INTERNATIONAL STANDARD

ISO 8980-5

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Ophthalmic optics — Uncut finished spectacle lenses —

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

Optique ophtalmique — Verres de lunettes finis non détourés —

Partie 5: Exigences minimales pour les surfaces de verres de lunettes déclarées être résistantes à l'abrasion

Reference number
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Foreword

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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 8980-5 was prepared by Technical Committee ISO/TC 172, *Optics and photonics*, Subcommittee SC 7, *Ophthalmic optics and instruments*.

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

1 Scope

This part of ISO 8980 specifies the requirement and test method for spectacle lens surfaces that are claimed to provide a basic level of abrasion resistance including those with coatings.

A lens claimed to be abrasion-resistant shall meet the requirements on both front and back surfaces.

Lens powers and surface form is restricted for testing, however test results are applicable to claims for lenses and lens surfaces with identical properties other than the lens power or surface radius.

This part of ISO 8980 does not attempt to define the properties of lens surfaces with abrasion resistance better than the following defined criteria.

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 13666, *Ophthalmic optics — Spectacle lenses — Vocabulary*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 13666 and in ISO 8980-4 and the following apply.

3.1
abrasion resistance
property of a spectacle lens surface to resist damage during normal use such as scratches caused by cleaning or wear

4 Requirement

Under the conditions described in the test method given in Clause 5, the surface tested shall be free of visible abrasion.

When used as a type test, 10 consecutively tested surfaces shall be free of visible abrasion.

5 Test method

5.1 Materials and equipment

5.1.1 Abrasion tool

The abrasion tool[1)] allows the controlled positioning and movement of an eraser covered with cheesecloth against the test surface. The abrasion tool is calibrated to apply a force of (5 ± 1) N. (A model of an abrasion tool is shown in Annex A.)

5.1.2 Eraser

The eraser[1)] (see Annex A) shall be a uniform mixture of rubber and abrasive, formed by an extrusion process. It shall be composed of no less than 15 % by mass of pumice. All abrasive shall be fine-ground, such that 100 % will pass through a sieve with opening 45 µm. The formulation shall not contain any ingredient that might leave a residue on the surface under test that would lubricate subsequent strokes during the test procedure. The finished eraser shall have an international rubber hardness degree (IRHD) in accordance with ISO 48 of 75 ± 5 on both ends. The diameter of the eraser shall be from 6,5 mm to 7 mm with a usable flat surface of no less than 5,5 mm. It shall be of sufficient length so as to be held securely in the abrasion tester with no more than 3 mm exposed. The eraser shall be free from any excessive holes, cracks, splits, or foreign particles, which might adversely affect its use. In order to maintain specified hardness, the eraser shall periodically be checked and replaced as required.

5.1.3 Cotton cheesecloth

The cheesecloth[1)] (see Annex A) shall be unbleached, the warp shall have 41 yarns to 47 yarns per 25 mm, and the weft shall have 33 yarns to 39 yarns per 25 mm. The total number of yarns in a 25 mm by 25 mm square shall be 76 to 84.

5.1.4 Lens and surface form

The lenses to be tested shall have an optical power between −3,00 D and +3,00 D.

The tested surface shall have a numerical radius of curvature no less than 75 mm.

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1) Abrasion tool, cheesecloth and eraser manufactured to the requirements in 5.1 may be available from:

