DRAFT TANZANIA STANDARD

Wrought Aluminium and Aluminium Alloys Cookware — Specification.

2nd Edition

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The Mechanical Engineering Divisional Standards Committee (MEDC) under whose supervision, this Draft Tanzania Standard was prepared, consists of representatives from the following organizations:

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*National Development Corporation (NDC)
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0 Foreword

This draft Tanzania Standard has been prepared by Metals and Structures Technical Committee (MEDC 02) under the supervision of Mechanical Engineering Standards Divisional Committee (MEDC).

The main objective of this draft Tanzania Standard is to protect the consumer as regards lifespan and safety of household cooking utensils.

In the preparation of this draft Tanzania Standard, assistance was drawn from the following publications:

EAS 176 (Part 1):2000, *Aluminium hollowware uncoated utensils - Part 1: Sufurias and lids – Specification*.
BS EN 602:2004 *Aluminium and aluminium alloys. Wrought products. Chemical composition of semi-finished products used for the fabrication of articles for use in contact with foodstuff*
BS EN 485-2:2016+A1:2018, *Aluminium and aluminium alloys. Sheet, strip and plate -Part 2: Mechanical properties.*
DIN EN 515:2017, *Aluminium and aluminium alloys – Wrought products – Temper designations*.
IS 737:2008 (Reaffirmed 2018), *Wrought Aluminium and Aluminium Alloy Sheet and Strip for General Engineering Purposes - Specification*
IS 21:1992 (Reaffirmed 2017), *Wrought Aluminium and Aluminium Alloys for Manufacture of Utensils – Specification*
IS 5052:1993 (Reaffirmed 2003), *Aluminium and its alloys - Temper designations*

This second edition cancels and replaces the first edition which is technically revised.

For the purpose of deciding whether a particular requirement of this Draft Tanzania 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 TZS 4 (see clause 2).

Wrought Aluminium and Aluminium Alloys Cookware — Specification

1 Scope

This draft Tanzania Standard covers cold-formed wrought aluminium and aluminium alloys utensils for domestic and catering applications excluding the pressure cookers. It specifies dimensions, materials, construction and testing.

This standard lays down the requirements for the following types of aluminium utensils:
a) Cooking utensils,
b) Serving utensils,
c) Table utensils, and
d) Storage utensils.

2 References

For the purpose of this Draft Tanzania Standard, the following references shall apply:

TZS 4, *Rounding off numerical values*
TZS 684, Aluminium and aluminium alloys — Sheets, strips and plates for household utensils Specification

3 Definitions

For the purpose of this Draft Tanzania Standard the following definitions shall apply:

3.1 Cooking utensil
A deep utensil with or without lid, made from aluminium or aluminium alloy, formed by cold forming and used for food cooking purposes.
3.2 Gross capacity
The volume of water that fills the utensil up to its top edge or up to the level of the lid for utensils having a lid.
3.3 The uniform diameter utensil
The inner diameter of the utensil, having uniform diameter, at its top level, which defines gross capacity.
3.4 Sufuria
aluminium cooking-pot with flange.
3.5 Lid
aluminium circle shaped to cover the sufuria.

4 General Requirements

4.1 The body of the utensil and the lid (if provided) shall be cold formed either by deep drawing or spinning.
4.2 The utensil shall be so designed as to be easily cleaned and to prevent any accumulation of dirt.
4.3 The top edge of the utensil shall not be sharp; it shall be flat, and parallel to the external surface of the bottom of the utensil.
4.4 The manufacturing process shall leave the bodies of the utensils smooth, clean, free from deformations, oils, burrs and any other defects inside and outside. No defect shall be treated by filling or patching. The articles shall be thoroughly clean and of smooth surface.
4.5 The utensil body shall show no leakage when filled with liquid.

5 Specific Requirements

5.1 The body of a utensil not provided with handles shall have a flange of a width not less than 8 mm extending outward to facilitate handling of the utensil.

5.2 The external surface of the bottom of the utensil shall be flat within a tolerance of 0.05 mm for each 100 mm of diameter.

5.3 Lid (if any)

5.3.1 Lid shall be made of the same material as that of the body.

5.3.2 The seating surface of lid on the edge of body of the utensil shall be shaped such as to ensure maximum contact area with top of the utensil within a tolerance not exceeding 1 mm.

5.4 Handle (if any)

5.4.1 It shall be of such a shape and position as to provide a comfortable and easy grip without the hand coming in contact with the surface of the utensil.

5.4.2 It shall be smooth and without any sharp edges.

5.4.3 It shall be securely fixed in its position by rivet or fasteners, made from any aluminium alloy which does not react with the material of the utensil.

5.4.4 Rivets, fasteners and hinges shall prevent the accumulation of any dirt.

5.4.5 Non – metallic handles shall be provided with a metallic core for fixing of the fastener. The fastening length shall not be less than 10 mm.

5.4.6 Length of a straight type handle shall be proportional to the utensil diameter and it shall be so fixed that the stability of utensil on the horizontal plane is ensured.

5.4.7 Non – metallic handle shall be made from non – flammable materials which have such resistance to heat conduction that the temperature of the handle will not exceed $50^{o}C$ after the lapse of at least 15 minutes from the point of boiling of water in the utensil.

5.4.8 The handle fitted to the utensil shall not deform or show other damage when the utensil, containing a load equal to 3 times its water capacity, is lifted by the handle and also after carrying out the test of strength of handle attachment.

5.4.9 For utensil in which pouring is a function of their use, liquid shall not creep down the outer wall of the utensil from the pouring position, when carrying out the spillage tests.

6 Materials

Both the utensil body and lid (if any) shall be made from a single and same material of aluminium sheet. The chemical composition and mechanical properties of the aluminium sheet shall comply with the requirements of TZS 684 shown in Table 4 and 5.

7 Dimensions

The dimensions and tolerances for aluminium and aluminium alloys cooking utensils shall be as illustrated in table 1.

Table 1 – Dimensions of aluminium and aluminium alloys cooking pot (Sufuria)

Table 1A – Standard sufuria

Sufuria size	Sufuria diameter d, mm	Tolerance mm	Flange diameter d2 , mm	Tolerance mm	Height H, *min* mm	Thickness t, *min* mm	Volume, *min* Litres
9	132	± 2	152	± 2	55	0.6	0.75
10	144	± 2	164	± 2	64	0.6	1.05
11	155	± 2	175	± 2	68	0.6	1.2
12	170	± 2	190	± 2	71	0.6	1.6
13	180	± 2	210	± 2	79	0.6	2.0
14	190	± 2	230	± 2	88	0.6	2.5
15	210	± 2	240	± 2	92	0.6	3.0
16	225	± 2	260	± 2	96	0.6	3.6
17	240	± 2	275	± 2	102	0.6	4.6
18	250	± 2	280	± 3	112	0.7	55
19	265	± 2	295	± 3	128	0.7	6.3
20	280	± 2	325	± 3	130	0.7	8.0
21	290	± 2	335	± 3	136	0.7	9.0
22	310	± 2	355	± 3	139	0.7	10.5
23	320	± 2	365	± 3	149	0.7	12

