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Oil burning water boilers

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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 Heating Appliance Inspection Association (JHIA) 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 3021:2007** is replaced with this Standard.

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Oil burning water boilers

Introduction

This Japanese Industrial Standard was established in 1972 and has gone through nine revisions to this day. In this 10th revision, the requirements for quality performance have been revised to respond to the Ordinance of the Ministry of Economy, Trade and Industry with respect to the technical requirements for specified products prescribed under the provisions of Consumer Product Safety Act and its Enforcement Ordinance.

The corresponding International Standard has not yet been published at this moment.

1 Scope

This Standard specifies the oil burning water boilers (hereafter referred to as “boilers”) used for hot-water supply, heating, etc. which use kerosene, light oil or heavy oil as fuel, whose working pressure, is 0.1 MPa or lower and heating surface area is 4 m² or smaller.

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 A 9504 *Man made mineral fibre thermal insulation materials*
- JIS B 0203 *Taper pipe threads*
- JIS B 8410 *Pressure reducing valves for water works*
- JIS B 8414 *Relief valves for hot water appliances*
- JIS C 3301 *Rubber insulated flexible cords*
- JIS C 3306 *Polyvinyl chloride insulated flexible cords*
- JIS C 3307 *600 V Polyvinyl chloride insulated wires*
- JIS C 3312 *600 V Grade polyvinyl chloride insulated and sheathed portable power cables*
- JIS C 3323 *600 V Silicone rubber insulated wires*
- JIS C 3327 *600 V Rubber insulated flexible cables*
- JIS C 3405 *Road vehicles—High tension cables*
- JIS C 4003 *Thermal evaluation and classification of electrical insulation*
- JIS G 3101 *Rolled steels for general structure*
- JIS G 3131 *Hot-rolled mild steel plates, sheets and strips*
- JIS G 3141 *Cold-reduced carbon steel sheets and strips*
- JIS G 3302 *Hot-dip zinc-coated steel sheet and strip*
- JIS G 3452 *Carbon steel pipes for ordinary piping*

- JIS G 3459 *Stainless steel pipes*
- JIS G 4051 *Carbon steels for machine structural use*
- JIS G 4053 *Low-alloyed steels for machine structural use*
- JIS G 4303 *Stainless steel bars*
- JIS G 4304 *Hot-rolled stainless steel plates, sheet and strip*
- JIS G 4305 *Cold-rolled stainless steel plate, sheet and strip*
- JIS G 4309 *Stainless steel wires*
- JIS G 5501 *Grey iron castings*
- JIS H 3100 *Copper and copper alloy sheets, plates and strips*
- JIS H 3250 *Copper and copper alloy rods and bars*
- JIS H 3260 *Copper and copper alloy wires*
- JIS H 3300 *Copper and copper alloy seamless pipes and tubes*
- JIS H 4000 *Aluminium and aluminium alloy sheets, strips and plates*
- JIS H 4040 *Aluminium and aluminium alloy rods, bars and wires*
- JIS H 5202 *Aluminium alloy castings*
- JIS H 5302 *Aluminium alloy die castings*
- JIS H 8641 *Hot dip galvanized coatings*
- JIS H 8642 *Hot dip aluminized coatings on ferrous products*
- JIS K 6343 *Rubber hoses for oil discharge*
- JIS K 6380 *Rubber packing material*
- JIS K 6915 *Phenolic moulding compounds*
- JIS R 2304 *Fireclay brick*
- JIS R 2501 *Refractory mortars*
- JIS R 3414 *Textile glass fabrics*
- JIS R 4301 *Vitreous and porcelain enamels—Quality test methods of enamelled products*
- JIS S 0011 *Guidelines for all people including elderly and people with disabilities—Marking tactile dots on consumer products*
- JIS S 0012 *Guidelines for all people including elderly and people with disabilities—Usability of consumer products*
- JIS S 3019 *Oil control valves for oil burning appliances*
- JIS S 3020 *Oil tanks for oil burning appliances*
- JIS S 3025 *Supply and exhaust pipes for burning appliances*
- JIS S 3030 *General rules for construction of oil burning appliances*
- JIS S 3031 *General rules for test methods of oil burning appliances*
- JIS S 3200-1 *Equipment for water supply service—Test methods of hydrostatic pressure*

- JIS S 3200-2 *Equipment for water supply service—Test method of low temperature resistant*
- JIS S 3200-3 *Equipment for water supply service—Test method of water hammer*
- JIS S 3200-4 *Equipment for water supply service—Test method of prevention from back current*
- JIS S 3200-5 *Equipment for water supply service—Test methods of destruction by vacuum pressure*
- JIS S 3200-7 *Equipment for water supply service—Test methods of effect to water quality*
- JIS Z 8305 *Dimensions of printing types*

3 Classification

3.1 Classification according to burning systems

The classification of boilers according to burning systems shall be “pot type”, “pressure spray type”, “rotary vaporization type” and “carburetion type” specified in 4.1 of **JIS S 3030**.

3.2 Classification according to draft systems

The classification of boilers according to draft systems shall be as specified in 4.2 of **JIS S 3030** and as given in table 1.

