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Reusable metal dental mirrors and handles

Miroirs et manches de miroirs dentaires métalliques réutilisables

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Foreword

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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.

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Introduction

This International Standard specifies requirements for a type of dental viewing and retracting instrument in common use throughout the world. However it is well known that there are also other types of mirrors in use which have different designs and/or are made of different materials. Amongst these other types are mirrors with plastics cases and/or stems; mirrors with a polished metal reflecting surface (as opposed to a coated glass surface); mirrors with a cone socket design; and disposable mirrors. Standardization of these other types may form the subject of future work.

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Reusable metal dental mirrors and handles

1 Scope

This International Standard specifies requirements and tests for reusable mouth mirrors with a coated glass reflecting surface and metal casing and handle suitable for dental use in the oral cavity.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were 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 editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 261:1973, *ISO general purpose metric screw threads — General plan*.

ISO 7153-1:1983, *Instruments for surgery — Metallic materials — Part 1: Stainless steel*.

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 mirror: Assembled instrument comprising the mirror head and the mirror handle.

3.2 mirror head: Assembly comprising the mirror glass, reflecting surface, casing with packing (if present), and the threaded stem.

3.3 stem: That part of the mirror connecting the mirror head to the handle.

3.4 reflecting surface: Layer applied to the mirror glass for the purpose of reflecting light.

3.5 reflecting back surface: Reflecting layer coated onto the back surface of the mirror glass so that the image may be observed through the glass.

3.6 reflecting front surface: Reflecting layer coated onto the front surface of the mirror glass so that the image may be observed with no intervening glass layer.

3.7 plane mirror: Dental mirror whose reflecting surface is flat.

3.8 magnifying mirror: Dental mirror whose reflecting surface is concave to produce an enlarged image of the objects observed.

3.9 nominal magnification: Nominal magnification, M , is calculated from the following equation

$$M = \frac{250}{f}$$

where f is the focal length, in millimetres.

3.10 viewing surface: Surface of the mirror glass, excluding the bevel, not enclosed by the metal casing. (See figure 1, diameter d_2 .)

3.11 distortion: Image deformation due to optical defect(s).

4 Mirror heads

4.1 Material

4.1.1 Mirror glass

The mirror glass shall be made of polished glass free from visible defects such as waves, chips, scratches and other imperfections observable to the naked eye.

Test in accordance with 6.1.

The glass or front surface reflective coating shall show no blemish or other deterioration after having been tested.

Test in accordance with 6.2, 6.3 and 6.4.

4.1.2 Mirror casing

The mirror casing shall be made of a metal which is resistant to corrosion, e.g. stainless steel or a plated non-ferrous alloy. The metal shall show no visible signs of corrosion after having been tested. Any visible blemish on the metal shall be considered as evidence of corrosion.

Test in accordance with 6.2, 6.3 and 6.4.

4.2 Dimensions

Dental mirrors shall meet the dimensions given in figure 1 and table 1.

4.3 Other requirements

4.3.1 Position of mirror head to stem

The mirror head shall be positioned such that the long axis of the stem bisects the casing to provide a symmetrical mount about the plane surface of the mirror glass/casing.

Test in accordance with 6.1.

