
**Timekeeping instruments — Watch
external parts made of hard material
— General requirements and test
methods**

*Instruments horaires — Habillages de montre en matériaux durs —
Exigences générales et méthodes d'essais*

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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.

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).

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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 114, *Horology*.

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.

Introduction

In recent years, hard materials such as tungsten carbide, ceramics, etc., have found several applications in the horological industry, particularly for the external parts of watches, and more particularly in watchcases and some of their accessories such as bezels, crowns, wristbands and clasps.

Their properties in terms of hardness, wear resistance or finish quality (brightness) bring many undeniable advantages for this type of application.

This document deals with constitutive components of external parts of watches. Given the variety of possibilities in the mounting of these elements, it is not possible to define and to specify “a complete watch made of hard material”.

Manufacturers of hard materials have developed know-how with the aim of satisfying the legal requirements and the criteria of horological standardization, without standards nor specifications that can serve as references. The aim of this document is to clarify the general requirements and the test methods for the horological external parts made of hard material.

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Timekeeping instruments — Watch external parts made of hard material — General requirements and test methods

1 Scope

This document concerns whole watches, in which all or some of the components of the external parts are made of hard material, with the exception of watch glasses.

It applies to all elements made in massive material whose hardness is greater than or equal to 1 200 Vickers.

It describes the performance in terms of resistance to mechanical and thermal shocks, to corrosion, to scratches, to sunlight exposure and also to the wear of its components.

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 1413:2016, *Horology — Shock-resistant wrist watches*

ISO 3160-2:2015, *Watch-cases and accessories — Gold alloy coverings — Part 2: Determination of fineness, thickness, corrosion resistance and adhesion*

ISO 4892-1, *Plastics — Methods of exposure to laboratory light sources — Part 1: General guidance*

ISO 9227:2017, *Corrosion tests in artificial atmospheres — Salt spray tests*

ISO 23160:2011, *Watch cases and accessories — Tests of the resistance to wear, scratching and impacts*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org>

3.1

external part

<horological context> part of a watch added to the movement and contributing to its external presentation, protection, fixing, control such as the watchcase, the bezel, the crown, the push buttons, the wristband and the clasp

3.2

hard material

material whose Vickers hardness is equal to or higher than 1 200 HV1

3.3

massive

<component> having a composition that is macroscopically homogeneous across its entire section

3.4 brittleness

<material or component> susceptibility to breaking, under the effect of a static or dynamic stress, without being significantly plastically deformed

4 Requirements, method of control and acceptance criteria

4.1 General

The requirements of this document apply to the elements of external parts of watches made in hard and massive material, according to the definitions in [Clause 3](#).

NOTE These materials can contain allergens or toxic materials such as nickel or cobalt.

The watch external parts made of hard material shall not present any shape which may be harmful for the user.

The control method and the acceptance criteria of these materials, constituting the prerequisites, are reported in [Annex A](#).

In the case of tests involving mechanical solicitations (see [4.2](#), [4.7](#) and [4.8](#)), the number of samples to be tested shall be sufficient to include the usually large dispersion of measurement inherent to the brittleness behaviour of hard materials. A statistical approach should be adopted (according to [Annex C](#)).

It is possible to apply all the tests or a selection of them to assemblies or to certain individual components. The definition of which components are to be tested and the test conditions to be achieved shall be given special attention in advance in order to highlight those parts that are typically sensitive under conditions of ordinary use.

In the case of hard materials that are additionally coated, the surface-related tests should be interpreted differently (wear, scratches, hardness, etc.).

The existence of porosity is admitted as long as the requirements below are fulfilled.

4.2 Mechanical shock resistance

4.2.1 Requirements and control method

The purpose of this test is to verify the mechanical behaviour of the tested elements or assemblies.

The external elements of watches made of hard material shall comply with the specific requirements of ISO 1413:2016, 5.3. However, the height to be used shall be 0,75 m because of the lower shock resistance of hard materials, of which the consumer should be made aware.

4.2.2 Acceptance criteria

The examination of the elements made of hard material shall not reveal any permanent deterioration affecting its functions, its performance or its appearance (flaws or broken components).

The examination of the wristband shall not reveal any failure and not present any loss of components.

The assembly of the watch head, the wristband and its functional elements (clasp, loop, etc.) shall stay functional.

4.3 Thermal shock resistance

4.3.1 Requirements and control method

The purpose of this test is to evaluate the behaviour of assemblies containing at least one element made of hard material.

The elements of external parts of watches made of hard material shall meet the specific requirements according to the following method:

- Place the samples in a thermal chamber stabilized at $70\text{ °C} \pm 2\text{ °C}$ without humidity contribution during 2 h.
- Soak them immediately in deionized water at $5\text{ °C} \pm 2\text{ °C}$ during 30 s minimum.
- Repeat this cycle five times minimum. Samples shall be dried after each cycle.
- Observe the horological external parts and record visible variations.

Other heating methods can be used but shall be specified in the report.

4.3.2 Acceptance criteria

No visible degradation shall be observed on the components or assembly tested.

4.4 Corrosion resistance

4.4.1 Requirements and control method

The purpose of this test is to evaluate hard material elements or assemblies against corrosive agents.

The elements of external parts of watches made of hard material shall meet the specific requirements, concerning the following tests, of ISO 9227:2017, 5.2.2 and ISO 3160-2:2015, 7.4.

4.4.2 Acceptance criteria

To be determined by the concerned parties.

4.5 Wear resistance

4.5.1 Requirements and control method

The purpose of this test is to evaluate the potential degradation of the element made of hard material due to random wear.

The elements of external parts of watches made of hard material shall meet the specific requirements of ISO 23160:2011, 4.1.

4.5.2 Acceptance criteria

To be determined according to ISO 23160:2011, 4.1.6.

The wear resistance shall be high due to customers' expectations.