SLOVENSKI STANDARD
SIST EN 168:1996

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Osebno varovanje oči - Metode neoptičnih preskusov

Personal eye-protection - Non-optical test methods

Persönlicher Augenschutz - Nichtoptische Prüfverfahren

Protection individuelle de l'oeil - Méthodes d'essais autres qu'optiques

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ICS:

13.340.20 Varovalna oprema za glavo Head protective equipment

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Personal eye-protection - Non-optical test methods

Protection individuelle de l'oeil - Méthodes d'essais autres qu'optiques

Persönlicher Augenschutz - Nichtoptische Prüfverfahren

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CEN

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

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Contents

Foreword

This European Standard has been prepared by the Technical Committee CEN/TC 85 "Eye-protective equipment" of, which the secretariat is held by AFNOR.

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of an identical text or by endorsement, at the latest by November 1995, and conflicting national standards shall be withdrawn at the latest by November 1995.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EC Directive(s).

According to the CEN/CENELEC Internal Regulations, 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 United Kingdom.

1 Scope

This standard specifies non-optical test methods for eye-protectors, the requirements for which are contained in other European Standards. Alternative test methods may be used if shown to be equivalent.

The optical test methods are given in EN 167.

A definition of terms is given in EN 165.

2 Normative references

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.

EN 165	Personal eye-protection - Vocabulary
EN 166:1995	Personal eye-protection - Specifications
EN 167:1995	Personal eye-protection - Optical test methods
ISO 565	Test sieves - Metal wire cloth, perforated metal plate and electroformed sheet - Nominal sizes of openings.

3 Test for increased robustness

New specimens shall be used for this test.

3.1 Unmounted oculars

3.1.1 Apparatus

The support for the ocular (see figure 1) shall be a steel or rigid plastic cylinder with an internal diameter of (35,0 ± 0,1) mm and an outside diameter of (41,0 ± 0,1) mm. The cylinder shall be inserted into, or be an integral part of a steel base. The ocular shall be cushioned by a silicone seating ring firmly attached to the top of the tube.

This seating ring shall have a nominal thickness of 3 mm and the same inside and outside diameters as the tube. The silicone seating material shall have a hardness of (40 ± 5) I.R.H.D. The combined mass of the support shall be at least 12 kg.

A load ring of mass (250 ± 5) g is placed on the ocular. The ring has an inside diameter the same as that of the support tube, and any convenient outside diameter. A silicone seating ring having the same dimensions and hardness as the support tube seating ring is placed between the load ring and the ocular. A piece of carbon paper on a piece of white paper is placed at the base of the 1,5 mm deep cavity in the ocular support (see figure 1).

For curved oculars with a cylindrical component, the test support tube and load ring shall be curved to conform to the convex and concave surfaces of the ocular respectively.

If the ocular is of insufficient dimensions to enable its entire periphery to be adequately supported, suitable adaptor sleeves shall be used.

3.1.2 Procedure

Centre the intended points of impact of the ocular on the support tube. Adjust the apparatus so that a 22 mm nominal diameter steel ball of 43 g minimum mass falling from (1,3 $^{0}_{-0,03}$) m strikes the ocular within a 5 mm radius from the centre of the support tube. This height will provide an impact speed of approximately 5,1 m/s.

The points of impact are at the geometric centre of oculars for covering one eye and at the two points of vision for oculars covering both eyes. The points of vision are on the approximate line of sight and nominally 64 mm apart (corresponding to the centres of the eye).

The test shall be carried out at (23 ± 5) °C.

