Specification for table cutlery with non-metallic handles

ICS 97.040.60

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee CW/17, Cutlery and table holloware, upon which the following bodies were represented:

Association of British Cutlers and Allied Trades
British Cutlery and Silverware Association
CESA — The Association of Catering Equipment Manufacturers and Importers
Consumer Policy Committee of BSI
Cutlery and Allied Trades Research Association
Institute of Trading Standards Administration
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Contents

Foreword

This revision of BS 5577 has been prepared by Technical Committee CW/17. It partially replaces BS 5577:1984 which is withdrawn. This new edition now only applies to cutlery with non-metallic handles. Cutlery with metallic handles is covered by BS EN ISO 8442-2:1998.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 13 and a back cover.

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1 Scope

This British Standard specifies material and performance requirements for cutlery with non-metallic handles intended for use at the dining table. It includes knives, forks, spoons, carving sets, ladles and other serving pieces.

Requirements are specified for stainless steel cutlery and silver-plated nickel-silver or silver-plated stainless steel cutlery. This standard does not cover cutlery wholly made of precious metals, aluminium, non-stainless steel or that made entirely of plastics, nor does it cover gold-plated or chromium-plated cutlery except for chromium-plated sharpening steels. However, cutlery incorporating sterling silver caps and ferrules or unplated nickel-silver rivets and caps are within the scope of this standard.

Composition limits are specified for steels and non-ferrous metals for cutlery.

Requirements are specified for non-metal handles made from the more commonly used materials (see **4.2.4**), but not those made from exotic materials such as ivory or mother-of-pearl. The standard includes requirements for cutlery with non-metal handles for use in a dishwashing machine.

In the case of silver-plated cutlery, three minimum average thicknesses are specified, first, second and third class, with decreasing thickness of the silver deposit.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this British Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

BS EN 10109-1, *Metallic materials — Hardness test — Rockwell test (scales A, B, C, D, E, F, G, H, K) and Rockwell superficial test (scales 15 N, 30 N, 45 N, 15 T, 30 T and 45 T).*

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

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

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

BS EN ISO 6507-1, *Metallic materials — Vickers hardness test — Part 1: Test method.*

BS 498, *Specification for rasps and engineers' files.*

BS 2782-1:Method 120C, *Determination of the 1/10 Vicat softening temperature of thermoplastics.*

BS 1006, *Methods of test for colour fastness of textiles and leather.*

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

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

3 Definitions

For the purposes of this Standard the definitions given in ISO 4481:1977 apply together with the following.

3.1

items of frequent use

pieces of cutlery regularly used at the dining table such as: coffee or teaspoon; soup spoon; dessert spoon; menu spoon; table spoon; dessert fork; menu fork; fish-eating fork; table fork; dessert knife; menu knife; fish-eating knife; table knife

3.2

items of infrequent use

pieces of cutlery which are occasionally used at the dining table. These items are defined in ISO 4481:1977 and exclude those listed in **3.1**

3.3

significant surfaces

parts of cutlery in contact with a flat horizontal surface upon which they are laid; for spoons, forks and ladles this will be the convex face, i.e. their bowls or fork prongs are uppermost; for 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 such as fish, butter, tart and cake and whose blades are therefore not made of martensitic stainless steel

4 Materials and their applications

4.1 General

Table cutlery shall be made from materials that enable the finished cutlery to meet the performance requirements of clause **7** and shall be in accordance with **4.2** and **4.2.4** as appropriate.

4.2 Metals

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

The composition of nickel-silver for spoons, forks, ladles, unsharpened knives, carving forks, sharpening steels, caps, ferrules and rivets shall be as follows:

— Cu: 60.0 % min.;

— Ni: 9.0 % min.;

— Mn: 0.50 % max.;

— Fe: 0.30 % max.;

— Pb: 0.05 % max.;

— Total impurities 0.50 % max.;

— Zn remainder.

Silver coatings, caps and ferrules shall have a minimum silver content of 92,5 %.

NOTE Some of the British Standard materials that meet the relevant composition requirements are given in annex A.

4.2.2 Any parts of table cutlery made of nickel-silver (copper-zinc-nickel-alloy) shall be silver-plated in accordance with clause **6** except that caps and rivets made from nickel-silver as specified in **4.2.1** need not be plated.

4.2.3 Any parts of cutlery made of stainless steel and silver-plated shall be in accordance with clause **6**.

NOTE The non-stainless steel parts of sharpening steels may be chromium-plated.

4.2.4 Non-metal handles shall be made of plastics, wood, wood-plastics laminates, impregnated wood, ceramics or stag horn or any material such that the finished cutlery conforms to the relevant performance requirements of clause **7**. Handles which are superficially protected by paint, varnish lacquer or a similar coating shall meet the requirements of clause **7**.

