

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

Part 12: Aspheric surfaces

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National foreword

This British Standard is the UK implementation of ISO 10110-12:2007+A1:2013. It supersedes BS ISO 10110-12:2007 which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to ISO text carry the number of the ISO amendment. For example, text altered by ISO amendment 1 is indicated by **A1** **A1**.

The UK participation in its preparation was entrusted to Technical Committee CPW/172, Optics and photonics.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Part 12: Aspheric surfaces

*Optique et photonique — Préparation des dessins pour éléments et
systèmes optiques —*

Partie 12: Surfaces asphériques



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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.

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; roughness and waviness* 
- *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: Centring 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*

3 Mathematical description of aspheric surfaces

3.1 General

3.1.1 Coordinate system

Aspheric surfaces are described in a right-handed, orthogonal coordinate system in which the Z axis is the optical axis.

Unless otherwise specified, the Z axis is in the plane of the drawing and runs from left to right; if only one cross-section is drawn, the Y axis is in the plane of the drawing and is oriented upwards.

If two cross-sections are drawn, the XZ cross-section shall appear below the YZ cross-section (see Figure 5). For clarity the X- and Y-axes may be shown on the drawing.

The origin of the coordinate system is at the vertex of the aspheric surface (see Figure 1).

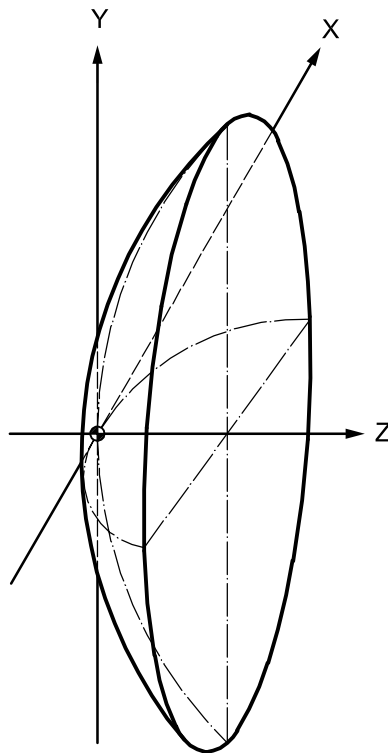


Figure 1 — Coordinate system

3.1.2 Sign conventions

NOTE 1 As will be shown later in this part of ISO 10110, the various types of aspheric surface are given by mathematical equations. In drawings the chosen equation and the corresponding constants and coefficients are specified. To achieve unambiguous indications of the surfaces, sign conventions for the constants and coefficients need to be introduced.

NOTE 2 In this case, “left” and “right” presume z is increasing from left to right. When the Z-axis is reversed as a result of a reflection (a 180° rotation about the Y-axis), the sign convention for radius and sagitta is also reversed. This is discussed further in 3.3.2.3.

A radius of curvature (commonly given for the vertex) has a positive sign if the centre of curvature is to the right of the vertex and a negative sign if the centre of curvature is to the left of the vertex.