SLOVENSKI STANDARD
SIST EN ISO 8980-4:2006

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Očesna optika – Nebrušena zglajena stekla očal - 4. del: Specifikacije in preskusne metode za protiodbojno prevleko (ISO 8980-4:2006)

Ophthalmic optics - Uncut finished spectacle lenses - Part 4: Specifications and test methods for anti-reflective coatings (ISO 8980-4:2006)

Augenoptik - Rohkantige fertige Brillengläser - Teil 4: Anforderungen und Prüfverfahren für reflexmindernde Vergütungen (ISO 8980-4:2006)

Optique ophtalmique - Verres de lunettes finis non détourés - Partie 4: Spécifications et méthodes d'essai relatives aux traitements antireflet (ISO 8980-4:2006)

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ICS:

11.040.70 Oftalmološka oprema Ophthalmic equipment

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English Version

Ophthalmic optics - Uncut finished spectacle lenses - Part 4: Specifications and test methods for anti-reflective coatings (ISO 8980-4:2006)

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This European Standard was approved by CEN on 7 August 2006.

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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.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This document (EN ISO 8980-4:2006) has been prepared by Technical Committee ISO/TC 172 "Optics and optical instruments" in collaboration with 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of an identical text or by endorsement, at the latest by February 2007, and conflicting national standards shall be withdrawn at the latest by February 2007.

This document supersedes EN ISO 8980-4:2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Endorsement notice

The text of ISO 8980-4:2006 has been approved by CEN as EN ISO 8980-4:2006 without any modifications.

INTERNATIONAL STANDARD

ISO 8980-4

Second edition
2006-08-15

Ophthalmic optics — Uncut finished spectacle lenses —

Part 4: Specifications and test methods for anti-reflective coatings

Optique ophtalmique — Verres de lunettes finis non détourés — Partie 4: Spécifications et méthodes d'essai relatives aux traitements antireflet

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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 8980-4 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 8980-4:2000), which has been revised to include non-optical specifications.

ISO 8980 consists of the following parts, under the general title *Ophthalmic optics — Uncut finished spectacle lenses*:

— *Part 1: Specifications for single-vision and multifocal lenses*

— *Part 2: Specifications for progressive power lenses*

— *Part 3: Transmittance specifications and test methods*

— *Part 4: Specifications and test methods for anti-reflective coatings*

— *Part 5: Minimum requirements for spectacle lens surfaces claimed to be abrasion-resistant*

Ophthalmic optics — Uncut finished spectacle lenses —

Part 4: Specifications and test methods for anti-reflective coatings

1 Scope

This part of ISO 8980 specifies optical and non optical requirements, including durability, and test methods for anti-reflective coatings on spectacle lenses.

This part of ISO 8980 does not deal with the following topics:

— transmittance and absorptance;

— the colour of the reflected light.

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 48, *Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD)*

ISO 8980-1, *Ophthalmic optics — Uncut finished spectacle lenses — Part 1: Specifications for single-vision and multifocal lenses*

ISO 8980-2, *Ophthalmic optics — Uncut finished spectacle lenses — Part 2: Specifications for progressive power lenses*

ISO 8980-3, *Ophthalmic optics — Uncut finished spectacle lenses — Part 3: Transmittance specifications and test methods*

ISO 13666, *Ophthalmic optics — Spectacle lenses — Vocabulary*

ISO 14889, *Ophthalmic optics — Spectacle lenses — Fundamental requirements for uncut finished lenses*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 13666 and the following apply.

3.1
durability
⟨of anti-reflective coating⟩ ability to resist deterioration of its reflectance characteristics, over time, in normal use

NOTE 1 The major factors contributing to deterioration of an anti-reflective coating are rubbing, heat, UV radiation and humidity.

NOTE 2 The main failure mechanism affecting the durability of anti-reflective coatings is a loss of adhesion. Therefore, requirements of this part of ISO 8980 are related to anti-reflective coating adhesion.