Table 1B – Medium heavy sufuria

Sufuria size	Sufuria diameter d, mm	Tolerance mm	Flange diameter d2 , mm	Tolerance mm	Height H, *min* mm	Thickness t, *min* mm	Volume, *min* Litres
12	170	± 2	190	± 2	71	0.9	1.6
13	180	± 2	210	± 2	79	0.9	2.0
14	190	± 2	230	± 2	88	0.9	2.5
15	210	± 2	240	± 2	92	0.9	3.0
16	225	± 2	260	± 3	96	0.9	3.6
17	240	± 2	275	± 3	102	0.9	4.6
18	250	± 2	280	± 3	112	0.9	5.5
19	265	± 2	295	± 3	128	0.9	6.3
20	280	± 2	325	± 4	130	0.9	8.0
21	290	± 2	335	± 4	136	0.9	9.0
22	310	± 2	355	+4	139	0.9	10.5
23	320	± 2	365	± 5	149	1.0	12.0
24	340	± 2	380	± 5	154	1.0	14.0
25	355	± 2	395	± 5	161	1.0	16.0
26	370	± 2	420	± 5	167	1.0	18.0
27	380	± 2	430	± 5	176	1.0	20.0
28	395	± 2	435	± 6	179	1.0	22.0
29	405	± 2	445	± 6	186	1.0	24.0
30	420	± 2	465	± 7	202	1.2	28.0
31	430	± 2	475	± 7	206	1.2	30.0
32	455	± 2	500	± 7	209	1.2	34.0
33	465	± 2	515	± 7	224	1.2	38.0
34	480	± 2	535	+ 8	227	1.4	41.0
35	495	± 2	550	+ 8	234	1.4	45.0
36	520	± 2	570	+ 8	235	1.4	50.0

8 Nesting

Utensils of consecutive sizes shall fit one inside another freely.

9 Marking, Packaging and Labeling

9.1 Marking

Each utensil shall be legibly and indelibly (permanently) marked on the body side externally with the following information:

a) the manufacturer's name or trademark;
b) Material grade or batch number;
c) the country of origin

9.2 Packaging

Utensils shall be wrapped in soft tissue paper and shall be packed in accordance with the best trade practices or according to the instructions of the purchaser. All utensils shall be packed neatly in the container that is closed to prevent contamination during storage and transportation. Care shall be taken to see that the utensils do not get dented or damaged during transit.

9.3 Labeling

Each package of the utensil shall be labeled with the following information:

a) manufacturer's name or trademark;
b) country of origin;
c) batch number;
d) material grade.
e) name of the utensil, gross capacity (in litres)/ size (in mm) and quantity in the package.

10 Standard Tests

10.1 Visual inspection

The utensil shall be visually inspected to check the presence of any damage or apparent defects in manufacture or whether any of its part out is missing.

10.2 Dimension measurement

10.2.1 *Measurement of inner and outer diameter*

The inner diameter of the utensil shall be measured at the upper plane at which its nominated capacity ends; the outer diameter shall be measured at the same place. Where it is difficult to measure the inside diameter directly, the outside diameter shall be measured and twice the thickness of the utensil subtracted from it.

10.2.2 *Height measurement*

The height from the bottom to the upper edge of the utensil shall be measured by graduated scale, at least at three positions, and the calculated mean of the measurements shall be taken as the height.

10.2.3 *Thickness measurement*

The thickness of the bottom of the utensil shall be measured by a micrometer at least at three positions, within a circle concentric with, and of diameter equal to the radius of the bottom. The calculated mean of the measurements shall be taken as the thickness.

10.3 Capacity measurement

The capacity shall be measured by one of following two methods:

10.3.1 The utensil shall stand on a level base, then it shall be gradually filled with water up to its upper edge or to the level of lid seating (if a lid is provided), and left for one minute. The volume of water shall be measured by using a measuring jar.

10.3.2 The utensil shall be weighed empty (without lid), filled with water to its upper edge or to the level of the lid seating (if a lid is provided), and reweighed. The capacity in litres is considered to be the difference in kg, between the weight of utensil filled with water and its weight empty.

10.4 Tightness test
The utensil shall be placed on a level base, then filled with water to its upper edge and left for 5 minutes. Any sign of leakage shall be noted.

10.5 Spillage test
This test shall be only carried out on utensils in which pouring is a function of their use, and shall be carried out as follows:
The utensil shall be fixed on a horizontal platform rotating around a horizontal axis and permitting gradual and regular inclinations of the utensil, and then filled gradually with water up to ¾ of its capacity; the platform shall then be rotated so that its inclination to the horizontal is 10^{o}, 30^{o} and 60^{o} respectively. Any sign of creepage of liquid down the outside wall of the utensil from its pouring position (spout) shall be noted.
Utensils for boiling milk shall be tested using milk at 82 ^{o}C and any effect produced by the skim on the walls, is ignored.

10.6 Stability test (for utensils having straight handle)
The utensil shall be placed empty on a plane inclined at 10^{o} to the horizontal, with the handle in the downward direction and left for one minute. The utensils shall be observed to determine whether it remains stable.

10.7 Thermal insulation test for non-metallic handles
10.7.1 The utensil shall be filled with water at 23 ^{o}C + 2 ^{o}C up to 90 % of its nominated capacity, and the lid (if provided) placed in position.
10.7.2 The water shall be heated using an electric heating coil immersed in the water, so as to reach boiling point within 15 minutes to 20 minutes.
10.7.3 The temperature of the handle shall be measured not less than 15 minutes after the water starts to boil, by means of thermocouples fixed to points A and B indicated in figure 1.
10.7.4 The temperature shall be recorded and compared with those specified.

10.8 Test for handle strength
The untesil shall be placed on a horizontal plane and a load equal to 3 times its capacity, in kg, shall be placed inside it. The utensil shall then be lifted by the handle as in normal use and kept lifted for at least one minute. The utensil and handle shall then be examined to detect any deformation.

10.9 Test of strength of handle attachment
10.9.1 A quantity of mass equal to 2.25 times the capacity of the utensil, in kg, shall be placed inside the utensil. The handle shall be attached to the lever of an apparatus as shown in figure 2.
10.9.2 The utensil shall be lifted off and lowered on to a flat surface per minute for 24 hours by means of a rotating cam. When the utensil has two handles, each shall be tested separately but the mass of the load shall be reduced by half.
10.9.3 After carrying out the test, the utensil shall be inspected, to detect any rupture failure or separation between the handle and utensil. The utensil shall then be filled with water to detect whether or not there is any leakage.

