INTERNATIONAL STANDARD

ISO 14889

Second edition
2003-05-15

Ophthalmic optics — Spectacle lenses — Fundamental requirements for uncut finished lenses

Optique ophtalmique — Verres de lunettes — Exigences fondamentales relatives aux verres finis non détourés

Reference number
ISO 14889:2003(E)

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Published in Switzerland

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 14889 was prepared by Technical Committee ISO/TC 172, *Optics and optical instruments*, Subcommittee SC 7, *Ophthalmic optics and instruments*.

This second edition cancels and replaces the first edition (ISO 14889:1997), which has been technically revised.

Ophthalmic optics — Spectacle lenses — Fundamental requirements for uncut finished lenses

1 Scope

This International Standard specifies fundamental requirements for uncut finished spectacle lenses. This International Standard is not applicable to protective spectacle lenses.

This International Standard takes precedence over the corresponding requirements of other standards, if differences exist.

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 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 8980-4, *Ophthalmic optics — Uncut finished spectacle lenses — Part 4: Specifications and test methods for anti-reflective coatings*

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

3 Terms and definitions

For the purposes of this International Standard, the terms and definitions given in ISO 13666 as well as the following.

3.1
manufacturer (of an uncut finished spectacle lens)
natural or legal person who places the uncut finished lens on the market

4 Fundamental requirements for spectacle lenses

4.1 Performance

In addition to the requirements specified in this International Standard, uncut finished lenses shall comply with the relevant parts of ISO 8980.

4.2 Design

Spectacle lenses shall be designed so that the overall risk associated with their use according to the conditions intended by the manufacturer, relative to the risk when the spectacle lenses are not used, is reduced to a level consistent with the materials used and compatible with the generally acknowledged state-of-the-art.

4.3 Materials

4.3.1 Physiological compatibility

Lenses shall not be made from materials known to be physiologically incompatible or known to create allergic or toxic reactions amongst a significant proportion of wearers when the lenses are used as intended by the manufacturer.

4.3.2 Inflammability

When the lens is tested as described in 5.2, there shall be no continued combustion after withdrawal of the test rod.

4.4 Mechanical strength

Uncut spectacle lenses shall withstand the quasi-static loading type test for minimum robustness described in 5.3.

The requirement for minimum robustness shall be satisfied if the spectacle lens withstands the application of a 22 mm diameter steel ball with a force of (100 ± 2) N, when tested as described in 5.3.

This test shall be carried out immediately after conditioning at a temperature of (23 ± 5) °C.

After this test, the following defects shall not be apparent:

a) lens fracture

A spectacle lens shall be considered to have fractured if it has cracked through its entire thickness into two or more pieces or if more than 5 mg of the lens material has become detached from the surface away from the one in contact with the ball or if the ball has passed through the test specimen.

b) lens deformation

A spectacle lens shall be considered to have been deformed if a mark has appeared on the white paper underneath the lens.

NOTE If the spectacle lens is intended for use for industrial or other purposes where mechanical hazards exist, a higher level of mechanical strength or robustness may be required. If eye protection is required, the specific requirements are given in the appropriate International Standard.

4.5 Transmittance

4.5.1 General requirements

The transmittance shall conform to the requirements specified in ISO 8980-3.

When using illuminant D 65, the luminous transmittance τ_V of spectacle lenses shall not be $\leqslant$ 3 % at the design reference point.

4.5.2 Additional requirements for lenses intended for use when driving

4.5.2.1 General

Spectacle lenses having a luminous transmittance $\leqslant$ 8 % are not intended for driving or road use. This clause therefore does not contain requirements for such lenses.

4.5.2.2 Spectral transmittance

The spectral transmittance $\tau(\lambda)$ at any wavelength in the range 500 nm to 650 nm shall be not less than 0,2 τ_V.

4.5.2.3 Daylight use

When using illuminant D 65, the luminous transmittance τ_V of spectacle lenses for driving during daylight shall be $>$ 8 % at the design reference point.

4.5.2.4 Use at night

When using illuminant D 65, the luminous transmittance τ_V of spectacle lenses for driving at night shall be $\geqslant$ 75 % at the design reference point.

4.5.2.5 Relative visual attenuation coefficient (quotient) for signal light recognition

Spectacle lenses conforming to 4.5.2.2, 4.5.2.3 and 4.5.2.4 shall have a relative visual attenuation coefficient (quotient) Q not less than:

a) 0,8 for Q red;

b) 0,8 for Q yellow;

c) 0,6 for Q green;

d) 0,4 for Q blue.

NOTE A definition of the relative visual attenuation coefficient (quotient) Q is given in ISO 13666.

5 Test methods

5.1 General

All tests described in this International Standard are type tests.

5.2 Inflammability

5.2.1 Apparatus

The test device consists of a steel rod (300 ± 3) mm long and 6 mm nominal diameter, with a flat end face perpendicular to its longitudinal axis, a heat source and a thermocouple with a temperature-indicating device.