Dimensions in millimeters
(nominal unless toleranced)

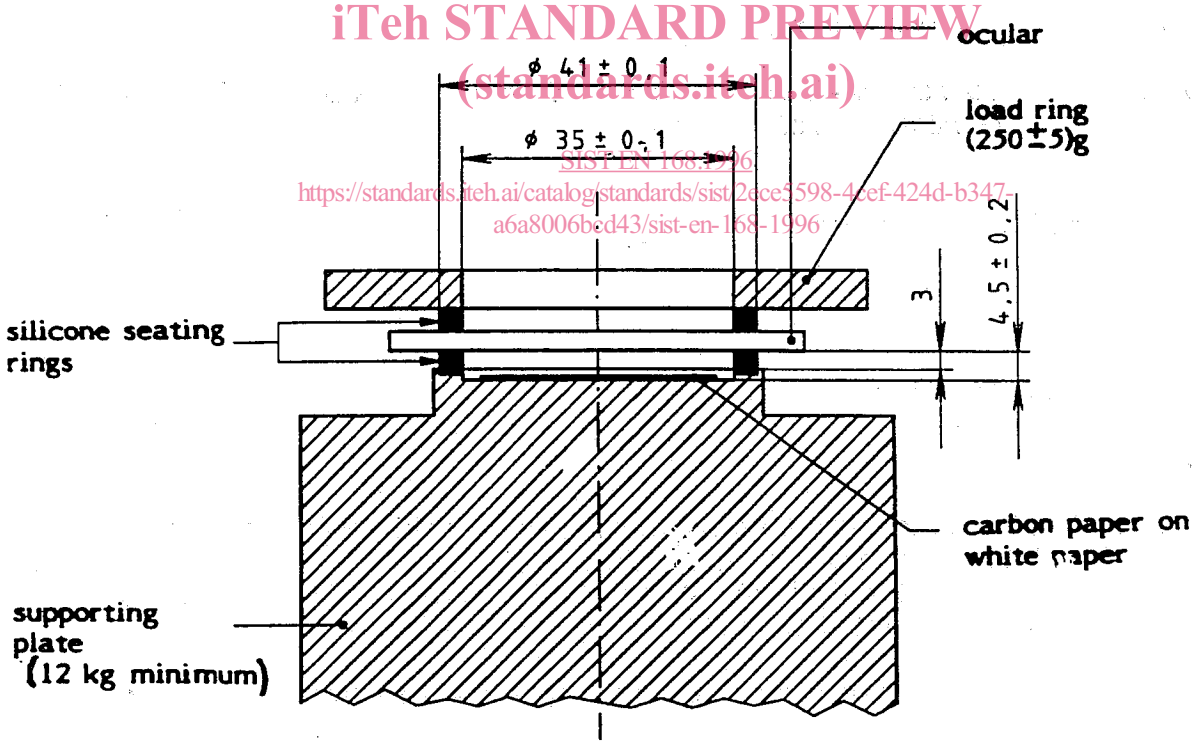

Figure 1 : Holding device for oculars for the increased robustness test

3.2 Complete eye protectors

3.2.1 Apparatus

3.2.1.1 Head-form, as defined in clause 17

3.2.1.2 Either a device enabling a 22 mm nominal diameter steel ball of 43 g minimum mass to be projected at a specified point on the eye-protector at a speed of approximately 5,1 m/s or a device enabling a 6 mm nominal diameter steel ball of 0,86 g minimum mass to be projected at the specified point at ($12{,}0\ ^{+0{,}6}_{0}$) m/s.

3.2.2 Procedure

The eye-protector to be tested shall be placed on the head-form in the position corresponding to normal use.

A sheet of carbon paper on top of a sheet of white paper is inserted between the eye-protector and the head-form. The head-form and eye-protector assembly is positioned in the test apparatus.

The ball is projected at the points of impact defined in 3.2.3.

The impacts are carried out in the following conditions :

a) With the eye-protector heated to (55 ± 2) °C and maintained at this temperature for at least 1 h ;

b) With the eye-protector cooled to a temperature of (-5 ± 2) °C and maintained at this temperature for at least 1 h.

New eye-protectors shall be used for each individual point of impact and for each temperature condition. The impact shall be applied within 30 s of temperature conditioning.

The tests shall be conducted at an ambient temperature of (23 ± 5) °C.

3.2.3 Points of impact

There are four impact points, and these are defined with respect to the head-form rather than the eye-protector. The ball is aimed at these impact points with the eye-protector mounted in the normal use position.

The impact points shall be considered as any single point within a 10 mm radius of one of four impact centres. These impact centres are denoted by an asterisk (*) in figure 11.

