

INTERNATIONAL STANDARD

ISO
8442

First edition
1988-12-01



INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
ORGANISATION INTERNATIONALE DE NORMALISATION
МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Stainless steel and silver-plated table cutlery — Requirements

Couverts et coutellerie de table en acier inoxydable et en métal argenté — Spécifications

STANDARDSISO.COM :: Click to view the full PDF of ISO 8442:1988

Contents

	Page
Foreword	iii
1 Scope	1
2 Normative references	1
3 Definitions	1
4 Materials and their applications	1
5 Construction	2
6 Silver-plated cutlery	3
7 Performance requirements	3
8 Marking and labelling	4
Annexes	
A Method of test for average thickness of silver coating	5
B Schlegel method of determining surface area	6
C Method of test for corrosion resistance of unplated stainless steel cutlery	8
D Method of test for strength of knives with martensitic stainless steel blades and carving forks	10
E Method of test for adhesion of silver coatings	12

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 8442 was prepared by Technical Committee ISO/TC 186, *Cutlery and table and decorative metal hollow-ware*.

Annexes A to E form an integral part of this International Standard.

STANDARDSISO.COM : Click to view the PDF of ISO 8442:1988

STANDARDSISO.COM : Click to view the full PDF of ISO 8442:1988

Stainless steel and silver-plated table cutlery — Requirements

1 Scope

This International Standard specifies

- a) performance requirements for table cutlery (this includes knives, forks, spoons, carving sets, ladles and other serving pieces);
- b) composition limits for steels and non-ferrous metals for cutlery;
- c) tests for resistance to permanent deformation, firmness of handle attachment, hardness of blades, resistance to corrosion of stainless steel parts and the thickness and adhesion of silver coatings. The corresponding test methods are specified in annexes A to E.

This International Standard is applicable to stainless steel cutlery and silver-plated nickel-silver or silver-plated stainless steel cutlery. It does not cover cutlery made of precious metals, aluminium, non-stainless steel or that made entirely of nickel-silver nor does it cover gold-plated or chromium-plated cutlery or that with non-metal handles.

In the case of silver-plated cutlery, two minimum average thicknesses are specified, a "normal thickness" and a "special thickness" with a thicker deposit of silver.

This International Standard is concerned only with quality and does not include requirements for design, size, type of finish, blade flexibility or similar characteristics which are matters of personal choice or which can be readily assessed by the purchaser at the point of sale. No sampling provisions are included within this International Standard, the requirements specified being for each and every item produced. In this International Standard the method of defining silver deposits also relates to each and every item, in contrast to traditional methods which relate to an average of 12 or 24 pieces among which some items may have a significantly lower thickness of silver coating.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1463 : 1982, *Metallic and oxide coatings — Measurement of coating thickness — Microscopical method.*

ISO 2177 : 1985, *Metallic coatings — Measurement of coating thickness — Coulometric method by anodic dissolution.*

ISO 3543 : 1981, *Metallic and non-metallic coatings — Measurement of thickness — Beta backscatter method.*

ISO 4481 : 1977, *Cutlery and flatware — Nomenclature.*

ISO 6508 : 1986, *Metallic materials — Hardness test — Rockwell test (scales A - B - C - D - E - F - G - H - K).*

3 Definitions

For the purposes of this International Standard the definitions given in ISO 4481 and the following definitions apply.

3.1 items of frequent use: The following items as designated in ISO 4481:

41, 44, 45, 49, 61, 72, 78, 79, 82, 93, 100, 102 and 105.

3.2 items of infrequent use: Those items designated in ISO 4481 which are not listed in 3.1 and which may be used at the table.

3.3 significant surfaces: Those parts of the cutlery in contact with the flat horizontal surface upon which they are laid; in the case of spoons, forks and ladles, the concave faces of their bowls or fork prongs are uppermost. In the case of knives, both sides are regarded as having significant surfaces.

3.4 unsharpened knives: Knives that do not have a sharpened blade because they are intended for use with soft foods and whose blades are therefore not made of martensitic stainless steel.

This includes the following items as designated in ISO 4481:

90, 92, 97, 102 and 103.

4 Materials and their applications

4.1 General

Table cutlery shall be made from materials that enable the finished cutlery to meet the requirements of clause 7. The materials shall be in accordance with 4.2.

4.2 Metals

4.2.1 The composition of metal parts of table cutlery shall be as given in table 1.

4.2.2 Any parts of the table cutlery made of nickel-silver (copper-zinc-nickel alloy) shall be silver-plated in accordance with clause 6.

