INTERNATIONAL STANDARD

ISO 8627

First edition
1987-10-01

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
ORGANISATION INTERNATIONALE DE NORMALISATION
МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Dentistry — Stiffness of the tufted area of tooth-brushes

Art dentaire — Dureté de la surface garnie des brosses à dents

Reference number
ISO 8627 : 1987 (E)

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 8627 was prepared by Technical Committee ISO/TC 106, *Dentistry.*

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Dentistry — Stiffness of tufted area of tooth-brushes

0 Introduction

The stiffness of tooth-brushes, determined in accordance with a compromise method based on the BSI method and the French/Norwegian methods, was originally classified into five categories. However as a result of collaborative testing between laboratories it was subsequently decided to reduce the number of categories to three.

This International Standard specifies a method for determining the stiffness of the tufted area of tooth-brushes and a means of assigning the stiffness so measured into categories of stiffness, i.e.

— soft;

— medium;

— hard.

Classification enables the consumer to choose a brush with the appropriate stiffness for his or her needs. It is therefore desirable that all manufacturers use the same test methods and categories in order that the user can select according to the category and obtain the required stiffness irrespective of brand or country of origin of the brush. At present there can be considerable differences between identical stiffness gradings as claimed by different manufacturers. This has been recognized and has been accommodated in the elaboration of this International Standard by allowing for an overlap of stiffness categories for a limited period, the intention being to revise this International Standard in 5 years' time and replace the existing categories by those shown in the note to clause 6.

1 Scope and field of application

This International Standard specifies a test method and grading scheme for the stiffness of the tufted area of conventional manual tooth-brushes, together with relevant information concerning definitions and information concerning testing machines.

2 Definitions

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

2.1 filament : A single element of a tuft fixed into a brush.

2.2 tufted area, A : The total area of the tuft holes, i.e. the area of one tuft hole multiplied by the number of tuft holes.

2.3 stiffness grade, G : The stiffness as measured and calculated according to this International Standard.

2.4 stiffness category : The category, e.g. soft, medium or hard, as defined by the range into which the stiffness grade falls.

2.5 stiffness index : A number relating to the stiffness category.

2.6 filament length, X : The length measured at right angles to the stock from the tip of the free end of the filament to the point at which it enters the tuft hole.

2.7 deflection force : The reaction force caused by the deflection of the filaments from their normal position by one-third of the weighted mean filament length (see 5.3.3).

2.8 brush stiffness : The reaction force exerted per unit area of the brush during deflection.

3 Sampling

The tooth-brushes used for testing shall be standard model tooth-brushes. They shall not be altered or adjusted in any way that makes them different from the standard model manufactured.

A minimum of five brushes of each category shall be tested.

NOTE — The sampling method and the means of procurement are not covered by this International Standard and should be subject to agreement between the interested parties.

4 Testing conditions

The tests shall be carried out under the following conditions :

— dry : 23 ± 2 °C and (50 ± 5) % relative humidity;

— wet : immerse the brushes in water at 23 ± 4 °C for 90 s; remove from the water and commence the test 3 min ± 15 s after removal.

5 Test method

5.1 Principle

Determination of the length of a filament of a tooth-brush followed by the determination of the tufted area of the brush and measurement of the deflection force. Calculation of the degree of stiffness of the brush from the values obtained.

5.2 Apparatus

NOTE — An example of a suitable apparatus is shown in the figure.

The apparatus comprises the following elements.[1)]

5.2.1 Gripping unit to grip the brush at right angles to the filaments, which consists mainly of

5.2.1.1 Block in which the head of the brush is fixed. (See the footnote.)

5.2.1.2 Adjustable screw for adjusting and moving the block (5.2.1.1).

5.2.1.3 Comparator for measuring the movement of the block (5.2.1.1).

NOTE — Micrometer calipers may be used instead of the adjustable screw (5.2.1.2) and comparator.

5.2.2 Apparatus for measuring and indicating the deflection force, F, comprising

5.2.2.1 Carriage sliding freely along a **slideway** at an axis parallel to the brushing surface.

5.2.2.2 Grid, supported by the carriage (5.2.2.1) and made up of stainless steel wires rigidly mounted in parallel, with the following dimensions :

- diameter of wire : 0,5 mm
- width : 17 mm
- pitch : 3 mm
- length : 55 mm (min.)
- maximum surface roughness, R_a = 0,4 µm

NOTE — Pitch is the distance between the centres of the wires.

