INTERNATIONAL STANDARD

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

Optique ophtalmique — Mesure de l'acuité visuelle — Optotype normalisé et sa présentation

Reference number
ISO 8596:1994(E)

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.

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.

International Standard ISO 8596 was prepared by Technical Committee ISO/TC 172, *Optics and optical instruments*, Sub-Committee SC 7, *Ophthalmic, endoscopic, metrological instruments and test methods*.

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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.

NOTE 1 For the purposes of measuring visual acuity, the standard optotype, or other optotypes which have been correlated with the standard optotype (as described in ISO 8597), should be used.

For clinical use, see the recommendation prepared by the Visual Functions Committee of the International Council of Ophthalmology (see clause 2).

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

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

ISO 8597:—[1], *Optics and optical instruments — Visual acuity testing — Method of correlating optotypes.*

Consilium Ophthalmologicum Universale — Visual Functions Committee, *Visual Acuity Measurement Standard.* Ital. J. Ophthalmol. II/I (1988), pp. 5-19.

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 a test type and that of the next smaller one shall be:

$\sqrt[10]{10} = 1{,}2589$ (series of preferred numbers R10 from ISO 3).

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.

1) To be published.

Table 1 — Visual acuity grades

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

1) The values in parentheses shall be used only for the purpose of identifying the acuity grade.

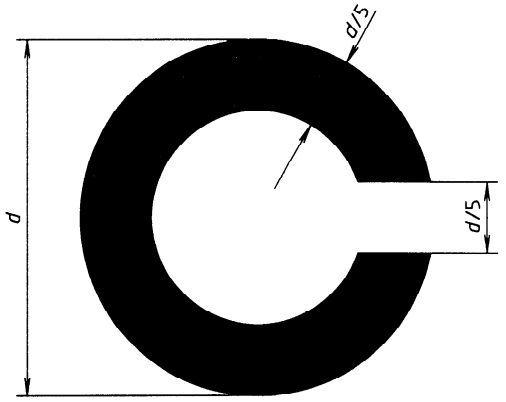

Figure 1 — Landolt ring

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° 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. 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 are an odd number of presentations, this value shall be rounded to the next larger integer. The sequence of presentations shal 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.

NOTE 2 In general, if correlated optotypes (see ISO 8597) are used, at least five presentations should be made for each size. As the number varies, the choice of optotypes should be as diversified as possible and should be randomly ordered.

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; and at least six shall be called correctly if the total number of optotypes used is ten.

NOTE 3 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

Table 3 — Luminance

Luminance range cd/m^2	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[1)]
1) Not brighter than 10° field.		

to table 1, as one grade lower than the grade at which test is terminated.

7 Luminance

The luminance of the test area shall be 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 4 In measuring the visual acuity, the luminance and contrast conditions should be such that consistent results can be expected for a normal eye.

8 Test report

The test report shall include the following information:

a) reference to this International Standard (ISO 8596);

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.

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Descriptors: optics, optical equipment, tests, visual acuity tests, optotypes, standard measures.

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