Table 1 — Mirror head and viewing surface

Dimensions in millimetres

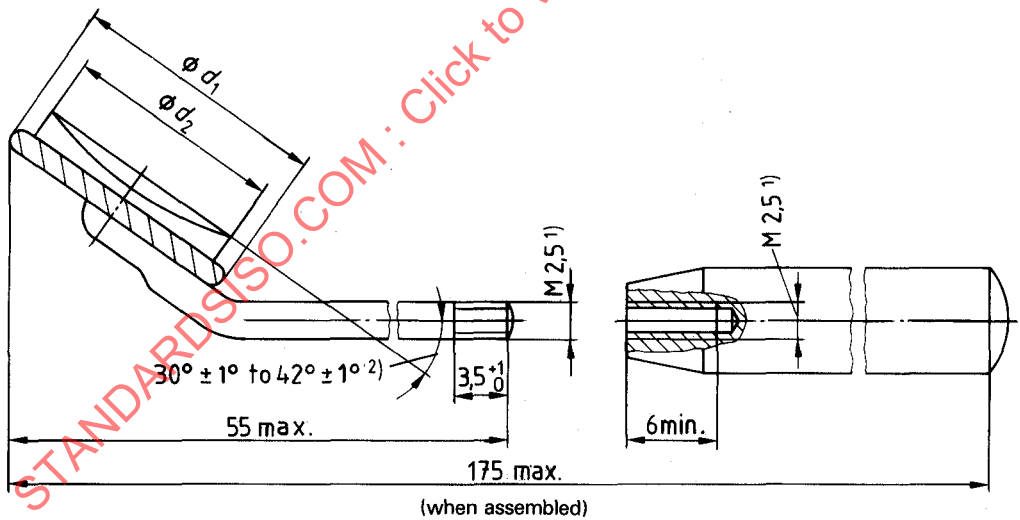
Preferred sizes and designation: nominal diameter d_1	d_2	Size designation currently in use
18	$d_1 - 2,5 \text{ max.}$	2
20		3
22		4
24		5
26	$d_1 - 3 \text{ max.}$	6
28		7
30		8

NOTES

1 The mirror head size designations are based on the nominal diameter d_1 of the casing expressed in millimetres and increasing in size by 2 mm.

2 The preferred sizes are suggested for all likely dental applications.

Dimensions in millimetres



1) See ISO 261.
2) To be stated : see 7.3.

Figure 1 — Dental mirror

4.3.2 Casing of mirror head

The casing shall have a formed edge which shall be below the level of the viewing surface of the glass and shall be visibly free from sharp edges, burs or other irregularities.

Test in accordance with 6.1.

The glass shall be held and supported in position in the casing so that no movement can occur under normal conditions of use. The reflecting surface, and if applicable, the packing material within the mirror head casing shall show no sign of deterioration or water ingress after having been tested.

Test in accordance with 6.2.

4.3.3 Reflecting surfaces

The reflecting surfaces shall allow the image to be viewed through, or from, the whole of the viewing surface.

Test in accordance with 6.1.

4.3.4 Nominal magnification

The nominal magnification (see 3.9) of magnifying mirrors shall be between 2,8 and 3,3.

4.3.5 Distortion

There shall be no observable distortion when the reflecting surface of the plane or magnifying mirror is tested.

Test in accordance with 6.7.

4.3.6 Casing/stem joint strength

There shall be no observable distortion and/or loosening of the mirror casing/stem joint after having been tested.

The reflecting surface shall conform to the requirements of 4.3.3 after the specified torque has been applied to the casing/stem joint.

Test in accordance with 6.8.

5 Mirror handles

5.1 Material

Mirror handles shall be made of stainless steel according to ISO 7153-1 or chromium-plated non-ferrous metal.

5.2 Other requirements

All external surfaces of the handle shall be visibly free from imperfections.

Test in accordance with 6.1.

The handle shall show no sign of deterioration, degradation or corrosion after having been tested.

Test in accordance with 6.4 and inspect in accordance with 6.1.

Hollow handles shall emit no bubbles when tested.

Test in accordance with 6.9 and inspect in accordance with 6.1.

6 Test methods

6.1 Visual inspection

Conduct visual inspection at normal visual acuity without magnification.

6.2 Test sequence

Carry out the procedures described in 6.3, 6.4 and 6.5 consecutively in one continuous operation as follows:

- 50 cycles for the mirror head according to the test specified in 6.3;
- five cycles for the complete instrument (mirror head with mirror handle) according to the autoclave test specified in 6.4;
- five cycles for the complete instrument (mirror head with mirror handle) according to the dry heat test specified in 6.5.

After completing the procedures described in 6.3, 6.4 and 6.5, wipe the instrument and vigorously rub it with a soft dry cloth. Inspect for any sign of corrosion or other deterioration in accordance with 6.1.

