



SLOVENSKI STANDARD
oSIST prEN ISO 6872:2013
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Zobozdravstvo - Keramični materiali (ISO/DIS 6872:2013)

Dentistry - Ceramic materials (ISO/DIS 6872:2013)

Zahnheilkunde - Keramische Werkstoffe (ISO/DIS 6872:2013)

Médecine bucco-dentaire - Matériaux céramiques (ISO/DIS 6872:2013)

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Dentistry — Ceramic materials

Art dentaire — Produits céramiques

[Revision of third edition (ISO 6872:2008)]

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ISO/CEN PARALLEL PROCESSING

This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

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Contents

Foreword.....	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Types, Classes and their Identification	4
5 Requirements	4
6 Sampling.....	5
7 Test Methods	5
8 Information and Instructions.....	14
9 Packaging, Marking and Labelling.....	15
Annex A (informative) Fracture Toughness.....	19
Annex B (informative) Weibull Statistics	25

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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.

Attention is drawn to the possibility that some of the elements of this part of ISO 6872 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 6872 was prepared by Technical Committee ISO/TC 106, Dentistry, Subcommittee SC 2, Prosthodontics.

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Introduction

Specific qualitative and quantitative requirements for freedom from biological hazard are not included in this International Standard, but it is recommended that, in assessing possible biological or toxicological hazards, reference be made to ISO 10993-1 and ISO 7405.

This edition cancels and replaces ISO 6872:2008. The following changes were made to the previous edition of ISO 6872:

- The strength table has been expanded to take into account the different test methods and specimen sizes.
- New 2008 ISO standard 23146 for fracture toughness by SEVNB has been added as an alternative in the Annex. It has a rigorous procedure developed by ISO TC 206, Fine Ceramics.
- A restriction on the use of the SEVNB method for fracture toughness determination for 3Y-TZP has been added. In most cases, the notch cannot be made sharp enough with a razor blade.
- Maximum chamfer size on bend bars has been reduced a little bit for the case of the thin specimens.
- A recommendation is added that the chamfers to bend bars be ground lengthwise.
- Recommendations to grind lengthwise were added to the bend bar preparation step in paragraph 7.3.1.2.2
- The Y equations for SEVNB fracture toughness in 3-point have been refined and expanded to cover more configurations.
- Modification to Table 1 changing “aesthetic” to “monolithic”.

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Dentistry — Ceramic Materials

1 Scope

This International Standard specifies the requirements and the corresponding test methods for dental ceramic materials for fixed all-ceramic and metal-ceramic restorations and prostheses.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3696: *Water for analytical laboratory use – Specification and test methods*.

ISO 1942: *Dentistry – Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1942 and the following apply:

3.1 Material

3.1.1

addition ceramic

dental ceramic material which is fired at a reduced temperature and is normally applied to restore contact points on a dental restoration or prosthesis

3.1.2

dental ceramic

inorganic, non-metallic material which is specifically formulated for use, when processed according to manufacturers instructions, to form the whole or part of a dental restoration or prosthesis

3.1.3

dental porcelain

predominantly glassy dental ceramic material used mainly for aesthetics in a dental restoration or prosthesis

3.1.4

dentine ceramic

dental ceramic material used to form the overall shape and basic colour of a dental restoration or prosthesis, simulating the natural tooth dentine

3.1.5

enamel ceramic

dental ceramic material used to overlay either partially or wholly the dentine ceramic and also to form the more translucent incisal third of a dental restoration or prosthesis, simulating the natural tooth enamel

ISO/CD 6872

3.1.6**flame-sprayed dental ceramic**

dental ceramic core or substructure layer formed via the technique of flame spraying

3.1.7**glass-ceramic (dental)**

dental ceramic material formed by the action of heat treatment on a glass, in order to cause initiation and growth of a wholly or predominantly crystalline microstructure

3.1.8**glass-infiltrated dental ceramic**

dental ceramic core or substructure layer which is porous and is subsequently densified by the infiltration of specialised glass at elevated temperature

