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IS 15104-1 (2002): Materials and Articles in Contact with Foodstuffs - Cutlery and Table Holloware, Part 1: Requirements for Cutlery for the Preparation of Food [MED 33: Utensils, Cutlery and Domestic Hardware]



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खाद्य पदार्थों के संपर्क में आने वाली सामग्री और वस्तुएँ —
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भाग 1 खाना तैयार करने की छुरी काँटों की अपेक्षाएँ

Indian Standard

**MATERIALS AND ARTICLES IN CONTACT WITH
FOODSTUFFS — CUTLERY AND TABLE HOLLOWARE**

PART 1 REQUIREMENTS FOR CUTLERY FOR THE PREPARATION OF FOOD

ICS 67.250; 97.040.60

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

NATIONAL FOREWORD

This Indian Standard (Part 1) which is identical with ISO 8442-1 : 1997 'Materials and articles in contact with foodstuffs — Cutlery and table holloware — Part 1 : Requirements for cutlery for the preparation of food' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendations of the Utensils, Cutlery and Domestic Hardware Sectional Committee and approval of the Mechanical Engineering Division Council.

The text of ISO Standard has been approved for publication as Indian Standard without deviations. In the adopted standard, certain conventions are not identical to those used in Indian Standards. Attention is especially drawn to the following:

- a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.
- b) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use a full point (.) as the decimal marker.

The concerned technical committee has reviewed the provisions of the following International Standards referred in this adopted standard and has decided that they are acceptable for use in conjunction with this standard:

ISO 306 : 1994	Plastics — Thermoplastic materials — Determination of Vicat Softening Temperature (VST)
ISO 6508 : 1986 ¹⁾	Metallic materials — Hardness Test — Rockwell test (Scales A-B-C-D-E-F-G-H-K)

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance, with IS 2 : 1960 'Rules for rounding off numerical values (revised)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

¹⁾ ISO 6508 : 1986 has been revised by the International Organization for Standardization as ISO 6508 : 1999 and split in three parts. Users are requested to refer to the latest edition.

1 Scope

This Part of this Standard specifies material and performance requirements and test methods for metal cutlery and related implements intended for use in the preparation of food.

Two grades of cutlery are specified:

- a normal grade with corrosion resistant blades or prongs capable of withstanding dishwasher cleaning procedures;
- a special grade with corrosion resistant blades capable of withstanding dishwasher cleaning procedures and sterilization processes.

2 Normative references

This 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 hereafter. 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.

ISO 306 : 1994	Plastics - Thermoplastic materials - Determination of the Vicat Softening Temperature (VST)
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 Standard the following definitions apply.

3.1 cutlery: Utensils for the preparation and serving of food, for example knives with and without cutting edges, spatulas, palettes and carving forks.

3.2 normal corrected vision: The naked eye corrected to normal vision if necessary.

NOTE: This is usually done by the wearing of spectacles.

4 Materials

4.1 General

The cutlery should be made from materials that enable the finished product to meet all of the performance requirements of this standard.

NOTE: The cutlery should not under foreseeable conditions of use release any substance likely to be detrimental to health or to have any detrimental organoleptic effects.

4.2 Metals

4.2.1. The composition of metal blades of the cutlery shall be as given in table 1 which specifies the composition limits (see EN 10088 Parts 1 and 2)

4.2.2. Handle rivets, guards, swivels, shackles, hanging hooks, rings and other exposed parts of handles of the cutlery shall be made from stainless steel¹⁾, plain carbon steel¹⁾, brass¹⁾, bronze²⁾, nickel silver²⁾ and for only handle rivets aluminium alloy.

1) Subsequently chromium plated with an undercoat of copper/nickel.

2) Subsequently chromium plated with an undercoat of nickel.

