

Watch-cases and accessories - Gold alloy coverings - Part 2: Determination of fineness, thickness, corrosion resistance and adhesion (ISO 3160-2:2003, IDT)

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- ISO 3160-2:2003, IDT

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Voorbeeld  
Preview

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3160-2

Third edition  
2003-02-15

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**Watch-cases and accessories —  
Gold alloy coverings —**

Part 2:  
**Determination of fineness, thickness,  
corrosion resistance and adhesion**

*Boîtes de montres et leurs accessoires — Revêtements d'alliage d'or —*

*Partie 2: Détermination du titre, de l'épaisseur, de la résistance à la  
corrosion et de l'adhérence*

Preview



Reference number  
ISO 3160-2:2003(E)

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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 3160-2 was prepared by Technical Committee ISO/TC 114, *Horology*, Subcommittee SC 6, *Precious metal coverings*.

This third edition cancels and replaces the second edition (ISO 3160-2:1992), which has been technically revised.

ISO 3160 consists of the following parts, under the general title *Watch-cases and accessories — Gold alloy coverings*:

- *Part 1: General requirements*
- *Part 2: Determination of fineness, thickness, corrosion resistance and adhesion*
- *Part 3: Abrasion resistance tests of a type of coating on standard gauges*

# Watch-cases and accessories — Gold alloy coverings —

## Part 2: Determination of fineness, thickness, corrosion resistance and adhesion

### 1 Scope

This part of ISO 3160 specifies methods to determine fineness, thickness, corrosion resistance and adhesion for gold alloy coverings on watch-cases and accessories, including bracelets when they are permanently attached to the case.

The tests apply only to significant surfaces.

This part of ISO 3160 applies to all gold alloy coverings specified in ISO 3160-1.

### 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 1463:—<sup>1)</sup>, *Metallic and oxide coatings — Measurement of coating thickness — Microscopical method*

ISO 2177, *Metallic coatings — Measurement of coating thickness — Coulometric method by anodic dissolution*

ISO 3160-1, *Watch-cases and accessories — Gold alloy coverings — Part 1: General requirements*

ISO 3497, *Metallic coatings — Measurement of coating thickness — X-ray spectrometric methods*

ISO 3543, *Metallic and non-metallic coatings — Measurement of thickness — Beta backscatter method*

ISO 3868, *Metallic and other non-organic coatings — Measurement of coating thicknesses — Fizeau multiple-beam interferometry method*

ISO 4524-1, *Metallic coatings — Test methods for electrodeposited gold and gold alloy coatings — Part 1: Determination of coating thickness*

ISO 4524-5, *Metallic coatings — Test methods for electrodeposited gold and gold alloy coatings — Part 5: Adhesion tests*

ISO 4538, *Metallic coatings — Thioacetamide corrosion test (TAA test)*

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1) To be published. (Revision of ISO 1463:1982)

**ISO 3160-2:2003(E)**

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

ISO 11426, *Determination of gold in gold jewellery alloys — Cupellation method (fire assay)*

ISO 12687, *Metallic coatings — Porosity tests — Humid sulfur (flowers of sulfur) test*

ISO 14647, *Metallic coatings — Determination of porosity in gold coatings on metal substrates — Nitric acid vapour test*

**3 Terms and definitions**

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

**3.1 significant surface**  
that part of the surface which is to receive the gold alloy covering and which is essential to the appearance and serviceability of the component

NOTE When there is no agreement between the supplier and customer, a significant surface is considered to be any surface which can be touched by a 5 mm diameter ball.

**4 General**

In the context of this part of ISO 3160, the term "corrosion" includes tarnishing and oxidation, as well as surface penetration and the effects of the penetration of corrosive agents into gaps in the surface protection.

It is generally required that, except where specified to the contrary, gold-alloy-covered surfaces should not have suffered any damage after each of the proposed tests. In practice, however, this condition is never strictly fulfilled and certain minor changes are observed, especially at the edges of the gold-covered parts. Consequently, interpretation of the results requires a certain amount of common sense and, if necessary, agreement between the supplier and customer. The presence of such almost inevitable faults makes it impossible to sell the tested item as new. In this respect, the tests are therefore to be considered to be destructive.

The test methods apply to all gold alloy coverings specified in ISO 3160-1.

**5 Determination of fineness**

If the fineness is measured on a gold alloy covering which is separated from the base metal, the method used to separate the gold alloy covering from the base metal shall not affect the fineness of the gold covering to a significant extent.

For multilayer coverings, the covering content measured is the mean content, which shall be a minimum of 585/1 000, in accordance with ISO 3160-1.

The method of separation of the sample is specified in Annex A.

**6 Determination of contents**

Any of the following methods shall be used for the determination of contents:

- a) chemical analysis by reduction in an aqueous solution of, for example, sulfur dioxide or any other suitable reducing agent;



- b) analysis by:
- 1) cupellation (fire test) as specified in ISO 11426,
  - 2) atomic absorption spectrometry,
  - 3) spectrophotometry,
  - 4) X-ray spectrometry as specified in ISO 3497,
  - 5) plasma emission spectrometry (ICP method);
- c) touchstone method (only to be used to evaluate the approximate fineness);
- d) any other physico-chemical method.

Any method used shall be capable of giving an indication of fineness to within an accuracy of 50 parts per thousand.

In the event of arbitration, the reference method is that of analysis by cupellation (fire test) specified in ISO 11426.

## 7 Determination of thickness

Any of the following test methods for the determination of the thickness of gold alloy coatings shall be used, provided a measuring accuracy of  $\pm 10\%$  is guaranteed:

- a) the microsection method specified in ISO 1463 for a thickness of  $5\ \mu\text{m}$  ( $-20\%$ ) and above (local thickness);
- b) the dissolution method and chemical analysis for any thickness of gold alloy covering (average thickness) specified in ISO 4524-1;
- c) dissolution and measurement by the micrometer method specified in ISO 1463;
- d) the beta-ray backscatter method specified in ISO 3543;
- e) the X-ray spectrometric method (fluorescence) specified in ISO 3497;
- f) the coulometric method (coulometric method by anodic dissolution) specified in ISO 2177;
- g) the fizeau multiple-beam interferometry method specified in ISO 3868;
- h) the scanning electron microscope method specified in ISO 9220<sup>6)</sup>;
- i) any other physical-chemical method which can guarantee accuracy.

In the event of arbitration, the microsection method specified in ISO 1463 shall be used (local thickness).

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