4.2.3 Any parts of the table cutlery made of stainless steel and claimed to be silver-plated shall conform to the requirements of clause 6.

5 Construction

5.1 General

Cutlery manufactured from the materials specified in clause 4 shall be constructed in accordance with this clause in order to meet all the relevant performance requirements of clause 7.

5.2 Alignment, uniformity and absence of defects

5.2.1 All surfaces shall be free from cracks, pits and other defects.

5.2.2 All cutlery shall be essentially straight and symmetrical except when the lack of straightness or symmetry is an intentional feature of the design.

5.2.3 Identical items within a batch shall show no noticeably significant variation in dimension or form.

5.2.4 All edges, including the edges of spoons, forks, ladles and the insides of fork prongs shall be free from fash and burrs and the roughness of blanked edges shall have been removed by a suitable operation.

5.2.5 Table knives shall be properly balanced so that when the knife is laid on a flat surface its blade does not touch the surface.

5.2.6 Compliance with the requirements of 5.2.1 to 5.2.5 shall be checked by touch or by visual inspection.

5.3 Hollow handles

The seams joining hollow handles together shall be watertight.

5.4 Knife edges

The cutting edge of sharpened table knives shall be either scalloped or serrated or shall be whetted to an included angle no greater than 70°.

The cutting edge of a carving knife blade shall be whetted to an included angle no greater than 40° and shall be no thicker than 0,46 mm when measured 1 mm from the extremity of the edge.

5.5 Sprung fork guards

When fitted, sprung fork guards shall have a positive opening and closing snap action.

Table 1 — Metals for table cutlery

Applications	Material(s)	Chemical composition (%)						
		C	P max.	S max.	Cr min.	Ni min.	Mo max. *)	V max. *)
Spoons, forks, ladles	Austenitic stainless steel	0,07 max.	0,045	0,030	17,0	7,0	3,0	
Unsharpened knives								
Handles of knives and carving forks	Ferritic stainless steel	0,10 max.	0,040	0,030	16,0		1,30	
Guards and prongs of carving items								
Guards and prongs of carving items	Martensitic stainless steel (low carbon)	0,16 min.	0,040	0,030	12,0		1,30	0,40
Knife blades	Martensitic stainless steel (higher carbon)	0,26 min.	0,040	0,030	12,0		1,30	0,40
Handles of monobloc knives								
		Cu min.	Ni min.	Mn max.	Impurities max. (%)			Zn
					Fe	Pb	Total	
Spoons, forks and ladles	Nickel-silver	60,0	9,0	0,50	0,30	0,05	0,50	Remainder
Unsharpened knives								
Handles of knives, and carving forks								
Coatings	Silver	Ag min. 92,5						
*) Additions of Mo and V are optional.								

*) Additions of Mo and V are optional.

6 Silver-plated cutlery

6.1 General

Items of cutlery claimed to be silver-plated shall comply with the additional requirements of 6.2 and 6.3.

6.2 Average thickness

The average thickness of silver coating on each and every finished item when measured in accordance with the methods described in annex A (weight of coating) and annex B (area of coating) shall be

- a) **Normal thickness:**
not less than 20 μm for items of frequent use;
not less than 12 μm for items of infrequent use;
- b) **Special thickness:**
not less than 33 μm for items of frequent use;
not less than 19 μm for items of infrequent use.

6.3 Local thickness

The minimum local thickness of silver coating on significant surfaces (i.e. those parts of cutlery subject to the greatest wear; see 3.3) shall not be less than 60 % of the average thickness deemed to be on the piece.

Minimum local thickness shall be measured in accordance with one of the methods specified in ISO 2177 (coulometric), ISO 1463 (microscopical examination of cross-sections) or ISO 3543 (beta back scatter). In case of dispute the thickness shall be measured by the method specified in ISO 1463.

7 Performance requirements

7.1 Resistance to corrosion

The surfaces of stainless steel parts of table cutlery shall comply with the following requirements when tested in accordance with the method described in annex C:

- a) no transverse cracks shall have developed and no longitudinal cracks of a length exceeding 1,5 mm shall have developed;

- b) there shall not be more than three pits each having an area greater than a circle of 0,4 mm diameter on the handle, and not more than three pits each having an area greater than a circle of 0,4 mm diameter (0,126 mm²) elsewhere;

- c) there shall be no pits having an area greater than a circle of 0,75 mm diameter (0,442 mm²) on any part.

7.2 Strength

7.2.1 Knives with martensitic stainless steel blades and carving forks

A knife or carving fork shall not crack or break and shall not acquire a permanent deformation of more than 3° when tested in accordance with the method described in annex D. In addition, the handle-blade joint shall not become loose.

