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

Part 10: Table representing data of  
optical elements and cemented  
assemblies

ICS 01.100.20; 37.020





## National foreword

This British Standard reproduces verbatim ISO 10110-10:2004 and implements it as the UK national standard. It supersedes BS ISO 10110-10:1996 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee CPW/172, Optics and optical instruments, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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

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### Summary of pages

This document comprises a front cover, an inside front cover, the ISO title page, pages ii and iii, a blank page, pages 1 to 11 and a back cover.

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### Amendments issued since publication

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# INTERNATIONAL STANDARD

# ISO 10110-10

Second edition  
2004-02-15

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

Part 10:

### Table representing data of optical elements and cemented assemblies

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

*Partie 10: Tableau représentant les données d'éléments optiques et  
d'assemblages collés*



Reference number  
ISO 10110-10:2004(E)



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## Foreword

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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 10110-10 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 10110-10:1996) which has been technically revised to expand the scope from only single optical elements to single optical elements and cemented assemblies.

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 10:

## Table representing data of optical elements and cemented assemblies

### 1 Scope

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

This part of ISO 10110 specifies a format for indicating the dimensions, permissible deviations and material imperfections of optical elements and cemented assemblies in tabular form.

### 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 10110-2, *Optics and optical instruments — Preparation of drawings for optical elements and systems — Part 2: Material imperfections — Stress birefringence*

ISO 10110-3, *Optics and optical instruments — Preparation of drawings for optical elements and systems — Part 3: Material imperfections — Bubbles and inclusions*

ISO 10110-4, *Optics and optical instruments — Preparation of drawings for optical elements and systems — Part 4: Material imperfections — Inhomogeneity and striae*

ISO 10110-5, *Optics and optical instruments — 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 optical instruments — Preparation of drawings for optical elements and systems — Part 7: Surface imperfections tolerances*

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

ISO 10110-9, *Optics and optical instruments — Preparation of drawings for optical elements and systems — Part 9: Surface treatment and coating*

ISO 10110-11, *Optics and optical instruments — Preparation of drawings for optical elements and systems — Part 11: Non-toleranced data*



ISO 10110-17, *Optics and photonics — Preparation of drawings for optical elements and systems — Part 17: Laser irradiation damage threshold*

### 3 Format

#### 3.1 General

The drawing shall consist of the following three fields (see Figures 1 and 2):

drawing field in accordance with 3.2;

table field in accordance with 3.3;

title field in accordance with 3.4.

#### 3.2 Drawing field

In this field, a schematic drawing of the optical element or cemented assembly shall be given, together with all information not given in the table field. It is not necessary that the drawing be true-to-scale; if a drawing scale factor is indicated, the drawing shall be a true-to-scale technical drawing.

The datum axis for centring and the surface texture specification (see ISO 10110-6 and ISO 10110-8) shall be indicated on the drawing.

#### 3.3 Table field

This field contains dimensions, tolerances, and permissible material imperfections of the optical element or cemented assembly. It is sub-divided into subfields.

The number and contents of the subfields depend on whether a single element or a cemented assembly is specified.

a) In the case of a single element:

the left subfield refers to the left surface (surface 1) of the optical element;

the central subfield refers to material specification;

the right subfield refers to the right surface (surface 2) of the optical element.

See Figures 3 and 4.

b) In the case of a cemented assembly:

the number of subfields equals the number of surface;

cemented or contacted surfaces are counted as one surface.

See Figures 5, 6 and 7.

Table 1 lists detailed descriptions of the properties which may be indicated.

### 3.4 Title field

This field is provided for general indications such as name, type and/or reference number of the optical element or cemented assembly, part number and scale (if any) of the drawing, and for a reference to ISO 10110.