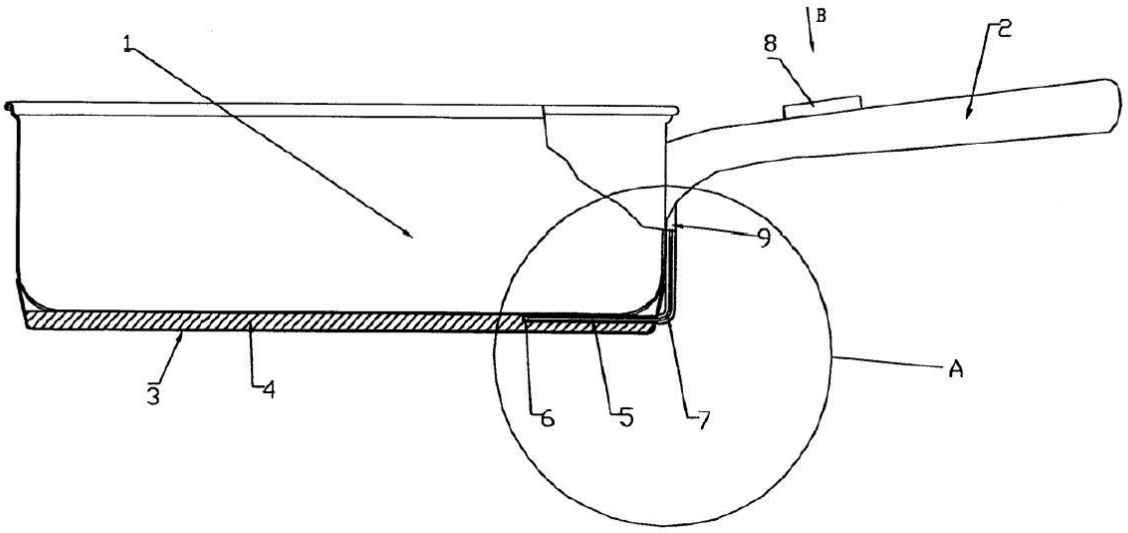


Figure 1: Points of measuring temperature of handle

Brief description of the drawings

a handle **2** is installed on a side of pan body **1**. An extra bottom layer **3** is constructed at a bottom of pan body **1**. A metallic plate **4** is sandwiched in between the bottom of the pan body **1** and the extra bottom layer **3**. An installation hole **5** is located below the handle **2** on the side of the metallic plate **4**. This installation hole **5** is extending to about ½ of the distance toward a center of the metallic plate **4**. Although the ideal position is that the installation hole **5** is extended to the center of the metallic plate **4**, however, since the metallic plate **4** has good heat conductivity, the installation hole **5** is extended inward to a position of ⅓ to ⅔ of the distance from the center of the metallic plate **4** under normal circumstances considering the need for installation and fabrication. The high temperature sustainable temperature sensor **6** is placed at the end of the installation hole **5**. Its connection wires **7** links the display unit **8** on handle **2** through a side wall of the extra bottom layer **3**. The display unit **8** is located on handle **2** near the pan body **1**. In order to protect the connection wires **7** and the temperature sensor **6**, a protection tube **9** is used to enclose the temperature sensor **6** and the connection wires **7**. This protection tube **9** is extended to handle **2**.

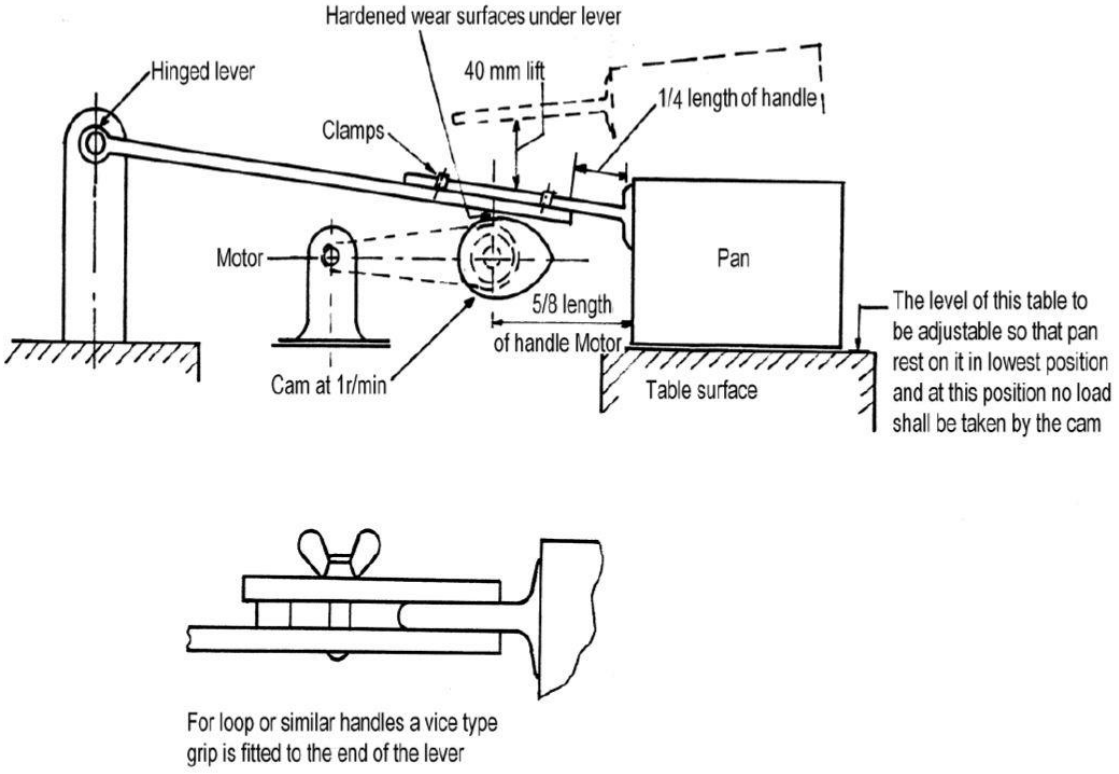


Figure 2 – Apparatus for testing strength of handle attachment

11 SAMPLING

11.1 The utensils to be selected from a lot are to be drawn at random. When utensils in a lot are packed in different boxes, a suitable number of boxes (not less than 10% of the total number in a lot subject to a minimum of 2) shall be first chosen at random. From each of the boxes so chosen, an approximately equal number of utensils shall be selected at random so as to obtain the required number of utensils.

11.2 Visual and Dimension Characteristics

Unless agreed to between the purchaser and the manufacturer, the sampling of utensils and criteria of conformity shall be according to Table 2 for visual and dimensional characteristics.

Table 2: Scale of sampling and criteria for conformity, for visual characteristics and dimensions (Normal Inspection)

LOT SIZE	VISUAL CHARACTERISTICS AQL = 2.5				
	Sample	Sample size	Cumulative Sample size	Acceptance number	Rejection number
0 to 50	First	8	8	0	2
	Second	8	16	1	2
51 to 100	First	13	13	0	2
	Second	13	26	1	2
101 to 150	First	20	20	0	3
	Second	20	40	3	4
151 to 300	First	32	32	1	4
	Second	32	64	4	5
301 to 500	First	50	50	2	5
	Second	50	100	6	7
501 to 1000	First	80	80	3	7
	Second	80	160	8	9
1001 to 3000	First	125	125	5	9
	Second	125	250	12	13
3001 to 10000	First	200	200	7	11
	Second	200	400	18	9
10001 and above	First	315	315	11	16
	Second	315	630	26	27
LOT SIZE	**DIMENSIONS AQL = 2.5**				
	Sample	**Sample size**	**Cumulative Sample size**	**Acceptance number**	**Rejection number**
0 to 50	First	5	5	0	2
	Second	5	10	1	2
51 to 100	First	8	8	0	2
	Second	8	16	1	2
101 to 150	First	13	13	0	2
	Second	13	26	1	2
151 to 300	First	20	20	0	3
	Second	20	40	3	4
301 to 500	First	32	32	1	4
	Second	32	64	4	5
501 to 1000	First	50	50	2	5
	Second	50	100	6	7
1001 to 3000	First	80	80	3	7
	Second	80	160	8	9
3001 to 10000	First	125	125	5	9
	Second	125	250	12	13
10001 and above	First	200	200	7	11
	Second	200	400	18	9

11.3 Standard Test

The lots which have been found satisfactory in respect of visual and dimensional characteristics shall then be tested for standard tests (where applicable). Unless agreed to between the purchaser and the manufacturer, the sampling of utensils and criteria of conformity shall be according to Table 3 for standard test.