Table 1: Metals for cutlery blades, composition limits

Applications	Type of material	Grades of cutlery Normal and special
Knife blades with type "A" cutting edges (see 5.3)	Martensitic stainless steel (X39Cr13) (1.4031)	12,50 % min. Cr 0,36 % min. C 0,015 % max. S ¹⁾ 0,040 % max. P
Knife blades with type "B" cutting edges (see 5.3)	Martensitic stainless steel (X20Cr13) (1.4021)	12,00 % min. Cr 0,16 % min. C 0,015 % max. S ²⁾ 0,040 % max. P
Blades of spatulas and other cutlery without a cutting edge	Austenitic stainless steel (X4CrNi1810) (1.4301)	17,00 % min. Cr 8,00 % min. Ni 0,07 % max. C 0,015 % max. S ¹⁾ 0,045 % max. P
	or (X12CrMnNiN1895) (1.4373)	17,00 % min. Cr 7,50 % min. Mn 0,15 % max. C 4,00 % min. Ni 0,015 % max. S ¹⁾ 0,045 % max. P 0,05 % min. N
	or Martensitic stainless steel (X30Cr13) (1.4028)	12,00 % min. Cr 0,26 % min. C 0,015 % max. S ¹⁾ 0,04 % max. P
	or Ferritic stainless steel (X6Cr17) (1.4016)	Normal only 16,00 % min. Cr 0,08 % max. C 0,015 % max. S 0,04 % max. P
<p>1) A higher content up to a maximum of 0,030 % may be acceptable in the case of products to be machined.</p> <p>2) For long products a maximum sulfur (S) content of 0,030 % applies. For products to be machined a controlled sulfur content of 0,015 % to 0,030 % is recommended.</p>		

4.3 Non-metals

Non-metal parts of the cutlery shall be made of plastics, wood-plastics laminates, impregnated wood or other synthetic materials such that the finished cutlery complies with the relevant performance requirements of this standard.

Non-metal parts of cutlery shall not be superficially protected by paint, lacquer, varnish or similar coatings unless such coatings are also capable of complying with the relevant performance requirements of this standard.

5 Construction

5.1 General

Cutlery manufactured from the materials specified in clause 4 shall be so constructed that it meets all of the relevant performance requirements of this standard. The design of the cutlery shall be such that thorough cleaning processes can be readily carried out to avoid contamination of prepared foods.

5.2 Alignment, uniformity and absence of defects

5.2.1 All visible surfaces shall be free from scale, cracks, laps and any other defects which can render the item unfit for use for its intended purpose.

5.2.2 All cutlery shall be essentially straight and symmetrical except when the lack of straightness or symmetry is an intentional feature of design, e.g. swaged back edges.

5.2.3 All edges shall be free from flash and burrs and the roughness of blanked edges shall have been removed.

5.2.4 There shall be no gaps in excess of 0,3 mm between components of the cutlery.

5.2.5 Compliance with the requirements of 5.2.1 to 5.2.3 shall be checked by touch or by visual inspection with normal corrected vision and with 5.2.4 by measurement with a feeler gauge.

5.3 Knife edges

Knives shall have either:

a) cutting edges that can be resharpened by the user and edges whose tooth pitch is larger than 1 mm (type "A" edges);

or

b) cutting edges which are not intended to be resharpened on a steel (type "B" edges).

Except where intended for chopping or boning, cutting edges shall be formed 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 and not less than 25 mm from the handle.

Those parts of edges of knife blades intended for chopping shall be no thicker than 0,6 mm, when measured 1 mm from the extremity of the edge and not less than 25 mm from the handle, except that in the case of knives of less than 100 mm in overall length this measurement shall be taken at not less than 15 mm from the handle.

5.4 Sprung fork guards

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

6 Performance

6.1 Corrosion resistance

6.1.1 Resistance to blade corrosion

Before commencing the determination of resistance to blade corrosion subject the cutlery to the appropriate bend test forces specified in 6.2 and the torque and pull test forces in 6.3 but without previously immersing any part of the cutlery in hot water.

When tested in accordance with the test method described in A.1, exposed stainless steel surfaces shall comply with requirements a) to c) if the blade length of the cutlery is less than 100 mm.