## 4 Non-toleranced data

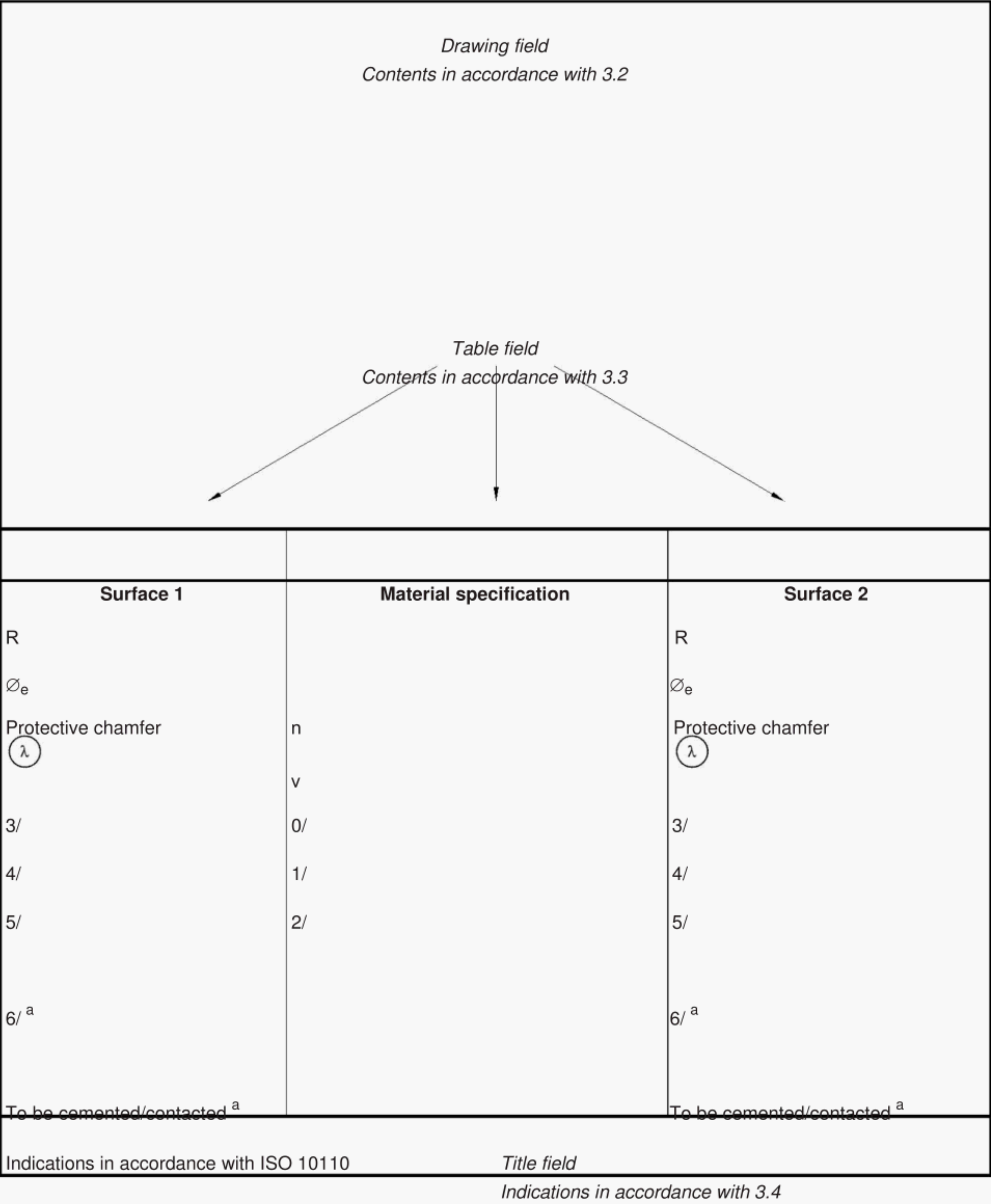
All properties specified neither in the drawing field nor in the table field are covered by ISO 10110-11.

## 5 Examples

Figures 3 to 7 give examples of the tabular indication of data for optical elements and cemented assemblies.

