

JAPANESE INDUSTRIAL STANDARD
JIS K 2265-1996
Crude oil and petroleum products--
Determination of flash point

January 1997

ERRATA

Page 17

Table 8

Column 2, line 8(Total length), replace " 200^{+4}_{-2} " with:
"195 to 200" .

Column 2, line 11(Diameter of Bulb), replace "4.50 to 4.65" with:
"4 to 6" .

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Subclause 6.7(b)

In line 2, replace "17 to 28°C" by "18 to 28°C" so that reads as follows :
..... tempera-
ture of the sample reaches 18 to 28°C below the expected flash point,
..... .

Remarks : This errata is for correcting the first edition of this Standard.
Japanese Standards Association

JIS

JAPANESE INDUSTRIAL STANDARD

Crude oil and petroleum products — Determination of flash point

JIS K 2265—1996

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**In the event of any doubt arising,
the original Standard in Japanese is to be final authority**

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JAPANESE INDUSTRIAL STANDARD

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Crude oil and petroleum products
— Determination of flash point

K 2265-1996

1. Scope This Japanese Industrial Standard specifies the testing methods for the flash point of crude oil and petroleum products.

- Remarks
1. Though dangerous reagents, operations and apparatuses are sometimes used in this Standard, safe treating methods are not always specified completely. Therefore, testers of those tests shall decide appropriate items to be prohibited on safety and health prior to testing.
 2. The standards cited in this Standard are shown in Attached Table 1.
 3. International Standards corresponding to this Standard are given in Table 1.
 4. The units and numerical values given in { } in this Standard are based on the traditional units and are appended for informative reference.

Table 1. Corresponding International Standards

Name of test method	ISO number	Title of ISO
Rapid equilibrium method	ISO 3679:1983	Paints, varnishes, petroleum and related products — Determination of flashpoint — Rapid equipment method
Pensky-Martens closed cup method	ISO 2719:1988	Petroleum products and lubricants — Determination of flash point — Pensky-Martens closed cup method
Cleaveland open cup method	ISO 2592:1973	Petroleum products — Determination of flash and fire points — Cleveland open cup method

Informative reference: Rapid equilibrium method is known as "Test methods for flash point by Setaflash closed tester".

2. Definitions For the purposes of this Standard, the following definitions apply.

- (1) flash point The flash point means the lowest temperature of a sample oil required to cause the mixed gas of oil vapor and air to ignite flashingly in a moment when a small flame is brought close to the surface of the sample oil heated under a specified condition.

Remarks: The measuring methods of the flash point are classified into the heating method under a closed condition and the one under an open condition, and the flash point measured under the former condition is called the "closed-cup flash point" and the one measured under the latter condition the "open-cup flash point".

Generally speaking, the open-cup flash point shows a higher value than the closed-cup flash point.

- (2) **fire point** The fire point means the lowest temperature of sample oil required to cause the mixed gas of oil vapor and air to burn continuously for at least 5 s when a small flame is brought close to the surface of the sample oil heated under a specified condition. The fire point can be measured by Cleveland open-cup flash point test.

Informative reference: The ignition temperature means the lowest temperature at which, when a sample oil is heated in the air, it naturally starts to burn (ignites) though spark or flame is not brought in contact therewith. The measurement of the ignition temperature is specified in ASTM E 659-78.

3. **Classification of test methods** The testing methods for flash point shall be classified into four classes given in Table 2.

Table 2. Classes of testing method for flash point

Class of flash point	Test method for flash point	Criteria of application ⁽¹⁾	Applicable oils (example of products specified in JIS)
Closed cup flash point	Tag closed method	Samples 93°C or lower in flash point, provided that the following should be excluded. (1) Samples whose kinematic viscosity at 40°C is 5.5 mm ² /s {5.5 cSt} or over, or those at 25°C is 9.5 mm ² /s {9.5 cSt} or over. (2) Samples generating an oil film under testing condition. (3) Samples containing suspended matter.	Crude oil, gasoline for industrial purpose, kerosine, aviation turbine fuel
	Rapid equilibrium method	Samples 110°C or lower in flash point.	Crude oil, kerosine, gas oil, heavy oil, aviation turbine fuel
	Pensky-Martens closed cup method	Samples requiring the measurement by closed cup flash point method and not suited for tag closed method.	Crude oil, gas oil, heavy oil, electrical insulating oil, rust preventive oil, cutting oil
Open cup flash point	Cleveland open cup method	Samples 80°C or higher in flash point, with the exception of crude oil and fuel oil.	Petroleum asphalt, liquid paraffin, air filter oil, petroleum wax, rust preventive oil, electrical insulating oil, heat treatment oil, cutting oil, various kinds of lubricant