When tested in accordance with the test method described in A.1, exposed stainless steel surfaces of cutlery with blade length exceeding 100 mm, shall also comply with requirements a) to c), except for a region of 15 mm from the handle if there is no bolster, or the bolster and that part of the blade within 25 mm of the bolster if a bolster is present (see figure 1).

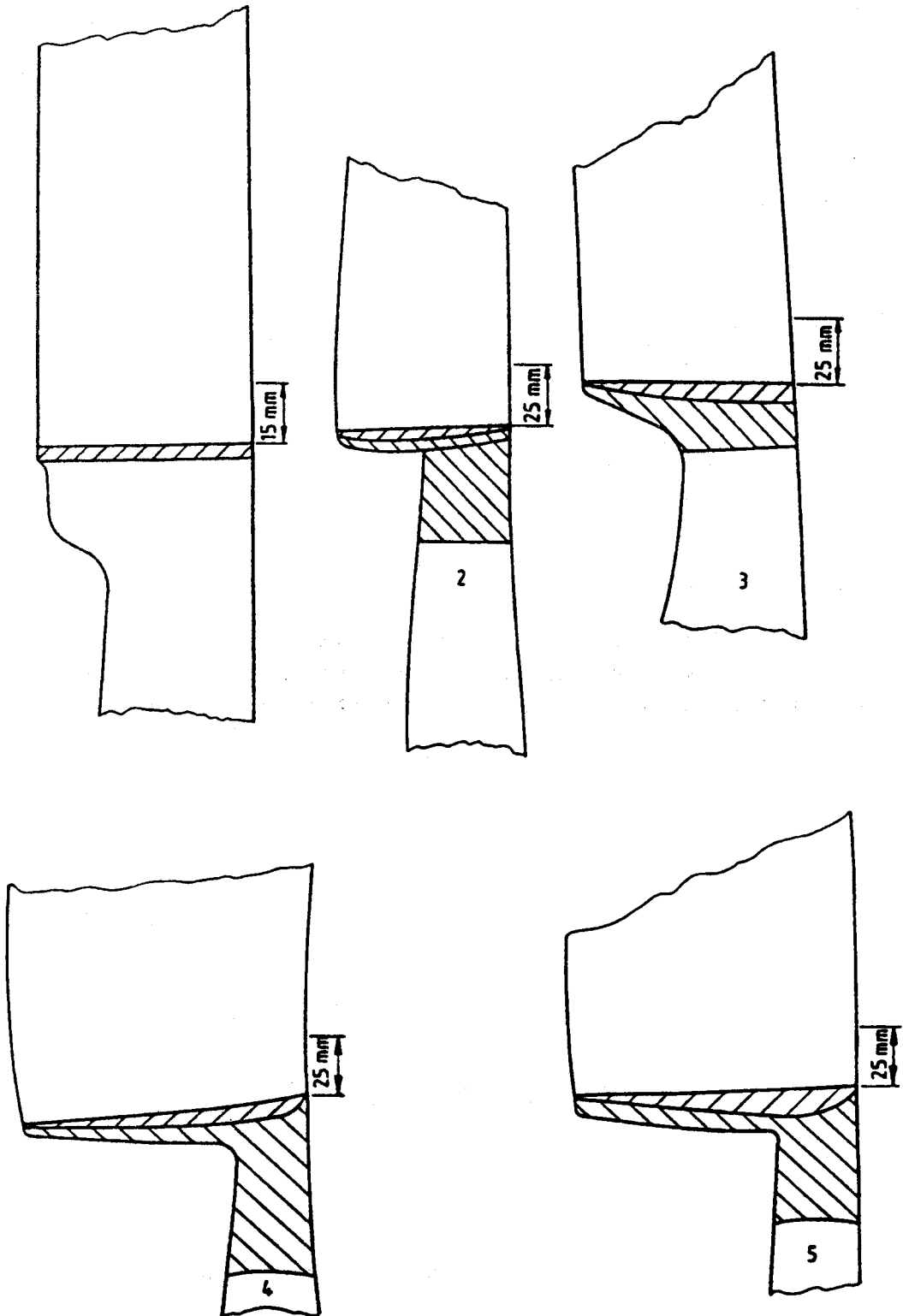
- a) No transverse or longitudinal cracks or laps shall have developed.
- b) There shall be not more than three pits or zones of intergranular corrosion, each having an area greater than a circle of 0,4 mm diameter for every 20 cm² of exposed surface.
- c) There shall be no pits or zones of intergranular corrosion having an area greater than a circle of 0,75 mm diameter.