6.3 Disinfection liquid and dry heat oven test

6.3.1 Materials

- a) disinfection solution: an aqueous solution of 2 % glutaraldehyde;
- b) distilled or de-ionized water.

6.3.2 Apparatus

- a) tank made of corrosion-resistant material (i.e. stainless steel or chromium-plated base metal);

b) dry heat oven capable of being operated at $(180 \pm 5) ^\circ\text{C}$.

6.3.3 Test procedure

Place the mirror head in the (undiluted) disinfecting solution [6.3.1 a)] at room temperature and leave it there for 10 min. Remove the mirror head from the disinfecting liquid and rinse the mirror in the water [6.3.1 b)]. Put the mirror head in the dry heat oven [6.3.2 b)] at $(180 \pm 5) ^\circ\text{C}$ and leave it there for 15 min.

Remove the mirror head from the dry heat oven and allow it to cool in air to room temperature.

Carry out the cycle 50 times.

6.4 Autoclave test

6.4.1 Materials

Distilled or de-ionized water.

6.4.2 Apparatus

Autoclave of the non-vacuum type capable of being operated at $134 ^\circ\text{C}$ to $138 ^\circ\text{C}$ and $0,22 \text{ MN}\cdot\text{m}^{-2}$ (2,2 bar).

6.4.3 Test procedure

Place the assembled instrument (mirror head and handle), unwrapped, in the tray of the autoclave. Using the water (6.4.1), subject the instrument to autoclaving cycles of $(3 \pm 0,5)$ min duration at $(136 \pm 2) ^\circ\text{C}$ and $0,22 \text{ MN}\cdot\text{m}^{-2}$ (2,2 bar). After each cycle, remove the tray from the autoclave and allow the contents to cool to room temperature.

Carry out the cycle five times.

6.5 Dry heat test

6.5.1 Apparatus

Dry heat oven capable of being operated at $(180 \pm 5) ^\circ\text{C}$.

6.5.2 Test procedure

Place the assembled instrument (mirror head and handle) in the dry heat oven at $(180 \pm 5) ^\circ\text{C}$ and leave it for 30 min.

Remove the instrument from the dry heat oven and allow it to cool in air to room temperature.

Carry out the cycle five times.

6.6 Magnifying mirror: determination of nominal magnification

6.6.1 Apparatus

The apparatus is illustrated in figure 2. The hole, A, which is 10 mm in diameter has cross-wires positioned as shown and a source of light situated immediately behind it. A white card, B, marked with squares as shown is fixed close to the hole, A, so that the image of the cross-wires will be in the same horizontal plane as the cross-wires.

6.6.2 Procedure

Place the mirror (with or without handle) as shown in figure 2 and move it forward or backward until the sharpest image is obtained in the centre square of the card, B. Measure the distance to $\pm 1 \text{ mm}$ between the mirror and the card, B.

Calculate the nominal magnification.