Note ⁽¹⁾ Where applicable testing methods or testing conditions are specified in the relevant specification or the like, they should be conformed to .

4. Tag closed flash point test

4.1 Principle of test method Put 50 ± 0.5 ml of sample in a closed sample cup, and heat gradually at a specified raising rate shown in Table 3. At each interval of temperature elevation shown in Table 3, bring the test flame close to the sample cup, and obtain the lowest temperature required to flash the vapor of the sample.

Table 3. Temperature condition of tag closed flash point test

Expected flash point °C	Temperature raising rate	Temperature interval for applying a test flame °C
Lower than 60	$1^{\circ}\text{C}/60 \pm 6 \text{ s}$	every 0.5
60 or higher	$3^{\circ}\text{C}/60 \pm 6 \text{ s}$	every 1.0

Remarks: An automatic flash point tester may be used.

In case of doubt about test results obtained through an automatic flash point tester, this testing method shall be invoked for final judgement.

Informative reference: Test method for tag closed flash point is specified by referring to ASTM D 56-87.

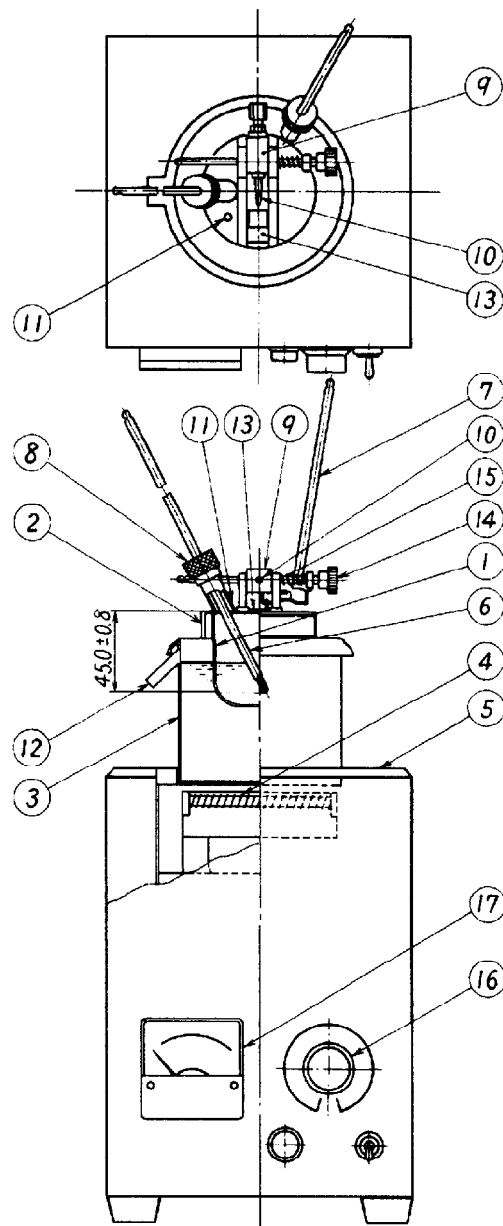
4.2 Tag closed flash point tester As shown in Fig. 1, this tester is composed of the following (1) to (5).

