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**Ophthalmic optics — Visual acuity  
testing — Standard optotype and its  
presentation**

*Optique ophtalmique — Essai d'acuité visuelle — Optotype normalisé et  
sa présentation*

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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 8596 was prepared by Technical Committee ISO/TC 172, *Optics and photonics*, Subcommittee SC 7, *Ophthalmic optics and instruments*.

This second edition cancels and replaces the first edition (ISO 8596:1994), which has undergone minor revision to take into account the withdrawal without replacement of ISO 8597:1994, *Optics and optical instruments — Visual acuity testing — Method of correlating optotypes*.

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# Ophthalmic optics — Visual acuity testing — Standard optotype and its presentation

## 1 Scope

This International Standard specifies a range of Landolt ring optotypes and describes a method for measuring distance visual acuity under daylight conditions for the purposes of certification or licensing.

It is neither intended as a standard for clinical measurements nor for the certification of blindness or partial sight.

For the purposes of measuring visual acuity, the standard optotype should be used.

For clinical use, see the recommendation prepared by the Visual Functions Committee of the International Council of Ophthalmology<sup>[1]</sup>.

## 2 Normative references

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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 3:1973, *Preferred numbers — Series of preferred numbers*

## 3 Standard optotype

The standard optotype shall be the Landolt ring as detailed in Table 1 and as shown in Figure 1.

The visual acuity grade 1 shall be represented by a Landolt ring whose outer diameter,  $d$ , subtends an angle of 5' and whose width, as well as the gap in its continuity, subtends an angle of 1' at the designated viewing distance.

The Landolt ring shall be capable of being presented in eight different positions (see 6.2).

## 4 Visual acuity grades and standard optotype grades

The visual acuity grades shall be as given in Table 1 and shall be expressed as the reciprocal of the gap width measured in minutes of arc.

The acuity values for the size of the optotype shall be graduated logarithmically. The quotient of the size of the optotype and that of the next smaller one shall be:

$$\sqrt[10]{10} = 1,258\ 9 \text{ (series of preferred numbers R10 from ISO 3:1973).}$$

Optotypes of acuity grades 0,05, 0,06, 0,08 and 2,0 may be omitted if necessary. Addition of further acuity grades is permitted.

Table 1 — Visual acuity grades

Acuity grade <sup>a</sup>	Log gap size	Optotype size		Minimum number of presentations
		Angle for gap and ring width Minutes of arc (')	Permissible deviation %	
0,05	+1,3	20	± 5	2
0,063 (0,06)	+1,2	16		
0,08	+1,1	12,5		
0,1	+1	10		
0,125	+0,9	8		3
0,16	+0,8	6,3		
0,2	+0,7	5		
0,25	+0,6	4		5
0,32 (0,3)	+0,5	3,2		
0,4	+0,4	2,5		
0,5	+0,3	2		
0,63 (0,6)	+0,2	1,6		
0,8	+0,1	1,25		
1,0	0	1		
1,25	-0,1	0,8		
1,6	-0,2	0,63		
2,0	-0,3	0,5	± 10	

<sup>a</sup> The values in parentheses shall be used only for the purpose of identifying the acuity grade.

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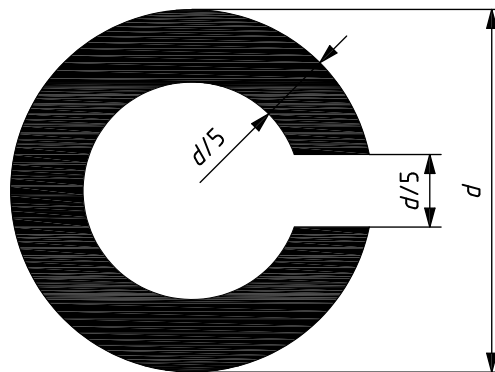


Figure 1 — Landolt ring

Table 2 — Spacing between standard optotypes (border to border)

Acuity grades	Minimum spacing between standard optotypes
less than 0,06	2 × width of gap in Landolt ring
0,06 to 0,125	diameter of Landolt ring
0,16 to 0,32	1,5 × diameter of Landolt ring
0,4 to 1,0	2 × diameter of Landolt ring
greater than 1,0	3 × diameter of Landolt ring

## 5 Test area and spacing between standard optotypes

The field shall extend at least  $0,5^\circ$  in all directions from the contour of the optotypes to the border of the test field. If more than one standard optotype is used in the same test area, the spacings given in Table 2 shall apply. If more than one acuity grade is used on the test area, the spacing for the largest optotype shall apply.