Table 1 — Steels for table cutlery

Applications	Materials	Chemical composition						
		C %	P (max.) %	S (max.) %	Cr (min.) %	Ni (min.) %	Mo (max.) (see note) %	V (max.) (see note) %
Spoons, forks, ladles, unsharpened knives, carving forks. Guards and prongs of carving items. Caps, ferrules and rivets	Austenitic stainless steel	0.15 max.	0.045	0.030	16.0	6.0	4.0	—
	Ferritic stainless steel	0.10 max.	0.040	0.030	16.0	—	1.30	—
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
Blades of sharpening steels	High carbon steel	1.10 min.	0.035	0.035	—	—	—	—

NOTE Additions of Mo and V are optional.

5 Construction

5.1 General

Cutlery shall be so constructed that it meets 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 straight and symmetrical except when the lack of straightness or symmetry is an intentional feature of the design.

5.2.3 Like 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, flash and burrs and the roughness of blanked edges shall have been removed.

5.2.5 Table knives shall be balanced so that when the knife is pivoted on its bolster, or at the junction of the handle and blade if no bolster is present, the handle shall be heavier than the blade.

5.2.6 There shall be no gaps in excess of 0.2 mm between components unless this is a design feature.

5.2.7 Conformance to the requirements of **5.2.1** to **5.2.5** shall be checked by touch or by visual inspection and for **5.2.6** by measurement.

5.3 Hollow handles

The seams joining hollow handles together and to the metal parts shall be water-tight.

5.4 Knife edges

The cutting edge of sharpened table knives shall be either scalloped or serrated or shall be sharpened to an included angle of not greater than 60°.

The edges of carving knife blades shall be whetted to an included angle no greater than 40° and they shall be no thicker than 0.46 mm when measured.

5.5 Sprung fork guards

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

6 Silver-plated cutlery

6.1 General

Silver-plated cutlery shall be in accordance with **5.2** to **5.4**.

6.2 Plated surfaces

There shall be a silver deposit on all surfaces deemed to be silver-plated.

6.3 Average thickness

The average thickness of silver coating on each finished piece when measured in accordance with the methods described in **B.1** (mass of coating) and **B.2** (area of coating) shall be as given in Table 2.

Table 2 — Average thickness of classes of silver coating

Description	Symbol	Items for frequent use	Items for frequent use
First class	I	min. 30 μm	min. 17 μm
Second class	II	min. 20 μm	min. 12 μm
Third class	III	min. 10 μm	min. 7 μm

6.4 Local thickness

The minimum local thickness of silver coatings on significant surfaces (i.e. those parts of cutlery subject to 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 BS EN ISO 2177, BS EN ISO 1463, BS EN ISO 3543 or ISO 3497.

7 Performance requirements

7.1 Resistance to corrosion

The surfaces of stainless steel parts of table cutlery shall conform to the following requirements when tested in accordance with **B.3**.

No transverse cracks shall have developed and no longitudinal cracks of a length exceeding 1.5 mm shall have developed.

There should be not more than three pits each having an area greater than a circle of 0.4 mm diameter (0.26 mm^2) on the blade.

There shall be no pits having an area greater than a circle of 0.75 mm diameter (0.442 mm^2) 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 permanent deformation of more than 3 mm when tested in accordance with **B.4**. In addition, the handle-blade joint shall not have noticeably loosened.

7.2.2 *Spoons, forks, ladles and unsharpened knives*

The piece shall not acquire a permanent deformation of more than 1 mm at the highest point of the handle when, laid across plane surfaces with that point uppermost, a force of 0.7 N for each mm of overall length or 100 N, whichever is the lesser, is applied to it for 10 s (as shown in Figure 1 for a spoon). During the application of this force the point of rest of the handle (A in Figure 1) shall be not more than 10 mm from the edge of the supporting surface.

In the case of pieces with attached handles, the cutlery shall also withstand a load of 100 N at the joint between the handle and the rest of the item, without acquiring more than 1 mm permanent deformation at that position.