Table 1 — Properties to be listed	
Items	Description
Material	Type, name, identification number of the material
n	If appropriate, refractive index and Abbe number (and tolerances) in accordance with ISO 7944.
v	
R	Radius of curvature with tolerance, if desired (see note below). The direction of curvature shall be indicated as follows: convex surface: CX concave surface: CC
$\varnothing_e$	Optically effective diameter
Protective chamfer	Minimum and maximum permissible widths of the protective chamfer
$\lambda$	Surface treatment and coating in accordance with ISO 10110-9
0/	Stress birefringence tolerance in accordance with ISO 10110-2
1/	Indication of permissible bubbles and other inclusions in accordance with ISO 10110-3
2/	Inhomogeneity and striae classes in accordance with ISO 10110-4
3/	Surface form tolerance in accordance with ISO 10110-5
4/	Centring tolerance in accordance with ISO 10110-6
5/	Surface imperfection tolerance in accordance with ISO 10110-7
6/	Laser irradiation damage threshold indication in accordance with ISO 10110-17 (if appropriate)
If appropriate, the words "To be cemented" or "To be contacted" shall be added.	

NOTE Other ISO symbols are defined for the radius of curvature. In particular, ISO 129 uses "SR" as such a symbol.



<sup>a</sup> If required; delete non-applicable state.

