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JAPANESE INDUSTRIAL STANDARD

**Combustion Safety Controllers
for Gunttype Oil Burners**

JIS B 8412 —1981

Translated and Published

by

Japanese Standards Association



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Combustion Safety Controllers for
Gunttype Oil Burners

B 8412-1981

1. Scope

This Japanese Industrial Standard specifies the combustion safety controllers for gunttype oil burners using mainly kerosene, gas oil and the like, which, in particular, operate combustion blower, fuel feed pump, fuel shut-down valve, etc. by incorporating with flame detector and controllers of pressure, temperature, etc., for the purpose of securing safety of combustion, hereinafter referred to as the "controllers".

2. Definitions

In addition to the definitions given in JIS B 0113, the following definitions apply to the principal terms used in this standard:

Applicable Standards:

JIS B 0113-Glossary of Terms for Industrial Combustion Equipments
(Liquid and Gaseous Fuels)

JIS B 7411-Etched-Stem Liquid-in-Glass Thermometers, Total Immersion
Type

JIS C 0911-Vibration Testing Procedure for Electric Machines and Equipment

JIS C 0912-Shock Testing Procedure for Electric Machines and Equipment

JIS C 1301-Insulation Resistance Testers (Magneto Generator Operated)

JIS C 1302-Insulation Resistance Testers (Battery Operated)

JIS C 1602-Thermocouples

JIS C 3306-Polyvinyl Chloride Insulated Flexible Cords

JIS C 3307-600 V Grade Polyvinyl Chloride Insulated Wires

JIS C 4003-Classification of Materials for Insulation of Electrical Machinery
and Apparatus

JIS G 3141-Cold Rolled Carbon Steel Sheets and Strip

JIS H 3100-Copper and Copper Alloy-Sheets, Plates, Strip and Coiled Sheets

JIS H 3110-Phosphor Bronze and Nickel Silver-Sheets, Plates and Strips

JIS H 3130-Copper Beryllium Alloy, Phosphor Bronze and Nickel Silver-
Sheets, Plates and Strip for Springs

JIS K 6719-Polycarbonate Molding Materials

JIS K 6873-Acrylonitrile-Butadiene-Styrene (ABS) Sheets

JIS K 6912-Laminated Thermosetting Sheets

JIS K 6915-Phenolic Molding Compounds

JIS K 6917-Melamine Formaldehyde Molding Compounds

JIS K 6919-Liquid Unsaturated Polyester Resin for Reinforced Plastics

JIS Z 8704-Electrical Methods of Temperature Measurement

Reference Standard:

ISO 3544-Atomizing oil burners of the monobloc type-Safety times and safety,
control and monitoring devices

- (1) shut-down time at ignition failure In the case where a burner fails, when it starts, to be ignited after a fuel feed signal is made, a time lapsed until a fuel shut-down signal is made through a ignition failure signal brought from the flame detector.
- (2) fail-safe In the event of intermittence of electric source arising and of any failure of the controller components itself taking place, a performance of the controller to work for safety, such as making signal for the igniting action or a fuel shut-down signal.
- (3) performance to check safty at starting Performance of the controller to check automatically the function of the flame detector and flame detecting circuit by the use of interlocking action of electric circuit, prior to the transmitting the starting signal to the burner, to arrest, if any false signal of flame is being made due to failure taking place, the signals of burner starting and fuel feed starting.
- (4) safety switch A switch which supervises the igniting behaviour of a burner and has the same function as that of manual resetting type relay and time limit type relay; its mechanism interrupts ignition action by transmitting a signal to stop the fuel feed, if no flame is detected within a predetermined time (in this standard, referred to as the shut-down time at ignition failure) after a signal to start igniting action of the burner is made, and its mechanism stops the fuel feed and obstructs the automatic reignition, if any ignition failure, flame fault shut-down and the like take place.

3. Standard Service Conditions of Controllers

Unless otherwise specified, the standard service conditions of the controllers shall be as specified below.

- (1) The ambient temperature shall be within the range of -20 to $+60^{\circ}\text{C}$, provided that, the controller does not freeze.
- (2) The relative humidity shall be within the range of 45 to 85 %, provided that, the controller makes no dew condensation.

4. Types and Symbols

The types of controller shall be classified by the shut-down time at ignition failure, rated voltage and rated frequency, existence of prepurging function, existence of postpurging function, igniting system, and operation after flame fault shut-down, and their type symbols shall as given below.

- (1) Classification by Shut-down Times at Ignition Failure The classification by the shut-down times at ignition failure shall be as given in Table 1.

Table 1

Shut-down time at ignition failure		Type symbol	Classification by fuel oil consumption for burners ⁽¹⁾
Nominal value	Classification		
7 sec	7.7 sec or less	S	Exceeding 30 kg/h
15 sec	16.5 sec or less	L	30 kg/h or less

Note (1) This classification is in accord with the fuel oil consumption for burners specified in ISO 3544 (Atomizing oil burners of the mono-bloc type-Safety times and safety, control and monitoring devices).