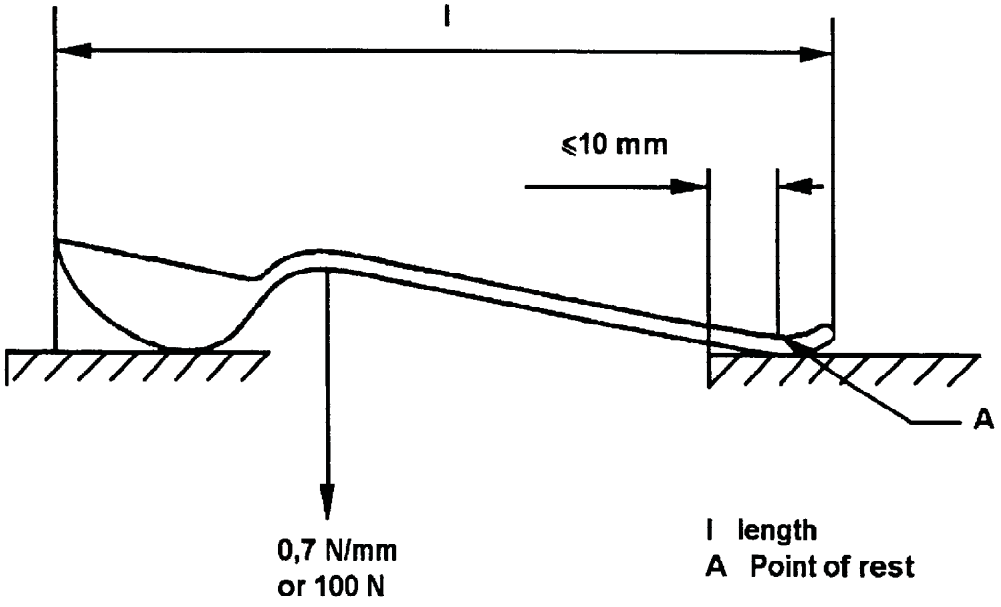

Figure 1 — Strength test for a spoon

7.3 Firmness of handle attachment

Handles 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 50 °C the item is subjected to the following:

a) a pulling force of 90 N for 10 s;

b) a torque of 2.25 N·m for 10 s.

If the handles are part of cutlery claimed to be of dishwasher grade, each test shall be carried out immediately after the piece has been immersed for 10 min in water at a temperature of 75 °C.

The pulling force and torque shall be applied successively, immersing the handles for 10 min in water at 50 °C or 75 °C, as appropriate, immediately before the application of each force.

7.4 Hardness

7.4.1 *Knife blades*

Knife blades made from martensitic stainless steel shall have a minimum hardness of 52 HRC when tested in accordance with BS EN 10109-1 or 560 HV when tested in accordance with BS EN ISO 6507-1. Readings shall be taken not less than 25 mm from the handle.

7.4.2 *Sharpening steels*

Sharpening steels shall withstand, without visible detriment, a single stroke of length (100 ± 10) mm from the flat of a taper saw file, second cut single, conforming to BS 498, subject to a normal load of (25 ± 1) N.

7.5 Adhesion of silver coatings

Silver coatings shall show no sign of looseness, blistering or peeling when the cutlery is ball-burnished for 40 min in a burnishing machine as described in **B.5**.

7.6 Resistance to dropping

Cutlery with wood, stag horn, wood-plastics, laminated or impregnated wood or plastics handles shall be capable of withstanding being dropped in a vertical position with the handle pointing downwards from a height of 1.2 m on to a concrete surface five times without the handle becoming loose or breaking and without cracking or breaking of the blade.

7.7 Resistance of plastics handles to softening at elevated temperatures

Plastics handles shall not be penetrated more than 0.10 mm by the flat end of a round steel rod of (1.0 ± 0.015) mm^2 section under a force of (10 ± 1) N maintained for a period of 30 min at the following temperature:

(60 ± 1) °C for normal grade cutlery;

(85 ± 1) °C for dishwasher grade cutlery.

The test shall be carried out on a piece of plastics cut from the handle and as described in BS 2782-1:Method 120C, except that the test shall be carried out in a heating bath containing water maintained at the appropriate temperature stated above, for 30 min.

7.8 Resistance of plastics handles to environmental stress cracking

Plastics handles of cutlery shall not crack when tested as follows:

a) immersed for 14 days in a 50 g/l solution of the detergent specified in annex C maintained at a temperature of (60 ± 2) °C;

b) evenly immersed in a solution of toluene: n-propanol (1:3 by volume) for 24 h at a temperature of (22 ± 4) °C.

NOTE Softening of the handle does not constitute a failure.

These tests shall be carried out on separate items of cutlery which have previously been tested in accordance with **7.2**, **7.3** and **7.6**.

7.9 Resistance of handles to discoloration

7.9.1 *Discoloration by light*

Plastics handles shall have a fastness to light not less than standard 8 when tested in accordance with BS 1006, section B02 using the xenon arc fading lamp test.

7.9.2 *Discoloration in detergent solution*

Handles shall not noticeably discolour when immersed for 24 h in a 5 g/l solution of the detergent specified in annex C, maintained at a temperature of (60 ± 2) °C.

7.10 Resistance of handles other than ceramic or glass to distortion in hot water

Cutlery with handles other than ceramic or glass shall withstand 72 h immersion in water at the relevant temperature specified below without visible distortion; in particular, no visible gaps in excess of 0.35 mm shall form between the metal and non-metal parts.

Immersion temperature for normal grade cutlery: (50 ± 1) °C.

Immersion temperature for dishwasher grade cutlery: (75 ± 1) °C.

Each item of cutlery shall be fully immersed during the whole of the period and shall be supported at its extremity at an angle of 45° with the handle uppermost.

7.11 Resistance of ceramic and glass handles to cracking

Ceramic or glass handles shall be capable of withstanding 60 min immersion in water at the appropriate following temperature without cracking.