Table 3: Scale of sampling and criteria for conformity for Standard Test

Sample	Sample size	Cumulative Sample size	Acceptance number	Rejection number
First	5	5	*	2
Second	5	10	*	2
Third	5	15	0	2
Fourth	5	20	0	3
Fifth	5	25	1	3
Sixth	5	30	1	3
Seventh	5	35	2	3
*Acceptance not permitted at this sample size				

Table 4: Chemical Composition of Wrought Aluminium and Aluminium Alloys for Manufacture of Utensils
(Composition limits are in percent maximum unless shown otherwise)

Designation	Aluminium	Copper	Magnesium	Silicon	Iron	Manganese	Zinc	Titanium and/or Other Grain Refining Elements	Cromium	Remarks
19000	99.0, Min	0.1	0.2	0.5	0.7	0.1	0.1	—	—	Cu+Mg+Si+Fe+Mn+Zn = 1.0
19500	99.5, Min	0.05	—	0.3	0.4	0.05	0.05	—	—	Cu+Si+Fe+Mn+Zn = 0.5
19600	99.6, Min	0.05	—	0.25	0.35	0.03	0.06	—	—	Cu+Si+Fe+Mn+Zn = 0.4
31000	Remainder	0.1	0.1	0.6	0.7	0.8 - 1.5	0.2	0.2	0.2	—
31500	Remainder	0.2	0.6 - 1.3	0.4	0.7	1.0 - 1.5	0.2	0.2	—	—
40800	98.0, Min	0.2	0.1	0.6 - 0.95	0.6 - 0.95	0.1	0.2	0.2	—	—
51000-A	Remainder	0.2	0.5 - 1.1	0.6	0.7	0.2	0.25	—	0.1	—
51000-B	Remainder	0.2	1.1 - 1.8	0.6	0.7	0.2	0.25	—	0.1	—
64430	Remainder	0.1	0.4 - 1.2	0.6 - 1.3	0.6	0.4 - 1.0	0.1	0.2	0.25	—

NOTES

1. The lead content of the material shall not exceed 0.05%.
2. Other elements not specified in the chemical composition, the maximum content for each shall not exceed 0.05% because of insufficient knowledge about behavior in contact with food. Higher limits may be introduced when more information is available.
3. It is the responsibility of the supplier to ensure that any element not specifically limited, is not present in any amount such as is generally accepted as having an adverse effect on the product. If a purchaser's requirements necessitate limits for any element not specified, it should be agreed between the purchaser and the supplier.

Table 5: Mechanical Properties of Wrought Aluminium and Aluminium Alloys Sheet and Strip for Manufacture of Utensils

Designation	Condition	0.2 Proof stress *MPa*	Tensile Strength, *MPa*		Elongation on 50 mm Gauge Length, *Percent*, For Thickness in mm				Bend Test, Radius of Bend
		Min	*Min*	*Max*	0.5 ≤ t ≤ 0.8	0.8 < t ≤ 1.3	1.3 < t ≤ 2.6	2.6 < t ≤ 6.3	
19000	O	—	70	110	20	25	29	30	Close
	Hx2	—	90	130	5	6	8	8	Close
	Hx4	—	105	140	3	4	5	5	1/2t
	Hx6	—	125	150	2	3	4	4	1/2t
	Hx8	—	140	—	2	2	3	3	1t
19500	O	—	55	95	22	25	29	30	Close
	Hx4	—	100	135	4	5	6	6	1/2t
	Hx8	—	125	—	3	3	4	4	1t
19600	O	—	—	95	25	25	29	32	Close
	Hx4	—	95	125	4	5	6	6	1/2t
	Hx8	—	125	—	3	3	4	4	1t
31000	O	—	90	130	20	23	24	24	Close
	Hx2	—	115	150	5	6	7	8	Close
	Hx4	—	130	180	3	4	5	5	1/2t
	Hx6	—	150	195	2	3	4	4	1t
	Hx8	—	170	—	2	2	3	3	3t
31500	O	—	125	165	16	16	18	20	Close
	Hx2	—	150	210	5	5	6	8	Close
	Hx4	—	190	245	3	4	5	5	1/2t
	Hx6	—	215	275	2	2	3	4	1/2t
	Hx8	—	245	—	1	1	1	2	1t
40800	O	—	85	120	20	23	25	30	Close
	Hx2	—	105	140	5	6	7	8	Close
	Hx4	—	125	160	3	4	5	5	1/2t
	Hx6	—	150	180	2	3	4	4	1t
	Hx8	—	175	—	2	2	3	3	3t
51000-A	O	—	105	150	18	18	18	22	Close
	Hx2	85	120	160	3	4	5	6	Close
	Hx4	105	140	180	2	3	4	4	1/2t
	Hx6	125	160	200	1	2	2	2	1t
	Hx8	—	185	—	1	2	2	2	3t

51000-B	O	—	125	170	18	18	18	19	Close
	Hx2	110	155	195	3	4	5	6	1/2t
	Hx4	140	175	215	2	3	4	4	1t
	Hx6	155	190	225	1	2	2	2	3t
	Hx8	—	200	—	1	2	2	2	—
64430	O	—	—	175	14	16	16	17	Close
	T4	115	200	—	12	15	15	15	2t
	T6	250	295	—	5	5	5	6	3t

NOTES

1. 1MPa = 1 N/mm^2 = 1 MN/m^2 = 0.102 kgf/mm^2 = 144.4 psi.
2. *t* is the thickness of the test piece.
3. For thickness 2.6 mm and less, elongation values are for guidance only and not guaranteed. For this purpose bend test as specified in 7.2 may be carried out.

ANNEX A

BENDING STRENGTH TEST

A-1 APPARATUS

A-1.1 A means of applying a force of 75 N at a speed not exceeding 50 mm/min.

NOTE - A tensile testing machine is an appropriate means of achieving this.

A-1.2 A D section loading bar, diameter 10 ± 1 mm, to transmit the applied force evenly across the width of a handle under test.

A-1.3 A means of attaching the cookware firmly to a rigid base throughout the test, for example, a G clamp, or for attaching a handle via its fixing system to an appropriate support.

A-2 PROCEDURE

A-2.1 Attach the cookware firmly to the rigid base so that the contacting face of the loading bar is 10 ± 1 mm from the end of the handle (see Fig. 1).

A-2.2 Apply the loading bar at a speed not exceeding 50 mm/min until a force of 75 N is applied or until failure of the assembly occurs, whichever is the sooner.