Figure 1 — Tabular indication of data for a single element

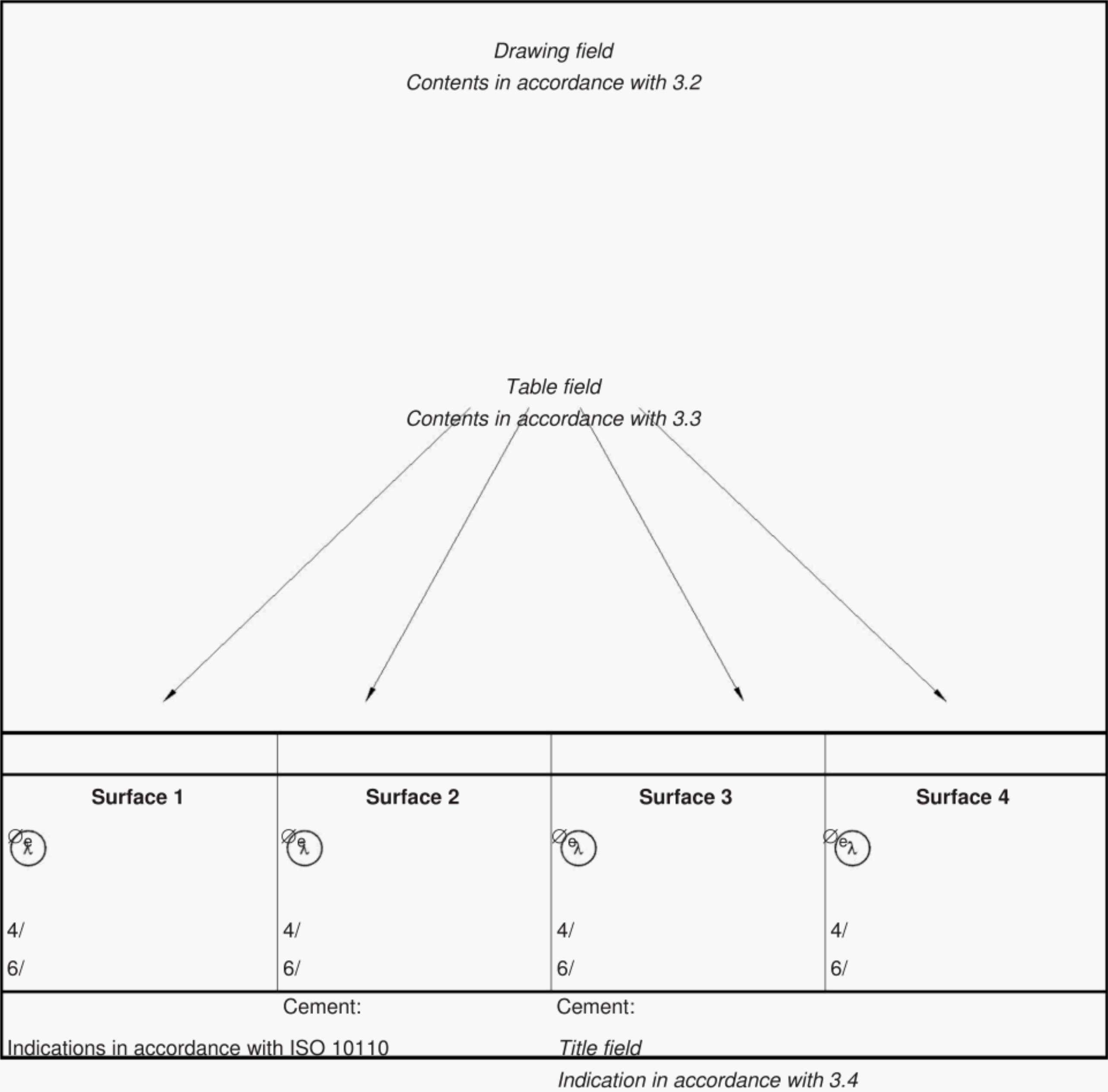