5.2.2 Procedure

Heat one end of the steel rod over a length of at least 50 mm to a temperature of (650 ± 20) °C. Measure the temperature of the rod by means of the thermocouple attached at a distance of (20 ± 1) mm from the heated end of the rod.

With the rod positioned with its axis vertical, allow the heated face of the rod to rest under its own weight on the surface of the test sample for a period of not less than 5 s, and then remove the rod.

Repeat this test on a sample lens made from each material to be used. Carry out visual inspection to establish whether combustion continues after removal of the rod from the test sample.

5.3 Test for mechanical strength

5.3.1 Apparatus (see Figure 1)

5.3.1.1 Loading device

A steel ball of 22 mm nominal diameter is fastened to the lower end of a tube, the nominal length of which is 70 mm. The loading mass shall be such that the force acting on the test specimen is (100 ± 2) N.

5.3.1.2 Specimen support

The specimen support consists of a steel supporting plate and a pressure ring. The upper face of the steel supporting plate and the lower face of the pressure ring are, by appropriate means, each fitted with a circular silicone rubber ring of (40 ± 5) IRDH having an inside diameter of (35 ± 0,1) mm and a nominal cross section of 3 mm × 3 mm.

If the specimen lens is of insufficient dimensions to enable its entire periphery to be adequately supported, a suitable adaptor sleeve shall be used.

The pressure ring has a mass of (250 ± 5) g.

NOTE 1 This pressure ring is necessary to ensure that the silicone seating presses securely against the upper surface of the specimen.

A sheet of carbon paper on top of a sheet of white paper is placed on the plane base of a cylindrical cavity in the supporting plate. The plane base of the cavity is located 1,5 mm below the surface to which the silicone ring is attached (assumed as being plane in this case), and parallel to it. In those cases where a supporting plate is designed to support a lens surface that is not rotationally symmetrical and therefore has a three-dimensional upper face to carry the silicone ring (see 5.3.2.2), the distance of 1,5 mm is measured from the lowest point of the edge of the cavity to the plane base of it.

NOTE 2 An alternative method may be used (e.g., a mechanical sensor to measure deformation) if shown to be equivalent.

5.3.2 Procedure

5.3.2.1 Preparation

Carry out the test at the temperature specified in 4.4.

5.3.2.2 Positioning of the specimen

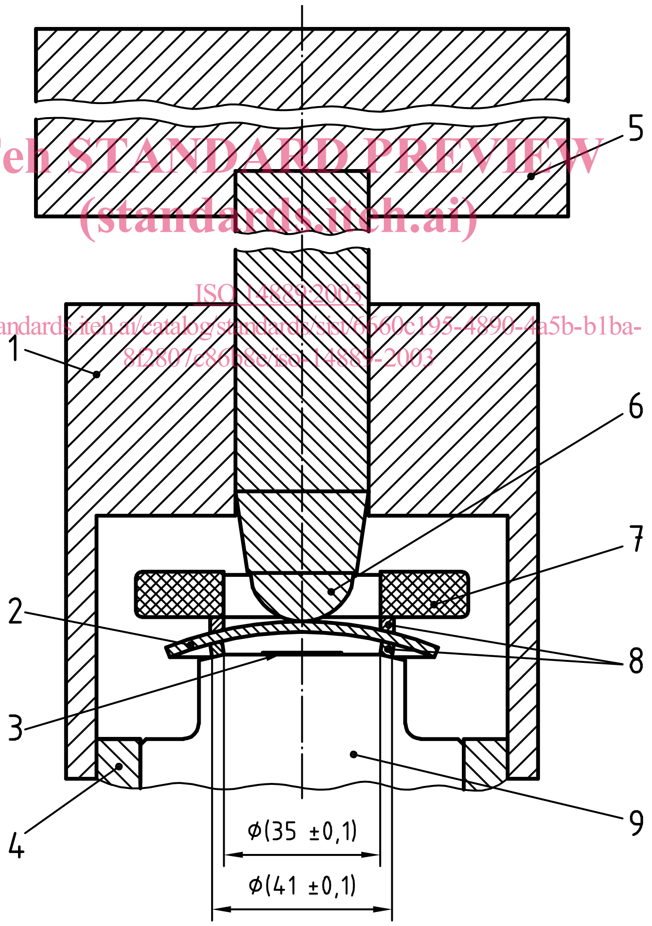
Centre the specimen on the support with the back surface downwards and place the pressure ring centrally on the specimen with its silicone rubber ring face down.

NOTE For lenses with other than rotationally symmetrical back surfaces, the supporting plate should be curved to conform to the lens back surfaces.

5.3.2.3 Application of the load

Lower the loading mass on to the lens at a speed not exceeding 400 mm/min. Maintain the force of (100 ± 2) N for (10 ± 2) s then remove the loading mass.

Dimensions in millimetres



Key

1 guiding block
2 spectacle lens
3 carbon paper on white paper
4 centring ring
5 loading mass (100 ± 2) N
6 steel ball
7 pressure ring (250 ± 5) g
8 silicone seating rings (35 × 3 × 3) mm
9 support system

Figure 1 — Apparatus for minimum robustness test