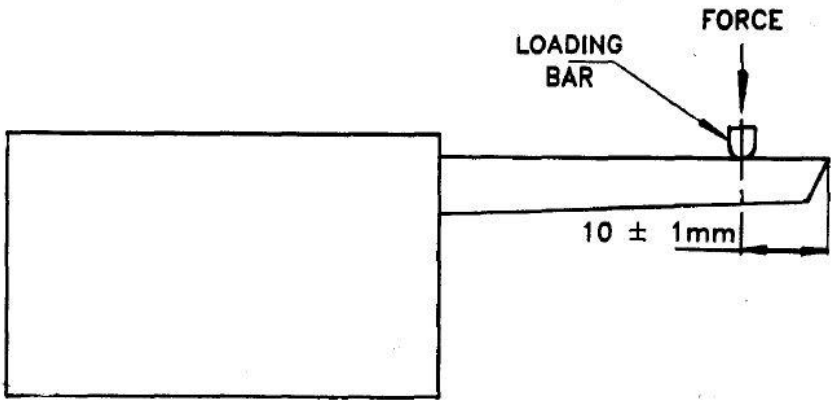


Figure. 1 Arrangement for Bending Strength Test

ANNEX B

TORQUE TEST

B-1 APPARATUS

B-1.1 A calibrated torque wrench capable of applying a torque of up to 5 N.m.

B-1.2 A means of attaching the cookware firmly to a rigid base throughout the test, for example, a G clamp, or for attaching a handle or knob via its fixing system to an appropriate support.

B-2 PROCEDURE

B-2.1 Attach the cookware firmly to the rigid base and clamp the torque wrench to the handle or knob adjacent to the fixing system at 90’ to the major axis of the fixing system.

B-2.2 By means of the wrench twist the handle or knob until a torque of 5 N.m for a handle or 3 N.m for a knob is applied or until failure of any part of the assembly occurs, whichever is the sooner.

ANNEX C

IMPACT STRENGTH TEST

C-1 APPARATUS

C-1.1 A means of dropping a weighted striker from a height of 500 ± 5 mm so that it falls vertically, essentially without friction, using guides.

C-1.2 A steel striker of hemispherical striking surface 25 ± 1 mm in diameter and mass 250 ± 5 g capable of being weighted to a total mass of 500 ± 5 g.

C-1.3 A means of attaching the cookware firmly to a rigid base throughout the test, for example, a G clamp, or for attaching a handle or knob via its fixing system to an appropriate support and arranged such that the cookware may also be turned through 90° and 1 80° so that the handle or knob may additionally be struck on its side and, if appropriate, on its lower surface.

C-2 PROCEDURE

C-2.1 Attach the cookware or the lid firmly to the rigid base so that it is correctly aligned below the striker. Support the underside of a lid when striking the knob directly.

C-2.2 Load the striker to the appropriate mass (one half of the mass of the empty cookware of 500 g, whichever is less for a handle, 250 g for knob or for the handle of cookware of mass less than 500 g) and release it so that it strikes the handle within 10 mm of its end (see Fig. 2) or the knob directly.

C-2.3 Inspect the assembly and report any visible damage.

C-2.4 Rotate the assembly through 90’ so as to strike the handle or knob on one side.

C-2.5 Repeat the procedures described in C-2.2 and C-2.3.

C-2.6 Rotate the assembly through a further 90º so as to strike the handle or knob (if appropriate) on its underside.

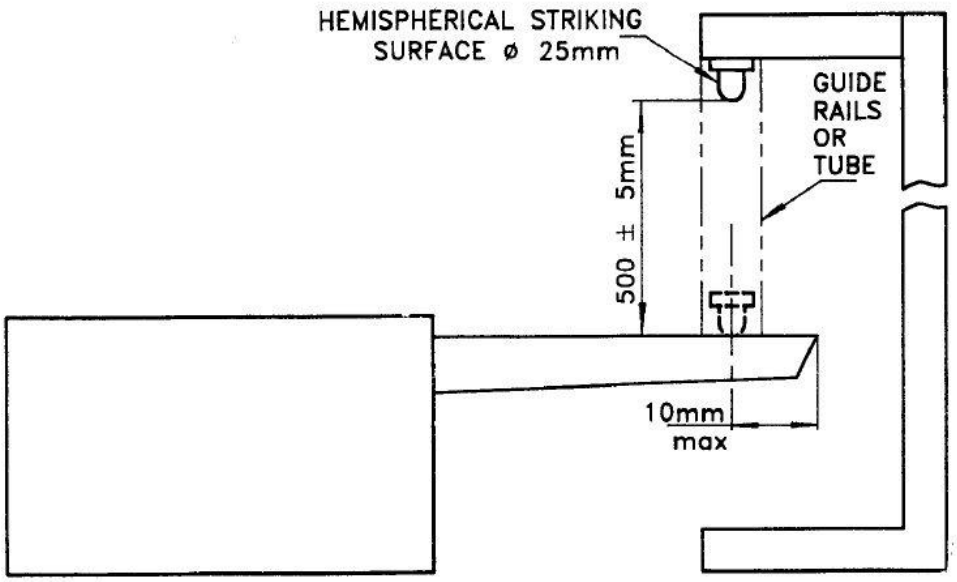


Figure. 2 Arrangement for Impact Test

ANNEX D

FATIGUE TEST

D-1 APPARATUS

D-1.1 A means of continuously raising the lowering a loaded item of cookware from a level surface once per minute by means of its handle. The general form of a suitable apparatus is shown in Fig. 3, the profile of the cam providing the raising and lowering action is such that a smooth graduation from rest to the fully raised position (40 ± 2 mm) and back to rest is achieved in 60 ± 1 s.

D-1.2 Metal spheres 40 ± 10 mm in diameter, as loading for the cookware during the test.

D-2 PROCEDURE

D-2.1 Place into the cookware a loading of metal spheres of mass equivalent to 2.25 times the mass of water at the gross capacity of the cookware.

D-2.2 Attach the cookware securely to the apparatus as shown in Fig. 3A, 3B or 3C, as appropriate and raise and lower it once per minute by means of the rotating cam. The selection of apparatus is made according to the number and type of handle(s) specified in 4.3 irrespective of the number and type of handle(s) actually fitted.

D-2.3 At the completion of 1500 raising and lowering cycles, examine the cookware and report any permanent visible distortion or weakening of any part of the handle assembly or assemblies.