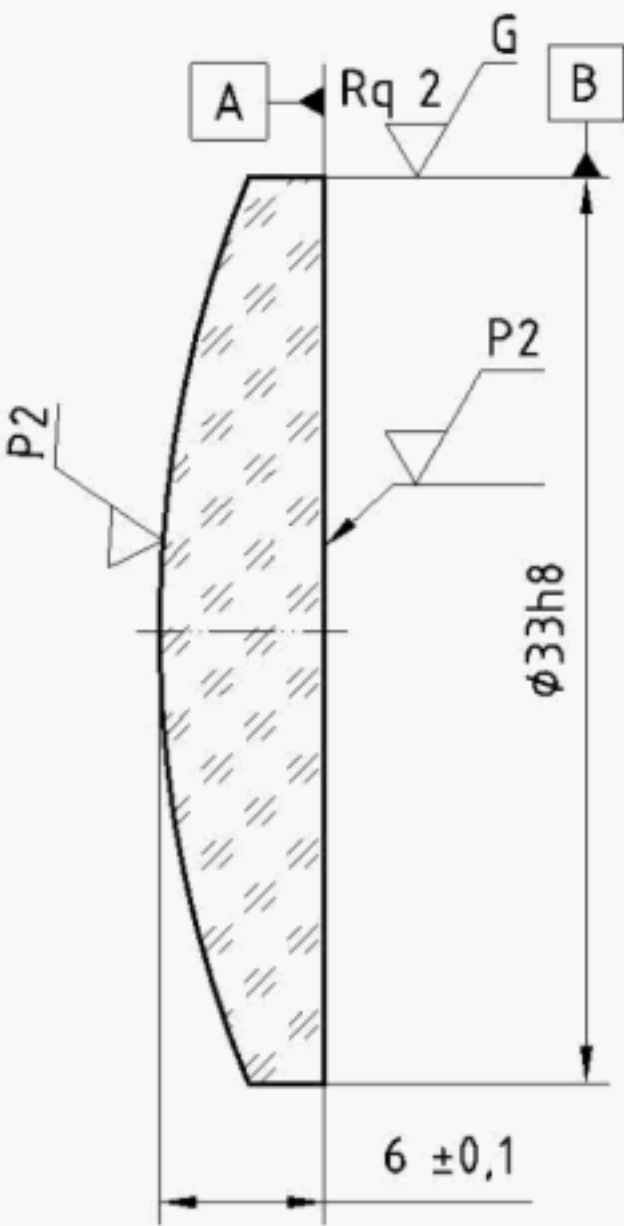
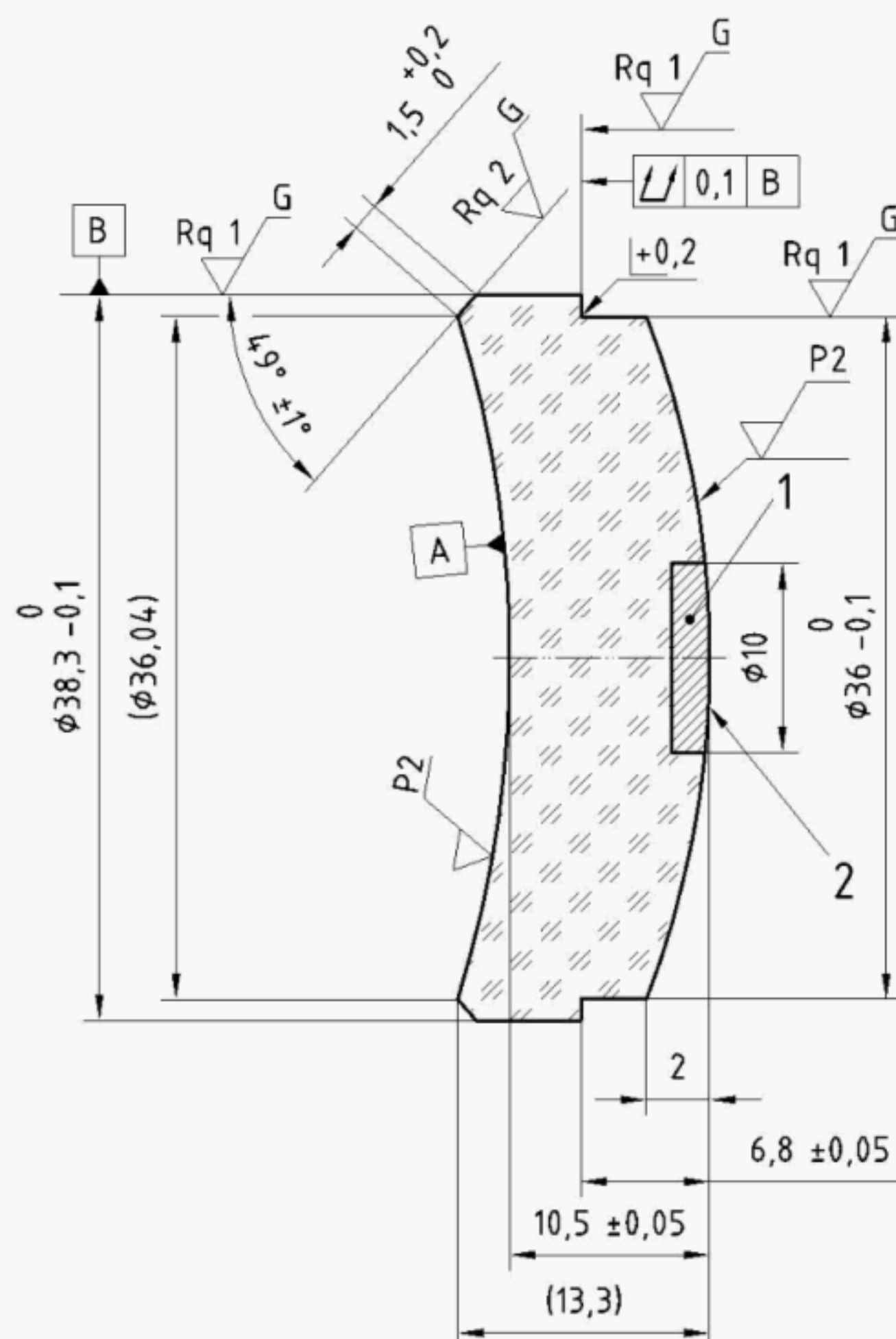