- (2) Classification by Rated Voltage and Rated Frequency The classification by the rated voltage and the rated frequency shall be as given in Table 2.

Table 2

Rated voltage V	Rated frequency Hz	Type symbol
100	50/60	1
200		2
220	60	3

- (3) Classification by Existence of Prepurging Function The classification by the existence of prepurging function shall be as given in Table 3.

In the case where a controller which is symbolized as NO in Table 3 is used, it shall be either assembled with a mechanism capable of performing prepurging or shall be prepurged manually in advance of starting.

Table 3

Existence of prepurging function	Type symbol
Existing	B
No	NO

- (4) Classification by Existence of Postpurging Function The classification by the existence of the postpurging function shall be as given in Table 4. However, a controller which is symbolized as NO in (3) Classification by Existence of Prepurging Function shall be symbolized as A in type symbol of the postpurging function.

Table 4

Existence of postpurging function	Type symbol
Existing	A
No	N

- (5) Classification by Igniting System The classification by the igniting system shall be as given in Table 5.

Table 5

Igniting system	Type symbol
Continuous system ⁽²⁾	C
Overlapping system ⁽³⁾	I
Limit time system ⁽⁴⁾	T

Notes ⁽²⁾ The continuous system shall be a system of which igniting device operates continuously, irrespective of combustion of the burner.

⁽³⁾ The overlapping system shall be a system of which igniting device operates overlapping during combustion of the burner.

⁽⁴⁾ The limit time system shall be a system of which igniting device operates during a predetermined time only.

- (6) Classification by Operations after Flame Fault Shut-Down The classification by operations after flame fault shut-down⁽⁵⁾ shall be as given in Table 6.

Table 6

Operation after flame fault shut-down	Type symbol
Reignition ⁽⁶⁾	RL
Restart ⁽⁷⁾	RC
Shut-down ⁽⁸⁾	LO

Notes ⁽⁵⁾ The flame fault shut-down means a condition where a flame is just dying away or nearly same condition as that, because of any abnormality taking place.

⁽⁶⁾ The reignition means a igniting action which starts immediately after the completion of the flame fault response time specified in 5. Performance, after detection of the flame fault shut-down.

- (7) The restart means an operation, after the detection of flame fault shut-down, which starts again in accordance with a predetermined safety operating sequence including the prepurging function after transmitting a signal of fuel shut-down immediately after the completion of the flame fault response time specified in 5. Performance.
- (8) The shut-down means an operation, after detection of flame fault shut-down, which will not reignite or restart automatically unless a manual resetting operation is carried out, after transmitting a fuel shut-down signal immediately after the completion of the flame fault response time specified in 5. Performance. However, for those of C and I in type symbol specified in 4.(5), the shut-down time at ignition failure is applicable to the flame fault response time specified in 5. Performance.

5. Performance

The controller shall prove that its performance meets the requirements specified in Table 7, when it is tested by the methods specified in 9.

Table 7

Item	Performance	Test method
Voltage variation characteristic	In a range of -15 to $+10\%$ of the rated voltage, it shall start normally and keep the operations.	9.3
Insulation resistance	When the rated voltage is applied, it shall be not less than $10\text{ M}\Omega$.	9.4
Withstand voltage	It shall withstand the rated voltage for 1 min.	9.5
Impulsive voltage resistance	It shall operate normally.	9.6
	Insulation resistance	
	When the rated voltage is applied, it shall be not less than $5\text{ M}\Omega$.	
Low temperature resistance	Change in shape and operation	9.7
	There shall be no crack, swell, deformation, etc., and a series of operation shall be normal.	
	Insulation resistance	
High temperature resistance	When the rated voltage is applied, it shall be not less than $5\text{ M}\Omega$.	9.8
	Voltage resistance	
	It shall withstand the rated voltage for 1 min.	
Humidity resistance	Change in shape and operation	9.9
	There shall be no crack, swell, deformation, etc., and a series of operation shall be normal.	
	Insulation resistance	
	When the rated voltage is applied, it shall be not less than $3\text{ M}\Omega$.	9.9
	Voltage resistance	
	It shall withstand the rated voltage for 1 min.	

Table 7 (Continued)

Item	Performance	Test method
Flame resistance	It shall not burn under the specified conditions.	9.10
Vibration resistance	Vibration durability	9.11 (1)
	Mis-operation due to vibration	9.11 (2)
Impact resistance	Impact durability	9.12 (1)
	Mis-operation due to vibration	9.12 (2)
Inspectionability for safety of starting	It shall neither start nor transmit fuel feed signal.	9.13
Fail-safe	Electric source interruption	9.14 (1)
	Failure of circuit components	9.14 (2)