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Dental tweezers —

Part 1:
General requirements

Précelles dentaires —

Partie 1: Exigences générales

Reference number
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Contents

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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 3.

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.

International Standard ISO 15098-1 was prepared by Technical Committee ISO/TC 106, *Dentistry*, Subcommittee SC 4, *Dental instruments*.

ISO 15098 consists of the following parts, under the general title *Dental tweezers*:

— *Part 1: General requirements*

— *Part 2: Meriam types*

— *Part 3: College types*

Annexes A and B of this part of ISO 15098 are for information only.

Dental tweezers —

Part 1:
General requirements

1 Scope

This part of ISO 15098 specifies general material and performance requirements for metal dental tweezers.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 15098. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 15098 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 1942-3, *Dental vocabulary — Part 3: Dental instruments.*

ISO 6507-1, *Metallic materials — Vickers hardness test — Part 1: Test method*.

ISO 7153-1, *Surgical instruments — Metallic materials — Part 1: Stainless steel*.

ISO 13402, *Surgical and dental hand instruments — Determination of resistance against autoclaving, corrosion and thermal exposure*.

3 Terms and definitions

For the purposes of this part of ISO 15098, the terms and definitions given in ISO 1942-3 apply.

4 Material

The working end shall be made of martensitic stainless steel of grade B, C, D or R or austenitic stainless steel, complying with ISO 7153-1, or other materials providing the instrument made therefrom meets the requirements of clause 5.

5 Requirements

5.1 Maximum overall length

Unless specified in other parts of ISO 15098, the maximum overall length of dental tweezers shall be 178 mm.

Annex A provides details of one method of measurement applicable to most types of dental tweezers.

5.2 Vickers hardness of the working end

The Vickers hardness of the working end of the finished instrument, when tested in accordance with ISO 6507-1, shall be within the range 390 HV1 to 550 HV1.

Annex B provides details of a method for measuring the Vickers hardness.

5.3 Surface finish

5.3.1 All surfaces

All surfaces shall be visibly free from pores, crevices, grinding marks, residual scales, acid, grease and residual grinding and polishing materials, when inspected using normal vision.

5.3.2 Satin finish

Any satin finish shall be both uniform and smooth, and it shall reduce glare.

5.3.3 Mirror finish

Any mirror finish shall be ground to remove all surface imperfections and polished to remove grinding marks, resulting in a highly reflective surface.

5.4 Resistance against corrosion

When tested for resistance to autoclaving or boiling water in accordance with 6.2 or 6.3, the tweezers shall exhibit no visible signs of corrosion.

5.5 Resistance against thermal exposure

When tested for resistance against thermal exposure in accordance with 6.3, the tweezers shall exhibit no visible signs of alteration. The Vickers hardness after thermal exposure shall remain within the stipulated hardness range.

6 Test methods

6.1 Test sequence and cycles

Carry out one of the following test alternatives in one continous operation for five cycles:

a) autoclave test or

b) boiling water test and thermal exposure test.

After completing the test sequence (6.2 or 6.3), rub the instrument vigorously with a cloth to remove blemishes.

6.2 Autoclave test

Carry out the autoclave test as specified in ISO 13402.

6.3 Boiling water test and thermal exposure test

Carry out both the boiling water test and the thermal exposure test as specified in ISO 13402.

7 Marking

The instrument shall be indelibly marked with the following information:

a) manufacturer’s name or trade name;

b) pattern number or name;

c) lot number.

Annex A
(informative)

Measurement of dimensions

A.1 General

This method of measurement is applicable to most types of dental hand instrument and is based on the use of an optical projector. Dimensions are measured parallel, and at right angles, to the centreline of the instrument and are constructed from a datum point at its working end.

Although this is the preferred method, it is by no means the only technique available.

A.2 Apparatus

A.2.1 Optical projector (shadowgraph) fitted with a 10× magnifying lens and micrometer stage**.**

A.2.2 Glass specimen slide and plasticine, or

A.2.3 Mechanical holding device (e.g. light machine vice), or

A.2.4 V-block.

A.3 Procedure

A.3.1 Preparation for measurement

A.3.1.1 Support or hold the dental instrument using one of the devices in A.2.2, A.2.3 or A.2.4.

A.3.1.2 Place the supported instrument on the micrometer stage of the projector (A.2.1) and ensure that the following requirements are met:

a) the working end of the instrument projects beyond the holding device;

b) the instrument is securely held;

c) there is an unobstructed view of the working end.