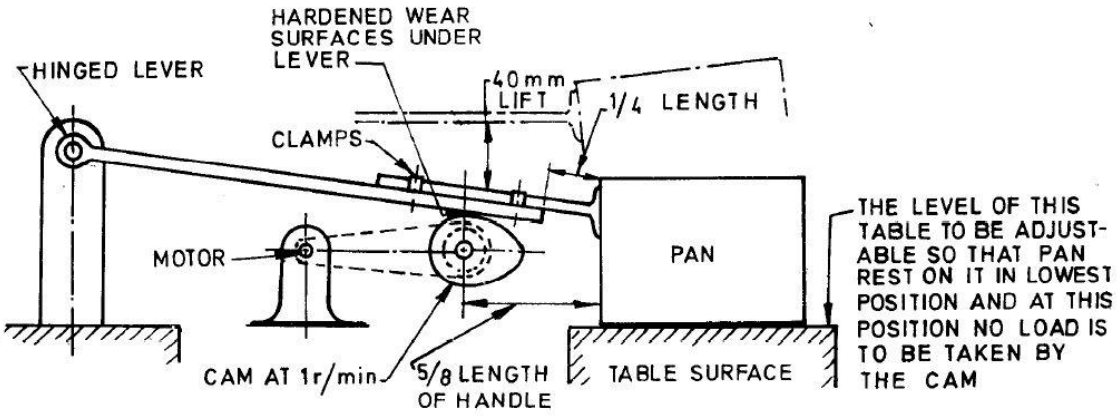


Figure. 3A Arrangement for Fatigue Tests - For a Single Straight Handle

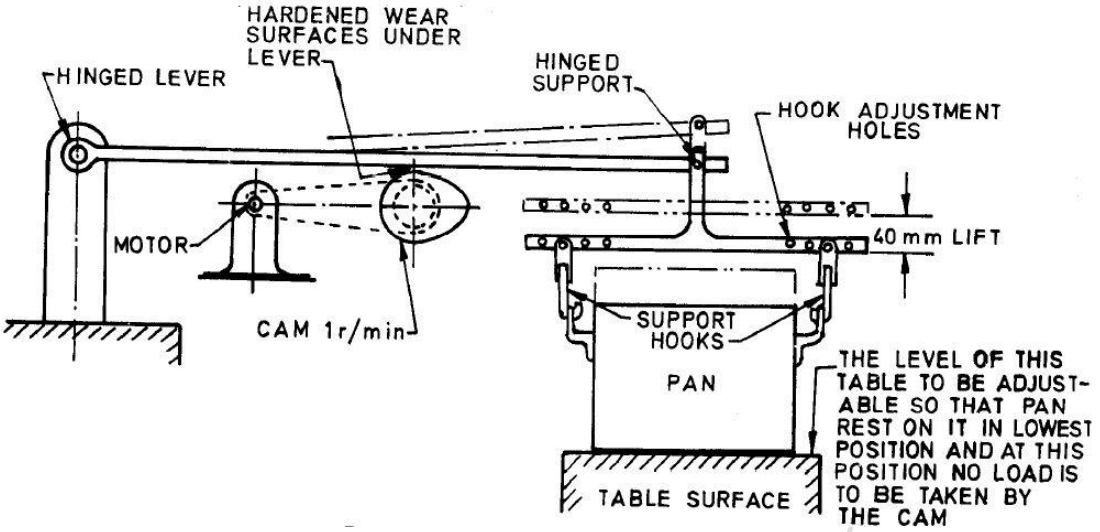


Fig. 3B Arrangement for Fatigue Tests - For Two Loop, Flange or Similar Handles

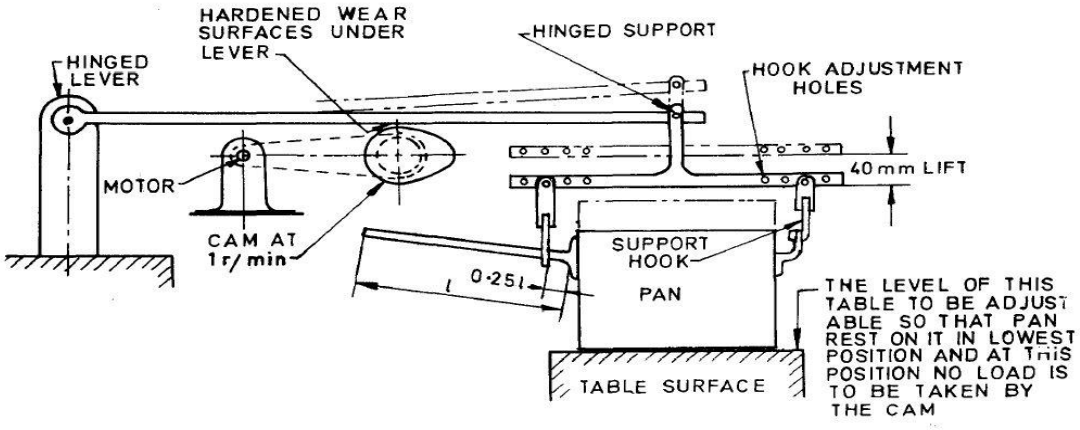


Figure. 3C Arrangement for Fatigue Tests - For One Straight Handle and One Loop, Flange or Similar Handle

ANNEX E

LEAKAGE AND THERMAL INSULATION TEST

E-1 APPARATUS MATERIALS AND CONDITIONS

E-1.1 Gas ring or hot plate rated at 3 kW in still air and of sufficient size to heat the whole area of the base of the cookware under test without extending beyond this in the area below the handle.

E-1.2 Thermocouple,or any other temperature measuring device accurate to ± 3ºC over the range 30°C to 100°C and consisting of a surface contact probe capable of being held in intimate contact with a handle or knob.

NOTE -Temperatures are measured on the underside of a handle and half way up at the sides of a knob or a handle fixed to a lid.

E-I.3 Water of no special degree of purity and cooking oil of flash point in excess of 250 ºC.

E-I.4 The tests are carried out in draught free conditions at room temperature.

The actual room temperature at the time of the measurements required by E-2.1.3, E-2.2.3 or E-2.3.3 is recorded to accuracy off 3°C to enable calculation of the temperature rise above room temperature (see 5.7).

E-2 PROCEDURE

E-2.1 Cookware in which cooking oil is not normally intended to be used, other than pressure cookers

(see E-2.3).

E-2.1.1 Fill the cookware with cold water to above the level of the main handle connection(s) and attach the lid, if any.

E-2.1.2 Raise the temperature of the water to boiling point and maintain at a constant, moderate rate of ebullition.

E-2.1.3 By means of the thermocouple or any other temperature measuring device, measure the temperatures reached at each of the points specified in Fig. 4A to 4D, as appropriate and record these after 30 minutes ebullition.

E-2.1.4 During the test observe and record whether there is leakage through any fixing penetrating the body of the cookware.

E-2.2 Cookware in Which Cooking Oil is Intended to be Used

E-2.2.1 Fill the cookware with cooking oil to 50 percent of gross capacity for shallow items or 90 percent of gross capacity for other items.

NOTE - For reasons of safety, it is essential that this test be carried out without any lid or cover on the cookware unless the product under evaluation is expressly intended to be covered.

E-2.2.2 Raise the temperature of the cooling oil to:

a) 220 f 5OC for -shallow items of cookware; and

b) 180 f 5’C, for other items of cookware.

Maintain the cooking oil at the appropriate temperature.

E-2.2.3 By means of the thermocouple measure the temperature reached at each of the point specified in Fig. 4A to 4D as appropriate and record these after 15 minutes at the appropriate temperature.

E-2.2.4 During the test observe and record whether there is leakage through any fixing penetrating the body of the cookware.

WARNING NOTE - Due care should be exercised when conducting this test with cooking oil. The temperatures specified are close to the flash point of the oil and adequate ventilation is essential.

E-2.2.5 If the level of oil in the test does not come above the level of the main handle connections, carry out test described in E-2.1 omitting the temperature measurements of E-2.1.3.

E-2:3 Pressure Cookers

E-2.3.1 Fill the pressure cooker to one half of its gross capacity with cold water and attach the lid in accordance with the manufacturer's instructions.

E-2.3.2 Raise the temperature of the water to the nominal operating pressure of the cooker and maintain it steadily at the nominal operating pressure with the burner adjusted to the minimum setting required to achieve this.