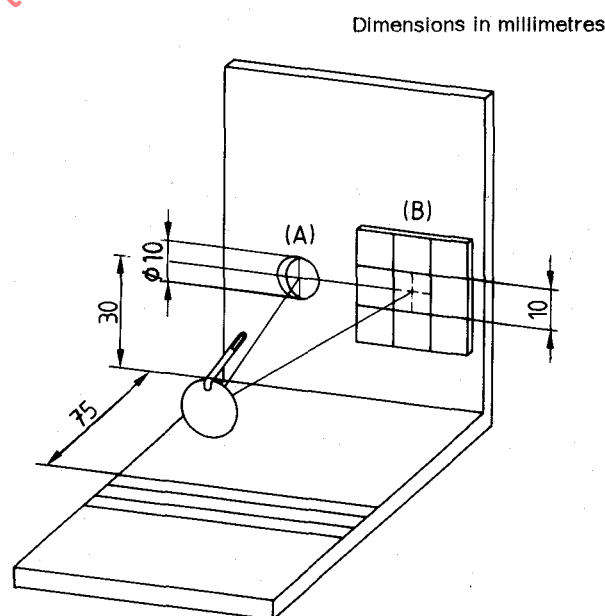


Figure 2 — Apparatus for determination of nominal magnification

Dimensions in millimetres

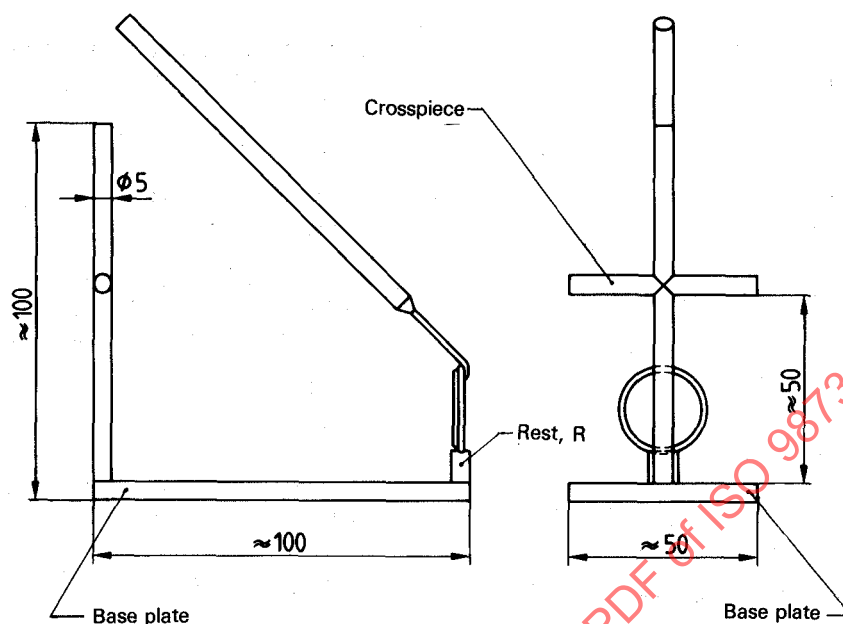


Figure 3 — Apparatus for distortion test

6.7 Distortion

6.7.1 Apparatus

The apparatus is illustrated in figure 3. The upright consists of a rod 5 mm in diameter with a horizontal crosspiece at its midpoint. The rest, R, has a groove into which the mirror head is placed.

6.7.2 Procedure

Screw the mirror head into the handle and place it in the rest, R, with the handle in the same vertical plane as the upright of the apparatus. View the reflecting surface from a position directly above the upright and move the handle until the image of the intersection and the crosspiece is visible. Move the mirror vertically up and down keeping it in line with the upright of the apparatus and observe whether or not any distortion occurs in the image of the crosspiece and upright.

Repeat the exercise after placing a sheet of graph paper against the crosspiece of the apparatus. Once again, observe whether or not any distortion occurs in the image of the graph paper.

6.8 Casing/stem joint strength test

6.8.1 Apparatus

The apparatus is illustrated in figure 4 and figure 5. The clamping force should be such that the mirror case is firmly held but not distorted by the clamping force. It is imperative that the mirror head does not move when the torque is applied.

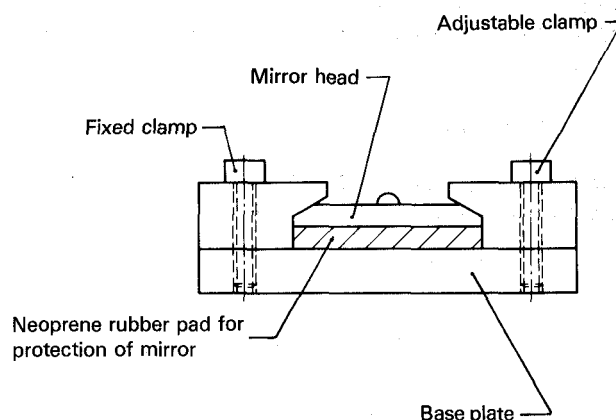


Figure 4 — Locking device for mirror head