4 Requirements

4.1 General requirements

Anti-reflective coated lenses shall comply with the general requirements concerning the finished spectacle lens specifications in:

— ISO 8980-1;

— ISO 8980-2;

— ISO 8980-3;

— ISO 14889.

NOTE 1 For further information on the properties of anti-reflective coatings, see informative Annex A.

NOTE 2 The reflectance characteristics of an anti-reflective coating should not significantly change due to deterioration of the coating in normal use.

4.2 Luminous and mean reflectances

The luminous reflectance ρ_V and the mean reflectance ρ_M of an anti-reflective coated lens shall be determined by the method specified in 5.2.

If the manufacturer specifies values for luminous and mean reflectances, the measured values shall not exceed the specified values by more than 20 %.

When determined as described in 5.4, the luminous reflectance ρ_V of any anti-reflective coated lens surface shall be less than 2,5 %.

4.3 Usable diameter of coated area

The usable diameter of the coated area for uncut finished spectacle lenses shall be $\geqslant (d_n - 4)$ mm, where d_n is the nominal diameter of the lens, in millimetres, indicated by the manufacturer.

4.4 Durability

Under the conditions described in the test method given in 5.6, five consecutively tested lenses shall be free of significant loss of adhesion as defined in 5.6.4.

A product meets the durability requirements of this part of ISO 8980 if all five lenses tested satisfy this criterion.

5 Testing

5.1 General

This clause specifies type test methods for anti-reflective coatings on spectacle lenses. At least 24 h shall elapse after coating before any type test is carried out. Lenses shall be stored at a temperature of 20 °C to 26 °C.

5.2 Method of determination of reflectance

5.2.1 Apparatus

Use any dual-beam or single-beam spectrophotometer with an incident angle not larger than 17° and with a measurement accuracy sufficient to give the value of the spectral reflectance at all wavelengths λ between 380 nm and 780 nm with an uncertainty of less than 0,1 % (for example, an anti-reflective coating quoted as having 0,5 % reflectance may be measured as having 0,4 % to 0,6 % reflectance). The wavelength increment of measurement shall not be more than 5 nm. The spectral bandwidth (full width at half maximum, FWHM) shall not exceed 5 nm.

The calibration specimen shall have a surface curvature within 0,50 D of that of the spectacle lens to be tested. The back surface of this specimen shall be designed such that no reflection will interfere with the measurement (e.g. both frosted and painted matt black). The calibration specimen shall be of known refractive index $n(\lambda)$ (uncertainty $\Delta n < 0{,}001$) and have no coating (which could affect its surface reflective properties). The surface shall be cleaned.

5.2.2 Spectacle lens preparation

The surface of the spectacle lens under test shall have a radius of curvature not less than 80 mm. The back surface of the lens shall be designed such that no reflection will interfere with the measurement (e.g. both frosted and painted matt black). The surface shall be cleaned.

5.2.3 Measurement

Insert the calibration specimen and calibrate the spectrophotometer to give a value of 100 %. Then insert the spectacle lens. The spectrophotometer will give the value of the spectacle lens to calibration specimen spectral reflectance ratio $R_T(\lambda)$, expressed as percentage. By using this technique, any error due to surface curvature will be eliminated.

Measure the spectacle lens to calibration specimen spectral reflectance ratio over the range 380 nm to 780 nm, at least every 5 nm.

5.3 Determination of spectral reflectance values

The value of the calibration specimen surface spectral reflectance $R_C(\lambda)$ is calculated theoretically from the refractive index.

$$R_C(\lambda) = \left[\frac{n(\lambda)-1}{n(\lambda)+1}\right]^2$$

The value of the spectacle lens surface spectral reflectance is calculated by multiplying the calibration specimen spectral reflectance value by the spectacle lens-to-calibration specimen spectral reflectance ratio:

$$\rho(\lambda) = R_C(\lambda) \times R_T(\lambda)$$