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Aluminium cookwares

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Japan Aluminium Products Association (JAPA)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently, **JIS S 2010:2009** is replaced with this Standard.

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Aluminium cookwares

Introduction

This Japanese Industrial Standard was established in 1951 and has gone through nine revisions up to the present. The last revision was made in 2009, and the revision at this time is to respond to changes in market of intended aluminium cookwares, changes of heat sources to be used and the like.

No corresponding International Standard has been established at this point.

1 Scope

This Standard specifies aluminium cookwares which are mainly used in households (hereafter referred to as “cookwares”). However, the following are excluded.

- a) Cookware of which the whole body has multilayer structure with dissimilar metal.
- b) Cookware without a handle or that with a detachable handle.
- c) Cookware for a special purpose and that having special shape.
- d) Cookware whose inner surface of the body is processed with coating, etc. other than anodic oxide treatment or fluororesin film.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS C 7601 *Fluorescent lamps for general lighting service*

JIS G 4304 *Hot-rolled stainless steel plate, sheet and strip*

JIS G 4305 *Cold-rolled stainless steel plate, sheet and strip*

JIS H 4000 *Aluminium and aluminium alloy sheets, strips and plates*

JIS H 5202 *Aluminium alloy castings*

JIS H 5302 *Aluminium alloy die castings*

JIS H 8601 *Anodic oxide coatings on aluminium and aluminium alloys*

JIS H 8680-1 *Test methods for thickness of anodic oxide coatings on aluminium and aluminium alloys—Part 1: Microscopical method*

JIS H 8680-2 *Test methods for thickness of anodic oxide coatings on aluminium and aluminium alloys—Part 2: Eddy current method*

JIS H 8681-1 *Test methods for corrosion resistance of anodic oxide coatings on aluminium and aluminium alloys—Part 1: Alkali resistance test*

JIS H 8682-3 *Anodizing of aluminium and its alloys—Measurement of abrasion resistance of anodic oxidation coatings—Part 3: Falling sand abrasion resistance test*

JIS K 6911 *Testing methods for thermosetting plastics*

JIS K 8150 *Sodium chloride (Reagent)*

JIS R 6252 *Abrasive papers*

JIS R 6253 *Waterproof abrasive papers*

JIS S 6006 *Pencil, coloured pencils and leads for them*

JIS Z 1522 *Pressure sensitive adhesive cellophane tapes*

JIS Z 8401 *Guide to the rounding of numbers*

JIS Z 8730 *Colour specification—Colour differences of object colours*

3 Terms and definitions

For the purposes of this Standard, the following terms and definitions apply.

3.1 aluminium cookware

cookware of which the main material of the body is composed of sheets and plates, castings or die castings of aluminium or aluminium alloy

3.2 pan

vessel mainly for boiling food

3.3 vessel for frying

vessel mainly for grilling or frying food

3.4 kettle

vessel for boiling water

3.5 steamer

vessel for steam cooking which is composed of a container for steaming food as the body in which cooking food is put, and a lower pan in which water is put

3.6 frying pan

shallow vessel mainly for grill cooking or fry cooking of which the difference of areas between the opening part and the bottom part is small

3.7 rolled egg pan

vessel mainly for making rolled egg

3.8 pan for stir-fry

vessel mainly for fry cooking of which the bottom part is smaller compared with the opening part and the bottom part is flat

3.9 cookpot for tempura

vessel mainly for making deep-fried cooking

3.10 whistling kettle

kettle with a whistling function at the time of boiling

3.11 body

portion of a major part of cookware into which cooking food and water are put

3.12 handle

portion for holding a cookware

3.13 fitting for handle attachment

fitting for connecting a handle to a body

3.14 lid

object that covers a body

3.15 knob

portion for holding a lid

3.16 clad bottom

bottom to which magnetic material is joined by the method such as pressure laminating, brazing, casting, thermal spraying, etc. in order to use on an induction heating device

3.17 water line

line that shows highest water level or lowest water level

3.18 tempered glass

glass that is made hard to break against an impact by applying special heat or chemical treatment

3.19 heat resisting glass

glass that is made strong to thermal change by making the expansion coefficient small

It is also called borosilicate glass or glass ceramics.

3.20 deformation detrimental to use

deformation generated by heat, load, impact, etc. that compromises the safety and functionality of cookware such as unsteadiness that lacks stability, a large clearance between a body and a lid, a wobbly handle and drop-off

3.21 water leakage

water leakage from a body (including an attaching part of handle)

3.22 induction heating device (IH cooking heater)

electric heater that produces heat by the material resistance of cookware with an eddy current generated at the bottom face of cookware placed on the top plate by electromagnetic induction caused by a current that flows a heating coil

3.23 IH cooking heater standard checker

standard checker as specified in Annex E of an IH cooking heater used for the test in which the IH cooking heater is used as a heat source

3.24 boiling

water temperature of 95 °C or higher in this Standard

4 Type

4.1 Classification by use

The classification by use shall be as given in table 1.