E-2.3.3 By means of the thermocouple measure the temperature reached at each of the points specified in Fig. 4A to 4E as appropriate and record these after 10 minutes of steady operating at the nominal operating pressure.

NOTE - A handle, or part of a handle, affixed to the lid of a pressure cooker is measured at the point specified in Fig. 4E.

All dimensions in millimetres.

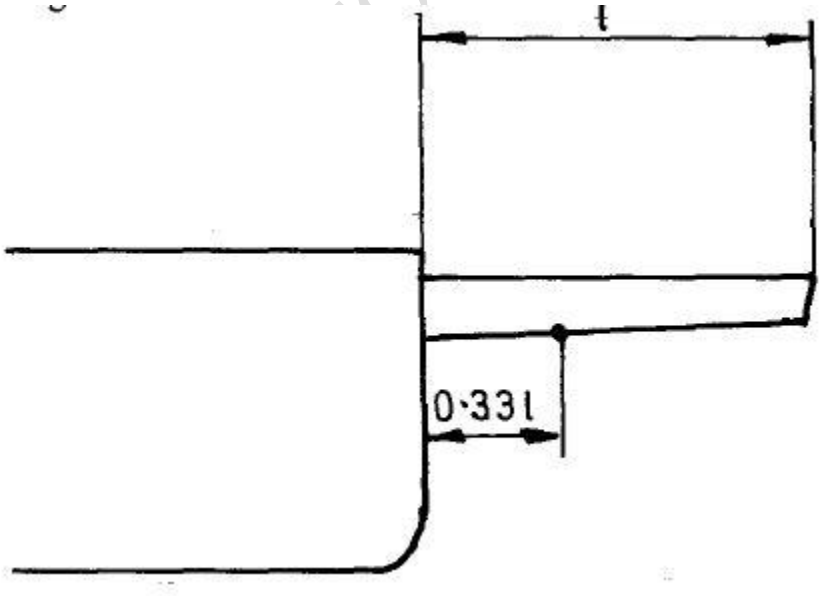


Figure. 4A Points for Temperature Measurement - Long Handle

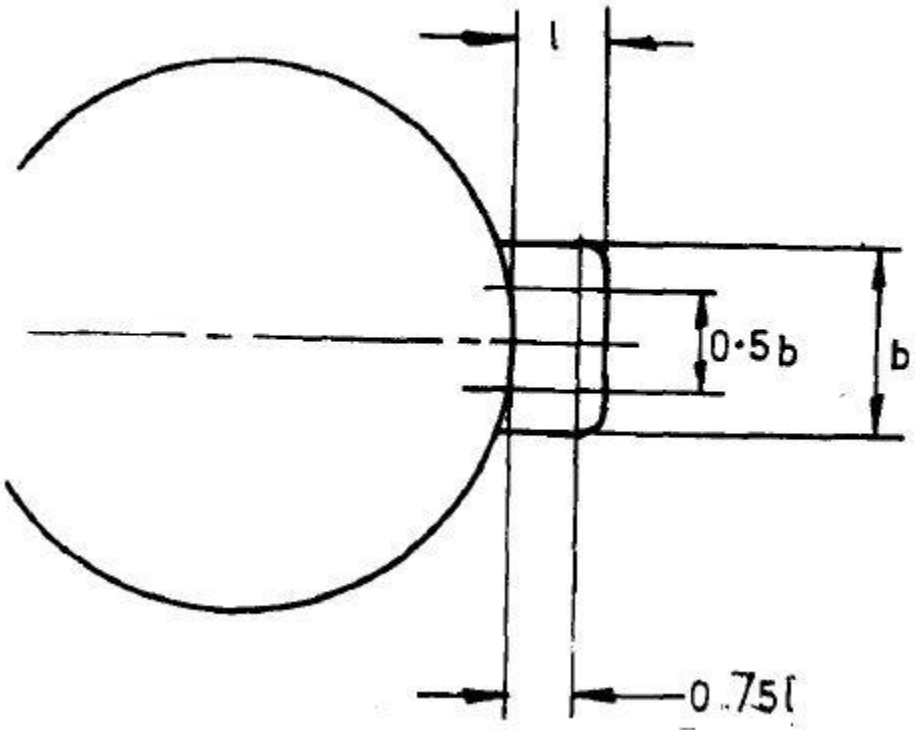


Figure. 4B Points for Temperature Measurement - Solid Flange Handle

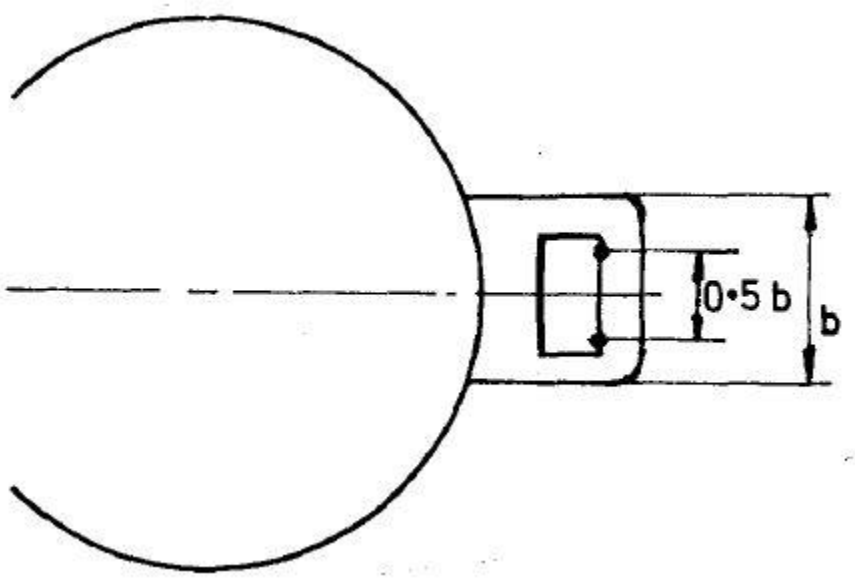


Figure. 4C Points for Temperature Measurement - Loop Handle

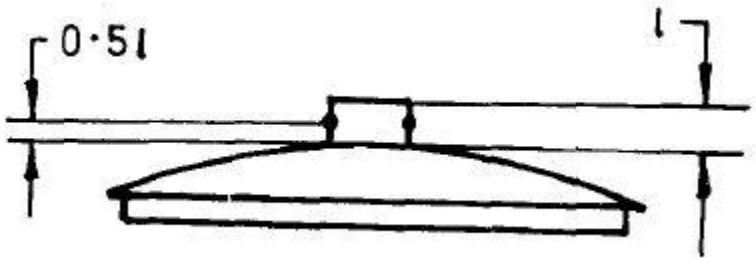


Figure. 4D Points For Temperature Measurement - Knob

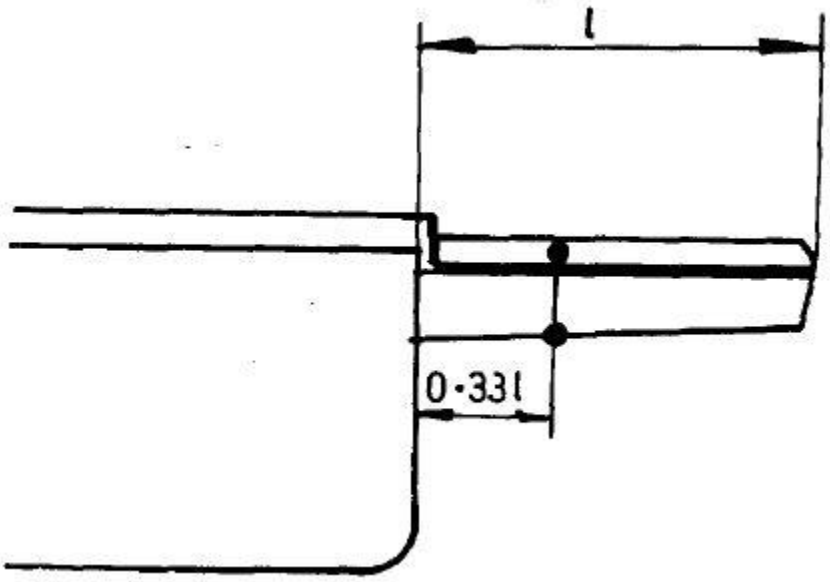


Figure. 4E Points For Temperature Measurement - Pressure Cooker Handle(S)

ANNEX F

RESISTANCE TO BURNING

F-1 APPARATUS

F-1.1 A burden burner, tube diameter 9.5 ± 0.5 mm fuelled by natural gas and adjusted to a flame height of 38 ± 2 mm with the air inlet to the burner closed.

F-1.2 A means of attaching the cookware firmly to a rigid base throughout the test for example, a G clamp, or for attaching a handle or knob via its fixing system to an appropriate support.

F-1.3 A draught free area provided with a facility for the extraction of any fumes immediately following the test.