- (1) Sample cup The sample cup shall be of shape and dimensions shown in Fig. 2, made of brass or copper, and have a mass of 68 ± 1 g with uniform thickness.
- (2) Sample cup lid The lid can closely contact with the sample cup and is equipped with an opening-and-closing device, a peep mechanism for test flame and the like which, respectively, opens the vent holes and the peephole for the test flame and which bring the test flame to the specified position.
 - (a) Lid The lid, having the shape and dimensions as shown in Fig. 3, shall be made of brass or copper, and have a clearance not more than 0.05 mm between the inside diameter of a rim and the neck of a liquid bath. The peephole for the test flame is provided at the center of the lid and two ventholes are provided on both sides of it. Also provide a pipe for inserting a thermometer and a standard bead of 4 ± 0.2 mm in diameter which is made the standard for the size of test flame. The rim shall be equipped with two cuts situated opposite to each other as shown in Fig. 3, which, when fitted in two protrusions at the neck of the liquid bath as shown in Fig. 4 and rotated, can closely contact with the lower surface of the lid with the upper flange surface of the sample cup dropped in the neck of the liquid bath.

Fig. 1. Tag closed flash point tester (example)

Electric heating type

Unit: mm



- | | | |
|--------------------------|------------------------------------|--------------------------|
| ① Sample cup | ⑦ Thermometer for liquid bath | ⑫ Overflow opening |
| ② Sample cup lid | ⑧ Holder of thermometer for sample | ⑬ Sliding plate |
| ③ Liquid bath | ⑨ Gas control valve | ⑭ Knob |
| ④ Heater for liquid bath | ⑩ Nozzle for test flame | ⑮ Coil spring |
| ⑤ Frame for liquid bath | ⑪ Standard bead | ⑯ Voltage regulator |
| ⑥ Thermometer for sample | | ⑰ Voltmeter (or ammeter) |