Table 1 Classification by use

Classification	Name of product
Pans	Pan, steamer
Vessels for frying	Frying pan, rolled egg pan, pan for stir-fry, cookpot for tempura
Kettles	Kettle, whistling kettle

4.2 Classification by surface treatment

The classification by surface treatment shall be as follows according to the surface treatment of the inner surface of the body of cookware.

- a) Cookware to which anodic oxide treatment ¹⁾ is applied
- b) Cookware to which fluororesin film is applied
- c) Cookware to which no surface treatment is applied

Note ¹⁾ Generally, it is called “alumite.”

4.3 Classification by heat source to be used

The classification by heat source to be used shall be as follows according to the heat source to be used.

For the cookwares usable on IH cooking heater, pans and vessels for frying are included but kettles are not.

- a) Cookwares usable on IH cooking heater
- b) Cookwares not usable on IH cooking heater

5 Quality

5.1 Appearance

The appearance of cookware, when tested according to 8.3.1, shall conform to the following.

- a) There is no remarkable wrinkles or flaws.
- b) Finish is good.

- c) There is no deformation.

5.2 Structure

The structure of cookware, when tested according to **8.3.2**, shall conform to the following.

- a) Steadiness is good.
- b) Stability is secured.
- c) No water leakage. Also, there is no oil leakage from a vessel for frying (except an rolled egg pan).
- d) Joint and assembly are secured.
- e) Parts and accessories are good in quality and solid.
- f) Spout of kettles has good draining-off and no wrong flow along its outside.
- g) Whistling kettle has the line showing water level.

5.3 Sanitation

The portions (including lid and accessories) where there is a contact or a possibility to contact with foodstuff shall conform to the criteria about foodstuffs, additives on a basis of the Food Sanitation Act (Act No. 233, 1947).

5.4 Performance

5.4.1 Performance of surface treatment

The performance of surface treatment shall be as given in table 2.

Table 2 Performance of surface treatment

Classification by surface treatment	Performance
Cookware on which anodic oxide treatment is applied	In the test specified in 8.3.3 , AA6-A • K _S -WR _F or upward, or AA6-AA • K _C -WR _F or upward of JIS H 8601 .
Cookware on which fluororesin film is applied	In the test specified in 8.3.4 , no abnormalities such as peel and swell in appearance, 15 µm to 60 µm in film thickness, at least HB in hardness, 25/25 in adhesiveness, and no abnormalities in abrasion resistance (vessels for frying), hot-oil resistance (vessels for frying except rolled egg pan) and corrosion resistance (pans).
Cookware on which no surface treatment is applied	Material specified in 7.1.1 except aluminium alloy die casting.

5.4.2 Performance according to heat source to be used

The performance of cookware shall be as follows according to the classification of heat sources to be used.

The performance required for each classification (test to be carried out) is given in Annex A as a reference.

- a) **Performance of cookware usable on IH cooking heater** The performance of cookware usable on IH cooking heater, when tested according to clause 8, shall conform to table 3.

Table 3 Performance of cookware usable on IH cooking heater

Items	Performance	Testing method
Effective diameter of magnetic material on bottom face	120 mm or over to and excl. 260 mm, and 55 % or more for the ratio to nominal diameter.	8.3.5
Input power ^{a)}	As follows according to the effective diameter of magnetic material on bottom face. 120 mm or over to and excl. 140 mm: 1.1 kW or more 140 mm or over to and excl. 160 mm: 1.3 kW or more 160 mm or over to and excl. 260 mm: 1.5 kW or more For rolled egg pan, 1.1 kW or more.	8.3.6
Bottom flatness	No unsteadiness and outward warpage. Inward warpage is as follows according to the effective diameter of magnetic material on bottom face. 120 mm or over to and excl. 160 mm: 0.5 mm or under in cold condition, and 2.0 mm or under in heated condition 160 mm or over to and excl. 260 mm: 1.0 mm or under in cold condition, and 3.0 mm or under in heated condition	8.3.7
Thermal shock resistance	No deformation detrimental to use on body, and no chipping and cracking on handle and knob ^{b)} made of synthetic resin or wood. Flatness of bottom in cold condition is satisfied.	8.3.8
Strength of handle	No cracking, damage, deformation, unsteadiness, leakage, etc., and 2 % or under in residual strain between body and handle.	8.3.9
Repetitive strength of handle	No cracking, damage, deformation, unsteadiness, leakage, etc., and 3 % or under in residual strain between body and handle.	8.3.10
Temperature rise of handle ^{c)} and knob ^{d)}	Temperature of handle and knob is 75 °C or under.	8.3.11
Notes ^{a)} That for IH cooking heater standard checker shall be used. ^{b)} A knob is applicable to pans to which a lid is attached. ^{c)} Handles made of metal are excluded. ^{d)} Applicable to pans to which a lid is attached except that made of metal.		