7.2.2 Spoons, forks, ladles and unsharpened knives

Lay the item on a plane surface with the highest point of the handle facing upward. Apply a force equivalent to 7 N per centimetre of overall length or 100 N whichever is the lesser for 10 s (see figure 1 for a spoon). The item shall not acquire a permanent deformation of more than 1 mm at the point where the force is applied.

In the case of items with attached handles, the item shall also withstand the same force at the joint between the handle and the rest of the item, without acquiring a permanent deformation of more than 1 mm at that position.

7.3 Firmness of handle attachment

Handles that are not an integral part of the rest of the item shall be attached by a method that prevents the handle turning relative to the rest of the piece or pulling away from the blade when, immediately after being immersed for 10 min in water at a temperature of 100 °C, the item is subjected to

- a) a pulling force of 180 N for 10 s;
- b) a torque of 4,5 N·m, for items whose handles have a surface area of 37 cm² or more, or a torque of 3,7 N·m for items whose handles have a surface area below 37 cm². The torque shall be applied for 10 s.

The pulling force and torque shall be applied successively, immersing the handles for 10 min in water at 100 °C immediately before the application of each force.

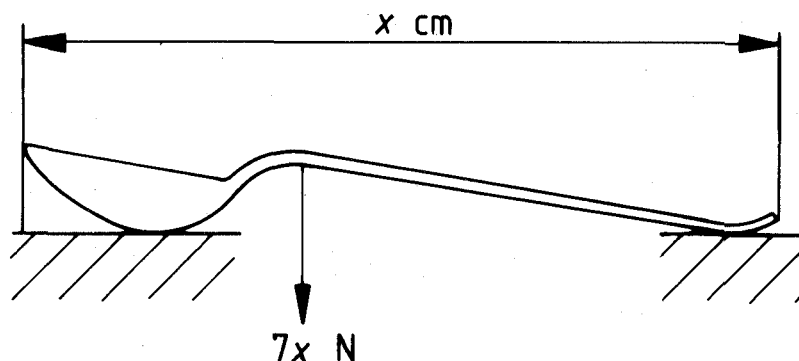


Figure 1 — Strength test for a spoon

7.4 Hardness of knife blades

Knife blades made from martensitic stainless steel shall have a minimum hardness of 50 HRC when tested in accordance with ISO 6508. Readings shall be taken not less than 40 mm from the handle.

7.5 Adhesion of silver coatings

Silver coatings shall show no sign of flaking, blistering or peeling when the cutlery is ball-burnished for 40 min in a burnishing machine as described in annex E.

NOTE — Alternative methods of determining the adhesion of silver coatings may be used, provided that the results obtained are in correlation with those given by ball-burnishing.

8 Marking and labelling

8.1 Marking

8.1.1 Each item of cutlery deemed to comply with the requirements of this International Standard shall be marked¹⁾ with

- a) the name, trade name or any other means of identifying the manufacturer or responsible supplier;
- b) the identification "ISO".

In addition

c) in the case of silver-plated cutlery, the identification "ISO" shall be followed by a symbol indicating the thickness of silver coating:

- I for items with special thickness, see 6.2 b)
- II for items with normal thickness, see 6.2 a);

d) in the case of unplated stainless steel cutlery, the identification "ISO" shall be followed by numbers indicating the average percentage Cr content of the steel or, for austenitic stainless steel, by the average percentage Cr and Ni contents of the steel, e.g. "18/8".

The marking system is mandatory only for pieces manufactured in the period commencing one year from the date of publication of this International Standard.

8.1.2 When the minimum average thickness of silver deemed to be present on each item is also to be marked, it shall be marked in micrometres and suffixed by "µm".

8.2 Labelling

The following information shall be made available at the point of sale:

- a) the number of this International Standard, or the equivalent national standard, and a statement that the cutlery meets the requirements of this International Standard;
- b) for silver-plated cutlery, whether the silver coating is of "normal thickness" or "special thickness" and whether the base metal is of ferritic stainless steel or austenitic stainless steel or nickel-silver;
- c) for unplated stainless steel cutlery (other than blades made from martensitic stainless steel) whether it is of ferritic stainless steel or austenitic stainless steel;

This information may be provided as leaflets on the packaging or by means of labelling or on a display card.

1) Such marking is a claim of compliance to ISO 8442 but does not imply ISO approval of the product. The claim is solely the responsibility of the person applying the marking.

