

Dentistry - Ceramic materials (ISO 6872:2015)

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

See Eesti standard EVS-EN ISO 6872:2015 sisaldab Euroopa standardi EN ISO 6872:2015 ingliskeelset teksti.	This Estonian standard EVS-EN ISO 6872:2015 consists of the English text of the European standard EN ISO 6872:2015.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 10.06.2015.	Date of Availability of the European standard is 10.06.2015.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile [standardiosakond@evs.ee](mailto:standardiosakond@evs.ee).

ICS 11.060.10

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:

Aru 10, 10317 Tallinn, Eesti; koduleht [www.evs.ee](http://www.evs.ee); telefon 605 5050; e-post [info@evs.ee](mailto:info@evs.ee)

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:

Aru 10, 10317 Tallinn, Estonia; homepage [www.evs.ee](http://www.evs.ee); phone +372 605 5050; e-mail [info@evs.ee](mailto:info@evs.ee)

English Version

## Dentistry - Ceramic materials (ISO 6872:2015)

Médecine bucco-dentaire - Matériaux céramiques (ISO 6872:2015)

Zahnheilkunde - Keramische Werkstoffe (ISO 6872:2015)

This European Standard was approved by CEN on 23 April 2015.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

## Foreword

This document (EN ISO 6872:2015) has been prepared by Technical Committee ISO/TC 106 "Dentistry" in collaboration with Technical Committee CEN/TC 55 "Dentistry" the secretariat of which is held by DIN.

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 December 2015, and conflicting national standards shall be withdrawn at the latest by December 2015.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 6872:2008.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## Endorsement notice

The text of ISO 6872:2015 has been approved by CEN as EN ISO 6872:2015 without any modification.

# Contents

Page

<b>Foreword</b>	<b>v</b>
<b>Introduction</b>	<b>vi</b>
<b>1 Scope</b>	<b>1</b>
<b>2 Normative references</b>	<b>1</b>
<b>3 Terms and definitions</b>	<b>1</b>
3.1 Material	1
3.2 Processing	3
3.3 Properties	4
<b>4 Types, classes, and their identification</b>	<b>4</b>
<b>5 Requirements</b>	<b>6</b>
5.1 Uniformity	6
5.2 Freedom from extraneous materials	6
5.3 Mixing and condensation properties of type I ceramics	6
5.4 Physical and chemical properties	6
5.5 Biocompatibility	6
5.6 Shrinkage factor	6
<b>6 Sampling</b>	<b>6</b>
6.1 Type I ceramics	6
6.2 Type II ceramics	7
<b>7 Test methods</b>	<b>7</b>
7.1 Preparation of test specimens	7
7.1.1 Components of test specimens (type I ceramics)	7
7.1.2 Apparatus for mixing	7
7.1.3 Method of mixing	7
7.1.4 Procedure for specimen fabrication	7
7.1.5 Firing	8
7.2 Radioactivity of dental ceramic	8
7.2.1 Preparation of samples	8
7.2.2 Counting procedure	8
7.2.3 Assessment of results	8
7.3 Flexural strength	8
7.3.1 Three-point and four-point bending tests	8
7.3.2 Biaxial flexure test (piston-on-three-ball test)	12
7.4 Linear thermal expansion coefficient	14
7.4.1 Apparatus	14
7.4.2 Preparing of test specimens (type I and type II ceramics)	14
7.4.3 Dilatometric measurement	14
7.4.4 Assessment of results	14
7.5 Glass transition temperature	14
7.5.1 Operating procedure	14
7.5.2 Assessment of results	15
7.6 Chemical solubility	15
7.6.1 Reagent	15
7.6.2 Apparatus	15
7.6.3 Preparation of test specimens	16
7.6.4 Procedure	16
7.6.5 Calculation and assessment of results	16
<b>8 Information and instructions</b>	<b>16</b>
8.1 Information	16
8.1.1 General	16
8.1.2 Type I Ceramics	16

8.1.3	Type II ceramics .....	16
8.2	Instructions for use .....	17
<b>9</b>	<b>Packaging, marking, and labelling .....</b>	<b>17</b>
9.1	Packaging .....	17
9.2	Marking and labelling .....	17
<b>Annex A</b> (informative)	<b>Fracture toughness .....</b>	<b>19</b>
<b>Annex B</b> (informative)	<b>Weibull statistics .....</b>	<b>26</b>
<b>Bibliography</b> .....		<b>28</b>

## 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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 106, *Dentistry*, Subcommittee SC 2, *Prosthodontic materials*.

This fourth edition cancels and replaces the third edition (ISO 6872:2008), which has been technically revised with the following changes:

- new edition of ISO 23146:2012 for fracture toughness by SEVNB has been added as an alternative in [Annex A](#). 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 for the case of the thin specimens;
- recommendations to grind lengthwise were added to the bend bar preparation step in [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”.

## 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 document is a preview generated by EVS



# 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*

ISO 13078, *Dentistry — Dental furnace — Test method for temperature measurement with separate thermocouple*

## 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**

**add-on ceramic**

**correction ceramic**

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

#### 3.1.2

**aesthetic ceramic**

*dental porcelain* (3.1.5) or *glass ceramic* (3.1.10) having appropriate translucency and colour used to mimic the optical properties of natural teeth

#### 3.1.3

**chromatic dentin ceramic**

dentine ceramic having a high strength or saturation of the hue (color)

#### 3.1.4

**dental ceramic**

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

#### 3.1.5

**dental porcelain**

predominantly, glassy *dental ceramic* (3.1.4) material used mainly for aesthetics in a dental restoration or prosthesis

#### 3.1.6

**dentine ceramic**

*dental ceramic* (3.1.4) material used to form the overall shape and basic colour of a dental restoration or prosthesis simulating the natural tooth dentine