Fig. 2. Sample cup

Mass 68 ± 1 g

Unit: mm

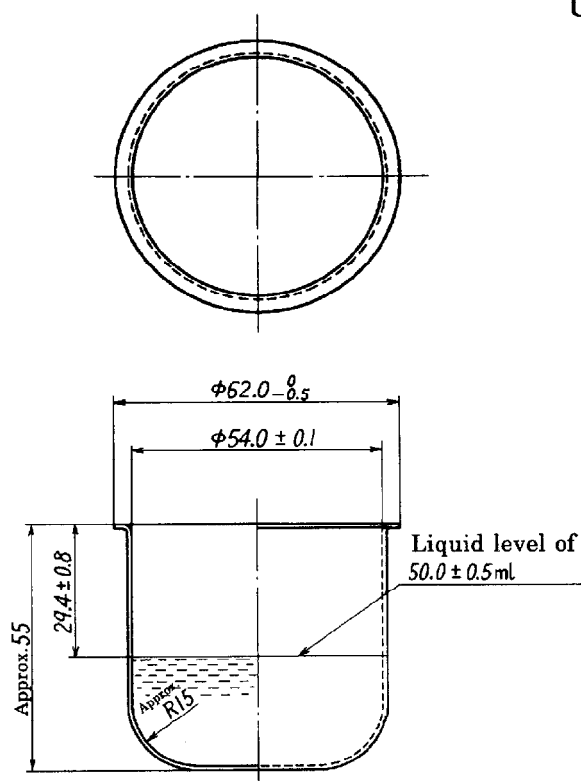


Fig. 3. Lid

Unit: mm

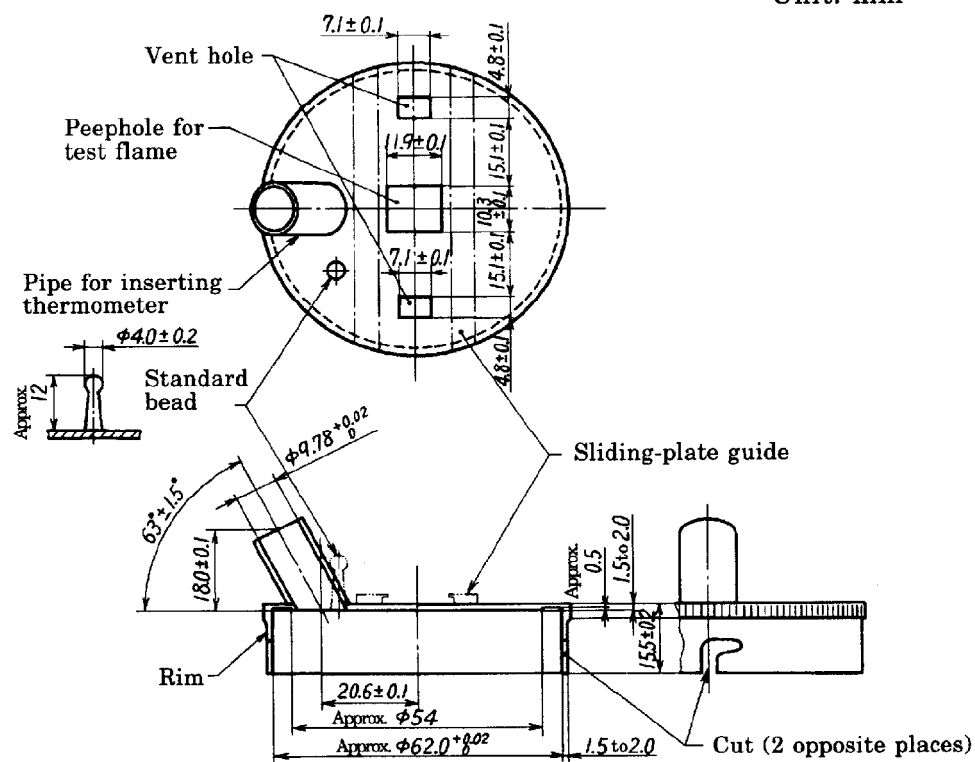
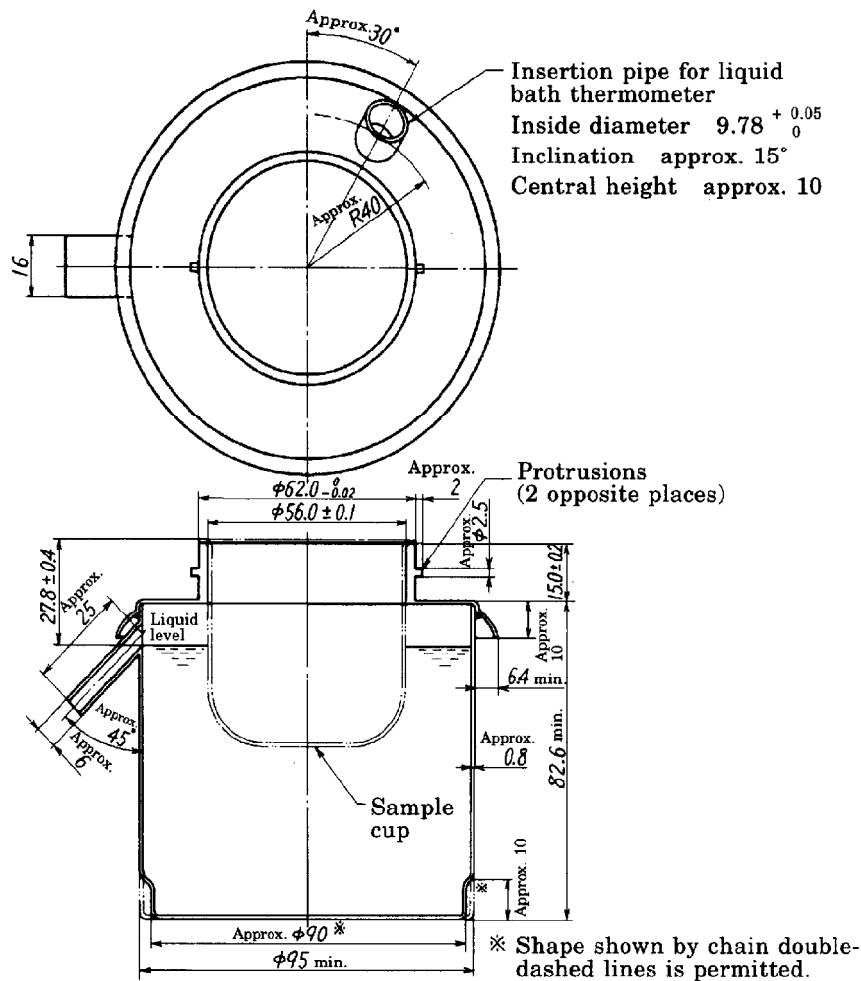