Summers Optical
321 Morris Road
P.O. Box 162
Fort Washington, PA 19034
USA

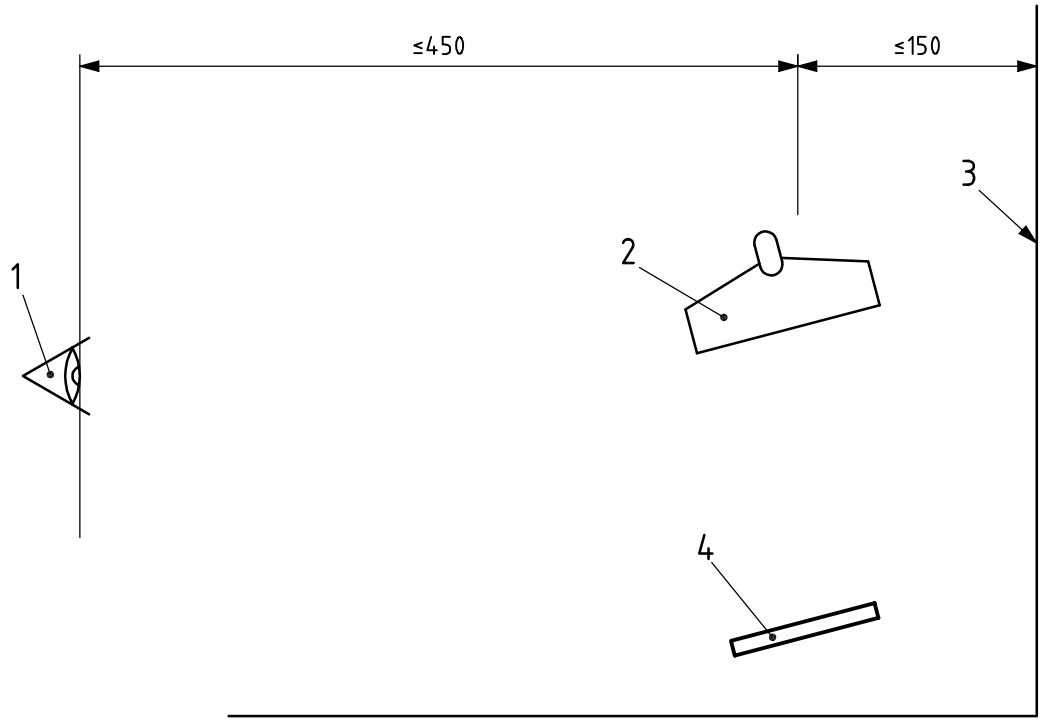
phone (215) 646 1477
fax (215) 646 8931
e-mail sgkcck@aol.com
http://www.emsdiasum.com

This information is given for the convenience of users of this part of ISO 8980 and does not constitute an endorsement by ISO of this supplier.

5.1.5 Inspection lighting

Use a fluorescent light source of at least 400 lm, which, for example can be achieved by one fluorescent tube of 15 W or a set of two fluorescent tubes of 8 W each. The light source and specimen shall be configured as shown in Figure 1 and Figure 2. Inspect the lens in a room with ambient lighting of about 200 lx.