- b) **Performance of cookware not usable on IH cooking heater** The performance of cookware of which the heat source is other than an IH cooking heater, when tested according to clause 8, shall conform to table 4.

Table 4 Performance of cookware not usable on IH cooking heater

Items		Performance	Testing method
Thermal shock resistance		No deformation detrimental to use in a body, and no chipping and cracking on handle and knob ^{a)} made of synthetic resin or wood.	8.3.12
Strength of handle		No cracking, damage, deformation, unsteadiness, leakage, etc., and 2 % or under in residual strain between body and handle.	8.3.9
Repetitive strength of handle		No cracking, damage, deformation, unsteadiness, leakage, etc., and 3 % or under in residual strain between body and handle.	8.3.10
Durability ^{b)} of folding-type handle		No damage and detachment of rivets, and no deformation and abrasion detrimental to use.	8.3.13
Temperature rise of handle ^{c)} and knob ^{d)}		Temperature of handle and knob is 75 °C or under.	8.3.11
Whistling kettle	Sound volume	55 dB or more.	8.3.14
	Durability of whistling lid	No damage, detachment, deformation detrimental to use, unsteadiness, etc. 55 dB or more in sound volume after testing.	8.3.15
Notes ^{a)} A knob is applicable to kettles, and pans to which a lid is attached. ^{b)} Applicable to kettles with folding-type handle. ^{c)} Handles made of metal are excluded. ^{d)} Applicable to kettles and pans to which a lid is attached except that made of metal.			

6 Nominal diameter or nominal capacity, dimensions or full capacity and minimum bottom thickness

6.1 Nominal diameter, dimensions and minimum bottom thickness of pans

The nominal diameter, dimensions and minimum bottom thickness of pans shall be according to Annex B.

6.2 Nominal diameter, dimensions and minimum bottom thickness of vessels for frying

The nominal diameter, dimensions and minimum bottom thickness of vessels for frying shall be according to Annex C.

6.3 Nominal capacity, full capacity and minimum bottom thickness of kettles

The nominal capacity, full capacity and minimum bottom thickness of kettles shall be according to Annex D.

7 Material

7.1 Material of main part

7.1.1 Material of body of cookware

The material of body of cookware shall be as given in table 5.

Table 5 Material of body of cookware

Classification	Material	Quality
Pans and vessels for frying	Aluminium, and aluminium alloy sheets and plates	Grades specified in JIS H 4000 or sheets and plates having performance at least equivalent to these, and clad plates of these combinations. When no surface treatment is applied, those of the alloy number of No. 1 000s or No. 3 000s specified in JIS H 4000 .
	Aluminium alloy castings	Grades specified in JIS H 5202 or castings having performance at least equivalent to these.
	Aluminium alloy die casting	Grades specified in JIS H 5302 or die castings having performance at least equivalent to these.
Kettles	Aluminium, and aluminium alloy sheets and plates	Grades specified in JIS H 4000 or sheets and plates having performance at least equivalent to these, and clad plates of these combinations. When no surface treatment is applied, those of the alloy number of No. 1 000s or No. 3 000s specified in JIS H 4000 .

7.1.2 Material of lid

The material of lid shall be as given in table 6.

Table 6 Material of lid

Division	Material	Quality
Pans and vessels for frying	Aluminium, and aluminium alloy sheet and plate	Grades specified in JIS H 4000 or sheets and plates having performance at least equivalent to these, and clad plates of these combinations. When no surface treatment is applied, those of the alloy number of No. 1 000s or No. 3 000s specified in JIS H 4000 .
	Aluminium alloy casting	Grades specified in JIS H 5202 or castings having performance at least equivalent to these.
	Aluminium alloy die casting	Grades specified in JIS H 5302 or die castings having performance at least equivalent to these.
	Stainless steel	Grades specified in JIS G 4304 or JIS G 4305 , or stainless steel plates having mechanical properties at least equivalent to these.
	Glass	Heat resisting glass, or tempered glass reinforced with metal ring, which is free from cracking and damage in thermal shock resistance test specified in 8.3.16 . In the case of tempered glass, free from cracking and damage in shock resistance test specified in 8.3.17 .
Kettles	Aluminium, and aluminium alloy sheet and plate	Grades specified in JIS H 4000 or sheets and plates having performance at least equivalent to these, and ply metals of combination of these. When no surface treatment is applied, those of the alloy number of No. 1 000s or No. 3 000s specified in JIS H 4000 .
	Stainless steel	Grades specified in JIS G 4304 or JIS G 4305 , or stainless steel plates having mechanical properties at least equivalent to these.
	Glass	Heat resisting glass, or tempered glass reinforced with metal ring, which is free from cracking and damage in thermal shock resistance test specified in 8.3.16 . In the case of tempered glass, free from cracking and damage in shock resistance test specified in 8.3.17 .