Fig. 4. Liquid bath

Unit: mm

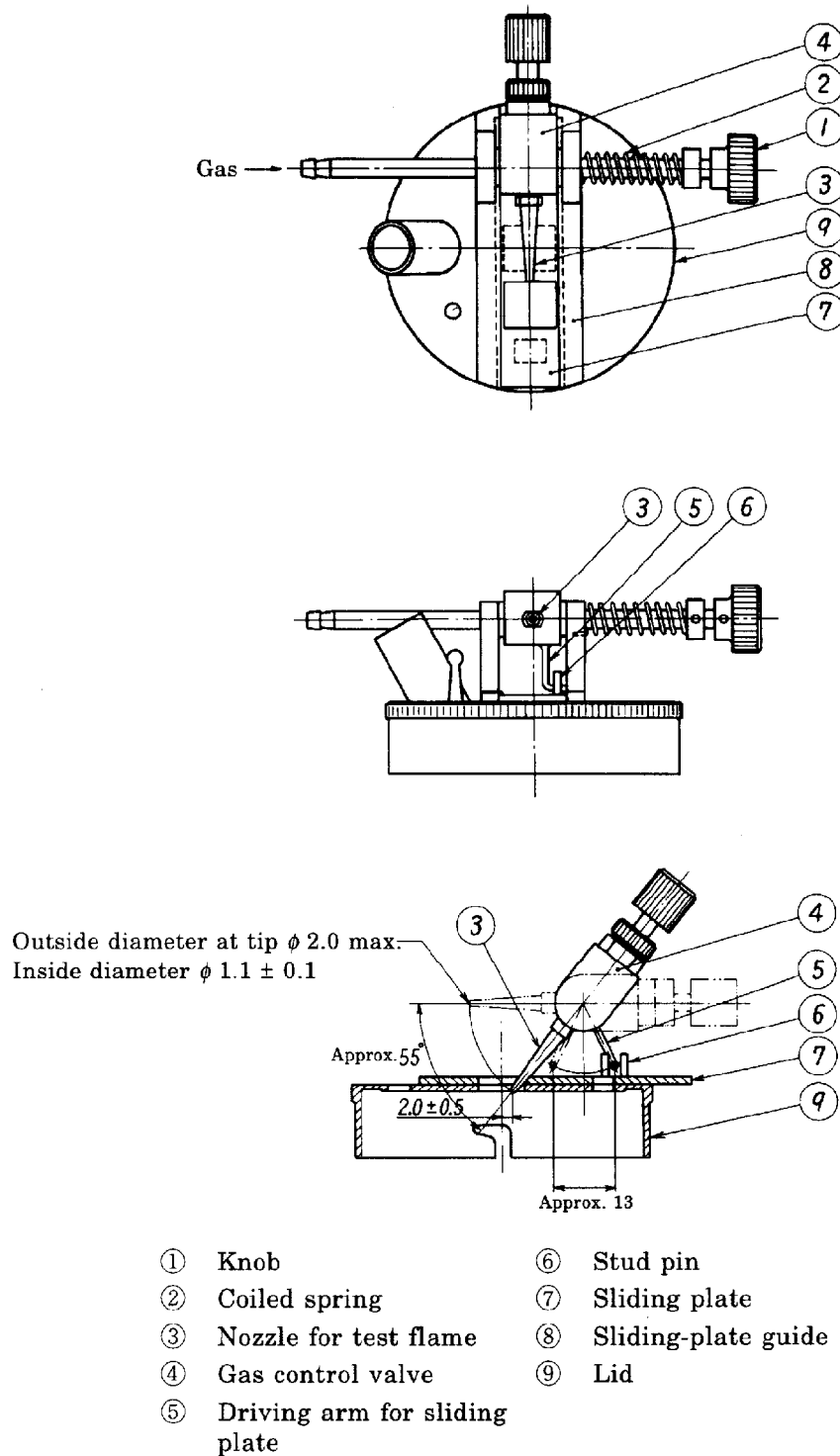


- (b) Peep mechanism for test flame This shall be of the shape and dimensions as shown in Fig. 5 and be made of brass or stainless steel.

