



**SLOVENSKI STANDARD**  
**SIST EN 12472:1999**  
**01-november-1999**

---

Gja i `jfUbUcVfUWbc!\_cfcnj'g\_Ua YrcXU'nUcX\_fjj Ub'Y'b]\_`U]n'dfYj`Y Yb]\  
dfYXa Yrcj

Method for the simulation of wear and corrosion for the detection of nickel release from coated items

Simulierte Abrieb- und Korrosionsprüfung zum Nachweis der Nickelabgabe von mit Auflagen versehenen Gegenständen

Méthode pour la simulation de l'usure et de la corrosion pour la détermination du nickel libéré par les objets revetus

**ITIH STANDARD PREVIEW**  
**(standards.iteh.ai)**  
<https://standards.iteh.ai/catalog/standards/sist/9b44d09-9688-4a37-a13a-0ba1d15265eb/sist-en-12472-1999>

**Ta slovenski standard je istoveten z: EN 12472:1998**

---

**ICS:**

39.060            Nakit                                    Jewellery

**SIST EN 12472:1999**                                    **en**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 12472:1999

<https://standards.iteh.ai/catalog/standards/sist/f9b44d09-9688-4a37-a13a-0ba1d15265eb/sist-en-12472-1999>

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 12472**

November 1998

ICS 39.060

Descriptors: precious metals, nickel coatings, tests, migration, detection, nickel, accident prevention, wear tests, accelerated corrosion tests, procedure

English version

## Method for the simulation of wear and corrosion for the detection of nickel release from coated items

Méthode pour la simulation de l'usure et de la corrosion pour la détermination du nickel libéré par les objets revêtus

Simulierte Abrieb- und Korrosionsprüfung zum Nachweis der Nickelabgabe von mit Auflagen versehenen Gegenständen

This European Standard was approved by CEN on 14 October 1998.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Page 2  
EN 12472:1998

### Foreword

This European Standard has been prepared by Technical Committee CEN/TC 283 "Precious metals - Applications in jewellery and associated products", the secretariat of which is held by UNI.

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 May 1999, and conflicting national standards shall be withdrawn at the latest by May 1999.

Annex A is informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

## iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN 12472:1999

<https://standards.iteh.ai/catalog/standards/sist/9b44d09-9688-4a37-a13a-0ba1d15265eb/sist-en-12472-1999>



ALTERNATIVE ADVERTISED  
COPYRIGHT IN THE UNITED KINGDOM  
OF DESIGN IN THE UNITED KINGDOM  
1999

UNIVERSITY OF SHEFFIELD



## Introduction

The wear of objects in contact with the skin depends very much on nature and shape of the objects and the activities of the person concerned. This procedure attempts to simulate the wear and corrosion likely to be suffered by a coated article during two years of normal use. By its nature this is a pragmatic solution to the problems posed by the evaluation of coated items which are in contact with the skin, and which may be subject to several kinds of wear.

## 1 Scope and field of application

This European Standard specifies a method for accelerated wear and corrosion, to be used for the detection of nickel release from coated items that come into direct and prolonged contact with the skin.

## 2 Normative references

This European Standard incorporates by dated or undated reference provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed below. For dated references, subsequent amendments to, or revisions of, any of these publications apply to this standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 1811 Reference test method for release of nickel from products intended to come into direct and prolonged contact with the skin

## 3 Principle

The items to be tested are exposed to a corrosive atmosphere before being placed into a container together with abrasive chips, water, and a wetting agent. The container is rotated so as to subject the test pieces to friction from the mass of abrasive chips. This action smoothes the surfaces and abrades the coatings of the test items. The items are then tested for nickel release in accordance with EN 1811.

## 4 Reagents and materials

Except where indicated, all reagents shall be of recognized pro analysis, p.a., grade or better and shall be free of nickel.

### 4.1 Corrosion

**4.1.1 Container made of an inert material** (glass or plastic) with a lid and a device made of inert material for suspending the test pieces.

**4.1.2 Corrosive medium:** dissolve 50g DL-Lactic acid, > 88% purity, and 100g sodium chloride in 1000 ml deionized water.

**4.1.3 Degreasing solution:** dissolve 5g of an anionic surface-active agent such as sodium dodecylbenzene sulfonate or sodium alkylaryl sulfonate in 1000 ml water. An appropriately-diluted, neutral, commercially-available detergent may be used.

**4.1.4 Laboratory oven** capable of maintaining a temperature of  $(50 \pm 2)$  °C.

## 4.2 Wear

**4.2.1 Plastic container** having a minimum capacity of 2 l, such as a wide-mouth cylindrical plastic bottle, with a leak-proof screw closure.

NOTE: Containers with a diameter of between 115 mm and 150 mm have been found generally suitable.

**4.2.2 Wear test apparatus:** a device capable of imparting a constant rotating movement around the long axis of the container (4.2.1), the latter being positioned horizontally (see figure 1). The device shall be capable of adjustment such that the velocity of the container is  $(12 \pm 1)$  m/min at its circumference.