F-2 PROCEDURE

F-2.1 Attach the cookware to the rigid base.

F-2.2 Position the burner (alight) so that the centre of the burner tip is 18 ± 2 mm below the bottom surface of the end of the handle (see Fig. 5).

F-2.3 Expose the handle to the flame for 30 ± 1 s, remove the flame, and allow the handle to burn either until any flame extinguishes or for 15 s whichever occurs first. Observe whether molten or burning material falls from the handle during this period.

F-2.4 Measure the record the length of any time for which the handle continues to burn following removal of the flame. If this reaches 15 s, immediately apply a steady draught of 5 m/s across the area of burning for 5 s and record whether burning continues or is extinguished.

F-2.5 Reposition the burned under the handle, ignoring any flame guard, as close as practicable to the body/ handle junction and repeat the procedures described in F-2.2 to F-2.4.

F-2.6 Allow the cookware to cool for 3 h at ambient temperature and then carry out the appropriate tests descirbed in Annexes C and E (see 4.10).

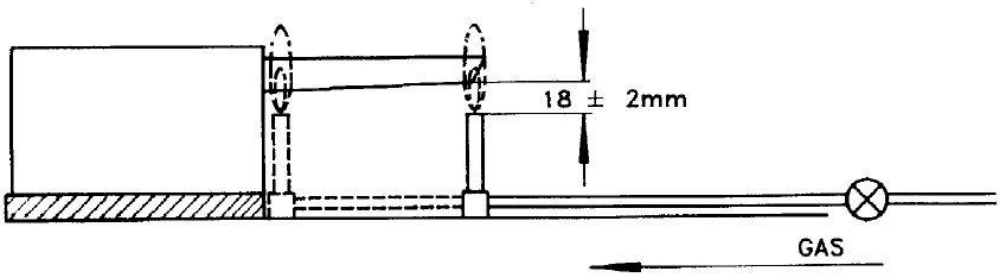
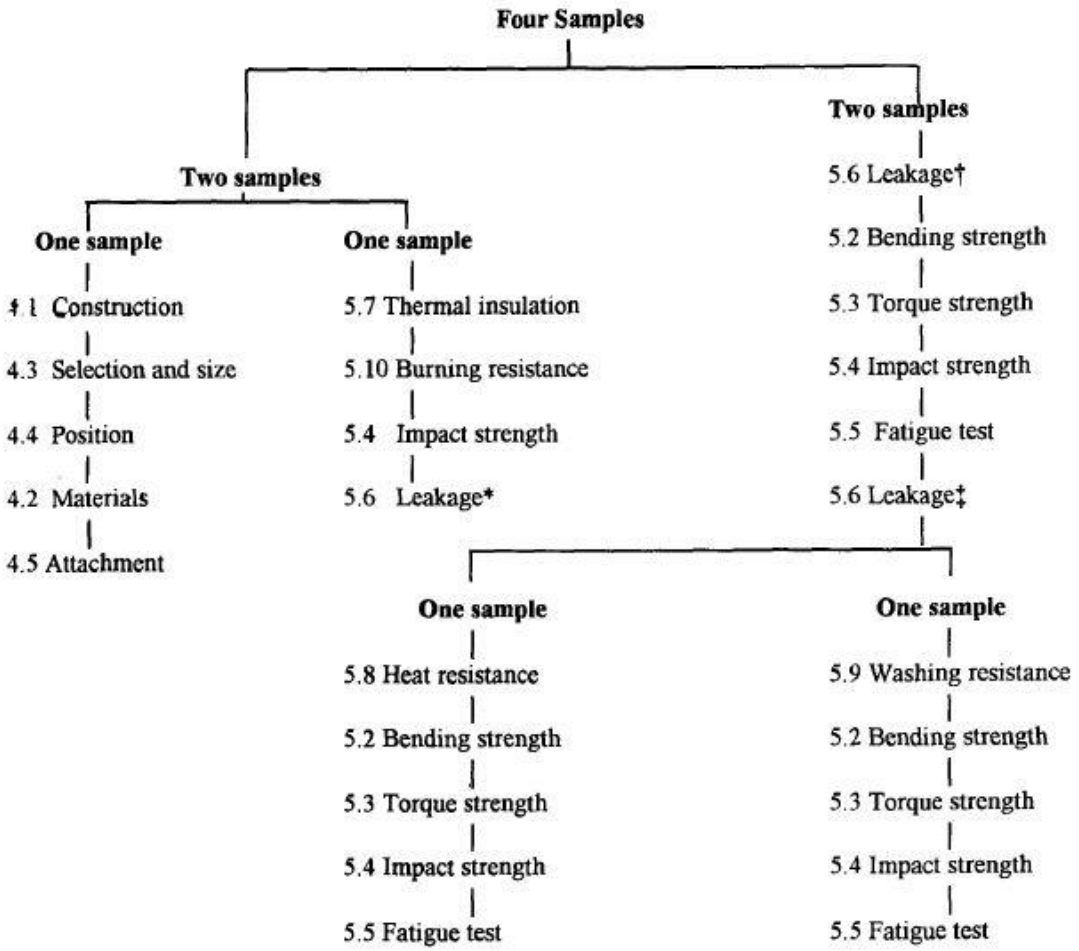


Figure. 5 Arrangement for Burning Test

ANNEX G

TESTING SEQUENCE

A suggested sequence for testing cookware/kitchenware/utensil to the requirements of this standard is shown below:



* *See* 5.6 paragraph 1.
† *See* 5.6 paragraph 2.
‡ *See* 5.6 paragraph 3.

Figure. 06 Test Sequence