As the knob is turned, this can drive the sliding plate and open the peephole for the test flame and simultaneously bring the nozzle for the test flame close to the sample cup. When the test flame is brought close, center of the tip end of the nozzle for test flame shall then be regulated to come to 2 mm before the center of the peephole (on the right of the peephole as shown in Fig. 5) and to coincide with the lower surface of the lid. A gas control valve for the test flame shall be furnished at a suitable place near the flame nozzle. The outside diameter of the tip of the flame nozzle shall be not more than 2.0 mm, and the inside diameter about 1.5 mm in the case of using LP gas as fuel and 0.7 mm to 0.8 mm in other cases.

Fig. 5. Peep mechanism for test flame (example)

Unit: mm

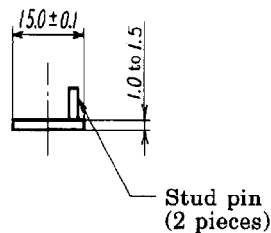
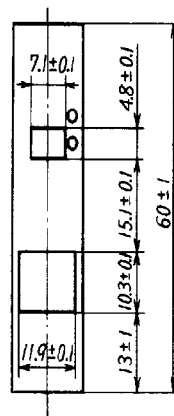


- (c) Opening-and-closing device The opening-and-closing device forms a part of the peep mechanism for the test flame, and comprises the sliding plate (see Fig. 6 for detail) which is made of brass or stainless steel, a driving arm for sliding plate, and a sliding-plate guide.

The sliding plate and driving mechanism shall have such a construction as the sliding plate makes the three holes on the lid become full open simultaneously as the knob (① in Fig. 5) is turned, and makes them shut hermetically by turning back to the original state by the repulsion of the coil spring (② in Fig. 5) as the knob is released. The slidingly contacting face between the upper surface of the lid and the sliding plate shall be kept tight by grinding to prevent sample vapor from escaping.

Fig. 6. Sliding plate

Unit: mm



- (3) Heater The heater consists of the liquid bath, its heater, and its frame described below.

- (a) Liquid bath The liquid bath shall be of the shape and dimensions as shown in Fig. 4, made of copper or brass, and have protrusions at two places on the diameter in the neck part to fit the cuts in the rim of the lid specified in (2) (a).

