused with the notes in the original document.

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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 standard, the OP Committee had the following members:

Hal Johnson, Chairperson
 David Aikens, Secretary & Editor
 David Aikens, Task Force Leader

Organization Represented

Name of Representative

†4D Technology Corp	Stephen Martinek
APOMA	Walter Czajkowski
Brookhaven National Lab.....	Peter Takacs
Corning Tropel (Observer)	Paul Dewa
Davidson Optronics, Inc.....	Don Pearson II
E. R. Precision Optical.....	Brian Weinberg Jason Hess, Alternate
Edmund Optics	Walt Czajkowski, acting
Engineering Synthesis Design, Inc.(observer).....	Piotr Szwaykowski
Exotic Electro-Optics.....	Melissa Stout Douglas Hibbard, Alternate
Fairfield Crystal Technology	Andy Timmerman
FLIR Precision Optics	Robert Bush
Gage-Line Technology, Inc	Frank Dombrowski
Harold Johnson Optical Lab.....	Hal Johnson
†IEEE/LEOS	Marla Dowell Rich Linke, alternate
Individual	Charles Gaugh
†Individual.....	Gordon Boulton
Individual	William Royall
Jenoptik Optical Systems (Observer)	none
Lacroix Optical Co. (Observer)	Raymond A. LaCroix, Jr.
Lattice Materials, LLC	Peter Brown
Lawrence Berkeley National Lab	Wayne McKinney Valeriy V. Yashchuk, Alternate
Lighthouse Imaging, LLC	Dennis Leiner
Lockheed Martin Missiles and Fire Control.....	Gary Wiese Daniel Palmari, Alternate
M ³ Measurement Solutions, Inc.	Erik Stover

† A member of the Task Force that prepared this standard

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<u>Organization Represented</u>	<u>Name of Representative</u>
†National Institute of Standards and Technology	Marla Dowell
Nikon Research Corporation of America	Brian Stamper
†Northrop Grumman Electronic Systems	Donna Howland Christopher Svec, Alternate
Ophir-Photon, LLC (Observer).....	Jeffrey Guttman
Ophir-Sphiricon, LLC.	Jed Simmons
Optical Perspectives Group, LLC (Observer)	Robert Parks
Optical Imaging Association (Observer)	Clark Mulligan
Optical Society of America (Observer).....	David Jenkins
†Optimax Systems, Inc.....	Mike Mandina, Alternate Rick Plympton Jessica DeGroote Nelson, Alternate Joe Tipps, Alternate
OptiPro Systems (Observer).....	none
Opto-Alignment Technology, Inc.	Sasha Pearlman
QED Technologies	Paul Murphy Greg Forbes, Alternate Chris Supranowitz, Alternate
R.A.Smythe, LLC	Robert Smythe
†Ray Williamson Consulting	Ray Williamson
Reichert Technologies.....	Doug Hoover
Research Electro-Optics, Inc.	Trey Turner
†Riyo LLC	Richard N. Youngworth
Rochester Precision Optics, LLC	Sharon Bedard Nicholas Smith, Alternate
†Savvy Optics Corp.	David Aikens
Science Applications International Corporation	Adam Phenis
†SPIE.....	Ron Scotti Peter Hallett, Alternate
†Triptar Lens Co., Inc.	Allen Krisiloff
University of Central Florida, CREOL (Observer).....	Kathleen Richardson
Zygo Corporation	Chris Evans

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NATIONAL
STANDARD** **ANSI/OEOSC
OP1.0110-12
[ISO 10110-12(E) MOD]**

ISO Second edition
2007-09-01

**Optics and photonics — Preparation of
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systems —**

Part 12:
Aspheric surfaces



Reference number
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ISO copyright office

Case postale 56 • CH-1211 Geneva 20

Tel. + 41 22 749 01 11

Fax + 41 22 749 09 47

E-mail copyright@iso.org

Web www.iso.org

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Foreword to the ISO Edition

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 10110-12 was prepared by Technical Committee ISO/TC 172, *Optics and photonics*, Subcommittee SC 1, *Fundamental standards*.

This second edition cancels and replaces the first edition (ISO 10110-12:1997) which has been technically revised.

ISO 10110 consists of the following parts, under the general title *Optics and photonics — Preparation of drawings for optical elements and systems*:

- *Part 1: General*
- *Part 2: Material imperfections — Stress birefringence*
- *Part 3: Material imperfections — Bubbles and inclusions*
- *Part 4: Material imperfections — Inhomogeneity and striae*
- *Part 5: Surface form tolerances*
- *Part 6: Centring tolerances*
- *Part 7: Surface imperfection tolerances*
- *Part 8: Surface texture*
- *Part 9: Surface treatment and coating*
- *Part 10: Table representing data of optical elements and cemented assemblies*
- *Part 11: Non-toleranced data*
- *Part 12: Aspheric surfaces*
- *Part 14: Wavefront deformation tolerance*
- *Part 17: Laser irradiation damage threshold*

Optics and photonics — Preparation of drawings for optical elements and systems —

Part 12: Aspheric surfaces

1 Scope

The ISO 10110 series specifies the presentation of design and functional requirements for optical elements in technical drawings used for manufacturing and inspection.

This part of ISO 10110 specifies rules for presentation, dimensioning and tolerancing of optically effective surfaces of aspheric form.

This part of ISO 10110 does not apply to discontinuous surfaces such as Fresnel surfaces or gratings.

This part of ISO 10110 does not specify the method by which compliance with the specifications is to be tested.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1101:2004, *Geometrical Product Specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out*

ISO 10110-1, *Optics and photonics — Preparation of drawings for optical elements and systems — Part 1: General*

ISO 10110-5, *Optics and photonics — Preparation of drawings for optical elements and systems — Part 5: Surface form tolerances*

ISO 10110-6, *Optics and optical instruments — Preparation of drawings for optical elements and systems — Part 6: Centering tolerances*

ISO 10110-7, *Optics and photonics — Preparation of drawings for optical elements and systems — Part 7: Surface imperfection tolerances*

ISO 10110-8, *Optics and optical instruments — Preparation of drawings for optical elements and systems — Part 8: Surface texture*