Dimensions in millimetres

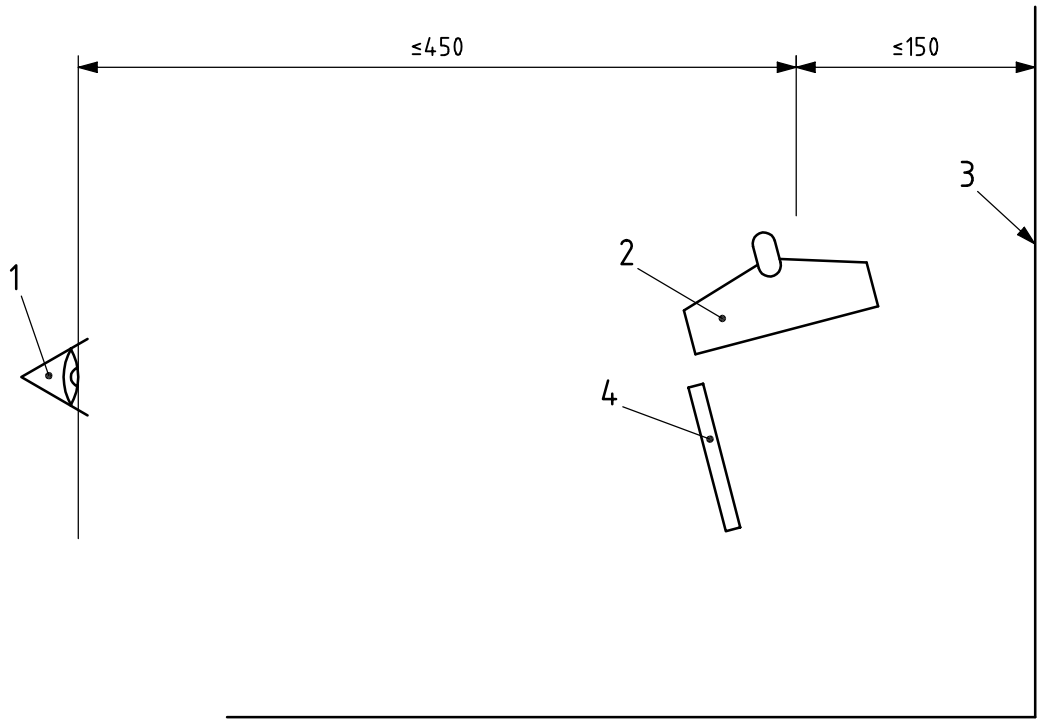


Key

1 observer
2 commercial fixture containing light source
3 matt black background
4 specimen

Figure 1 — Reflection inspection

Dimensions in millimetres



Key

1 observer
2 commercial fixture containing light source
3 matt black background
4 specimen

Figure 2 — Side illumination inspection

5.2 Preparation

5.2.1 Test site

Clean the test site and surrounding area, including all potential sources of particulate contamination.

Verification of the test site is required as described in Annex B at any time that a lens surface fails the requirements.

The environment of the test site shall be (23 ± 5) °C and (50 ± 20) % RH (relative humidity).

5.2.2 Lens samples

Before subjecting a lens surface to any inspection or test, the specimen shall be thoroughly cleaned to remove dirt, finger marks, smears, etc.

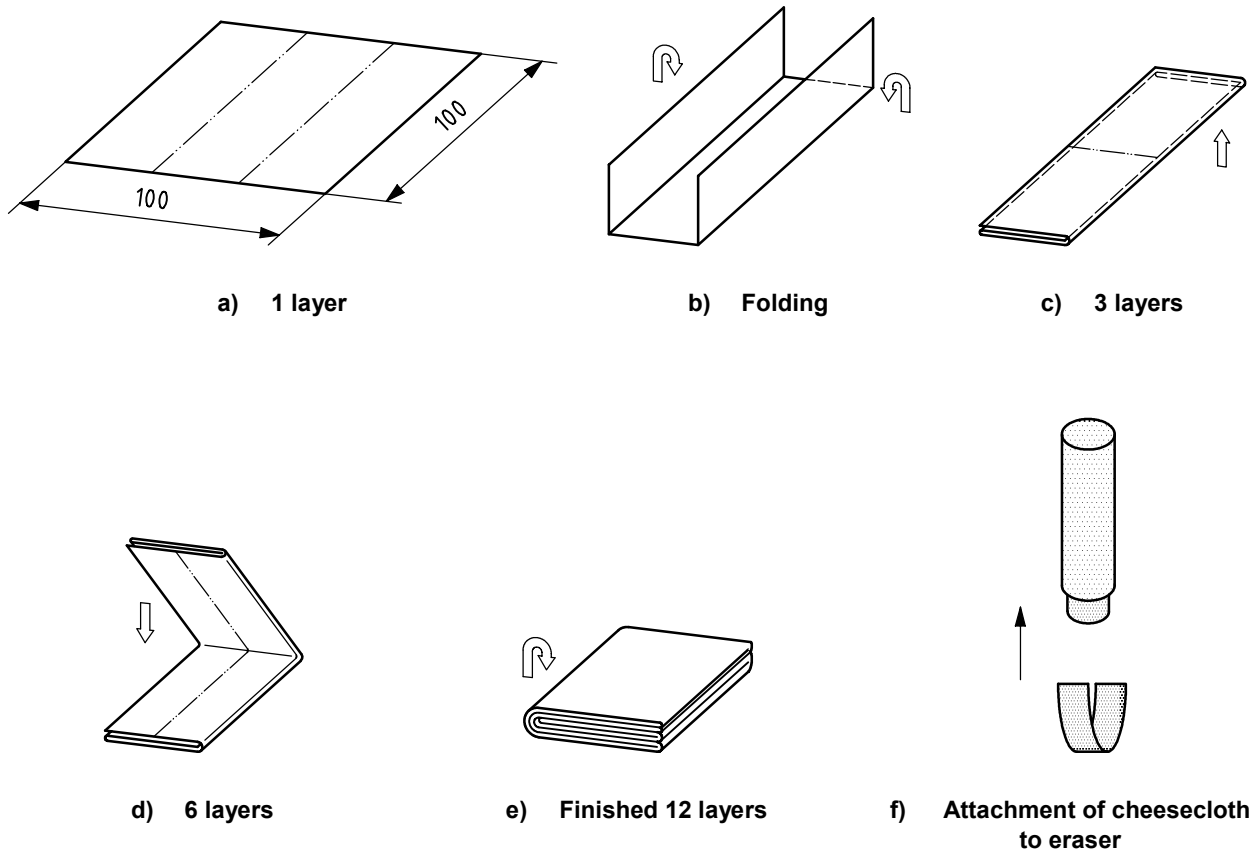
The lens surface shall be inspected to ensure that it is free from any visible surface abrasion or contamination.