The wires shall be in the same plane and this plane shall be parallel to the plane of movement of the head of the brush. The wires shall be parallel to each other and at right angles to the direction of movement of the brush head.

There shall be a clearance of approximately 10 mm between the grid and the baseplate under the grid.

5.2.2.3 Screw or bolt/nut system and **motor** to propel the carriage (5.2.2.1) along the axis of the brush and parallel to the brushing surface at a velocity of between 1 and 15 mm/s.

5.2.2.4 Load transducers connected to a **measuring device** fitted with a numerical indicator and a maximum value indicator, or connected to a **recording device.** The load transducers shall be capable of measuring forces of up to 20 N to an accuracy of ± 0,05 N.

5.2.3 Apparatus for measuring the filament length X, comprising

5.2.3.1 Carriage running freely in a slideway and operated by hand.

5.2.3.2 Flat plate carried by the carriage (5.2.2.1), the upper plane of which corresponds with level "0".

5.2.3.3 Guiding system for the plate (5.2.3.2), along an axis at right angles to its upper plane.

5.3 Procedure

5.3.1 Determination of the filament length

5.3.1.1 For a flat brush surface parallel to the head

Fix the brush head in the block (5.2.1.1) in the top position. Introduce the apparatus for measuring the filament length (5.2.3). Switch on the indicator or recorder (5.2.2.4) then lower the brush using the adjustable screw (5.2.1.2).

As soon as the first readings appear on the recorder, read, on the comparator (5.2.1.3), measurement X corresponding to the filament length.

Remove the measuring apparatus.

Take as the result the mean filament length $\bar{X}$.

5.3.1.2 For non-flat brush surfaces

Calculate the weighted mean of the overall length of the total number of filaments based on length measurements of individual filaments corrected for the proportion each occupies in the brush head.

5.3.2 Determination of the tufted area, A

Remove three tufts to determine the diameter of the holes. Using a pin gauge measure the diameter of each of the three holes and calculate the mean diameter, $\bar{d}$.

1) As an alternative, the apparatus can consist of a measuring unit which is permanently fixed and, in this case, it is the gripping unit which moves along the axis of the brush, i.e. the block slides with minimai friction along the carriage on an axis at right angles to the filaments.

Calculate the tufted area, A, using the following equation :

$$A = \frac{N \pi \bar{d}^2}{4}$$

where N is the number of tuft holes in the brush.

For brushes having holes which are not circular other appropriate equations are required.

5.3.3 Measurement of the deflection force, F

Remove the measurement units from the brushing surface. Lower the brush, using the adjustable screw (5.2.1.2) to a level fixed at two-thirds of $\bar{X}$ (i.e. two-thirds above the plane of the grid and one-third below).

Switch on the measuring apparatus (5.2.2) and the recorder (5.2.2.4), then introduce the grid (5.2.2.2) beneath the brushing surface using the motor (5.2.2.3). When the brush has completed a full forward and backward movement, read the maximum value, F, in both directions and calculate the mean value.

NOTE — In both the forward and backward movement the brush head should clear the grid at the end of the stroke.

5.4 Calculation of results

Calculate the mean value of the stiffness grades, G, expressed in centinewtons per square millimetre, in both the dry, G_d, and the wet, G_w, states for all the brushes in the sample, using the following equations

$$G_d = \frac{F_d}{A} \text{ and } G_w = \frac{F_w}{A}$$

$$G = \frac{G_d + G_w}{2}$$

where

F_d and F_w are the deflection forces, in the dry and wet states, respectively, in centinewtons, measured as specified in 5.3.3;

A is the tufted area, in square millimetres, determined as specified in 5.3.2.

5.5 Test report

The test report shall include the following particulars :

a) an identification of the sample;

b) the number of this International Standard, i.e. ISO 8627 : 1987;

c) the results and the method of expression used;

d) any unusual features noted during the determination;

e) any operation not included in this International Standard or in the International Standard to which reference is made, or regarded as optional.

6 Stiffness category

The stiffness shall be classified in accordance with the table.

Table — Classification of stiffness grades

Calculated stiffness (stiffness grade, G) cN/mm^2	Stiffness category	Stiffness index
$G < 7$	Soft	3
$6 < G < 9$	Medium	5
$8 < G$	Hard	7

NOTE — At the first revision of this International Standard, i.e. within five years, it is intended to amend the stiffness grades as follows :

Grade	Index
$G \leqslant 6$	3
$6 \leqslant G \leqslant 9$	5
$9 < G$	7

7 Marking

7.1 Handle

The handle shall be legibly marked with the manufacturer's name or a brand name.