Table 1 Classification according to draft systems

Place of installation	Division	
	Type	Style
Indoor use	Semi-closed type	Forced vent style
		Forced exhaust gas style
	Closed type	Forced draft style
Outdoor use	Open style	
	Forced vent style	
	Forced exhaust gas style	
NOTE : The boiler capable of combined use for indoors and outdoors may be classified as indoor/outdoor use.		

3.3 Classification according to systems of use divisions

The classification of boilers according to systems of use divisions shall be “warming water system” specified in 4.3 of **JIS S 3030**.

3.4 Classification according to water supply systems

The classification of boilers according to water supply systems shall be as given in table 2.

Table 2 Classification according to water supply systems

Classification	Water supply system	Informative
Waterworks direct connection type	System that directly connects with water supplying pipe and uses pressure reducing valve and relief valve to supply water at a pressure of 0.1 MPa or lower.	Figure 1
Cistern type	System that, without connecting directly to water supplying pipe, fills water once into cistern or the like to then supply water.	Figure 2
Tank type	System that, without connecting directly to water supplying pipe, collects water in a tank to circulate and use it.	Figure 3

3.5 Classification according to heating systems

The classification of boilers according to heating systems shall be as given in table 3.

Table 3 Classification according to heating systems

Classification	Heating system	Informative
One boiler-one water channel type	The system to heat directly the water in the boiler by storing in or by passing through the heat exchanger for hot-water supplying or for heating.	Figure 4 and figure 5
One boiler-two water channel type	The system to heat indirectly the water in the heat exchanger for heating or hot-water supplying which is installed in another heat exchanger for hot-water supplying or heating which is heated directly.	Figure 6 and figure 7
One boiler-three water channel type	The system that heats the water indirectly by installing a heat exchanger for bath furnace connected with another heating, hot-water supply, and bath tub using a circulation tube in the heat exchanger for hot-water supplying or heating which is heated directly.	Figure 8

3.6 Classification according to circulation systems of bath boiler path

The classification of the boilers according to the circulation systems of bath boiler path shall be as given in table 4.

Table 4 Classification according to circulation systems of bath boiler path

Classification	Circulation system	Informative
Forced circulation type	The system to heat the water in the heat exchanger for bath boiler by circulating forcibly.	Figure 8

4 Performance

4.1 Usability

The performance of boiler in its use shall be as follows:

- Ignition is easy and the use of dangerous materials of high inflammability such as alcohol or dangerous operation are unnecessary.

- b) Operation at each part is smooth and correct without any defect detrimental to use.
- c) Knobs, etc. shall not easily deform during use and shall be free from any abnormality in operation.
- d) When the temperature rises abnormally as a result of abnormal combustion, the combustion of burner stops automatically.
- e) Operation is easy and not likely to result in danger.
- f) Operation of flame extinction is done easily and securely.
- g) With regard to the boiler with peephole, it does not come to a condition impossible to confirm a state of combustion as a result of adherence of lamp black on the peephole during the combustion in a normal handling.
- h) Boiler equipped with combustion controller is, at each combustion rate, unlikely to generate abnormally large flame, produce severe amount of smoke, or lead to other abnormal states of combustion.

4.2 General quality performance

The general quality performance of boilers shall, when tested in accordance with clause **10**, conform to the requirements given in table 5.

Table 5 General quality performance

Item		Quality performance	Applicable clause and subclause in JIS S 3031
Burning performance	a) Surface temperature of knob and the like on which the hand is put ^{a)}	Difference between measured temperature and room temperature is not higher than 25 °C in the case of metal and ceramics and not higher than 35 °C in plastics.	6.1 and 6.2 a)
	b) Surface temperature of the part the hand is likely to touch ^{b)}	150 °C max.	6.1 and 6.2 b)
	c) Surface temperature of rectifier body	made of selenium 75 °C max. made of germanium 60 °C max. made of silicon 135 °C max.	6.1 and 6.2 c)
	d) Surface temperature of contact point of fuse clip	90 °C max.	6.1 and 6.2 d)
	e) Surface temperature of oil tank	Difference between measured temperature and room temperature is 25 °C or lower.	6.1 and 6.2 e)
	f) Surface temperature of wood stand under lower surface of boiler	Difference between measured temperature and room temperature is 65 °C or lower.	6.1 and 6.2 f)
	g) Surface temperature of wood stand surrounding boiler	Difference between measured temperature and room temperature is 65 °C or lower.	6.1 and 6.2 f)

Table 5 (continued)

