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**Oil burning bath boilers with water
heaters for domestic use**

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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 Appliances 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 3027:2007** is replaced with this Standard.

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Oil burning bath boilers with water heaters for domestic use

Introduction

This Japanese Industrial Standard was established in 1987 and has gone through six revisions to this day. In this 7th 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 bath boilers fueled by kerosene, gas oil or heavy oil with a fuel consumption¹⁾ of 70 kW or less and a heat exchanger capacity²⁾ of 50 L or less (hereafter referred to as “bath boilers”). However, the fuel consumption of the burner directly heating the heat exchange for bath boiler shall not be more than 39 kW.

Notes ¹⁾ The fuel consumption means a value of burning amount at the maximum burning indicated in the unit per hour, and if there are two or more burners, by the total of them.

²⁾ Heat exchanger capacity is the volume of the water from the inlet to the outlet of the water channel, i.e. the total sum of water volume in hot-water supply path and bath boiler path.

The hot-water supply path is the channel through which the warm water is taken for hot-water supply and the bath boiler path is the channel through which the warm water is taken for bath boiler.

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 4304 *Hot-rolled stainless steel plate, sheet and strip*
- JIS G 4305 *Cold-rolled stainless steel plate, sheet and strip*
- JIS G 5501 *Grey iron castings*
- JIS H 3100 *Copper and copper alloy sheets, plates and strips*
- JIS H 3260 *Copper and copper alloy wires*
- JIS H 3300 *Copper and copper alloy seamless pipes and tubes*
- JIS H 4040 *Aluminium and aluminium alloy rods, bars and wires*
- JIS H 4080 *Aluminium and aluminium alloys extruded tubes and cold-drawn tubes*
- JIS H 4140 *Aluminium and aluminium alloy forgings*
- JIS H 5202 *Aluminium alloy castings*
- JIS H 5301 *Zinc alloys die 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 6380 *Rubber packing material*
- 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 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 by burning system

Bath boilers shall be classified by the burning system into “pressure spraying type”, “rotary atomization type” and “carburetion type”, as specified in 4.1 of **JIS S 3030**.

3.2 Classification by draft system

Bath boilers shall be classified by the draft system as given in table 1, in accordance with 4.2 of **JIS S 3030**.

Table 1 Classification by draft systems

Installation location	Division	
	System	Type
Indoor	Semiclosed	Forced vent type Forced exhaust type
	Closed	Forced draft type
Outdoor	Open type	
	Forced vent type	
	Forced exhaust type	
NOTE : Those capable of both indoor and outdoor uses may be referred to as indoor/outdoor use.		

3.3 Classification by feed water system

The classification of bath boilers by the feed water system shall be as given in table 2.

Table 2 Classification by feed water system

Classification	Feed water system	Informative
Direct water works coupling type	Connecting directly with a water service pipe and water is fed by the straight pressure of water works.	Figure 1
	Connecting directly with a water service pipe and water is fed through a pressure reducing valve and an relief valve at the pressure of 0.1 MPa or under.	Figure 2
Cistern type	Not directly connecting with a water service pipe and water is fed through a cistern and the like in which the water is temporarily stored.	Figure 3

3.4 Classification by heating style

The classification of bath boilers by the heating style shall be as given in table 3.

Table 3 Classification by heating style

Classification	Heating style	Informative
Instantaneous heating	Detecting a water flow through the supply hot-water path, starts automatically burning to heat the water.	Figure 1
Storing water quick heating	Starts burning automatically correlating with the water temperature, under application of a pressure to the water in the supply hot-water path, to heat the water.	Figure 2 and figure 3

3.5 Classification by heating system

The classification of bath boilers by the heating system shall be as given in table 4.