Immersion temperature for normal grade cutlery: (50 ± 1) °C.

Immersion temperature for dishwasher grade cutlery: (75 ± 1) °C.

8 Marking and labelling

8.1 Marking

8.1.1 Each piece of cutlery shall be marked with:

a) the name, trade mark or other means of identifying the manufacturer or responsible supplier;

b) the number of this British Standard i.e. BS 5577:1999[1)];

c) A reference to this standard in combination with the following roman numerals (see Table 2):

I for first class silver coating;

II for second class silver coating;

III for third class silver coating.

8.1.2 If required, the minimum average thickness, in micrometres, of silver present on each piece shall be marked and suffixed by "μm".

8.2 Labelling

The manufacturer shall supply the following information on the packaging, as leaflets, by means of labelling or on a display card so that the information is available at the point of sale:

a) the number and date of this British Standard, i.e. BS 5577:1999;

b) for silver-plated cutlery, whether the silver coating is class I, II or III 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;

d) for handles, whether or not they are of "dishwasher grade";

e) the material(s) from which any non-metal parts are made, whether they are of plastics, wood-plastics laminates, impregnated wood, stag horn or ceramic.

NOTE The manufacturer may also supply information on the selection and care of cutlery as given in annex D.

[1)] Marking BS 5577:1999 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with third-party certification of conformity.

Annex A (informative)

Types of material

Table A.1 gives examples of some of the British Standard materials that conform to the relevant composition requirements specified in **4.2.1.**

Table A.1 — Materials

Material	British Standard	Type, grade or designation
Austenitic stainless steels	BS 970-1:1996	302S31, 304S11, 304S15, 304S31, 316S11, 316S13, 316S31, 316S33
	BS 1449-2:1983	301S21, 304S11, 304S15, 304S16, 304S31, 305S19, 315S16, 316S11, 316S13, 316S31, 316S33
Ferritic stainless steels	BS 970-1:1996	430S17
	BS 1449-2:1983	430S17, 434S17
Martensitic stainless steels (low carbon)	BS 970-1:1996	416S37, 420S37
Martensitic stainless steels (higher carbon)	BS 1449-2:1983	420S45
High carbon steel	BS 4659:1971	BW 1 C (provided neither the sulfur nor the phosphorus content exceed 0.035 %)
Nickel-silvers	BS 2870:1980	NS 103, NS 104, NS 105, NS 106

Annex B (normative)

Methods of test

WARNING NOTE. The method described in **B.1** involves the use of concentrated acids or sodium cyanide; only experienced persons, familiar with such materials and taking appropriate safety precautions, should undertake such testing. The methods described in **B.2** and **B.3** involve the use of toluene, acetone, and methylated spirits, precautions appropriate to their use should be observed.

NOTE The use of industrial methylated spirits is governed by the Methylated Spirits Regulations 1983 (S.I. 1983 No. 252) [1].

B.1 Test method for average thickness of silver coating

B.1.1 *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.

B.1.2 *Stripping solutions*

For silver-plated nickel-silver a chemical stripping solution consisting of 19 parts by volume of concentrated sulfuric acid (relative density 1.84) and 1 part by volume of nitric acid (relative density 1.42).

For silver-plated stainless steel, whether or not there is an undercoat of nickel, an electrolyte for anodic stripping comprising 90 g of sodium cyanide and 15 g of sodium hydroxide in 1 l of water.

B.1.3 *Procedure*

B.1.3.1 *General*

Degrease the sample thoroughly, and if necessary rinse and dry it. Weigh the sample. Use the appropriate stripping method, described in **B.1.3.2** or **B.1.3.3**, to remove the silver coating. Thoroughly rinse in running water, dry and reweigh the sample.

B.1.3.2 *Chemical stripping*

Ensure that the parts to be stripped are thoroughly dry and that water is kept out of the solution. Immerse the sample in the acid mixture, maintained at (80 ± 2) °C, until all the coating is removed.

B.1.3.3 *Anodic stripping*

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

B.1.4 *Expression of result*

Calculate the average coating thickness, t, in μm, by the formula:

$$t = \frac{m \times 10\,000}{A \times 10.5}$$

where

m is the loss in mass (in g);

A is the surface area of the silver coating (in cm^2) (see **B.2**);

10.5 is the density of silver (in g/cm^3).

The surface area of that part of the piece coated with silver shall be determined by the method given in **B.2**.

B.1.5 ***Accuracy of result***

The method is capable of an accuracy of ±3 %, including the accuracy for the method given in **B.2**. 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.

B.2 Schlegel method of determining surface area

B.2.1 ***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.2.2 ***Apparatus and materials***

B.2.2.1 *Fluidized bed*, consisting of glass beads (**B.2.2.5**) with a supply of fluidizing air. A means for heating the incoming air is incorporated 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.2.2.2 *A laboratory balance*, capable of weighing to an accuracy of ±2 mg.