NOTE: Suitable criteria for the assessment of the corrosion in this test of rivets made from aluminium alloy are under study and are likely to be incorporated at a later date.

6.1.2 Resistance to tang and bolster corrosion

No products of corrosion visible to the unaided eye shall have exuded from the tang area of cutlery following immersion of the cutlery in demineralized water containing $(50 \pm 5) \times 10^{-6}$ by mass of sodium chloride for 6 h at $22 \text{ }^{\circ}\text{C} \pm 4 \text{ }^{\circ}\text{C}$.

The same test and requirement shall apply also to cutlery with a blade length exceeding 100 mm for the region of 15 mm from the handle if there is no bolster, or for the bolster and that part of the blade within 25 mm of the bolster if a bolster is present (see figure 1).



1 Without bolster 2, 3, 4 5 With bolster

NOTE: The exempt area is the bolster and that part of the blade within 25 mm of the bolster or within 15 mm of the handle if there is no bolster.

Figure 1: Exemption from requirements of 6.1 for cutlery with blade length exceeding 100 mm

6.2 Strength of cutlery

A knife, carving fork or spatula shall not crack, break or acquire a permanent deformation of more than 3 ° when tested in accordance with the method described in A.2. In addition, the handle blade joint shall not have noticeably loosened.

The force applied to the item shall be related to its length as given in table 2, except that for thin flexible blades and carving forks where the force applied shall be 25 N ± 1 N regardless of their length.

Table 2: Relationship between bend test forces and blade length

Blade length mm	Bend test force N
Up to 100	20 ± 1
> 100	30 ± 1

A thin flexible blade e.g. that of a slicing knife, is defined as a blade, which when each side in turn is forced down at an angle of 45° on a plane until flat over 50 % of its length, remains undamaged and does not acquire a permanent set in excess of 3° (see figure 2).

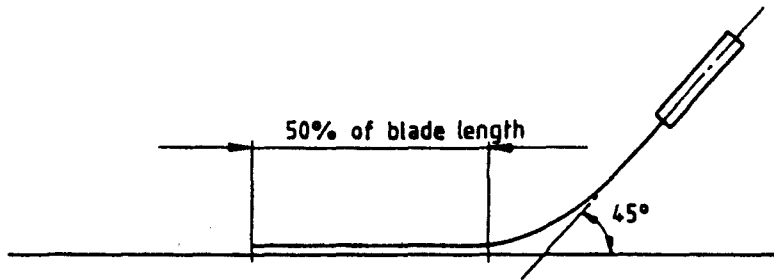


Figure 2: Screening test for thin flexible blades

6.3 Firmness of handle attachment

Handles that are not an integral part of the rest of the piece 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 30 min in water at a temperature of

75 °C ± 1 °C for normal grade cutlery;

100 ⁰₋₅ °C³⁾ for special grade cutlery;

the item is subjected to a pulling force and torque as specified in table 3 which shall be applied for 10 s each.

Table 3: Relationship between mass, pulling force and torque

Mass of item	Pulling force	Torque
g	N	Nm
mass ≤ 40	90 ± 1	2,3
40 < mass ≤ 80	180 ± 1	4,5
80 < mass ≤ 150	270 ± 1	6,78
150 < mass ≤ 220	360 ± 1	9,0
mass > 220	450 ± 1	11,00

The pulling force and the torque shall be applied successively, immersing the handles for 30 min in water at the applicable temperature immediately before applying the forces of the two different tests.