Table 2 applies to both horizontal and vertical spacing.

The background to the optotypes shall appear uniformly bright and without any variation of colour or texture which could indicate the orientation of the symbols. If the different orientations are achieved by rotation of the optotypes, this rotary movement shall not be observed by the subject.

## 6 Presentation of the standard optotype

### 6.1 Quality of presentation

The standard optotype as presented shall appear with sharply defined contours to an observer with a visual acuity of at least 1,0 at an observation distance of  $1/3$  of the distance at which the test types are designed to be used. Test types presented in instruments shall be observed with a magnification of  $3\times$ . The optotypes in a series shall not differ noticeably in contrast and contour.

### 6.2 Positions of the optotype

The optotype shall be presented in at least the number of different positions per acuity grade as shown in Table 1. In 50 % of these positions, the gap shall be either vertical or horizontal but, in the case when there is an odd number of presentations, this value shall be rounded to the next larger integer. The sequence of presentations shall be as diversified as possible and shall be randomly ordered. If the standard optotype is presented singly, this fact shall be specifically mentioned in the test report.

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### 6.3 Viewing distance for distance visual acuity testing

The test shall be performed with a minimum viewing distance of 4 m between the entrance pupil of the subject and the optotype.

### 6.4 Criteria for determination and assignment of visual acuity grade

When testing for visual acuity, the performance level at which the presentation of optotypes shall be terminated is dependent upon the number of optotypes used for each size.

For a "Pass" assessment:

- at least three shall be called correctly if the total number of optotypes used is five;
- at least four shall be called correctly if the total number of optotypes used is six or seven;
- at least five shall be called correctly if the total number of optotypes used is eight or nine;
- at least six shall be called correctly if the total number of optotypes used is ten.

NOTE Preferred numbers of presentation are five, eight or ten. In each case, the minimum called correctly represents approximately 60 % of the total.

The test shall be terminated at the first grade at which the number called correctly falls below the "Pass" level. The visual acuity shall be assigned, by reference to Table 1, as one grade lower than the grade at which the test is terminated.

## 7 Luminance

The luminance of the test area shall be as given in Table 3 and shall apply to all methods of presentation.

The luminance of the standard optotype shall be not more than 15 % of that of the test area, taking into account the room illumination. The surrounding field (test room) shall be darker than the test area. However, within an area of 10° diameter, the luminance of the surrounding field shall be not less than 1/10 nor more than 1/4 of the luminance of the test area. There shall be no direct or indirect glare source (e.g. light source, reflected image of a light source, glossy or very bright matt surface) within the field of view. White light within a colour temperature range of 2 500 K to 7 000 K shall be used.

NOTE In measuring the visual acuity, the luminance and contrast conditions should be such that consistent results can be expected for a normal eye.

**Table 3 — Luminance**

Luminance range cd/m <sup>2</sup>	General surrounding luminance as a fraction of the luminance of the test area	
	field ≤ 10°	field > 10°
80 to 320	not less than 0,1 not more than 0,25	not less than 0,01 <sup>a</sup>
<sup>a</sup> No brighter than 10° field.		

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## 8 Test report

The test report shall include the following information:

- a) reference to this International Standard, i.e. [ISO 8596:2009](https://standards.iteh.ai/catalog/standards/sist/8a5ed492-8f85-4b25-8a95-6df6948caf80/iso-8596-2009);
- b) identification of the acuity grades of the optotypes used in the test (see Table 1);
- c) the instrument used, if any;
- d) the number of different positions for each acuity grade (see 6.2);
- e) the viewing distance used (see 6.3);
- f) the assigned visual acuity grade (see 6.4);
- g) the date of the test.



## Bibliography

- [1] International Council of Ophthalmology — Visual Functions Committee, *Visual Acuity Measurement Standard*. Ital. J. Ophthalmol., 11/1, pp. 5-19, 1988

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