British Standard

BRITISH STANDARD

BS EN ISO 8597:1996
BS 4274-3: 1996

Visual acuity test types — Method for correlating optotypes used for non-clinical purposes

The European Standard EN ISO 8597:1996 has the status of a British Standard

ICS 11.040.70

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee CH/78, Ophthalmic optics, upon which the following bodies were represented:

Association of British Dispensing Opticians
Association of British Health-Care Industries
Association of Contact Lens Manufacturers
British College of Optometrists
British Contact Lens Association
British Medical Association
British Spectacle Frame Makers' Association
Consumer Policy Committee of BSI
Department of Health
Department of Trade and Industry (National Physical Laboratory)
Federation of Manufacturing Opticians
Federation of Ophthalmic and Dispensing Opticians
Flat Glass Manufacturers' Association
Optic (UK)
Royal College of Ophthalmologists

This British Standard, having been prepared under the direction of the Health and Environment Sector Board, was published under the authority of the Standards Board and comes into effect on 15 July 1996

The following BSI references relate to the work on this standard:
Committee reference CH/78
Draft for comment 86/55504 DC

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Amendments issued since publication

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Contents

National foreword

This British Standard has been prepared by Technical Committee CH/78 and is the English language version of EN ISO 8597:1996 *Optics and optical instruments — Visual acuity testing — Method of correlating optotypes*, published by the European Committee for Standardization (CEN). It is identical with ISO 8597:1994, including Technical Corrigendum 1:1995, published by the International Organization for Standardization (ISO). The point of implementation of Technical Corrigendum 1:1995 is indicated by a sideline.

This standard has been given the secondary identifier BS 4274-3 in order to differentiate the non-clinical application of optotypes from the use of test charts for the clinical determination of visual acuity specified in BS 4274-1. (This latter standard was originally published in 1968 as BS 4274 but has now been renumbered as BS 4274-1. It is being revised at the time of publication of this standard.)

It was assumed during drafting that this standard would be used and applied by those who are appropriately qualified and experienced.

BS EN ISO 8596:1996 *Visual acuity test types — Specification for Landolt ring optotype for non-clinical purposes* is published simultaneously with this standard.

Cross-references

Publication referred to	Corresponding British Standard
ISO 8596:1994	BS EN ISO 8596:1996 *Visual acuity test types — Specification for Landolt ring optotype for non-clinical purposes* (Identical)

See also Annex ZA.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN ISO title page, pages 2 to 6, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 8597

February 1996

ICS 11.040.70

Descriptors: Optics, optical equipment, tests, visual acuity tests, optotypes.

English version

Optics and optical instruments — Visual acuity testing — Method of correlating optotypes

(ISO 8597:1994, including Technical Corrigendum 1:1995)

Optique et instruments d'optique — Méthode d'essai de l'acuité visuelle — Méthode de corrélation entre les optotypes
(ISO 8597:1994, Rectificatif Technique 1:1995 inclus)

Optik und optische Instrumente — Sehschärfeprüfung — Verfahren zum Anschluß von Sehzeichen
(ISO 8597:1994, einschließlich Technische Korrektur 1:1995)

This European Standard was approved by CEN on 1996-02-16. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Foreword

The text of the International Standard from ISO/TC 172, Optics and optical instruments, of the International Organization for Standardization (ISO) has been taken over as a European Standard by the Technical Committee CEN/TC 170, Ophthalmic optics, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 1996, and conflicting national standards shall be withdrawn at the latest by August 1996.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain Sweden, Switzerland, and the United Kingdom.

1 Scope

This International Standard specifies a method of correlation between a given set of optotypes and the standard optotype (Landolt ring) specified by ISO 8596.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was 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 edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 8596:1994, *Ophthalmic optics — Visual acuity testing — Standard optotype and its presentation.*

3 General requirements for optotypes

For all optotypes, the requirements and method of use given in ISO 8596 shall appply, unless otherwise specified in this International Standard.

Each size of a set of optotypes shall be specified in terms of the size of some critical dimension common to that set of optotypes. In the case of the standard Landolt ring, the critical detail is the gap size. In the case of a set of optotypes where there is no dimension common to the different members of the set (e.g. optotypes for illiterates), the members of a given acuity grade shall have the same relative dimensions as corresponding members of other acuity grades. The size shall be identified by a specified dimension of one member of the set.

NOTE 1 If letters or figures are used for visual acuity measurement, then it should be acknowledged that these normally show large differences in respect of recognizability, even if their size and thickness of stroke are identical. The disadvantages of their use can be reduced by choosing letters or figures which are comparable with each other.