In the torque test there shall be a distance of 50 mm ± 1 mm between the clamps which fix the blade and the handle so that the clamp on the blade is as close as possible to the handle.

NOTE: Permanent deformation or breakage of the blade does not imply that the knife failed the test.

6.4 Hardness of knife blades

Knife blades with cutting edges shall have a hardness not less than 52 HRC for knives with type "A" edges and not less than 48 HRC for knives with type "B" edges when tested in accordance with ISO 6508:1986. Readings shall be taken at the centre of the blade.

³⁾ Boiling water

6.5 Resistance of plastics handles to softening at elevated temperatures

The surface of the plastics handles shall not be penetrated more than 0,10 mm by the flat end of a stainless steel rod of $1 \text{ mm}^2 \pm 0,015 \text{ mm}^2$ section under a force of $10 \text{ N} \pm 0,2 \text{ N}$ maintained for a period of 30 min at the following temperatures:

75 °C \pm 1 °C for normal grade cutlery;

100 °C \pm 5 °C³⁾ for special grade cutlery;

The test shall be carried out as described in A.3.

6.6 Resistance of plastics handles to environmental stress cracking

Plastics handles of cutlery, in the assembled state, shall not crack when

- a) evenly immersed in a solution of toluene: n-propanol (1:3 by volume) for 24 h at a temperature of 22 °C \pm 4 °C;
- b) subjected to 30 cycles as follows:

Storage of the assembled handles for 15 min in water at 70 °C \pm 1 °C, followed by an immediate transfer into a deep freeze unit kept at a temperature of -18 °C \pm 1 °C for a duration of 3 h, after which the handles are immediately transferred back into the hot water to restart the next cycle.

After the last cycle the specimens shall be normalized to a room temperature of at least 15 °C.

Thereafter the samples are inspected for any cracks using a calibrated microscope or lens of at least 4 times magnification.

NOTE: If this test has to be interrupted, samples should be kept in the deep freeze unit throughout the time of the interruption.

6.7 Resistance of non-metal handles to distortion in hot water

Cutlery with non-metal handles shall withstand 1 h immersion in water at the relevant temperature specified below, without visible distortion; in particular, no gaps in excess of 0,4 mm shall form between the metal and non-metal parts.

75 °C \pm 1 °C for normal grade cutlery;

100 °C \pm 5 °C³⁾ for special grade cutlery;

³⁾ Boiling water

The handle of each item and half of the blade length shall be fully immersed during the whole of the test period and shall be supported at its extremities at an angle with the handle downwards.

NOTE: Handles of normal grade cutlery should be capable of withstanding machine washing processes in aqueous solutions at the temperature given above. Handles of special grade cutlery should be capable of withstanding sterilization processes in aqueous solutions at the temperature given above.

6.8 Sharpness and edge retention

NOTE: It is intended that a specification for sharpness and edge retention will be developed as a future part of this standard.

6.9 Resistance to dropping

6.9.1 Knives

A knife shall be capable of withstanding being dropped from a height of 1,2 m on to a concrete surface five times successively in each of the following orientations without the handle becoming loose or breaking and without cracking or breaking of the blade:

- a) handle vertically downwards;
- b) knife back vertically downwards;
- c) side of knife vertically downwards;
- d) reverse side of knife vertically downwards.

6.9.2 Forks

A fork shall be capable of withstanding being dropped from a height of 1,2 m on to a concrete surface five times in a vertical position with the handle pointing downwards and then five times in a horizontal orientation without cracking or fracture of any part and without the handle, guard, shackle or hanging device becoming loose.

7 Marking and labelling

7.1 Marking

Each item of cutlery shall be legibly and indelibly marked with the following:

- a) name and/or trademark or other means of identifying the manufacturer or responsible supplier;
- b) the number of this Standard followed by the letter identifying the product grade:
 - i.e. EN ISO 8442-1 N for normal grade cutlery;
EN ISO 8442-1 S for special grade cutlery.