3.1.9**glaze ceramic**

dental ceramic material which is overlayed and fired at a reduced temperature compared to dentine or enamel ceramic, to produce a thin coherent sealed surface, the level of gloss being determined by the firing conditions

3.1.10**liner**

dental ceramic material used on all-ceramic substructure forming a layer that provides a background colour upon which dentine or opaque dentine may be applied to achieve overall aesthetics

3.1.11**modelling fluid**

liquid with which a dental ceramic powder is mixed, in order to shape or model it into its required form prior to firing

3.1.12**opaque dentine ceramic**

Dental ceramic material having a higher opacity than a dentine ceramic material, but which may still be used to contribute to the overall shape and basic colour of a dental restoration or prosthesis, simulating the natural tooth dentine

3.1.13**opaque dental ceramic**

dental ceramic material, which when applied to a metallic substructure, according to manufacturer's instructions, acts to bond to the metal surface, forming a layer that provides a background colour and interface upon which other dental ceramic materials may be applied to achieve overall aesthetics

3.1.14**shoulder ceramic**

dental ceramic material used to form shape and colour at the marginal area of the dental restoration or prosthesis, simulating natural tooth dentine in this area

3.1.15**stain ceramic**

dental ceramic powder or paste which is normally intensely coloured and which is formulated to be used either internally or externally, during the build up of a dental restoration or prosthesis, to simulate details within or on the surface respectively as are found in natural teeth

3.1.16**substructure (core) dental ceramic**

Predominantly polycrystalline dental ceramic material that forms a supporting substructure upon which one or more layers of dental ceramic or dental polymer material are applied, either partially or totally, to form a dental restoration or prosthesis

3.1.17**monolithic ceramic**

a monolithic dental ceramic is substantially made of a single, uniform material. A thin layer of glaze (staining technique) may be applied.

3.2 Processing

3.2.1

air firing dental ceramic

firing of dental ceramics under ambient atmospheric pressure

3.2.2

dental CAD/CAM

computer aided design/computer aided manufacture (CAD/CAM) procedures to manufacture a dental restoration or prosthesis normally including the following stages: 1. a digital scanning procedure of the model, wax-up or intra-orally to produce a 3D data set. 2. software manipulation of the 3D data set to design the prosthesis and 3. a computer directed machine tool that performs the manufacturing process

3.2.3

condensation of dental ceramic

powder process whereby a slurry of dental ceramic powder is vibrated to compact the powder, prior to sintering

3.2.4

injectable, castable, or pressable dental ceramic

dental ceramic material, normally in the form of a pellet or ingot (often pre-sintered), designed for use in a specialised furnace, which enables the ingot to be injected/cast/pressed into a mould, prepared via the lost wax technique

3.2.5

sintering of a dental ceramic

process whereby heat and potentially other process parameters (e.g. pressure and atmosphere) are applied to a ceramic powder or powder compact, in order to densify the ceramic into its required form. Note: “firing” and “sintering” are used interchangeably in this document (“firing” connoting the application of heat to drive sintering)

3.2.6

vacuum firing dental ceramic

firing of dental ceramics at reduced pressure (i.e. under vacuum) to yield the required density and associated aesthetics, especially degree of translucency. Dental ceramic for vacuum firing have a specific particle size distribution to reduce the entrapment of porosity

3.3 Properties

3.3.1

class of dental ceramic

classification of a dental ceramic material according to its intended function

3.3.2

fracture toughness

conventional fracture mechanics parameter indicating the resistance of a material to crack extension (propagation)

3.3.3

glass transition temperature

the approximate mid-point of the temperature range over which a glass transforms between elastic and viscoelastic behaviour, characterized by the onset of a rapid change in its coefficient of thermal expansion

3.3.4

glaze

surface appearance obtained when the gloss is clinically and aesthetically acceptable

4 Types, classes and their identification

For the purposes of this International Standard, dental ceramics are designated into two types: