

STN	Stomatológia Metódy skúšania korózie pre kovové materiály (ISO 10271: 2020)	STN EN ISO 10271 85 6327
------------	--------------------------------------------------------------------------------------------------------	--------------------------------------------------

Dentistry - Corrosion test methods for metallic materials (ISO 10271:2020)

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 12/20

Obsahuje: EN ISO 10271:2020, ISO 10271:2020

Oznámením tejto normy sa ruší
STN EN ISO 10271 (85 6327) z decembra 2011

132132

EUROPEAN STANDARD

EN ISO 10271

NORME EUROPÉENNE

EUROPÄISCHE NORM

September 2020

ICS 11.060.10

Supersedes EN ISO 10271:2011

English Version

**Dentistry - Corrosion test methods for metallic materials
(ISO 10271:2020)**Médecine bucco-dentaire - Méthodes d'essai de
corrosion des matériaux métalliques (ISO 10271:2020)Zahnheilkunde - Korrosionsprüfverfahren für
metallische Werkstoffe (ISO 10271:2020)

This European Standard was approved by CEN on 28 August 2020.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, 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: Rue de la Science 23, B-1040 Brussels**

EN ISO 10271:2020 (E)

Contents	Page
European foreword.....	3

European foreword

This document (EN ISO 10271:2020) 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 March 2021, and conflicting national standards shall be withdrawn at the latest by March 2021.

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

This document supersedes EN ISO 10271:2011.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 10271:2020 has been approved by CEN as EN ISO 10271:2020 without any modification.

INTERNATIONAL STANDARD

ISO 10271

Third edition
2020-08

Dentistry — Corrosion test methods for metallic materials

*Médecine bucco-dentaire — Méthodes d'essai de corrosion des
matériaux métalliques*



Reference number
ISO 10271:2020(E)

© ISO 2020

ISO 10271:2020(E)**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2020

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Test methods	3
4.1 Static immersion test.....	3
4.1.1 Information required.....	3
4.1.2 Application.....	3
4.1.3 Reagents.....	3
4.1.4 Apparatus.....	3
4.1.5 Solution preparation.....	4
4.1.6 Samples.....	4
4.1.7 Test procedure.....	5
4.1.8 Elemental analysis.....	6
4.1.9 Test report.....	6
4.2 Electrochemical test.....	6
4.2.1 Information required.....	6
4.2.2 Application.....	6
4.2.3 Reagents.....	6
4.2.4 Apparatus.....	7
4.2.5 Solution preparation.....	7
4.2.6 Samples.....	7
4.2.7 Test procedure.....	9
4.2.8 Test report.....	12
4.3 Sulfide tarnish test (cyclic immersion).....	13
4.3.1 Information required.....	13
4.3.2 Application.....	13
4.3.3 Reagents.....	13
4.3.4 Apparatus.....	13
4.3.5 Solution preparation.....	14
4.3.6 Samples.....	14
4.3.7 Test procedure.....	14
4.3.8 Inspection.....	15
4.3.9 Test report.....	15
4.4 Sulfide tarnish test (static immersion).....	15
4.4.1 Information required.....	15
4.4.2 Application.....	15
4.4.3 Reagents.....	15
4.4.4 Apparatus.....	15
4.4.5 Solution preparation.....	16
4.4.6 Samples.....	16
4.4.7 Test procedure.....	17
4.4.8 Inspection.....	17
4.4.9 Test report.....	17
4.5 Static immersion test with periodic analysis.....	18
4.5.1 Information required.....	18
4.5.2 Application.....	18
4.5.3 Reagents.....	18
4.5.4 Apparatus.....	18
4.5.5 Solution preparation.....	18
4.5.6 Samples.....	19
4.5.7 Test procedure.....	20

ISO 10271:2020(E)

4.5.8	Elemental analysis.....	21
4.5.9	Test report.....	21
4.6	Dental amalgam.....	22
4.7	Crevice corrosion.....	22
4.7.1	Principle.....	22
4.7.2	Application.....	22
4.7.3	Test medium.....	22
4.7.4	Materials.....	22
4.7.5	Apparatus.....	22
4.7.6	Specimen.....	23
4.7.7	Procedure.....	24
4.7.8	Inspection.....	24
4.7.9	Test report.....	24
Annex A (informative) Corrosion test method development.....		26
Bibliography.....		32

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).

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).