7.2 Labelling

The following information should be available at the point of sale:

- a) the number of this standard i.e. EN ISO 8442-1;
- b) the grade of the cutlery according to this Standard i.e. N or S as appropriate;
- c) the materials used for any non-metal parts of the product.
- d) an indication in respect to the possibility of resharpening the edge of the knife, e.g. whether it is a type 'A' or a type 'B' edge.

NOTE: This information should be supplied by such means as leaflets, label, or packaging imprints.

Annex A
(normative)

Test methods

A.1 Test method for corrosion resistance of normal and special grades of cutlery

A.1.1 Principle

The test specimens 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.

A.1.2 Reagents

During the test, unless otherwise stated, use only reagents of recognized analytical grade and only distilled water or water of equivalent purity.

Sodium chloride, 1 % (m/m) solution consisting of one part by mass sodium chloride in 99 parts demineralised/distilled water.

A.1.3 Apparatus

A suitable apparatus is shown in figure A.1 and comprises a glass or plastics container and a cover, which can be glass or plastics, and a plastics specimen rack with means to raise and lower it into the container.

Other forms of apparatus wherein the test samples are suspended by a hanging method are also appropriate.

Calibrated microscope or lens of at least 4 times magnification.

A.1.4 Procedure

A.1.4.1 Wash the selected specimens thoroughly in hot soapy water. Thoroughly rinse and then degrease the samples in acetone or methylated spirit.

A.1.4.2 Fill the container with the sodium chloride solution (A.1.2) using at least 1 l of solution for every square decimetre of area of the metal parts of the samples, bring the container and contents to 60 °C ± 2 °C and 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 and use fresh sodium chloride 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 sodium chloride solution.

A.1.4.3 Place the samples in the rack and in the case of knives with metal handles support the handles in such a way that they do not come into contact with the rack. Replace the cover.

A.1.4.4 Completely immerse and completely withdraw the samples from the solution at a rate of from two to three times per minute for 6 h.

A.1.4.5 At the completion of the test period, thoroughly wash and rinse the samples and examine them for corrosion.

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

A.1.5 Expression of results

Assess the size and number of pits per 20 cm² visually with the aid of a calibrated microscope or lens of at least four times magnification. Where two pits have obviously merged together, assess 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.

A.2 Strength and rigidity test for knives, carving forks and spatulas

A.2.1 Principle

The knife, carving fork or spatula, 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.

A.2.2 Apparatus

Apparatus suitable for carrying out the test is shown in figure A.2.

The hand lever shown in figure A.2 shall not be attached before both scales are set to zero and shall 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.

A.2.3 Procedure

A.2.3.1 Clamp the handle of the sample to be tested in the pivoted clamp. 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.

A.2.3.2 Clamp the blade, or prong tip in the unloaded tip clamp ensure that the hand lever is removed from the apparatus and set both scales to zero.

A.2.3.3 Connect the test load (see table 2) to the tip clamp put on the lever 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 hand lever to a position of rest and remove the hand lever, 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 together to give the angle of permanent deformation *c* (as shown in figure A.3).

A.2.3.4 Turn the sample over and repeat the test in the opposite direction.

A.2.4 Expression of results

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

A.3 Test for resistance of plastic handles to softening at elevated temperatures

A.3.1 Principle

The resistance of the plastic handle to penetration by a standard indenter under a standard load at the appropriate test temperature is determined.

A.3.2 Test specimen

Carry out the test on the original surface of an essentially flat piece of plastics at least 2,5 mm thick cut from the handle.

A.3.3 Apparatus

The apparatus, described in clause 4 of ISO 306:1994, except that the heating bath contains water and is equipped with means of controlling the temperature at the test temperature ± 1 °C.

A.3.4 Procedure

A.3.4.1 To ensure that the immersed part of the apparatus has reached the test temperature, position it in the water for at least 30 min before the test sample is introduced.