7.2 Material of accessories

The material of accessories shall be as given in table 7.

Table 7 Material of accessories

Part	Material	Type and quality level
Handle	Metal	Aluminium alloy casting, aluminium alloy die casting, stainless steel, etc.
	Wood	No chipping or cracking in burning resistance test specified in 8.3.18 .
	Synthetic resin	For tests specified in 8.3.19 , no cracking, swell and damage in the heat resistance test, and 180 s or under for burning time in burning resistance test.
Knob of lid	Metal	Aluminium alloy casting, aluminium alloy die casting, stainless steel, etc.
	Wood	No chipping or cracking in burning resistance test specified in 8.3.18 .
	Synthetic resin	For tests specified in 8.3.19 , no irritating odour in odour test, and no cracking, swell and damage, and no contamination of harmful component in heat resistance test.

8 Tests

8.1 General conditions

Tests shall be carried out at the same temperature condition after allowing cookwares to stand at $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ in temperature for 2 h or longer. However, for the tests of **8.3.1**, **8.3.2**, **8.3.4.1**, **8.3.4.5** to **8.3.4.7**, **8.3.5** to **8.3.8**, **8.3.11**, **8.3.12**, **8.3.14** and **8.3.16** to **8.3.19**, and the cases where the temperature is specified by the normative reference are excluded.

8.2 Rounding method of numerical values

The test results shall be obtained up to one digit lower than the required numerical value, and rounded according to **JIS Z 8401**.

8.3 Testing method

8.3.1 Appearance test

Appearance shall be examined visually. Finishing shall be examined visually and by the hand touch feeling.

8.3.2 Structure test

The tests of structure shall be carried out as follows. Also, the structure shall be examined visually and by the hand touch feeling, etc.

- Stability** For the stability test, fill the body of cookware with tap water to the brim, and check it visually that the cookware does not topple over when it is inclined at an angle of 15° in the direction of handle with a lid attached if it is provided.
- Water leakage** For the water leakage test, fill the cookware with tap water to the brim and allow it to stand for 5 min, and examine the existence of leakage.
- Oil leakage** For the oil leakage test of vessels for frying (except rolled egg pan), fill the cookware with kerosene of ordinary temperature ($20\text{ }^{\circ}\text{C} \pm 15\text{ }^{\circ}\text{C}$) to the brim and allow it to stand for 5 min, and examine the existence of leakage.

- d) **Wrong flow along outside** For the test of wrong flow along outside of kettles, pour out water from the state where tap water of about 70 % of full capacity is contained and check that water is poured normally.

8.3.3 Test on anodic oxide coating

8.3.3.1 Thickness

The thickness test shall be carried out so that three positions on the inside bottom face are measured according to either of the methods of **JIS H 8680-1** or **JIS H 8680-2**, which shall be averaged. An example of measuring positions is shown in figure 1.

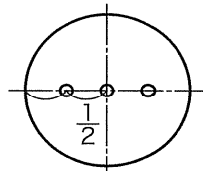


Figure 1 Example of measuring positions

8.3.3.2 Corrosion resistance

The corrosion resistance shall be tested according to **JIS H 8681-1**.

8.3.3.3 Abrasion resistance

The abrasion resistance shall be tested according to **JIS H 8682-3**.

8.3.4 Test of fluororesin film

8.3.4.1 Appearance

The appearance test shall be carried out visually [if necessary, magnification lens ($\times 20$) is used]. Using a light specified in **JIS C 7601**, examine the existence of peeling, swelling, etc. under the brightness of 600 lx or more. Also, check it by the hand touch feeling.

8.3.4.2 Thickness

The thickness test shall be carried out by measuring five positions on the inside bottom face according to either of the methods of **JIS H 8680-1** or **JIS H 8680-2**, which shall be averaged. An example of measuring positions is shown in figure 2.

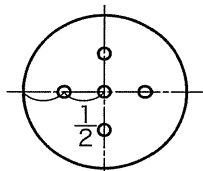


Figure 2 Example of measuring positions

8.3.4.3 Hardness

The hardness test shall be as follows.