B.2.2.3 *Hoist*, for withdrawing a test piece from the adhesive at 20 mm/min.

B.2.2.4 *Adhesive*, consisting of alkyd resin[2)], for example Alkydal L64, 1 part by mass and toluene (sulfur free) $C_6H_5CH_3$, 1 part by mass.

B.2.2.5 *Glass beads*, graded from 200 μm to 250 μm, 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.2.2.6 *Specimens of known area*, as follows.

A stainless steel rectangle of approximately 100 mm × 30 mm × 1.0 mm to indicate the mass of glass beads per cm^2 picked up.

B.2.3 ***Procedure***

B.2.3.1 Ensure that glass beads, 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 Once any moisture has been eliminated the beads should stay dry while the heating element remains switched on.

Maintain the fluidized bed of glass beads at 50 °C to 80 °C until the procedure specified in **B.2.3.8** is completed. If water-repellent beads are used, the bed may be used at ambient temperature for the procedure described in **B.2.3.7**

B.2.3.2 Attach a thin wire hanger to the test piece with a loop for suspension during weighing, etc.

B.2.3.3 Thoroughly clean the test piece in methylated spirits.

B.2.3.4 Dip the test piece in the adhesive and withdraw it at 20 mm/min using the hoist. Do not allow the test piece surface to come into contact with anything until the procedure described in **B.2.3.7** is completed.

B.2.3.5 Allow the adhesive to dry for (60 ± 5) min.

B.2.3.6 Weigh the test piece.

B.2.3.7 Immerse and continuously agitate the test piece in the fluidized bed of glass beads for (10 ± 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.

B.2.3.8 Reweigh the test piece.

B.2.3.9 Carry out a duplicate test on each piece; include at least two specimens of known area in each batch of pieces tested.

B.2.4 ***Expression of result***

Calculate the area of the piece, A, in cm^2.

$$A = \frac{M}{F}$$

where

M is the mean mass of beads adhering to the test piece (in g);

F is the mean mass of beads adhering to the relevant specimens of known area (in g/cm^2).

B.2.5 ***Accuracy of result***

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

B.3 Test method for corrosion resistance of unplated stainless steel cutlery

B.3.1 ***Principle***

The test samples are intermittently immersed in a 1 % solution of sodium chloride (NaCl) 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.

[2)] Alkydal L64 is suitable and is available from Bayer UK Ltd., Bayer House, Strawberry Hill, Newbury, Berkshire RG13 1JA. Alkydal is a trade mark owned by Bayer UK Ltd. and is an example of a suitable product available commercially. This information is given for the convenience of users of this standard and does not constitute an endorsement by BSI of this product.

B.3.2 *Apparatus*

B.3.2.1 Apparatus as shown in Figure B.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 it into the container.

NOTE Other methods of specimen support can be used provided that one contact of the specimen with the supporting means is minimal.

B.3.2.2 Calibrated microscope or lens of at least four times magnification.

B.3.3 *Procedure*

B.3.3.1 Wash the selected samples thoroughly in hot soapy water. Thoroughly rinse and then degrease the samples in acetone or methylated spirits.

B.3.3.2 Fill a container with a solution consisting of one part by mass of sodium chloride in 99 parts of demineralized or distilled water using at least 1 l of solution for every dm^2 of the area of the stainless steel parts of the samples and bring the container and contents to (60 ± 2) °C. Maintain the container and contents at this temperature. Do not allow the temperature of the solution to exceed 62 °C ± 2 °C at any time, even before the test commences; use a fresh salt solution for each test.

NOTE The temperature of the sodium chloride solution may be conveniently maintained at (60 ± 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.

B.3.3.3 Place the samples in the rack.

B.3.3.4 Completely immerse and completely withdraw the samples from the solution at the rate of from two to three times per minute for 6 h.

B.3.3.5 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 or by immersing the samples in a solution consisting of one part of 70 % (by volume) nitric acid (relative density 1.42) and two parts of water, by volume, for approximately 3 min.