Table 4 Classification by heating system

Classification	Heating system	Informative
One boiler-two water channel type	System to heat indirectly the heat exchanger for the bath boiler installed in the heat exchanger for supply hot-water which is heated directly, or system to heat indirectly the heat exchanger for bath boiler by the circulation of supply hot-water in the heat exchanger which is connected to the bathtub with circulation pipe.	Figure 4 and figure 5
Two boiler-two water channel type	System to heat directly both the heat exchanger for supply hot-water and the heat exchanger for bath boiler which is connected with the bathtub using circulation pipe. There are bath boilers with one burner and those with two burners.	Figure 6 to figure 8

3.6 Classification by circulation system of bath boiler path

The classification of bath boilers by circulation system of bath boiler path shall be as given in table 5.

Table 5 Classification by circulation systems of bath boiler path

Classification	Circulation system	Informative
Natural circulation type	System to heat the water within the heat exchanger for bath boiler by means of natural circulation resulting from the difference of temperature.	Figure 5 and figure 6
Forced circulation type	System to heat the water within the heat exchanger for bath boiler by forcible circulation.	Figures 4, 7 and 8

4 Performance

4.1 Working performance

The working performance of bath boilers shall be as follows:

- Ignition shall be easy and shall not require using any dangerous highly flammable substance such as alcohol or any dangerous operation.
- The actuation of each part shall be smooth, secure, and free from defects detrimental to use.
- Knobs and the like shall not easily deform or function abnormally during use.
- The burner shall automatically stop burning at an unusual temperature rise due to abnormal burning and the like.
- Operation shall be easy and shall not cause any danger.
- Flame shall be extinguished rapidly and securely.
- Those having an observation aperture shall be free from such soot adhesion on the aperture which hinders the confirmation of burning during burning in normal operation.
- Those provided with a burning control device shall not be liable to cause abnormal flame enlargement, visible smoking or any other abnormal burning, at any of each burning amount.
- Heat exchanger for bath boiler heated directly shall be free from danger of the pressure rise in the heat exchanger caused by boiling or superheated steam for accumulation of air or steam.
- Bath boilers with multiple burners capable of simultaneous combustion shall not cause any danger even if operated at the same time.

4.2 General quality performance

The general quality performance of bath boilers, when tested by the methods mentioned in clause 10, shall conform to the requirements given in table 6.

Table 6 General quality performance

Item		Quality performance	Applicable clause and subclause of JIS S 3031
Burning performance	a) Surface temperature of manually handled parts such as knobs ^{a)}	Difference between measured temperature and room temperature shall be 25 °C or under for metal and ceramics and 35 °C or under for plastics.	6.1 and 6.2 a)
	b) Surface temperature of parts liable to be touched by hand ^{b)}	150 °C or lower	6.1 and 6.2 b)
	c) Surface temperature of rectifier	Selenium 75 °C or lower; Germanium 60 °C or lower; Silicon 135 °C or lower.	6.1 and 6.2 c)
	d) Surface temperature of contact part of fuse clip	90 °C or lower	6.1 and 6.2 d)
	e) Surface temperature of oil tank	Difference between measured temperature and room temperature shall be 25 °C or under.	6.1 and 6.2 e)
	f) Surface temperature of wooden base under the bath boiler	Difference between measured temperature and room temperature shall be 65 °C or lower	6.1 and 6.2 f)
	g) Surface temperature of wooden base around the bath boiler	Difference between measured temperature and room temperature shall be 65 °C or lower	6.1 and 6.2 f)
	h) Surface temperature of wooden wall over the bath boiler	Difference between measured temperature and room temperature shall be 65 °C or lower	6.1 and 6.2 f)
	i) Surface temperature of wooden side wall of bath boiler	Difference between measured temperature and room temperature shall be 65 °C or lower	6.1 and 6.2 f)
	j) Surface temperature of wooden front wall of bath boiler	Difference between measured temperature and room temperature shall be 65 °C or lower	6.1 and 6.2 f)
	k) Surface temperature of wooden wall over exhaust pipe or draft pipe (only for forced exhaust and forced draft types for indoor use, and open and forced exhaust types for outdoor use)	Difference between measured temperature and room temperature shall be 65 °C or lower Forced exhaust type bath boilers whose installation conditions are specially indicated by an instruction or a manual need not comply with this requirement.	6.1 and 6.2 f)
	l) Surface temperature of wooden wall around the vent terminal (only for forced draft types for indoor use which use the vent terminal of which length from the outer wall to the point of the vent terminal is not more than 150 mm when installed as specified by the manufacturer)	Difference between measured temperature and room temperature shall be 65 °C or lower	6.1 and 6.2 f)

