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**Jewellery and precious metals — Non  
destructive precious metal fineness  
confirmation by ED-XRF**

*Joannerie, bijouterie et métaux précieux — Confirmation du titre de  
métal précieux par analyse non destructive ED-XRF*



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# Contents

	Page
<b>Foreword</b> .....	<b>iv</b>
<b>Introduction</b> .....	<b>v</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>
<b>4 Principle</b> .....	<b>2</b>
<b>5 Apparatus</b> .....	<b>2</b>
<b>6 Procedure</b> .....	<b>2</b>
6.1 Calibration.....	2
6.1.1 Calibration standards.....	2
6.1.2 Method calibration.....	3
6.2 Verification.....	3
6.2.1 Reference material.....	3
6.2.2 Method verification.....	3
6.3 Analysis.....	4
6.3.1 Sample preparation.....	4
6.3.2 Sample analysis.....	4
<b>7 Calculation and expression of the results</b> .....	<b>4</b>
7.1 Calculation.....	4
7.2 Uncertainty.....	4
7.3 Result interpretation.....	5
<b>8 Test report</b> .....	<b>5</b>
<b>Bibliography</b> .....	<b>7</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)).

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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 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 the following URL: [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 174, *Jewellery and precious metals*.

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](http://www.iso.org/members.html).

## Introduction

This document describes a non-destructive method to verify (confirm) the fineness of finished and semifinished jewellery items considered homogeneous by ED-XRF (energy-dispersive X-ray fluorescence).

Multiple methods are available to determine the fineness of precious metal alloys. They however are all requiring the destruction of the sample and long analysis time; for example gold cupellation by ISO 11426. Under some circumstances, destruction of the sample is not an option. This method proposes a non-destructive alternative, which allows validating a declared fineness.

The standard is not suitable for the regulatory hallmarking application. Because of the inherent higher uncertainty associated with ED-XRF measurements, some results might be inconclusive.

The document gives guidelines on the

- instrumentation,
- number and composition of calibration standards needed for calibration,
- composition of reference material needed to verify the calibration,
- number of measurement and replicates on the sample whose fineness is to be verified
- uncertainty calculation, and
- interpretation of the results.



# Jewellery and precious metals — Non destructive precious metal fineness confirmation by ED-XRF

## 1 Scope

This document describes a non-destructive method to verify (confirm) the precious metal fineness of finished and semifinished jewellery item(s) considered homogeneous by ED-XRF (energy dispersive X-ray fluorescence), including alloys according to ISO 9202.

This document is not suitable for any coated items. WD-XRF (wavelength dispersive X-ray fluorescence) equipment cannot be used.

## 2 Normative references

There are no normative references in this document.

## 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

#### **ED-XRF**

#### **energy-dispersive X-ray fluorescence**

X-ray fluorescence elemental analysis method where all elements in the sample are simultaneously excited and where the intensities of the characteristic fluorescence radiation emitted by each element are quantified by separating the differential energies specific to each element

### 3.2

#### **spot**

target area on the sample where the X-ray beam strikes the surface

### 3.3

#### **calibration standard**

material with appropriate homogeneity whose exact composition is known and which can be used to calibrate the *ED-XRF* (3.1) instrument

### 3.4

#### **reference material**

#### **RM**

material with appropriate homogeneity whose exact composition is known and which has been established to be fit for *ED-XRF* (3.1) measurement

### 3.5

#### **major element**

main precious metal element of interest in the alloy whose concentration is to be verified, as well as any other element whose concentration is higher

**EXAMPLE** In the case of gold 375 ‰ alloy with 500 ‰ of copper, both gold and copper are the major elements.