5.2.3 Abrasion tool

Fold the cheesecloth to create 12 layers, and then attach it to the tool as shown in Figure 3. Secure with a clamp.

Ensure that the travel of the plunger is not restricted.

Dimensions in millimetres



a) 1 layer

b) Folding

c) 3 layers

d) 6 layers

e) Finished 12 layers

f) Attachment of cheesecloth to eraser

Figure 3 — Cheesecloth and tool assembly

5.3 Procedure

Rub the lens surface with the prepared tool applying the force of (5 ± 1) N for 25 cycles. A cycle is defined as one stroke in one direction, followed by a return stroke in the opposite direction. A stroke is defined as one pass in one direction on the surface being tested. The centre of the abrasion track shall pass within ± 2 mm of the geometric centre, with a stroke length of (30 ± 5) mm. The test shall be conducted at a rate of (1 ± 0,1) cycle per second.

The lens sample shall be held firmly so that it does not move during the test. The tool shall follow the curvature of the lens during the rubbing operation to within ± 5° of the normal to the surface under test.

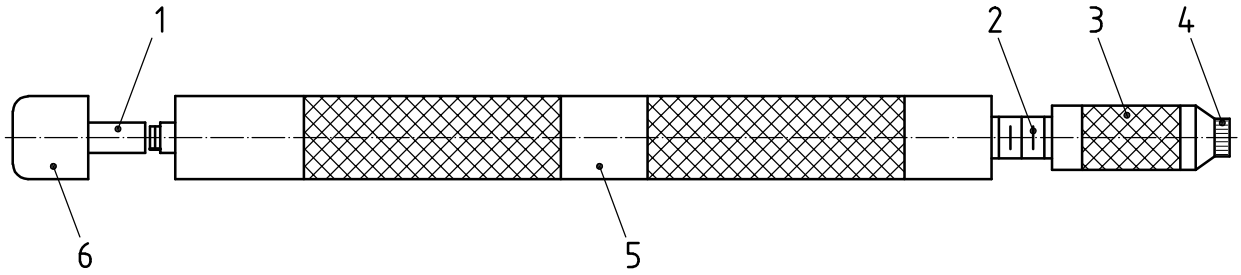
Inspect the lens surface tested by reflection and side illumination as described in Figures 1 and 2 for any visible scratches. If visible scratches are observed, refer to 5.2.

The use of mechanization can make it easier to perform the test (see Annex C).

Annex A
(informative)

Model of an abrasion tool and components

The plunger, which can move longitudinally within the body of the tool, is fitted at one end with a chuck holding an eraser wrapped in cheesecloth, while the other end carries a scale or other marking indicating the position of the plunger within the body. The plunger is loaded by a spring to apply a force of (5 ± 1) N when the body is held vertically to the specimen surface and the scale marking is in its required position.