4 Correlation of optotypes

4.1 Standard optotypes

The optotype sizes (grades) specified in ISO 8596 shall be used. Sufficient grades or steps shall be used to establish a frequency of seeing curve for the standard optotype and the optotype being investigated.

4.2 Test area

The test area shall be circular with a diameter of $4° \pm 0{,}4°$.

The surrounding field shall have a diameter of $15° \pm 1{,}5°$ and shall be illuminated homogeneously so that it does not influence the measurement.

The luminance of the surrounding field shall not be greater than that of the test area.

4.3 Presentation of the optotypes

In making a measurement of visual acuity with the eight-position Landolt ring, 120 presentations shall be made one ring at a time with the ring positions for successive presentations arranged in random order. In the case of the optotypes to be correlated, these shall also be presented one at a time in random order until a series of 120 presentations has been completed. In the 120 presentations, the different optotypes in each set shall be represented approximately the same number of times.

NOTE 2 The number 120 is divisible by 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 30, 40 and 60. Hence, with sets of optotypes having any of these numbers of different optotypes, it is possible for each optotype to be represented the same number of times in 120 presentations.

The comparison shall start with a grade of optotypes large enough to yield a frequency of seeing of 100 %. Measurements shall be made with both eight-position Landolt rings and the optotypes of the same size being correlated. When this has been completed, the procedure shall be repeated with smaller and smaller sizes until the failure rate corresponds to the level of guessing of 0,125. Each optotype shall be exposed for 3 s with an interval of 4 s between exposures.

NOTE 3 If possible, the comparison of optotypes should be made by means of binocular measurement.

4.4 Corrective lenses

The observers shall be fully corrected to a visual acuity of 1,0 or better, if necessary.

4.5 Test distance

The test shall be performed at a distance of $5\ m \pm 0{,}05\ m$ between the subject and the optotype.

NOTE 4 This test distance is for correlation purposes only. For visual acuity testing, the minimum viewing distance is 4 m (ISO 8596).

4.6 Luminance

The luminance of the test area shall be $200\ cd/m^2 \pm 50\ cd/m^2$ and shall be the same for the Landolt ring as for the optotypes to be correlated. The difference between the luminances of both test areas shall not exceed 10 %. The luminance of the optotypes themselves shall not exceed 10 % of the luminance of the test area.

5 Assignment of an acuity score

If, before the end of the test, the observer makes a point of no longer being able to recognize the test types, the subject shall be requested to make a guess. The subject shall not be informed before the end of the test whether or not any mistakes were made. The number of errors per optotype size shall be recorded. From the raw data, an allowance for guessing shall be made and the frequency of seeing shall be assessed for each optotype size.

NOTE 5 The allowance for guessing is performed by the following equation:

$$\frac{E}{N} = \frac{R - Np}{N(1-p)}$$

where

E is the number of right answers corrected for guessing;

N is the number of presentations;

R is the number of right answers;

p is the probability of guessing (p is equal to the reciprocal of the number of different optotypes or directions in the set).

For the various grades, the frequency of seeing shall be plotted against the logarithm of the size of the critical details. The points on the graph for each type of optotype shall be fitted with an ogive curve represented by the integral of the probability curve.

NOTE 6 Any of the usual methods of fitting the ogive curve may be used.

From the curves, the optotype sizes at which the frequency of seeing is 50 % shall be estimated, representing the thresholds for the Landolt ring optotype and the optotype being correlated. From these thresholds the acuity scores shall be derived.

6 Assessing the equivalence of two kinds of optotypes

The measurements described in clause **5** shall be repeated with ten or more observers with normal vision (visual acuity of 1,0 or better) or the observers shall be fully corrected to a visual acuity of 1,0 or better, if necessary. The threshold values for each kind of optotype shall be averaged.

NOTE 7 If the two averages differ by more than 0,05 log units, the two sets of optotypes cannot be said to be equivalent. They can be made equivalent by enlarging or contracting the size of the non-standard optotypes by a factor equal to the ratio of the visual acuity for the non-standard optotypes to the visual acuity for the standard optotypes.

7 Significance of the difference between the two averages

The meaningfulness of the difference between the two averages can be studied by

a) comparing the overlap of the frequency distributions of the two sets of scores;

b) using standard statistical procedures to evaluate the significance of the difference between the averages;

c) plotting a frequency distribution of the differences between the scores on the separate tests to evaluate the tendency to be high or low on both tests;

d) using the method of linear regression.

Annex ZA (normative)
Normative references to international publications with their corresponding European publications

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

Publication	Year	Title	EN	Year
ISO 8596	1994	*Ophthalmic optics — Visual acuity testing — Standard optotype and its presentation*	EN ISO 8596	1996

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List of references

See national foreword.

BS EN ISO 8597:1996
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BSI — British Standards Institution

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Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

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