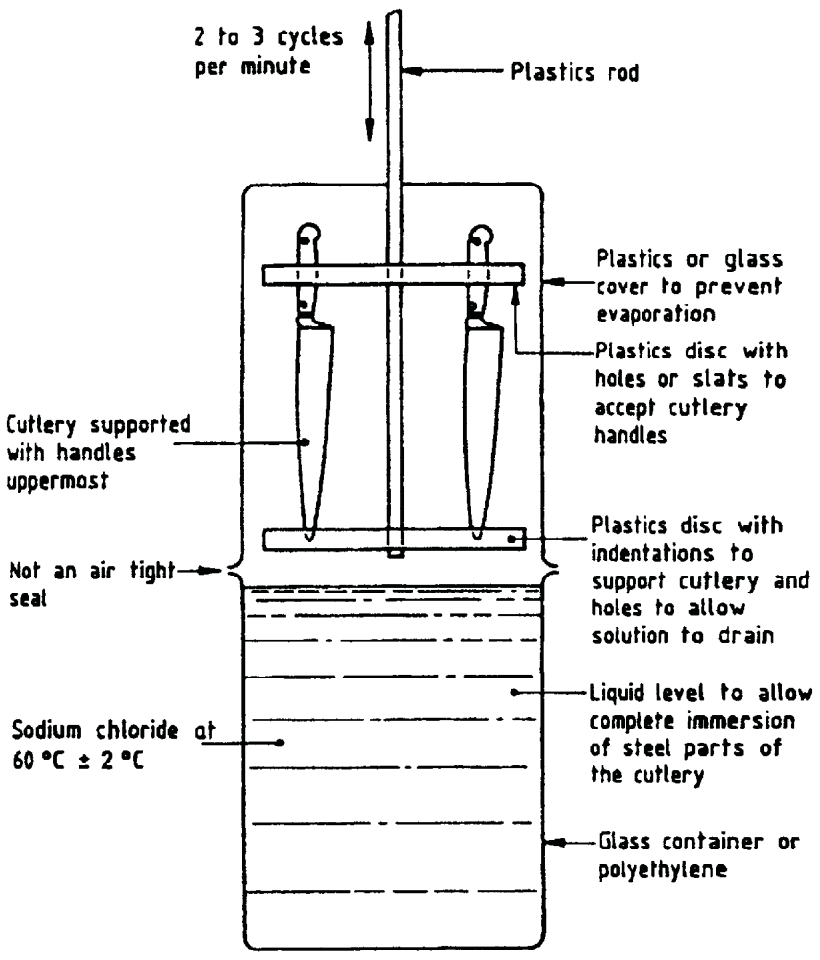

Figure B.1 — Apparatus for corrosion test

B.3.4 ***Expression of result***

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 0.4 mm diameter and 0.75 mm diameter respectively placed in contact with the sample surface provides a convenient method of assessing the size of pits with a hand lens.

B.3.5 ***Principle***

The knife, or carving fork, clamped at the handle and loaded at the blade or prong tip, is raised until the load is just lifted. The angle of permanent deformation after release of the load is measured.

B.3.6 ***Apparatus***

Apparatus suitable for carrying out the test as shown in Figure B.2.

NOTE The hand lever shown in Figure B.2 should not be attached before both scales are set to zero and should be removed before the angle of permanent set is measured; otherwise the hand lever exerts a torque on the pivoted clamp which will result in false measurements of permanent set.

B.3.7 ***Procedure***

B.3.7.1 Clamp the handle of the test specimen in the pivoted clamp and counterbalance the sample by means of the adjustable weight. Position the handle in the clamp so that during the test the tip of the blade, or carving fork prongs, and the end of the handle will remain in essentially the same horizontal plane.

B.3.7.2 Clamp the blade or prong tip in the unloaded tip clamp, ensure that the hand lever is removed from the apparatus and then set both scales to zero.

B.3.7.3 Connect the test load of (30 ± 1) N to the tip clamp and rotate the shaft of the pivoted clamp by means of the lever until the tip clamp just rises from the guide rails; maintain it in this position for 10 s. Return the lever to a position of rest, remove the load from the tip clamp and read off the angles of deflection *a* and *b* from the relevant scales. Add these two angles to give the angle of permanent deformation *c* (as shown in Figure B.3).

B.3.7.4 Turn the test specimen over and repeat the test in the opposite direction.

B.3.8 ***Expression of result***

Calculate the permanent deformation as the average of the angles of permanent deformation in the two directions.

B.4 Adhesion test for silver coatings

B.4.1 ***Principle***

Cutlery samples are examined after burnishing with steel balls by rotation in a rubber-lined drum containing soap solution.

