
**Dentistry — Corrosion test methods for
metallic materials**

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



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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 2.

The main task of technical committees is to prepare International Standards. 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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 10271 was prepared by Technical Committee ISO/TC 106, *Dentistry*, Subcommittee SC 2, *Prosthetic materials*.

This second edition cancels and replaces the first edition (ISO 10271:2001), which has been technically revised, in particular by the inclusion of two additional test methods. It also incorporates Technical Corrigendum ISO 10271:2001/Cor.1:2005.

Introduction

This International Standard was developed from the original Technical Report (ISO/TR 10271) as a result of worldwide demand for standard test methods to determine 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 International Standard, 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 behavior 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 behavior 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 International Standard, therefore, gives detailed procedures for test methods that have been found to be of merit as evidenced by considerable use.

This second edition differs from the first edition by the addition of two new test methods. To supplement the existing static immersion test, a static immersion test with periodic analysis has been 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 International Standard.

To supplement the sulfide tarnish test (cyclic immersion), a sulfide tarnish test (static immersion) has also been added to this second edition of ISO 10271. This test has been used successfully for many years to evaluate the corrosion of silver alloys.

In addition, an informative annex (Annex A) is provided that 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.

It is not the purpose of this International Standard to propose corrosion test methods for specific applications or to set limits as precise as those in the standard relating to the type of product and its application.

Dentistry — Corrosion test methods for metallic materials

1 Scope

This International Standard provides test methods and procedures to determine the corrosion behavior of metallic materials used in the oral cavity. It is intended that the test methods and procedures in this International Standard be referred to in the individual International Standards specifying such metallic materials.

This International Standard is not applicable to instruments and dental amalgam and appliances for orthodontics.

2 Normative references

The following referenced documents are indispensable for the application 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*

3 Terms and definitions

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

3.1

breakdown potential

E_p

least noble potential at which pitting or crevice corrosion, or both, initiates and propagates

3.2

corrosion

physicochemical interaction between a metallic material and its environment that results in a partial or total destruction of the material or in a change of its properties