With respect to the test schedule contained in table 11 of EN 166:1995, the four impact points are defined as follows :

- 1 left eye frontal ;
- 2 right eye frontal ;
- 3 left eye side ;
- 4 right eye side.

For frontal impacts at the two eye centres the ball is projected normal to the vertical axis of the head-form and parallel to its optical axis along each line of sight.

For lateral impacts the head-form is rotated about its vertical axis by 90° (left and right) from the frontal impact position.

The head-form may be moved horizontally and vertically to select any single impact point lying within 10 mm of the specified impact centres.

NOTE : As stated in 3.2.2, new eye-protectors shall be used for each individual impact.

4 Test for minimum robustness of oculars with filtering effects and cover plates

New specimens are used for this test.

4.1 Apparatus

See figure 2.

4.1.1 Loading device

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

4.1.2 Specimen support

The specimen is placed between two seating rings made of silicone rubber of (40 ± 5) I.R.H.D having an inside diameter of (35,0 ± 0,4) mm and cross sections of 3 mm x 3 mm nominal dimensions. The silicone seating rings are fixed to the steel supporting plate and the load ring.

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

The load ring shall have a mass of (250 ± 5) g. By its weight, it presses the upper silicone seating ring against the upper surface of the specimen.

A sheet of carbon paper on top of a sheet of white paper is placed on the supporting steel plate at the base of the 1,5 mm deep cavity.

4.2 Procedure

4.2.1 The test is carried out at (23 ± 5) °C

4.2.2 The specimen is centred on the support with the 'eye-side' downwards. The load ring is applied to the specimen. For curved oculars with a cylindrical component the supporting plate and the load ring are curved to conform to the surface of the ocular.

4.2.3 The loading mass is lowered on to the ocular at a speed not exceeding 400 mm/min. The force of (100 ± 2) N is maintained for (10 ± 2) s. The loading mass is then removed.

Dimensions in millimeters
(nominal unless toleranced)