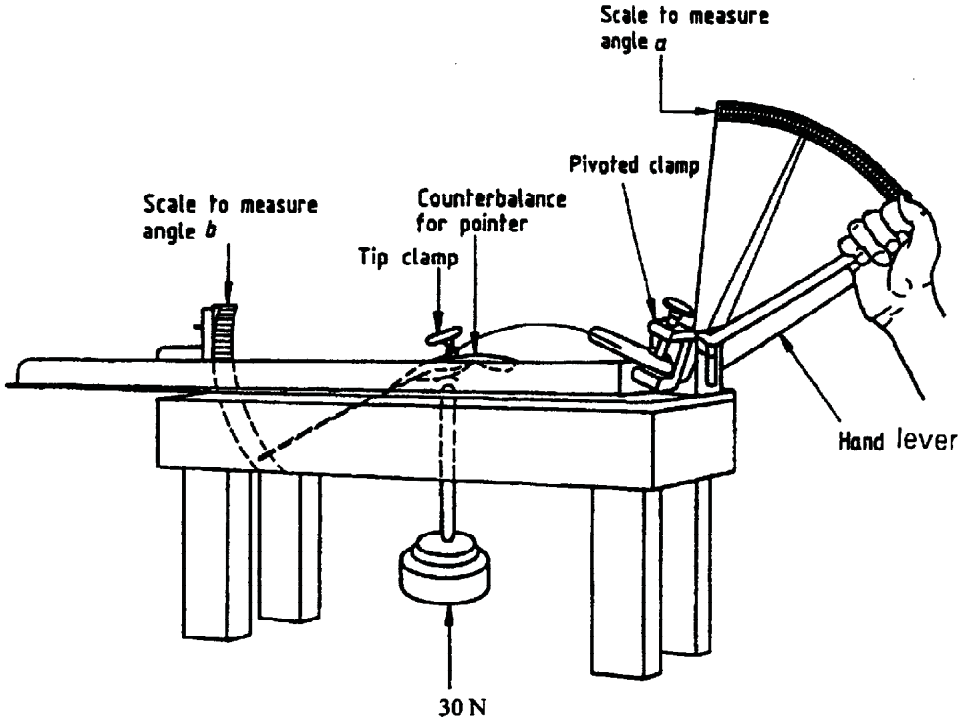

Figure B.2 — Strength test apparatus for knives and carving forks

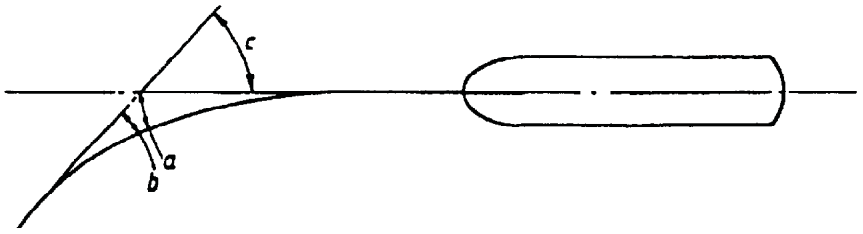

Figure B.3 — Determination of the angle of permanent deformation

B.4.2 *Apparatus*

Rotatable drum, rubber-lined, of hexagonal cross-section, measuring (250 ± 20) mm across the flats, capable of rotating at (25 ± 2) rpm and preferably fitted with transverse dividing panels so that compartments shorter than the pieces to be tested can be formed within the drum to prevent entanglement of the test pieces. The drum is half-filled with hardened steel balls in the following size proportions (to prevent geometric bunching):

a) 4.8 mm diameter: 50 % by mass;

b) 4.0 mm diameter: 25 % by mass;

c) 5.6 mm diameter: 25 % by mass.

Sufficient cold water, containing 1.2 g/l of soap (to inhibit corrosion of the steel balls), is added to the drum to cover the steel balls.

B.4.3 *Procedure*

Place the test pieces into the drum and rotate it at (25 ± 2) rpm for 40 min. Remove the test pieces from the drum and carefully examine them for any signs of peeling, blistering or any other indication of loosening of the silver coating.

Annex C (normative)

Detergent for the determination of resistance to environmental stress cracking

Ingredient	Percentage by mass
*Penta*sodium triphosphate	20
Sodium hexametaphosphate	40
Anhydrous sodium metasilicate	30
Anhydrous sodium sulfate	6
Sodium dichloroisocyanurate	2
Low foaming non-ionic wetting agent	2

Dry mix the first four ingredients listed for 5 min, then spray on the surfactant and mix for a further 5 min. Add the final ingredient and mix for 10 min before conditioning at ambient temperature for 24 h. Use within one month of preparation.

Annex D (normative)

Selection and care of cutlery

D.1 Selection

D.1.1 *General*

The choice between stainless steel and silver-plated cutlery is largely a matter of personal taste and fashion. Silver is whiter than stainless steel, a difference that becomes more pronounced with use, when a multitude of fine scratches produces the characteristic white patina of silver. On the other hand silver needs occasional cleaning.

D.1.2 *Silver-plated cutlery*

This consists of a base metal on to which a coating of silver has been electroplated. The life of the silver coating depends mainly upon its thickness. Silver coatings on cutlery to this standard may be "first class" (marked I), "second class" (marked II) or "third class" (marked III). In all cases, the thickness of silver specified for the frequently used pieces that form place settings is greater than it is for serving items such as ladles, jam spoons and salad servers. The life of the silver coating depends also upon the frequency and conditions of use, therefore it is impossible to be certain how long it will last. However, as a general guide to consumers, cutlery with a silver coating of grade II is expected to last for 20 years under average conditions of use in the home and those items with grade I are expected to last proportionately longer, i.e. approximately 30 years, and those with grade III are expected to last proportionately less, i.e. approximately 10 years. The base metal beneath silver deposits may be stainless steel, or nickel-silver. Of these, stainless steel has the highest resistance to indentation when roughly handled. For a given thickness, stainless steel is normally stronger than nickel-silver; therefore, to meet the minimum strength requirements of this standard, stainless steel cutlery is usually thinner than a similar article in nickel-silver. Nickel-silver cutlery is likely to be available in more heavily patterned designs than stainless steel, which is harder to shape.