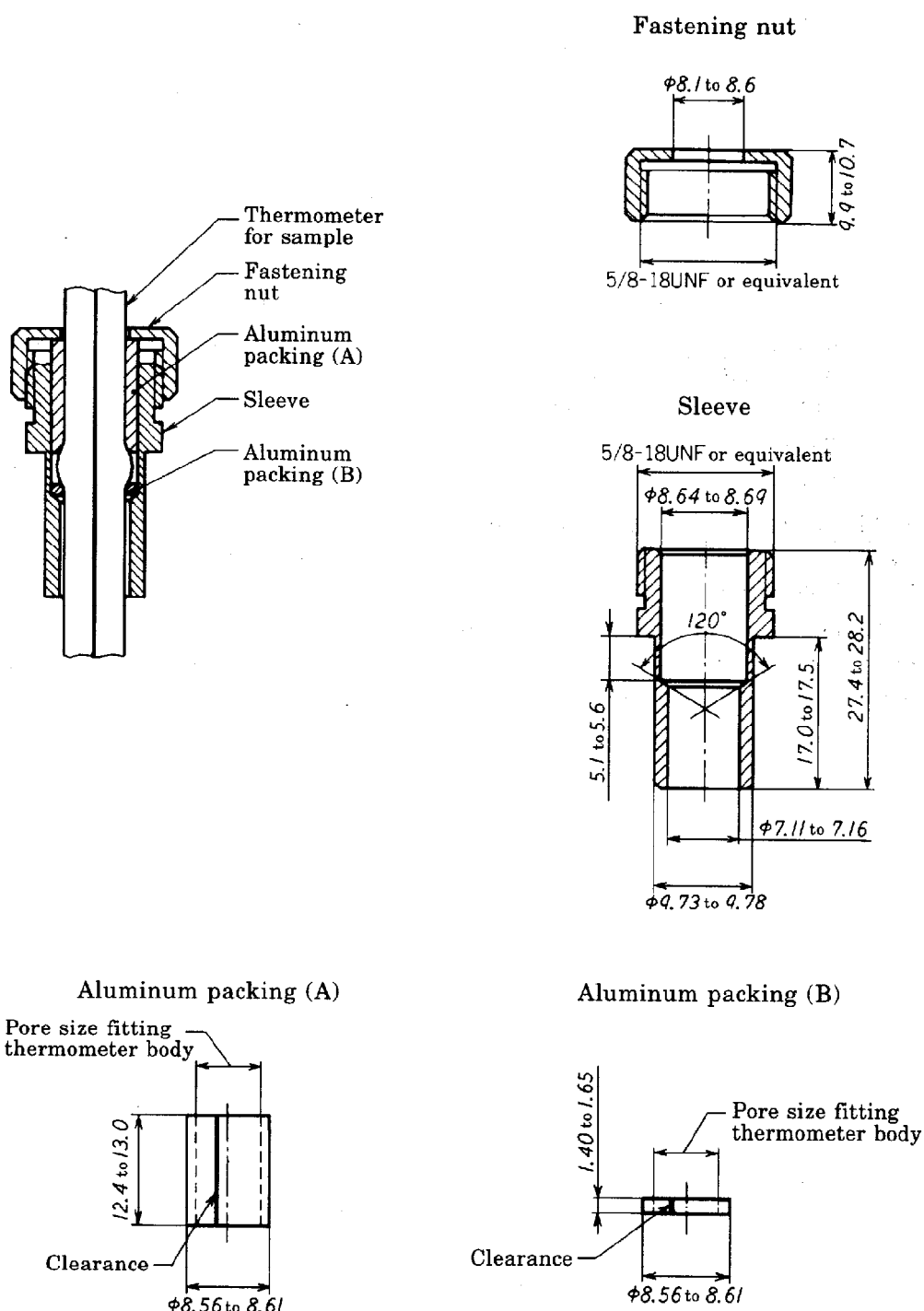
Further, to facilitate the temperature regulation, the body of liquid bath may be insulated by suitable heat insulating materials.

- (b) Heater for liquid bath The heater for the liquid bath shall be a gas, an alcohol or an electric heating type, which has a capacity to raise the temperature of a low viscosity oil by 3°C per 60 ± 6 s in the range of 85 to 93°C when the bath is filled with water in advance, and 50 ml of the oil with a flash point of 93°C or higher is put in a sample cup and heated. In the case of an electric heating type, it shall be equipped with a voltage regulator.
 - (c) Liquid bath frame This shall be capable of holding the liquid bath horizontally. In the case of a gas heating or alcohol heating type, however, the flame of the heater shall not be disturbed by air flow in the room.
- (4) Thermometer The thermometers shall be as follows:
- (a) Thermometer for sample This shall be a thermometer No. 30 (PMF) or 50 (TAG) as specified in JIS B 7410 or an electric thermometer having equivalent performances.
 - (b) Thermometer for liquid bath This shall be the same as the thermometer for sample.
- (5) Holder of thermometer for sample This should hold the thermometer so tightly that the vapor from the sample cup under test may not leak from the attached part. Fig. 7 exemplifies its construction.

When the thermometer is mounted to the holder, the lower end of the bulb of the thermometer shall be in a position 45.0 ± 0.8 mm below the lower surface of the lid.

Fig. 7. Holder of thermometer for sample (example)

Unit: mm



4.3 Check of tester When a tag closed flash point tester is tested with *p*-xylene specified in Table 4 in accordance with the description in the following 4.4 to 4.7, the flash point has only to fall within the range of $27 \pm 0.5^\circ\text{C}$. If test results go beyond this range, a retest shall be carried out after checking such conditions as sealability of the sample cup lid, the movement of the opening-and-closing device, the position and size of the test flame, the angle and position of the thermometer and with care against the influence of the wind.