International Standard

ISO 10110-6

Third edition
2025-05

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

Part 6: Centring and tilt tolerances

Optique et photonique — Indications sur les dessins pour éléments et systèmes optiques —

Partie 6: Tolérances de centrage et d'inclinaison

Reference number
ISO 10110-6:2025(en)

© ISO 2025



COPYRIGHT PROTECTED DOCUMENT

© ISO 2025
All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ... **iv**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **1**

4 Specification of centring and tilt tolerances ... **8**
4.1 General ... 8
4.2 Individual spherical or plano surfaces ... 8
4.3 Individual aspheric surfaces ... 8
4.4 Individual circular cylindrical surfaces ... 9
4.5 Individual non-circular cylindrical (acylindrical) surfaces ... 9
4.6 Individual surfaces without simple symmetries ... 10
4.7 Optical elements and subassemblies ... 10
4.8 Cement wedge in cemented optical assemblies ... 11
4.9 Surfaces without optical function ... 11
4.10 Field stops, reticles, etc ... 11

5 Indication in drawings ... **11**
5.1 Datum axis ... 11
5.2 Centring and tilt tolerance ... 12
5.3 Location of indication ... 13

6 Examples ... **13**

Annex A (informative) **Guidance for the use of datums, datum features, datum systems, and tolerances for optics** ... **23**

Bibliography ... **28**

© ISO 2025 – All rights reserved

Foreword

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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

This third edition cancels and replaces the second edition (ISO 10110-6:2015), which has been technically revised.

The main changes compared to the previous edition are as follows:

— title and scope have been changed to include tilt tolerances as well as centring tolerances;

— clarified the definitions of datum features and datums to be more consistent with standard practice;

— added a definition of a circular datum feature and a circular datum;

— clarified the conditions in which the datums need not be indicated on the drawing;

— removed the use of a target datum symbol and replaced it with the simpler circular datum;

— added examples of surface tilt and beam deviation tolerances for plates and prisms;

— removed Figure 20;

— added an informative Annex A as a guidance to datums, datum features, datum systems, and tolerances.

A list of all parts in the ISO 10110 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

© ISO 2025 – All rights reserved

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

Part 6: Centring and tilt tolerances

1 Scope

This document specifies the rules for indicating centring and tilt tolerances for optical elements, subassemblies, and assemblies in the ISO 10110 series, which standardizes drawing indications for optical elements and systems.

This document applies to plano surfaces, rotationally invariant (spherical and aspherical) surfaces, circular and non-circular cylindrical (cylindrical and acylindrical) surfaces, and non-symmetrical surfaces (general surfaces). General surfaces are described using ISO 10110-19.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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, *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*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1101 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
optical surface
surface performing an optical function upon the incident light

Note 1 to entry: Optical surfaces can be of different degrees of complexity. Correspondingly, the number of the degrees of freedom needed for describing the orientation and location of the surface increases with complexity.

Note 2 to entry: Optical functions may include e.g. reflection, refraction, spectral filtration, and patterning (as in a reticle or CGH).

3.2
optical element
part with one or more *optical surfaces* (3.1) providing an optical function

EXAMPLE One optical surface (e.g. parabolic mirror), two optical surfaces (e.g. lens), or more than two optical surfaces (e.g. cube corner prism).

© ISO 2025 – All rights reserved