Figure 2 — Tabular indication of data for a cemented assembly



Surface 1		Material specification		Surface 2	
R	37,449 CX	Hoya LaC9 or Schott N-LaK9		R	∞
Ø <sub>e</sub>	30,5			Ø <sub>e</sub>	29
Protective chamfer 0,4 to 0,6		n (1 060 nm) 1,675 9 ± 0,001		Protective chamfer 0,4 to 0,6	
⊙λ	AR 209.1060	v	—	⊙λ	AR 209.1060
3/	5 (1)	0/	20	3/	5(1)
4/	1,4'	1/	5 × 0,1	4/	—
5/	5 × 0,1; C 5 × 0,16; L 3 × 0,004; E 0,4	2/	1; 2	5/	5 × 0,1; C 5 × 0,16; L 3 × 0,004; E 0,4
6/	—			6/	—
Indications in accordance with ISO 10110				Lens 114.379	

Figure 3 — Example of tabular indication of data for an optical element



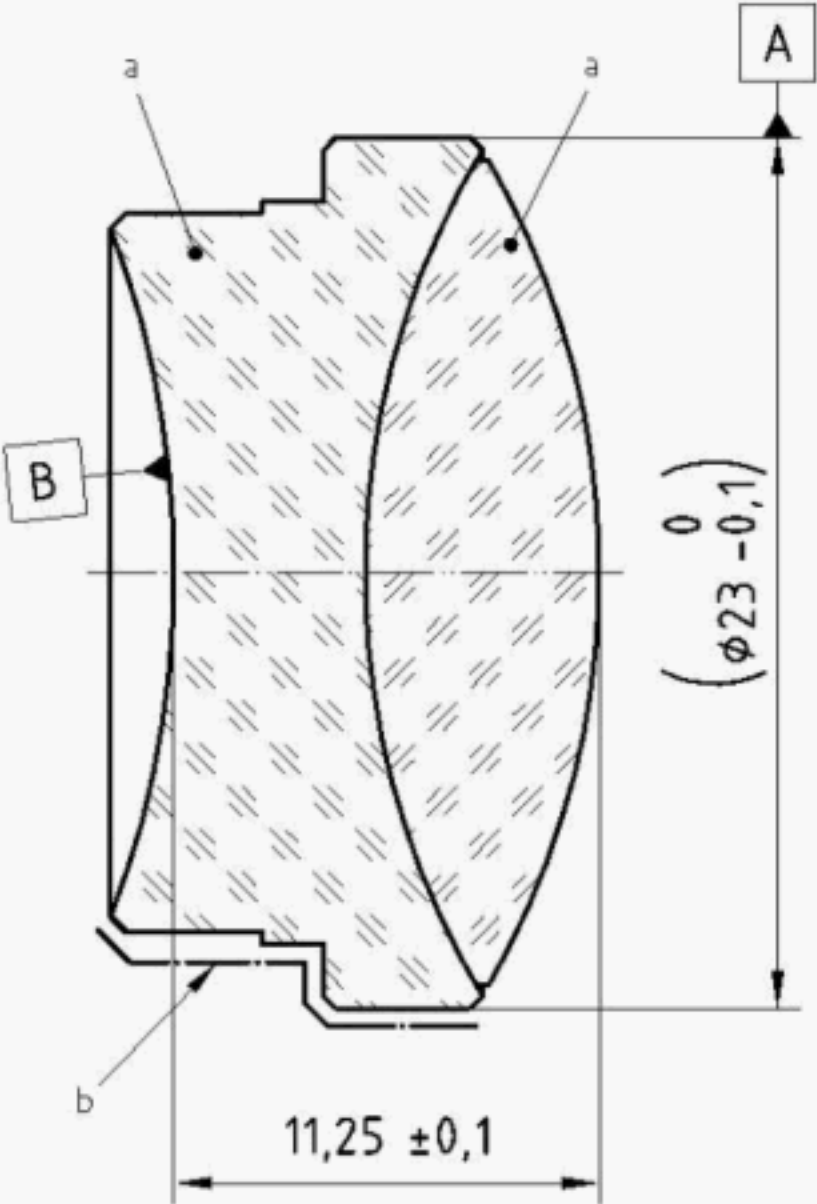
**Key**

1 test volume  $1/3 \times 0,1$

2 test zone  $5/3 \times 0,1$ ;  $L1 \times 0,004$

Surface 1		Material specification	Surface 2	
R	60,43 CC	N-BK7	R	50,17 CX
$\varnothing_e$	35		$\varnothing_e$	34
Protective chamfer 0,2 to 0,4		$n_e$ 1,518 72 $\pm$ 0,001	Protective chamfer 0,2 to 0,4	
$\lambda$	AR 207b	$v_e$ 63,69 $\pm$ 0,8 %	$\lambda$	—
3/	2 (0,5)	0/ 10	3/	3 (1)
4/	—	1/ 5 $\times$ 0,16	4/	2'
5/	5 $\times$ 0,16; L 2 $\times$ 0,04; E 0,5	2/ 1; 2	5/	5 $\times$ 0,16; L 2 $\times$ 0,04; E 0,5
			To be cemented	
Indications in accordance with ISO 10110			Lens 124.736	