A.3.4.2 Place the test specimen on the base of the apparatus below the indenter. Within a time of 2 min, add the weight so that the total thrust is $10\text{ N} \pm 0,2\text{ N}$ and note the reading of the micrometer dial gauge, or set the instrument to zero.

A.3.4.3 Note and record the dial gauge reading every 5 min until 30 min have elapsed. If, after 30 min, the reading indicates a penetration of the indenter tip in excess of 0,1 mm, the sample shall be deemed to have failed to meet the requirements of this standard.

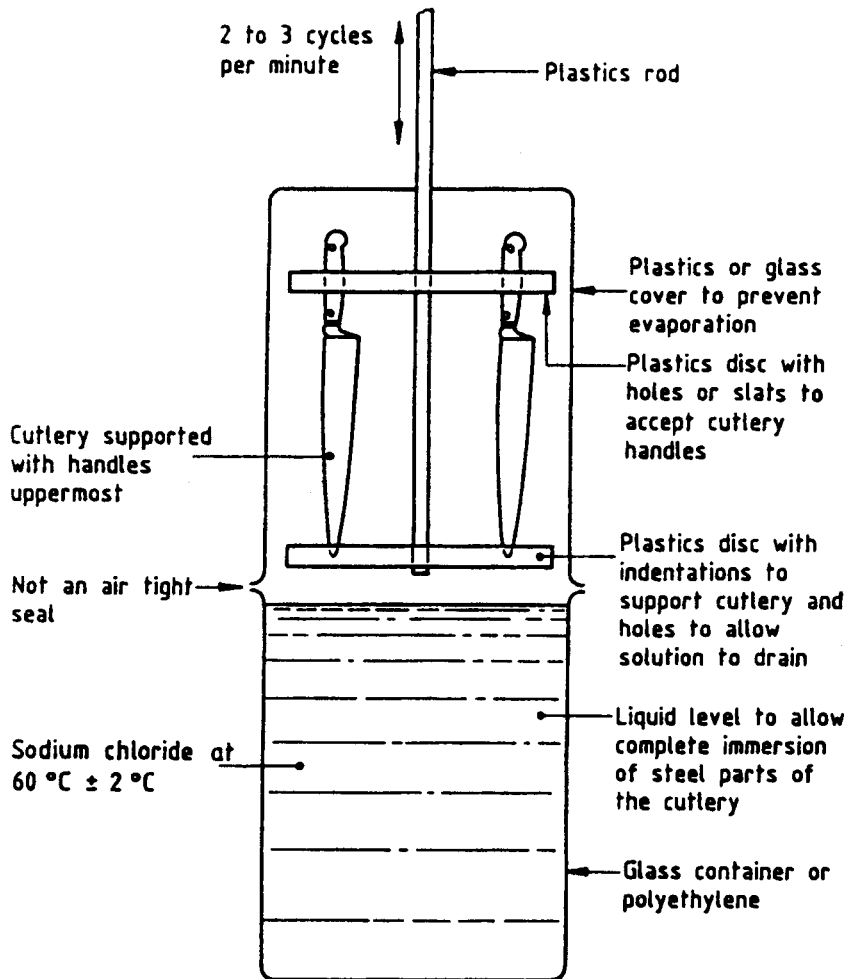


Figure A.1: Apparatus for corrosion test

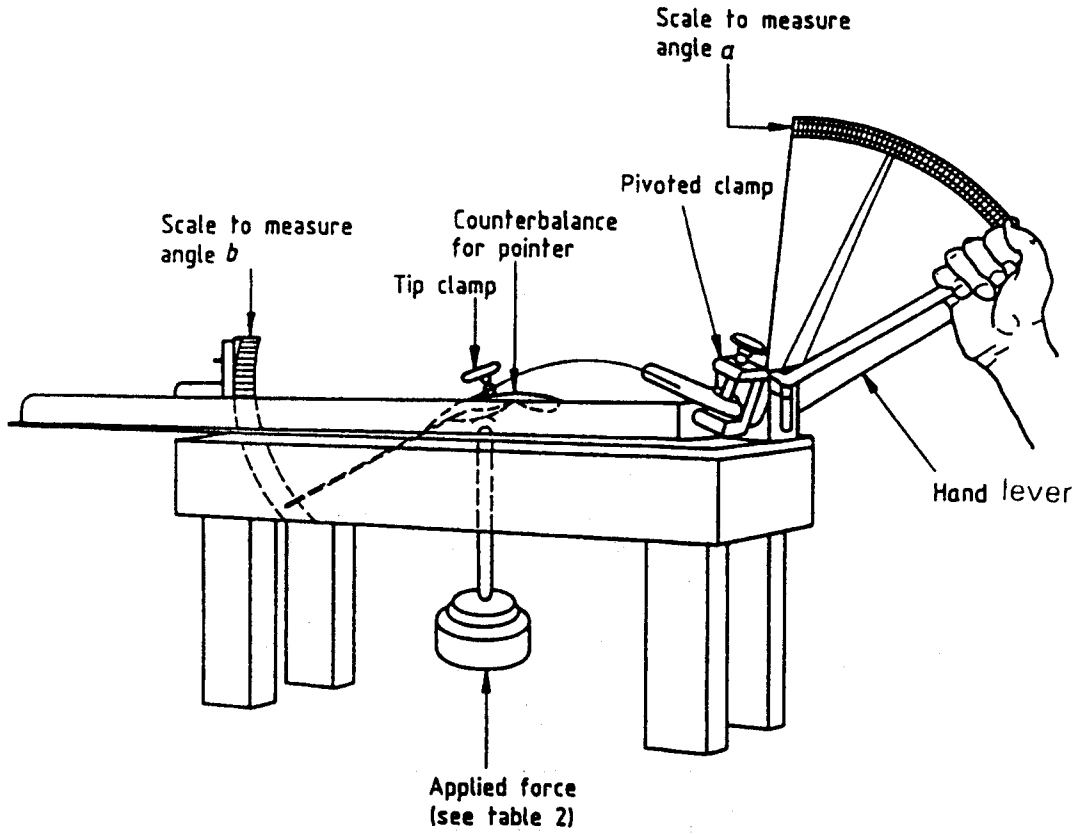


Figure A.2: Strength test apparatus for knives, carving forks and spatulas

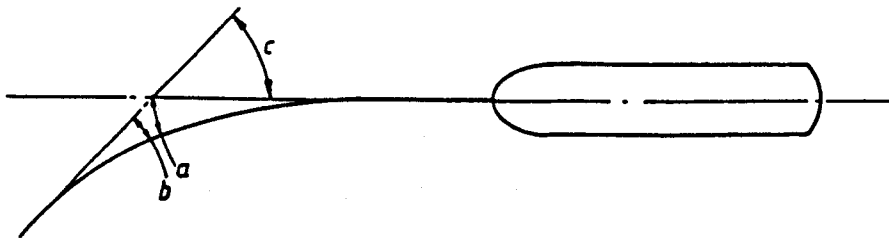


Figure A.3: Determination of angle of permanent deformation

Annex B

(informative)

Bibliography

Directives of the European Community

- EC 89/109 Dated 11.02.1989, Official Journal EC 1989, No L 40/38 page 38 Directive of the Council for the Harmonization of the Legal Procedures of the Member States concerning Materials and Utensils determined to come into contact with Foodstuffs
- EC 77/99 Dated 21.12.1976, Official Journal EC 1977 No L26, page 85, Requirements Annex A, Chapter I, Ciper 5

European Standards

- EN 10088-1 : 1995 Stainless steels - Part 1: List of stainless steels
- EN 10088-2 : 1995 Stainless steels - Part 2: Technical delivery conditions of sheet/plate and strip for general purposes

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This Indian Standard has been developed from Doc : No. ME 33 (0562).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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