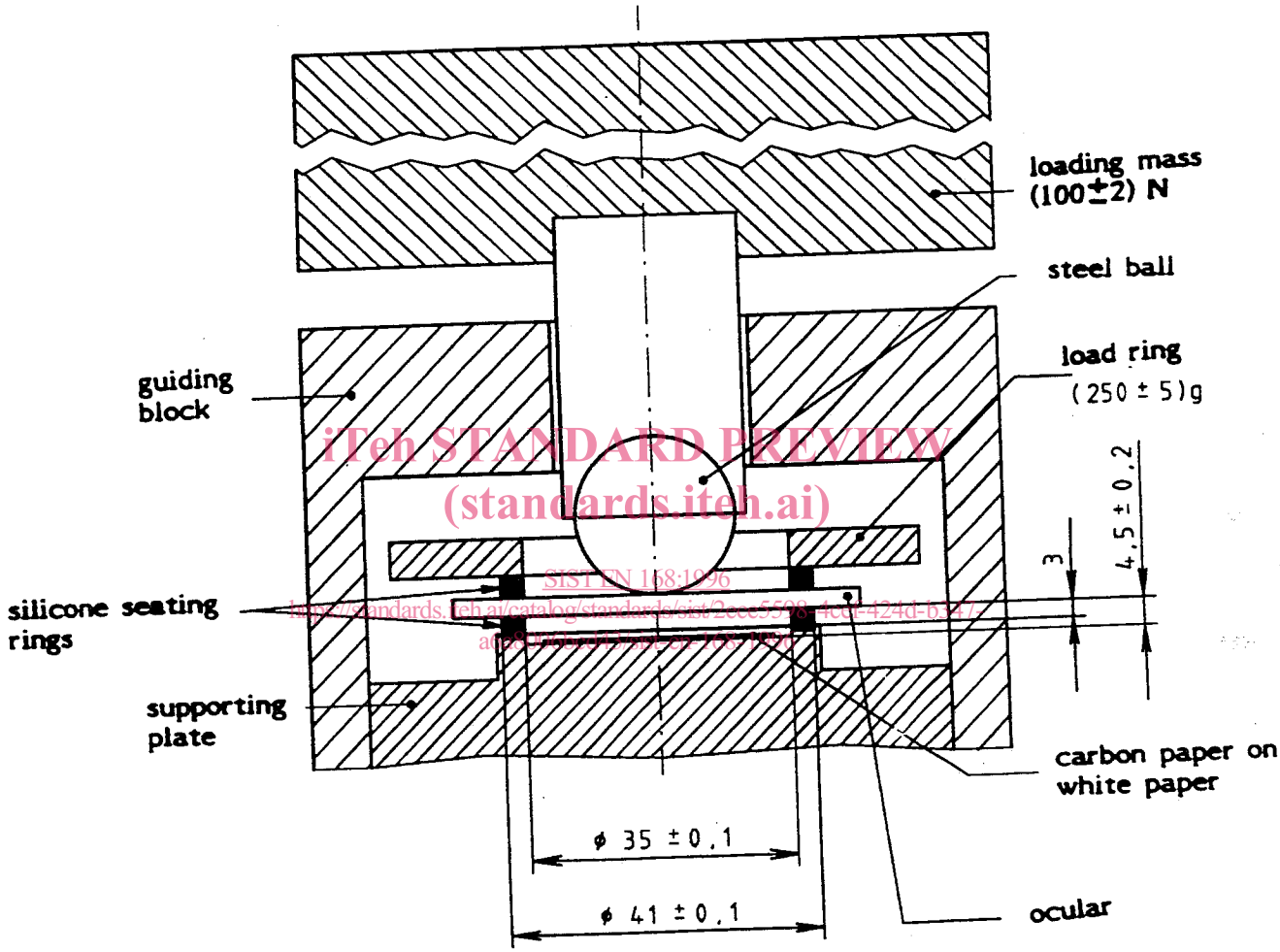

Figure 2 : Apparatus for minimum robustness (static deformation) test

5 Test for stability at elevated temperature

New specimens are used for this test.

5.1 Apparatus

Oven, capable of maintaining a temperature of (55 ± 2) °C.

5.2 Procedure

Place the specimen in a position corresponding to normal use, in the oven for (60 ± 5) min at a temperature of (55 ± 5) °C. Then remove it and allow to stabilise at (23 ± 5) °C for a minimum of 60 min. Examine the specimen and then submit it to the optical tests described in clause 3 of EN 167:1995.

6 Test for resistance to ultraviolet radiation

6.1 Apparatus

Fused-silica envelope high-pressure xenon lamp. The power of the lamp shall be between 400 W and 500 W, with a preferred value of 450 W. The spectral transmittance of the lamp envelope shall be at least 30 % at 200 nm.

NOTE : Suitable lamp references are XBO-450 W/4 and CSX-450 W/4. These lamps produce UV radiation with an appreciable amount of UVC radiation. This is appropriate, since industrial processes (for example, welding) produce appreciable amounts of UVC radiation.

6.2 Procedure

New specimens are used for this test. The test equipment is operated within an environment of temperature (23 ± 5) °C.

Expose the external face of the ocular to radiation from a fused silica envelope high-pressure xenon lamp (see 6.1). The angle of incidence of the radiation on the specimen surface shall be essentially perpendicular. The distance from the axis of the lamp to the nearest point on the sample shall be (300 ± 10) mm. The exposure time shall be as follows :

a) where the lamp is running at a power of 450 W, the exposure time shall be (50 ± 0,2) h ;

b) where the lamp is not running at 450 W, the exposure time shall be changed by an inverse proportion. For example, if the lamp is running at 400 W, the exposure time shall be (56,25 ± 0,20) h ; if the lamp is running at 500 W, the exposure time shall be (45,0 ± 0,2) h.

7 Test for resistance to ignition

7.1 Apparatus

7.1.1 Steel rod, (300 ± 3) mm long and 6 mm nominal diameter with end faces which are flat and perpendicular to its longitudinal axis.

7.1.2 Heat source.

7.1.3 Thermocouple and temperature indicating device.

7.1.4 Timer, capable of measuring an elapsed time of 10 s with an uncertainty of ± 0,1 s.