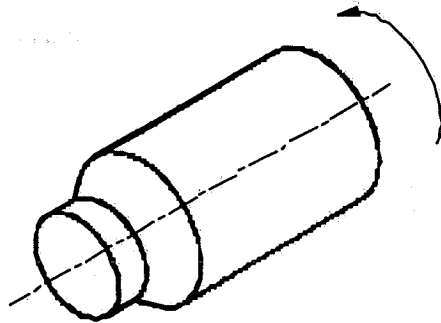


Figure 1 : Rotation of the container

**4.2.3 Abrasive chips:** chips of cylindrical shape, cut at  $45^\circ \pm 10^\circ$  at each extremity (see figure 2), made of sintered corundum free of nickel, and having the characteristics given in table 1. Before abrasive chips are used for the first time, subject them to preliminary wear by rotating them in the absence of any test pieces for 50 h under the conditions stipulated in 5.3. Rinse the chips thoroughly with a strong flow of tap water to remove all particles. Then, rinse the chips with deionized water.

Table 1: Characteristics of abrasive chips

Dimensions		Hardness	Maximum duration for using the same chips
diameter <i>a</i>	length <i>b</i>		
3 mm to 4 mm	9 mm to 11 mm	6 to 7 Mohs	500 h

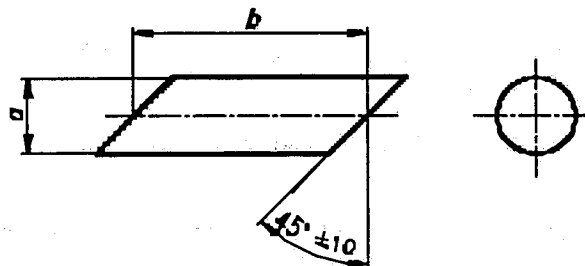


Figure 2 : Details of an abrasive chip

**4.2.4 Deionized water.**

**4.2.5 Sodium lauryl sulfate**, 20% aqueous solution.

**4.2.6 Wear medium:** the medium is composed of abrasive chips (4.2.3) and a lubricant consisting of a 0,1 % (V/V) aqueous solution of 20% sodium lauryl sulfate solution (4.2.5). Abrasive and lubricant are mixed before use as indicated in 5.3.

**4.2.7 Nitric acid**,  $\rho = 1,40$  g/ml, 65 % (m/m).

**4.2.8 Dilute nitric acid**, approximately 5 % (m/m).

Transfer 30 ml of nitric acid (4.2.7) into a 500-ml beaker containing 350 ml of deionized water. Stir and cool to room temperature. Transfer the solution to a 500-ml volumetric flask and make up to volume with deionized water.

## 5 Procedure

### 5.1 Sample preparation

Gently swirl the sample for 2 min in degreasing solution (4.1.3) at room temperature. Rinse thoroughly with deionized water and dry. After degreasing, samples should be handled with plastic forceps or clean protective gloves.

NOTE: This cleaning stage is intended to remove extraneous grease and skin secretions due to handling, but not any protective coatings.

### 5.2 Corrosion procedure

If applicable, the items to be tested shall first be opened to reveal critical surfaces. The items are suspended in a closed container (4.1.1) a few centimetres above the corrosive medium (4.1.2) for 2 h at 50°C. Open the container carefully under a fume hood. Rinse the items with deionized water and, if the wear procedure (5.3) is not to be carried out immediately, allow them to dry on an absorbing tissue.

NOTE: Parts of items which do not come into prolonged contact with the skin may be removed or protected before being subjected to corrosion and wear.

### 5.3 Wear procedure

Fill the plastic container (4.2.1) to 50% of its volume with an appropriate amount of abrasive chips which have been subjected to preliminary wear (4.2.3). Prepare the wear medium (4.2.6) by adding a volume of lubricant equal to 70% of apparent volume of the chips. Add the test items. Items to be tested together shall be of a similar type, taking into account their shape, size and finish. The total volume of items and wear medium in the container shall not exceed 75% of the container's volume. Close the lid of the container and place it horizontally on the wear test apparatus (4.2.2). Run the apparatus at the specified speed for a total of 4 h.

NOTE: Parts of items which do not come into prolonged contact with the skin may be removed or protected before being subjected to wear.

### 5.4 Determination of nickel release

Separate the items from wear medium, rinse the items thoroughly with deionized water and allow to dry. Test the items for nickel release in accordance with EN 1811.

NOTE: Indicative information on the extent of nickel release can be obtained by performing one of the tests specified in prEN 12471.

### 5.5 Reuse of chips

If the chips have not been used for more than 500 h and are to be reused, wash them thoroughly in tap water followed by soaking for at least 16 h in dilute nitric acid (4.2.8). Rinse thoroughly in tap water and finally in deionised water.

### 6 Test report

In addition to the information required by EN 1811, the test report shall contain the following particulars:

- a) a reference to this standard, i.e. EN 12472;
- b) details of any deviations from this standard method, if relevant;
- c) any unusual feature(s) observed during the test.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 12472:1999

<https://standards.iteh.ai/catalog/standards/sist/9b44d09-9688-4a37-a13a-0ba1d15265eb/sist-en-12472-1999>