**Figure 4 — Example of tabular indication of data for an optical element (lens)**



Surface 1		Surface 2		Surface 3	
$\varnothing_e$	16,5	$\varnothing_e$	19,8	$\varnothing_e$	20,8
$\lambda$	(AR 209.1060)	$\lambda$	—	$\lambda$	(AR 209.1060)
4/	—	4/	$\Delta 1'$	4/	0,6'
6/	—	6/	—	6/	—
Cement: NOA61					

Indications in accordance with ISO 10110

Optical cemented assembly 987.654

- a Part number.
- b Paint, specification 12345.

Figure 5 — Example of tabular indication of data for a cemented assembly (doublet)

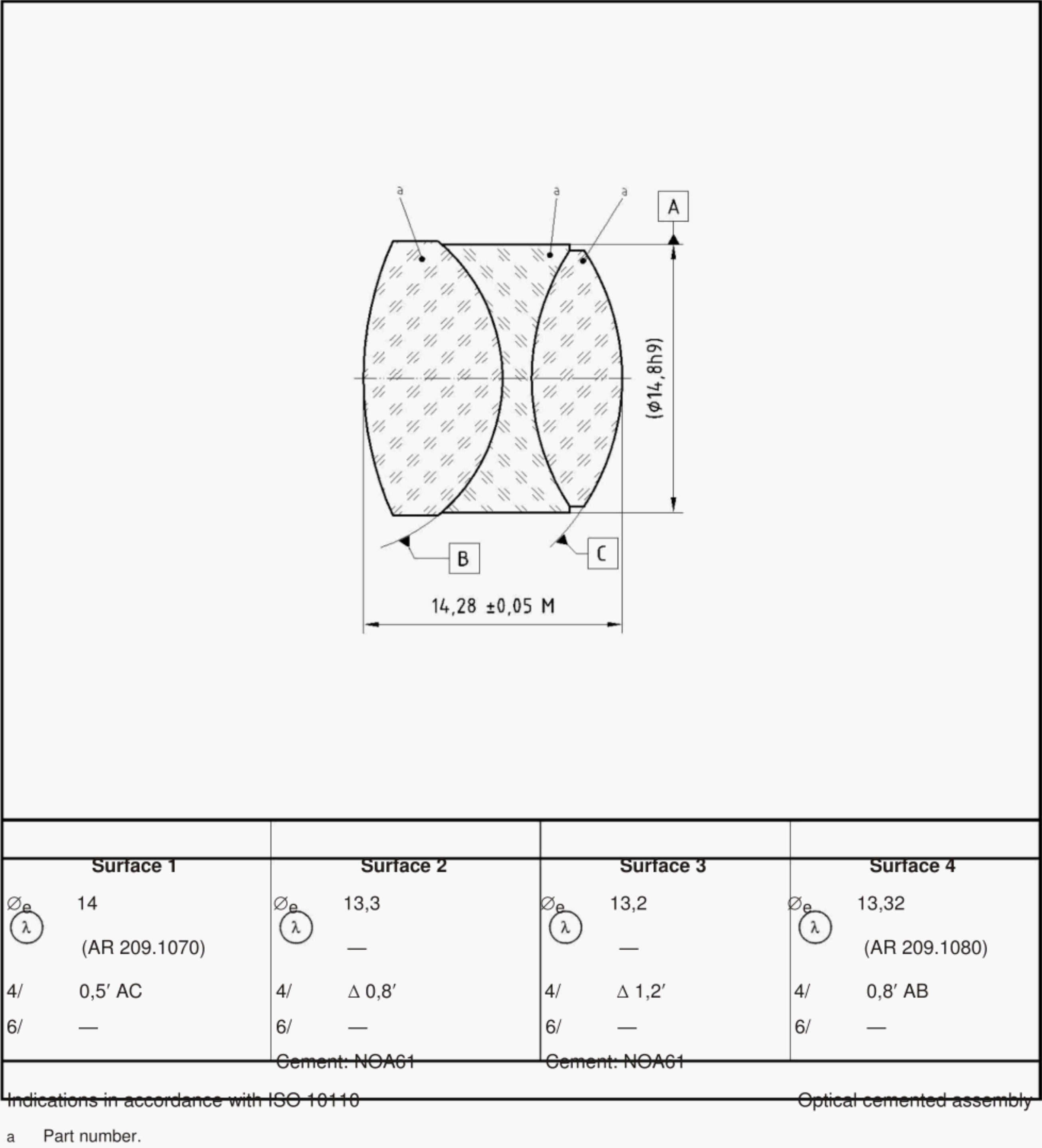
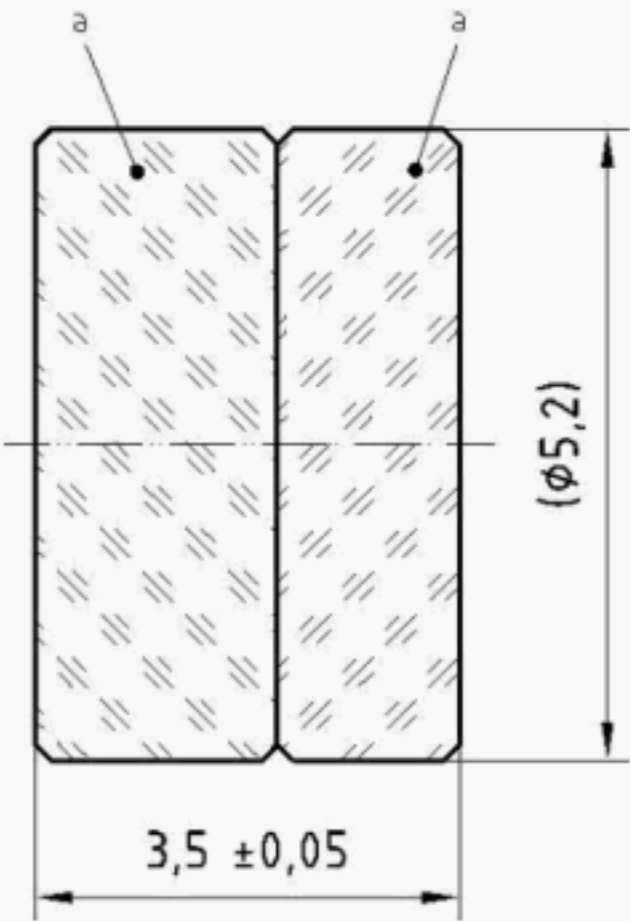


Figure 6 — Example of tabular indication of data for a cemented assembly (triplet)



Surface 1	Surface 2	Surface 3
$\varnothing_e$ 5,0 $\lambda$ spec. No. 4321 4/ —	$\varnothing_e$ 5,0 $\lambda$ — 4/ $\Delta 1'$	$\varnothing_e$ 4,8 $\lambda$ — 4/ — 6/ —
Cement: # 1234		

Indications in accordance with ISO 10110

Optical sub-assembly 456.654

a Part number.

Figure 7 — Example of tabular indication of data for a cemented assembly

## Bibliography

- [1] ISO 129, *Technical drawings — Dimensioning — General principles, definitions, methods of execution and special indications*
- [2] ISO 7944, *Optics and optical instruments — Reference wavelengths*
- [3] ISO 10110-1, *Optics and optical instruments — Preparation of drawings for optical elements and systems — Part 1: General*
- [4] ISO 10110-12, *Optics and optical instruments — Preparation of drawings for optical elements and systems — Part 12: Aspheric surfaces*
- [5] ISO 10110-14, *Optics and optical instruments — Preparation of drawings for optical elements and systems — Part 14: Wavefront deformation tolerance*



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