7.2 Packaging

The packaging shall be marked with the stiffness category (see clause 6) and the number of this International Standard, i.e. ISO 8627 : 1987.

NOTE — In addition, the stiffness index may be included at the option of the manufacturer on the handle and/or the package.

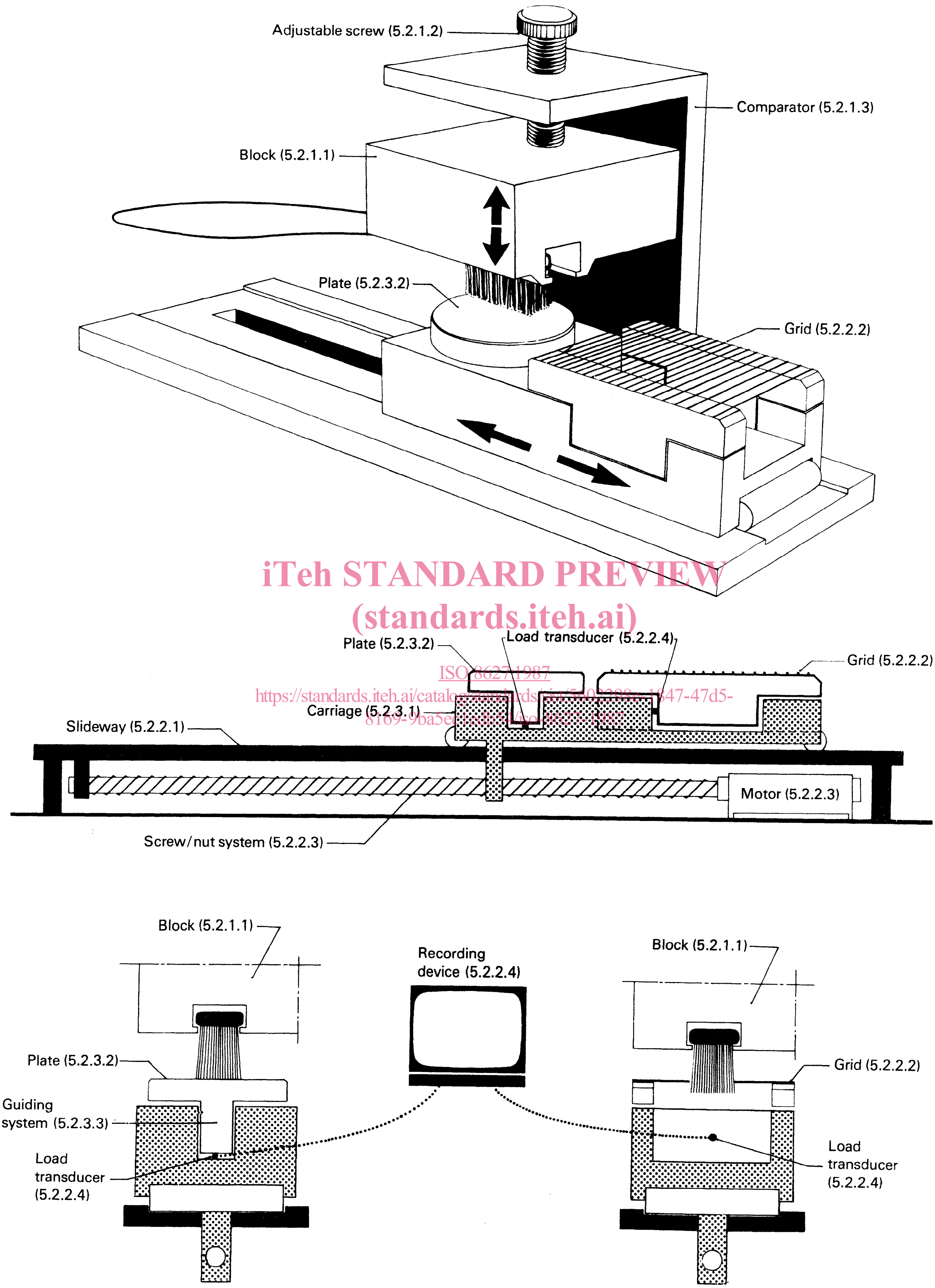

Figure — Diagram of suitable apparatus used for measuring stiffness

This page intentionally left blank

UDC 687.9 : 646.73

Descriptors : dentistry, tooth-brushes, classification, tests, stiffness tests, test equipment.

Price based on 4 pages