Item		Quality performance	Applicable clause and subclause in JIS S 3031
Burning performance	h) Surface temperature of wooden wall on upper surface of boiler	Difference between measured temperature and room temperature is 65 °C or lower.	6.1 and 6.2 f)
	i) Surface temperature of wooden wall on side surface (including back surface) of boiler	Difference between measured temperature and room temperature is 65 °C or lower.	6.1 and 6.2 f)
	j) Surface temperature of wooden wall on front surface of boiler	Difference between measured temperature and room temperature is 65 °C or lower.	6.1 and 6.2 f)
	k) Surface temperature of wooden wall on upper surface of exhaust tube or supply and exhaust tube (limited to forced exhaust gas style and forced draft style for indoor use and open style and forced exhaust gas style for outdoor use)	Difference between measured temperature and room temperature is 65 °C or lower. This requirement does not apply to the forced exhaust gas style boiler the setting condition of which is indicated specifically in handling explanation or instruction manual.	6.1 and 6.2 f)
	l) Surface temperature of wooden wall surrounding supply and exhaust terminal (limited to forced draft style for indoor use which uses a supply and exhaust terminal such that it is 150 mm or shorter from outer wall of the boiler to its top edge when it is attached according to the method designated by the manufacturer)	Difference between measured temperature and room temperature is 65 °C or lower.	6.1 and 6.2 f)
	m) Surface temperature of parts of exhaust tube or supply and exhaust tube which are in contact with the wall (limited to forced exhaust gas style and forced draft style for indoor use)	90 °C max. This requirement does not apply to the forced exhaust gas style boiler the setting condition of which is indicated specially in handling explanation or instruction manual.	6.1 and 6.2 g)
	n) Temperature of winding of electric motor and solenoid pump	100 °C max. for class A insulation 115 °C max. for class E insulation 120 °C max. for class B insulation 140 °C max. for class F insulation 165 °C max. for class H insulation	6.1 and 6.2 h)
	o) Oil temperature	Difference between measured temperature and room temperature is 25 °C or lower	6.1 and 6.2 i)

Table 5 (continued)

Item		Quality performance	Applicable clause and subclause in JIS S 3031
Burning performance	p) Burning condition and using performance	Conformance to the requirements in 4.1 is required in addition to the condition that, during combustion, fire flame does not become large, back fire does not occur, visible smoke does not arise and there are not such abnormalities as oil leakage and damage.	6.3 and 31.1
	q) Exhaust gas temperature (limited to forced exhaust gas style and forced draft style for indoor use and open style and forced exhaust gas style for outdoor use)	260 °C max.	6.6
	r) Ratio of carbon monoxide to carbon dioxide in burning exhaust gas (CO/CO ₂)	The boiler such that kerosene consumption does not exceed 70 kW and the capacity of heat exchanger for hot water supply does not exceed 50 L	6.7
		The one other than the above	
	s) Smoke concentration	"5" max. in smoke scale	6.9
	t) Heating output [limited to heating path ^{c)}]	At least 90 % of indicated rating	6.11.2
	u) Continuous hot-water supply output [limited to hot-water supply path ^{d)}]	At least 90 % of indicated rating	6.11.2
	v) Intermittent hot-water supply output (limited to the boiler such that the capacity of heat exchanger for hot-water supply exceeds 30 L and the ratio of the capacity of heat exchanger for hot-water supply to the continuous hot-water supply output exceeds 1/1.163 L/kW)	At least 90 % of indicated rating	6.11.2
	w) Heating efficiency (limited to the heating path)	61 % min. At least 90 % of indicated rating	6.12.2
	x) Continuous hot-water supply efficiency (limited to hot-water supply path)	70 % min. At least 90 % of indicated rating	6.12.2

Table 5 (continued)

Item		Quality performance	Applicable clause and subclause in JIS S 3031
Burning performance	y) Hot-water boiling efficiency (limited to bath boiler path)	52 % min.	6.12.2
	z) Fire extinction time	within 400 s for pot type within 10 s for pressure spray type within 10 s for rotary vaporization type within 20 s for carburetion type	6.14
	aa) Fuel consumption (maximum)	Difference between indicated value and actually measured value shall be ± 10 %.	6.15.1
Overload burning [limited to boilers equipped with oil controller ^{e)}]		Conformance to the specification given in this table is required except for t) heating output, u) continuous hot-water supply output, v) intermittent hot-water supply output, w) heating efficiency, x) continuous hot-water supply efficiency and y) boiling efficiency.	7
Burning performance by excessive fuel [limited to pot type with oil controller ^{e)}]	Burning condition and using performance	Each part shall not move from its position. Flame shall not go out of the boiler, or there shall not be any oil leakage, damage, etc. during combustion. After the test, the boiler shall conform to the requirements in 4.1 .	10
	Surface temperature of wooden wall on the side surface of boiler	Difference between measured temperature and room temperature is 65 °C or lower	
Actuation of overtemperature protection system (limited to hot-water supply path and heating path which are directly heated)	The boiler such that kerosene consumption does not exceed 70 kW and the capacity of heat exchanger for hot water supply does not exceed 50 L	a) The fire of the boiler shall be extinguished before the temperature reaches 100 °C. And the device shall not reset itself. b) When reused, the device shall function well.	15.2
	The one other than the above	a) The device is actuated without obstacle before boiling and is not automatically reset. b) When reused, the device shall function well.	
Hot-water supply temperature		90 °C max.	17
Temperature of water circulating from bathtub to bath boiler (limited to that having bath boiler path such that kerosene consumption does not exceed 70 kW and the capacity of heat exchanger for hot water supply does not exceed 50 L)		60 °C max.	17.2