A.3.1.3 Ensure that the dental instrument is parallel to the micrometer stage by focusing on, and traversing the length of, the handle. If the handle remains in focus over the traversed distance, then the instrument is ready for measurement.

If the handle does not remain in focus, repeat A.3.1.2 and A.3.1.3 until the handle remains in focus through the field of traverse.

A.3.1.4 Align the centreline of the dental instrument with the vertical or horizontal cross-wires on the projector screen.

A.3.2 Horizontal and vertical measurements

A.3.2.1 Refer to the illustration, table of dimensions and table of measurement points related to the instrument to be measured and, using the micrometer stage, bring the appropriate point of the projected image to either the vertical or horizontal cross-wire, whichever is appropriate to the datum measuring point of interest.

A.3.2.2 Zero the micrometer and move the micrometer stage to the final measurement position and record the measurement.

A.3.2.3 Realign the instrument (A.3.1.4) and repeat steps A.3.2.1 and A.3.2.2 for the remaining dimensions.

A.3.3 Angular measurements

A.3.3.1 Refer to the illustration, table of dimensions and table of measurement points related to the instrument to be measured and, using the micrometer stage, bring the appropriate point of the projected image to either the vertical or horizontal cross-wire, whichever is appropriate.

A.3.3.2 Rotate the bezel of the projector screen to the datum measuring point and note the angular reading.

A.3.3.3 Rotate the bezel to the final measurement position, subtract the initial angular reading from the final reading and record the measured angle.

Annex B
(informative)

Vickers hardness testing

B.1 General

The method described herein is applicable to most types of dental instrument and is based on applying a 1 kg load, via a 136° diamond indentor, to the working end of the instrument.

NOTE It may be necessary to encapsulate the working ends of certain dental instruments in a plastic mounting medium in order to achieve this objective.

ISO 6507-1 shall be regarded as the reference test method.

B.2 Apparatus

B.2.1 Vickers hardness testing machine.

B.2.2 Mass of 1 kg.

B.2.3 Set of tables for converting ocular reading to Vickers hardness values.

B.2.4 Fine file.

B.2.5 Machine vice.

B.2.6 Silicon carbide abrasive papers, of grades 180, 320, 400 and 600.

B.3 Preparation

B.3.1 For larger, robust dental instruments

a) Prepare a flat area on the working end of the instrument using a fine file and wipe the surface clean.

b) Smooth the flat area with progressively finer grades of abrasive paper. Wipe the surface clean between each grade of paper and resume the smoothing process at 90° to the direction of the previous operation.

c) Finish with a grade 600 silicon carbide abrasive paper and wipe the surface clean.

B.3.2 For finer, more delicate dental instruments

a) Remove the working end from the handle and encapsulate in plastic mounting medium suitable for the preparation of metallographic samples.

b) Using a succession of progressively finer grades of abrasive paper, flatten and smooth the surface. The mounted sample should be rinsed clean with water between each grade of paper and turned 90° from the direction of the previous operation prior to resumption of the smoothing process.

c) Finish with a grade 600 silicon carbide abrasive paper, rinse clean with water and dry.

B.4 Procedure

a) Place a machine vice on the horizontal (movable) platform of the hardness tester.

b) With the prepared smooth surface flat and level, grip the dental instrument in a machine vice and ensure that the working end is supported.

c) Slowly raise the horizontal platform and align the diamond indentor with the smooth area on the working end of the instrument. A gap of approximately 3 mm should be left between the indentor and the smooth surface.

d) Ensure that the instrument is axially aligned with the machine vice and firmly gripped.

e) Select the 1 kg weight and place on the weight carrier of the hardness tester.

f) Prime the hardness tester (e.g. by depressing the foot pedal or other priming device) and apply the test load by operating the release lever. The Vickers hardness tester automatically applies the load and, after 15 s, an alarm sounds to indicate completion of the cycle.

g) Lower the platform, align the test sample with the microscope and focus on the indentation.

h) Check that the ocular measuring device (attached to the microscope) reads zero when the knife-edges (visible in the eyepiece of the microscope) touch. If not, zero the ocular device.

i) Measure the indentation by placing the fixed knife-edge at the corner of one diagonal and bringing the movable knife-edge to touch the opposite corner of the diagonal.

j) Note the reading, repeat for the opposite diagonal and take an average of the two readings.

k) Using the table for conversion of the ocular readings to hardness readings for a 1 kg load, note the hardness value.

l) Conduct a further two tests and take an average of the three hardness readings.

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