Table 6 (continued)

Item		Quality performance	Applicable clause and subclause of JIS S 3031
Burning performance (continued)	m) Surface temperature of exhaust pipe or draft pipe adjacent to wall (only for forced exhaust and forced draft types for indoor use)	90 °C or lower Forced exhaust type bath boilers whose installation conditions are specially indicated by an instruction or a manual need not comply with this requirement.	6.1 and 6.2 g)
	n) Temperature of coils of motor and solenoid pump	Class A insulation 100 °C or lower Class E insulation 115 °C or lower Class B insulation 120 °C or lower Class F insulation 140 °C or lower Class H insulation 165 °C or lower	6.1 and 6.2 h)
	o) Oil temperature	Difference between measured and room temperatures shall be 25 °C or under.	6.1 and 6.2 i)
	p) Burning condition and working performance	There shall be no abnormalities during burning such as flame enlargement, backfire, visible smoke, oil leakage, breakage, etc., and shall conform to the specifications of 4.1 .	6.3 and 31.1
	q) Exhaust gas temperature (only for forced exhaust and forced draft types for indoor use and open and forced exhaust types for outdoor use)	260 °C or lower	6.6
	r) Ratio of carbon monoxide to carbon dioxide (CO/CO ₂) in exhaust	The one fueled by kerosene The one other than the above	6.7
	s) Smoke density	"5" or under in smoke scale	6.9
	t) Power output for continuous supply hot-water (only for supply hot-water path)	At least 90 % of the marked rating	6.11.2
	u) Efficiency of continuous supply hot-water (only for supply hot-water path)	70 % or over At least 90 % of the marked rating	6.12.2
	v) Water boiling efficiency (only for bath boiler path)	52 % or over	6.12.2
	w) Heating rate (only for supply hot-water path)	Instantaneous heating type within 45 s Storing water quick heating type within 300 s	6.13

Table 6 (continued)

Item			Quality performance	Applicable clause and subclause of JIS S 3031
Burning performance (concluded)	x) Time for extinction		Pressure spraying type within 10 s Rotary atomization type within 10 s Carburetion type within 20 s	6.14
	y) Fuel consumption (maximum)		Difference between determined value and the marked rating shall be within ± 10 %.	6.15.1
Function of overheat preventive device (only for storing water quick heating type)	The one fueled by kerosene		a) The fire of the boiler shall be put out before the temperature reaches 100 °C. And the device shall not reset itself. b) There shall be no function difficulty at reuse.	15.2
	The one other than the above		a) The device shall function before boiling without trouble, and not reset itself. b) There shall be no function difficulty at reuse.	
Supply hot water temperature			90 °C or lower	17
Temperature of water circulating from bathtub to bath boiler (only for the boiler which is fueled by kerosene)			60 °C or lower	17.2
Boil-dry prevention	Supply hot-water path (only for the heat exchanger for hot water supply heated directly)	The one fueled by kerosene	When there is no water in the heat exchanger, the boiler shall follow either a) or b). a) Ignition shall be impossible. b) The fire of burner shall be put out within 180 s after ignition. And, there shall be no function difficulty at reuse. If equipped with temperature controller function, there shall be no breakage nor occurrence of dangerous condition.	19.1
		The one other than the above	When there is no water in the path, ignition shall be impossible or shall be as follows. a) It shall function without trouble, and there shall be no function difficulty at reuse. b) For those temperature controller function, there shall be no breakage nor occurrence of dangerous condition.	