Annex A (normative)

Method of test for average thickness of silver coating

WARNING — This method involves the use of concentrated acids or sodium cyanide; it is assumed that only experienced persons, familiar with such materials and taking appropriate safety precautions, will undertake such testing.

A.1 Principle

The silver coating is chemically or electrochemically dissolved from the piece without attacking the substrate. The average thickness of the coating is calculated from its surface area, the mass of silver and the density of the coating.

A.2 Stripping solutions

A.2.1 For silver-plated nickel-silver without an undercoat of nickel, a **chemical stripping solution** consisting of 19 parts by volume of concentrated sulphuric acid ($\rho = 1,84$ g/ml) and 1 part by volume of nitric acid ($\rho = 1,42$ g/ml).

A.2.2 For silver-plated stainless steel or nickel-silver with an undercoat of nickel, an **electrolyte for anodic stripping** comprising 90 g of sodium cyanide and 15 g of sodium hydroxide in 1 litre of demineralized or distilled water.

A.3 Procedure

A.3.1 General

Degrease the sample thoroughly, and if necessary rinse and dry it. Weigh the sample. Use the appropriate stripping solution (A.2.1 or A.2.2) to remove the silver coating. Thoroughly rinse in running water, dry and reweigh the sample.

A.3.2 Chemical stripping

Ensure that the parts to be stripped are thoroughly dry and water is kept out of the solution. Immerse the sample in the acid mixture (A.2.1) maintained at $80\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ until all the coating is removed.

A.3.3 Anodic stripping

Using a stainless steel cathode and the sample as anode, immerse the sample in the electrolyte (A.2.2) at room temperature and apply a potential of 2 V to 8 V until all the coating is removed.

A.4 Expression of results

A.4.1 Method of calculation

Calculate the average coating thickness, δ , in micrometres, by the formula

$$\delta = \frac{\Delta m \times 10\,000}{A \times 10,5}$$

where

Δm is the loss in mass, in grams, after stripping;

A is the surface area, in square centimetres, of the silver coating (see annex B);

10,5 is the density, in grams per cubic centimetre, of silver.

The surface area of that part of the piece coated with silver shall be determined by the method specified in annex B.

A.4.2 Precision

The method is capable of an accuracy of $\pm 3\%$ including the accuracy for the method given in annex B. It can be checked that the loss in mass corresponds to that of the silver coating by determining the content of silver in the stripping bath.

Annex B (normative)

Schlegel method of determining surface area

B.1 Principle

Under controlled conditions, the test piece is coated with an adhesive and dipped in a fluidized bed of water-repellent or perfectly dry glass beads of uniform size; the mass of beads adhering to the piece is proportional to the surface area of the test piece.

The relationship between the mass of beads and the surface area of the piece is determined by applying the test to a standard specimen of known area, i.e. a regular shape whose area can be measured easily.

B.2 Apparatus and materials

B.2.1 Fluidized bed: a bed of glass beads (B.2.5) with a supply of fluidizing air and means for heating the incoming air if water-repellent beads are not used; this may be in the form of an electric heating element, near to the bottom of the bed, regulated by a voltage control, and sufficient to raise the temperature of the fluidized beads to between 50 °C and 80 °C.

NOTE — It is not advisable to control bead temperature by means of a thermostatic device because, when the power supply is disconnected from the heating element, the beads may pick up moisture from the air supply.

B.2.2 A laboratory balance, capable of weighing to an accuracy of ± 2 mg.

B.2.3 Hoist, for withdrawing the test piece from the adhesive at 20 mm/min.

B.2.4 Adhesive, composed of

alkyd resin ¹⁾ :	1 part by mass;
toluene (sulphur free):	1 part by mass.

B.2.5 Glass beads, graded to 200 μ m to 250 μ m, preferably of water-repellent type.

NOTE — Commercially available glass beads nominally graded to these limits may contain an undesirable proportion outside the limits; it is normally necessary to re-grade them.

B.2.6 Specimens of known area (at least two) in stainless steel, complying with the following:

- a cylinder, of approximately 16 mm diameter and 110 mm in length, to indicate the mass of glass beads per square centimetre picked up by hollow handles;
- a rectangle, of approximately 100 mm $\times$ 30 mm $\times$ 1 mm, to indicate the mass of glass beads per square centimetre picked up by areas other than hollow handles.

B.3 Procedure

B.3.1 Ensure that the glass beads (B.2.5), not of the water-repellent type, are thoroughly dry so that they do not adhere to each other. Beads may be dried and prevented from re-absorbing moisture from the air supply by preheating them in the fluidized bed at between 50 °C and 80 °C until no beads will adhere to a clean, dry piece of cutlery that is dipped into them. Usually a drying time of 1 h is adequate.