Key

1 indicator rod
2 plunger
3 chuck
4 eraser
5 body
6 cap

Figure A.1 — Model of an abrasion tool

Annex B
(normative)

Verification of test conditions

The results of this test can be adversely affected by unwanted particulate contamination. The following can be used to determine the cleanliness of the test site.

10 uncoated fully cured ADC (allyl diethyleneglycol carbonate) lenses shall be tested using the method described in Clause 5. All tested lens surfaces shall have no visible abrasion.

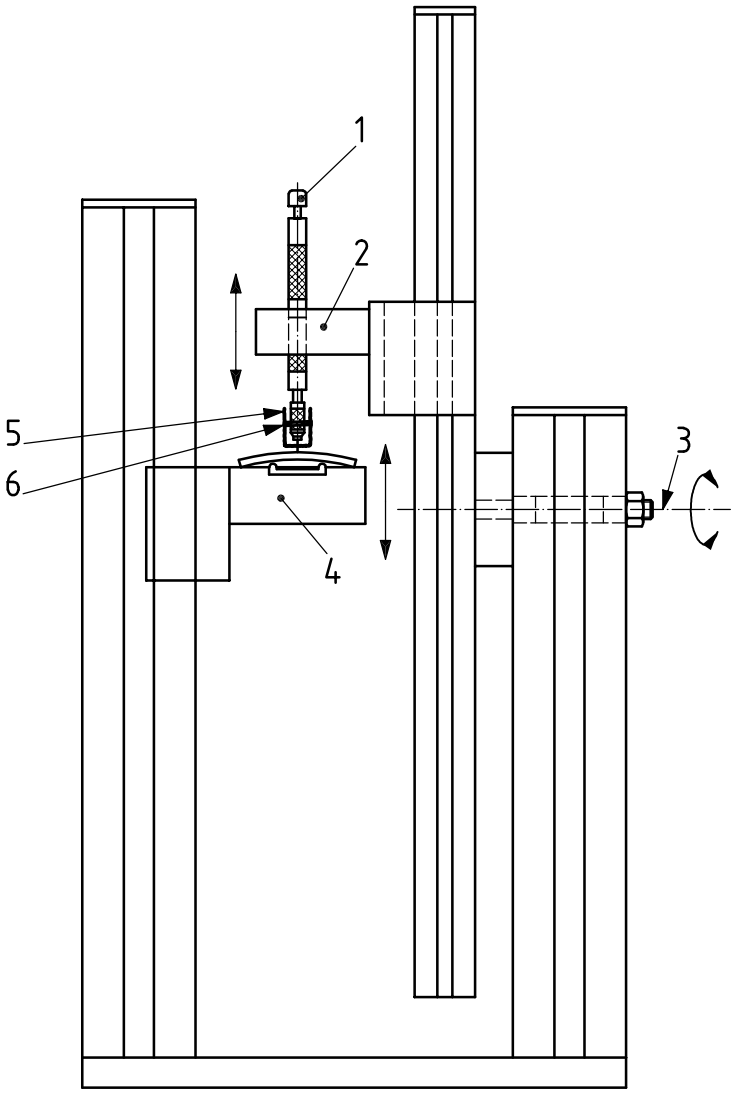
If the requirements of evaluation are not met, clean the area in which the test is being performed or move the test to a cleaner site. Assure that the cloth used in the test is clean and is stored in a manner that it is protected from airborne dust.

Annex C
(informative)

Example of test mechanization

Although the test may be performed manually, test mechanization is likely to provide more repeatable results.

The test mechanization should provide a means of securing the lens sample during the procedure, and a means to move the prepared tool normal to the lens surface, within the tolerances specified in 5.3, while maintaining the applied force specified in 5.3.



Key

1	abrasion tool	4	test lens holder
2	holder for tool	5	cheesecloth
3	pivot axis	6	cheesecloth-securing fixture

Figure C.1 — Example of mechanized test

ICS 11.040.70

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