D.1.3 *Stainless steel cutlery*

Knife blades manufactured to conform to the requirements of this standard are made of martensitic stainless steel, i.e. a stainless steel that can be hardened to a high degree so that it will take a long-lasting cutting edge. Knives that do not need a sharp cutting edge, for example butter and fish knives, are sometimes made of softer types of stainless steels known as "ferritic" or "austenitic", or nickel-silver, any of which may be silver-plated.

Stainless steel spoons, forks and ladles are made from either ferritic stainless steel, containing at least 16 % chromium, or from austenitic stainless steel containing at least 6 % nickel as well as at least 16 % chromium. Both types of steel have excellent resistance to corrosion pitting, but the austenitic type is less likely to be discoloured by unusual environments. It is possible to detect the marginally whiter colour of austenitic stainless steel.

D.1.4 *Handles*

Plastics, wood-plastics laminates, plastics-impregnated wood, ceramics and the natural materials, wood and horn, may be used for handles of cutlery manufactured to conform to the requirements of this standard.

Cutlery may be designated "dishwasher grade" if it is suitable for use in a dishwashing machine. Other cutlery manufactured to conform to the requirements of this standard will withstand immersion in hand-hot water without loosening of the handles or other serious deterioration, but handles of natural materials (wood and horn) will retain their pristine condition longer if they are not immersed in water.

D.2 Care of cutlery in use

D.2.1 *Tarnish on silver-plated cutlery*

Tarnish caused by sulfides in the atmosphere and certain foods can be removed by rubbing with a damp grit-free cloth and a silver plate powder or paste, or by a few seconds immersion in a proprietary dip solution. (Such solutions should not be allowed to come into contact with stainless steel, which they can discolour.)

Silver-plated cutlery is highly resistant to dishwashers but may acquire slight scratching if the vibration caused by the water jets causes it to knock against other metals. Such scratching is likely to be more noticeable on brand new silver-plated cutlery.

D.2.2 *Stainless steel cutlery*

Very occasionally stainless steel acquires tightly adherent stains that are usually due to something that has become firmly deposited on the steel rather than to any attack on the steel itself. For example, the natural mineral content of some tap water can leave a light stain on articles which have been allowed to dry without wiping. In most cases the stains can be removed by a good rub with a soapy cloth, but occasionally it is necessary to use a proprietary stainless steel polish.

If stainless steel corrodes, it tends to acquire isolated pits rather than to rust all over like non-stainless steel. The austenitic and ferritic stainless steels specified in this standard for spoons and forks, etc. are virtually immune to corrosion pitting under conditions found in the dining room or kitchen, but the martensitic stainless steel used for blades is specified to give a compromise between corrosion resistance and cutting properties; therefore knives (even knives that conform to the rigorous corrosion resistance requirements of this standard) should not be left wet for longer than necessary.

Prolonged contact with water is usually responsible for corrosion pitting. Water is very corrosive because of its natural salt content plus any that is introduced with soiled dishes; knives that are left undried or actually immersed in water overnight will receive in this time as much exposure to the corrosive effect of water as three or four months ordinary use when they are in contact with water for only a few minutes each time they are washed.

D.2.3 *Handles*

Only the "dishwasher grade" should be put into a dishwashing machine.

Handles of natural materials (wood and horn) will keep their pristine condition for longer if not immersed in water or left wet for longer than absolutely necessary. Ceramic (pottery) handles are not unbreakable.

D.2.4 *Dishwashing machines*

The following recommendations issued by the Federation of European Cutlery and Flatware Industries provide useful guidance on washing of cutlery in dishwashing machines. "Dishwashing machines provide a welcome relief from the task of washing up but to maintain knives in good condition a few simple precautions are necessary. Special hardenable stainless steels are generally used for knives to give them a lasting edge, but these steels can become slightly pitted if left repeatedly and for too long in contact with moisture.

Whenever possible wash knives immediately; do not leave them wet overnight and do not subject knives to the "rinse and hold" cycle.

As soon as the dishwasher has completed its cycle, remove the knives and wipe them dry. It is particularly undesirable to leave them overnight in the damp atmosphere of a dishwasher.

Observe the dishwasher manufacturers' instructions concerning the type and quantity of detergent used and the method of loading cutlery in the compartment provided.

Water with a high salt content is particularly corrosive to stainless steel. Dishwashers are often fitted with water softeners that must be regenerated with salt. After adding salt, make certain that the machine is put through the programme recommended by the supplier before washing knives in the machine.

Cutlery with non-metal handles should be washed by hand unless it is stated to be suitable for dishwashers."

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[1] Methylated Spirits Regulations 1983 (S.I. 1983 No. 252).

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