NOTE — It has been found that once any moisture has been eliminated the beads will stay dry while the heating element remains switched on.

Maintain the temperature of the fluidized bed of glass beads at 50 °C to 80 °C until the procedure described in B.3.8 has been reached. If water-repellent beads are used the bed may be used at ambient temperature for the procedure described in B.3.7.

B.3.2 Attach a thin wire hanger to the test piece with a loop for suspension during weighing etc.

B.3.3 Thoroughly clean the test piece in methylated spirits.

B.3.4 Dip the test piece in the adhesive (B.2.4) and withdraw at 20 mm/min using the hoist (B.2.3). If the surface area of the handle only is to be measured, only the handle should be immersed in the adhesive. Do not allow the test piece surface to come into contact with anything until stage B.3.7 is reached.

B.3.5 Allow the adhesive to dry for 60 min $\pm$ 5 min.

B.3.6 Weigh the test piece to the nearest 2 mg.

B.3.7 Immerse and continuously agitate the test piece in the fluidized bed of glass beads for 10 s $\pm$ 1 s. During immersion, the air flow should be vigorous enough to raise mounds of beads to a height of at least 40 mm above the bed of fluidized beads. Do not immerse more suspension wire than necessary.

1) A suitable resin, available commercially, is Alkydal L64. This information is given for the convenience of the user of this International Standard and does not constitute an endorsement of this product by ISO.

B.3.8 Reweigh the test piece to the nearest 2 mg.

B.3.9 Carry out a duplicate test on each piece; include at least two specimens of known area (B.2.6) in each batch of pieces tested.

B.4 Expression of results

B.4.1 Method of calculation

Calculate the area, A , in square centimetres, of the piece using the formula

$$A = \frac{m}{\rho_A}$$

where

m is the mean mass, in grams, of beads adhering to the test piece;

ρ_A is the mean surface mass density, in grams per square centimetre, of beads corresponding to the mass adhering to the relevant specimen of known area.

B.4.2 Precision

The method is capable of an accuracy of ± 1.5 % for all sizes and items of cutlery.

STANDARDSISO.COM :: Click to view the full PDF of ISO 8442:1988

Annex C (normative)

Method of test for corrosion resistance of unplated stainless steel cutlery

C.1 Principle

The test samples are intermittently immersed in a 1 % solution of sodium chloride maintained at 60 °C for 6 h. The number and size of any pits that have formed are measured visually with the aid of a microscope lens.

C.2 Reagents

Sodium chloride, 1 % (m/m) solution in demineralized or distilled water.

C.3 Apparatus

Apparatus, as shown in figure C.1, comprising a glass container and a cover, which may be glass or plastics, and a plastics specimen rack with means to raise and lower this into the container.

NOTE — Alternative methods of specimen support may be used provided that there is minimal contact of the specimen with the supporting means.

C.4 Procedure

C.4.1 Wash the selected samples thoroughly in hot soapy water. Thoroughly rinse and then degrease the samples in acetone or methylated spirits.

C.4.2 Fill the container with the sodium chloride solution (C.2) using at least 1 litre of solution for every square decimetre of area of the stainless steel parts of the samples. Bring the container and contents to 60 °C ± 2 °C. Maintain at this temperature. Do not allow the temperature of the solution to

exceed 62 °C at any time, even before the start of the test. Use a fresh salt solution for each test.

NOTE — The temperature of the sodium chloride solution may be conveniently maintained at 60 °C ± 2 °C by positioning the apparatus in a thermostatically controlled water bath, the level of which is maintained at approximately the same level as that of the salt solution.

C.4.3 Place the sample in the rack and, in the case of knives with stainless steel handles, support the handles in such a way that they do not come into contact with the rack. Replace the cover.

C.4.4 Completely immerse and completely withdraw the samples from the solution at the rate of from two to three times per minute for 6 h.

C.4.5 At the conclusion of the test period, thoroughly wash and rinse the samples and examine for corrosion.

NOTE — Products of corrosion that impede visual examination of corrosion pits may be removed by hand rubbing the surface of the cutlery with a stainless steel polishing paste applied with a soft cloth.

C.5 Expression of results

Assess the size of pits and the length of longitudinal cracks visually with the aid of a calibrated microscope or lens of at least 4 times magnification. Where two pits have obviously merged together they shall be assessed as two separate pits.

NOTE — The use of wires of diameter 0,4 mm and 0,75 mm respectively placed in contact with the sample surface provides a convenient method of assessing the size of pits with a hand lens.