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

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 106, *Dentistry*, Subcommittee SC 2, *Prosthetic materials*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 55, *Dentistry*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 10271:2011), which has been technically revised. The main changes compared with the previous edition are as follows:

- in the Scope, the statement about this document not being applicable to “appliances for orthodontics” and “dental amalgam” has been removed;
- in [4.1.6.3](#), a NOTE has been added to the static immersion test method acknowledging that “measuring the total surface area of orthodontic appliances can be difficult” and, therefore, if required in the appropriate standard, “it is acceptable for the ion release for each element of a set of orthodontic brackets to be reported in terms of μg in seven days for a specified number of orthodontic brackets”;
- since sodium sulfide hydrate (approximately 35 % Na_2S) analytical grade is not available in every country, text was added to the appropriate test methods indicating that sodium sulfidenonahydrate ($\text{Na}_2\text{S}\cdot 9\text{H}_2\text{O}$), $\leq 98\%$ may be used;
- this document has been harmonized with ISO 22674:2016 by making changes in the preparation sections of the various test methods that reflect changes that were made for the preparation of metals supplied for metal-ceramic restorations in ISO 22674:2016;
- subclause [4.6](#) “Dental amalgam” has been added, which refers the user to ISO/TS 17988 when testing the corrosion behaviour of dental amalgam;
- subclause [4.7](#) “Crevice corrosion” has been added, which provides a test method to evaluate the susceptibility of a dental metallic material to crevice corrosion.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

ISO 10271:2020(E)

Introduction

This document was developed from the original Technical Report (ISO/TR 10271¹⁾) as a result of worldwide demand for standard test methods to determine the acceptability of metallic materials for oral restorations in relation to corrosion.

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

The testing of the corrosion behaviour of metallic materials in dentistry is complicated by the diversity of the materials themselves, their applications and the environment to which they are exposed. Variation occurs between devices and within the same device during the exposure time. The type of corrosion behaviour or effect can also vary with exposure time. Accordingly, it is not possible to specify a single test capable of covering all situations, nor is it a practical proposition to define a test for each situation. This document, therefore, gives detailed procedures for test methods that have been found to be of merit as evidenced by considerable use.

In the second edition, two new test methods were added. To supplement the existing static immersion test, a static immersion test with periodic analysis was added. A major reason for the addition of this test is that the rate of corrosion of most dental metallic materials varies over time. Thus, the aim of this supplementary test is to provide information on this variation in the corrosion of a dental metallic material. A classification scheme to interpret the rate of corrosion of a tested material with time (i.e. steady, decreasing, increasing) was not included as part of the static immersion test with periodic analysis. It is intended to monitor the use of the test through appropriate working groups of ISO/TC 106 to ascertain whether a classification scheme is needed in a future revision of this document. In this third edition, a classification scheme is still not included.

To supplement the sulfide tarnish test (cyclic immersion), a sulfide tarnish test (static immersion) was also added to the second edition of this document. This test has been used successfully for many years to evaluate the corrosion of silver alloys.

In addition, the second edition added [Annex A](#), which sets out a procedure for each element of the test system such that a consistent approach can be taken for the development of further test methods. Equally, it is recognized that any element can represent only the current recommendation, but changes in the future are unlikely to change the framework.

The third edition differs from the second by the removal of the statement in the Scope about the document not being applicable to “appliances for orthodontics” and “dental amalgam”. With the appliances for orthodontics change in mind, a NOTE was added to the static immersion test acknowledging that “measuring the total surface area of orthodontic appliances can be difficult” and stating that, if required in the appropriate standard, “it is acceptable for the ion release for each element of a set of orthodontic brackets to be reported in terms of μg in seven days for a specified number of orthodontic brackets”. Also, with reference to dental amalgam, a subclause on dental amalgam (see [4.6](#)) has been added, which refers the user to ISO/TS 17988 when testing the corrosion behaviour of dental amalgam. Additionally, there is a clarification statement that the test methods given in [4.1](#) to [4.5](#) are still not applicable to the evaluation of dental amalgam.

The third edition was harmonized with ISO 22674:2016 by adding to the preparation sections of the various test methods the following change concerning metals supplied for metal-ceramic restorations:

- “Following the manufacturer’s instructions, simulate the oxidation procedure and four ceramic firings at the highest temperature recommended for fusing ceramic to the metallic material. Remove and place the specimens on a ceramic plate (which is at room temperature) to cool to room temperature after the oxidation and ceramic firing simulation.”

1) Withdrawn document.

Additionally, since sodium sulfide hydrate (approximately 35 % Na₂S) analytical grade is not available in every country, this third edition includes a statement, which was added to the appropriate test methods, indicating that sodium sulfide nonahydrate (Na₂S·9H₂O), ≤ 98 % may be used.

Also of importance, a test method to evaluate the susceptibility of a dental metallic material to crevice corrosion was added as [4.7](#).

It is not the purpose of this document to propose corrosion test methods for specific applications or to set limits as precise as those that may be required in a standard relating to a type of product and its application.

Dentistry — Corrosion test methods for metallic materials

1 Scope

This document specifies test methods and procedures to determine the corrosion behaviour of metallic materials used in the oral cavity. It is intended that these test methods and procedures be referred to in individual International Standards specifying such metallic materials.

This document is not applicable to dental instruments.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1042, *Laboratory glassware — One-mark volumetric flasks*

ISO 1942, *Dentistry — Vocabulary*

ISO 3585, *Borosilicate glass 3.3 — Properties*

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

ISO 6344-1, *Coated abrasives — Grain size analysis — Part 1: Grain size distribution test*

ISO 7183, *Compressed-air dryers — Specifications and testing*

ISO/TS 17988, *Dentistry — Corrosion test methods for dental amalgam*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN