

JIS

JAPANESE INDUSTRIAL STANDARD

**Electric Fuel Pumps for
Automobiles**

JIS D 3606—1988

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

JAPANESE INDUSTRIAL STANDARD

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Electric Fuel Pumps for Automobiles

D 3606-1988

1. Scope

This Japanese Industrial Standard specifies electric fuel pumps used in gasoline engines for automobiles ⁽¹⁾, hereinafter referred to as the "pumps".

Note ⁽¹⁾ They shall include those pumps used for gasoline injection engines.

Remark: The unit and numerical values shown in braces { } in this standard are based on the conventional units and are appended for informative reference.

2. Definition

The meanings of the main terms used in this standard mean as follows:

- (1) in-line type pump A pump of the type installed halfway of the fuel pipe line.
- (2) in-tank type pump A pump of the type installed in the fuel tank.
- (3) motor-driven rotor type pump A pump of the type in which the construction of the pump part is of the rotary type and which is driven by an electric motor.

3. Capacity

The pump capacity shall be expressed by the specified discharge ⁽²⁾ at the specified delivery pressure ⁽²⁾.

Applicable Standards:

JIS B 0203-Taper Pipe Threads

JIS B 0207-Metric Fine Screw Threads

JIS D 0203-Method of Moisture, Rain and Spray Test for Automobile Parts

JIS D 1601-Vibration Testing Method for Automobile Parts

JIS D 5403-Cable Terminals for Automobiles

JIS K 2201-Gasoline for Industrial Purpose

JIS K 2202-Motor Gasoline

JIS K 2203-Kerosine

Reference Standard:

JIS D 3601-Diaphragm Fuel Pumps for Automobiles

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Note (2) These values shall be specified by agreement between the purchaser and supplier. Their units shall respectively be kPa {kgf/cm²} and l/h.

4. Nominal Voltage

The values of nominal voltage of pumps shall be 6 V, 12 V, and 24 V.

5. Performance

5.1 Dry Suction Pressure When the inside of the pump and suction pipe is kept in dry condition, and with the discharge side opened and the suction side closed, the pump is operated at the nominal voltage, the suction pressure shall be -4.9 kPa {-0.05 kgf/cm²} or lower. However, this does not apply to in-tank type pumps.

5.2 Shut-Off Delivery Pressure

5.2.1 Average Value of Shut-Off Delivery Pressure (3) The average value of delivery pressure when the discharge side is closed while operating the pump at the nominal voltage shall be within the range of 70 to 100 % of the specified shut-off delivery pressure (4).

Notes (3) Average value of pulsating pressure.

(4) To be specified by agreement between the purchaser and supplier.

5.2.2 Maximum Value of Shut-Off Delivery Pressure For pumps for carbureter, the maximum value of the delivery pressure measured at the carbureter inlet when the pump is operated at a voltage ranging from 90 to 120 % of the nominal voltage with the piping arranged in practical service condition shall not exceed 130 % of the specified shut-off delivery pressure (4). However, this requirement those not apply to gasoline injection pumps.

5.3 Discharge The discharge values corresponding to respective temperatures and voltages when the discharge-side pressure is made agree with the specified delivery pressure (2) shall be as shown in Table 1.

Table 1. Discharge

Item	Fuel temperature (5)	Pump ambient temperature (6)	Test voltage	Discharge
Ordinary temperature nominal-voltage characteristics	Ordinary temperature	Ordinary temperature	Nominal voltage	Specified discharge (2) or greater
Ordinary temperature low-voltage characteristics	Ordinary temperature	Ordinary temperature	5/6 of nominal voltage	50 % or more of specified discharge
High-temperature nominal-voltage characteristics (1)	40 ± 3°C	60 ± 3°C	Nominal voltage	To be specified by agreement between purchaser and supplier
High-temperature nominal-voltage characteristics (2)(7)	60°C	80°C		
Low-temperature nominal-voltage characteristics	-30°C (8)	-30°C (8)	Nominal voltage	50 % or more of specified discharge
Low-temperature low-voltage characteristics	-30°C (8)	-30°C (8)	2/3 of nominal voltage	To be specified by agreement between purchaser and supplier

Notes (5) Fuel temperature at pump inlet.

(6) For in-tank type pumps, same as fuel temperature.

(7) The high-temperature nominal-voltage characteristics (2) shall be measured as required, and the fuel temperature and pump ambient temperature may be otherwise specified within the range not exceeding 60° and 80°, respectively, by agreement between the purchaser and supplier.

(8) The permissible deviation in temperature shall be specified by agreement between the purchaser and supplier.

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5.4 Temperature Rise in Electric Driving Part When the pump is operated while keeping the pump ambient temperature and the fuel temperature at the pump inlet at 40°C or lower and the coil temperature of the electric driving part has become constant, the temperature rise in the coil measured by the resistance method shall not exceed 60°C. However, the suction side of the pump shall be kept open and the discharge-side pressure shall be kept at the specified delivery pressure.

5.5 Airtightness There shall occur no leakage when the pump is immersed in the test oil for 10 sec. or longer while applying to the suction opening an air pressure of 98 kPa {1 kgf/cm²} or higher and equal to the specified shut-off delivery pressure (4). However, this does not apply to in-tank type pumps.

5.6 Vibration Resistance The test shall be performed according to step 4 specified in 5.3 (1) of JIS D 1601 while operating the pump at the nominal voltage with the suction side and discharge side kept open. However, the testing method and conditions for in-tank type pumps shall be specified by agreement between the purchaser and supplier.

The performance of the pump after the above test shall satisfy the requirements of 5.1, 5.2, 5.3, 5.4, and 5.5, respectively, and in addition, no detrimental defects shall occur in any part of the construction.

5.7 Water Resistance When the pump is tested according to R 2 specified in JIS D 0203, and then after wiping off the water attached outside, left standing for 1 h, no abnormalities shall be found in its insulation resistance and other parts. However, this test does not apply to in-tank type pumps.

5.8 Durability

5.8.1 Ordinary-Temperature Durability When the pump is operated under the conditions of Table 2 and then subjected to the tests of 5.1 and 5.2.1 and the ordinary-temperature nominal-voltage characteristics test of 5.3, the performance shall satisfy 90 % or more of the respective specified values.

In addition, the airtightness shall meet the requirement of 5.5, and no detrimental defects shall occur in any part of the construction.

5.8.2 High-Temperature Durability When the pump is operated under the conditions of Table 2 and then subjected to the tests of 5.1 and 5.2.1 and the ordinary-temperature nominal-voltage characteristics test of 5.3, the performance shall satisfy not less than the values specified by agreement between the purchaser and supplier.

In addition, the airtightness shall satisfy the requirement of 5.5, and no detrimental defects shall occur in any part of the construction.

Table 2. Durability Test Conditions

Item	Test voltage	Suction head	Discharge head	Fuel temperature	Running time
Ordinary temperature durability	7/6 of nominal voltage	500 mm (9)	500 mm(10)	Ordinary temperature	500 h(11)
High-temperature durability				50 to 60°C	100 h

- Notes (9) For in-tank type pumps, 0 mm.
- (10) For motor-driven rotor type pumps, specified delivery pressure.
- (11) For motor-driven rotor type pumps, 2000 h.

6. Construction

6.1 Airtightness of Pump Part The pump part shall have sufficient airtightness and be so constructed as to be free from fuel leakage and the like. However, this does not apply to in-tank type pumps.

6.2 Ignition Preventing Construction The pumps shall be so constructed that when the fuel happens to leak at the pump part or pipe connections, it does not enter such parts having the risk of ignition.

Further, those parts having the risk of ignition, such as electric contact points, shall be so constructed as to prevent ignition even if the fuel falls thereon from outside.

6.3 Coupling The couplings used at the pump suction opening and discharge opening shall as a rule, be as specified in Table 3.

Table 3. Coupling

Coupling system	Dimension
Screw coupling	JIS B 0203 PT 1/8
	JIS B 0207 M 10 x 1.25
	M 12 x 1.25
Tube coupling	Outer diameter: 6.35 mm, 8 mm, or 12 mm

6.4 Cable Terminal The cable terminals used for pumps shall, as a rule, conform to CA 104, CB 104, or LA of JIS D 5403.

7. Appearance

The surface of respective parts of the pump shall be free from detrimental cuts, rust, blowholes, burrs, strains, and other defects.

8. General Test Conditions

The general test conditions shall be as follows:

- (1) Tests shall be performed at ordinary temperature unless otherwise specified.
- (2) The fuel used for tests shall be an oil as specified in JIS K 2201, JIS K 2202, or JIS K 2203.

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- (3) Examples of the apparatus used for the discharge test are shown in Attached Figs. 1 and 2. However, the apparatus shall be added with suitable devices for adjusting the pump and fuel temperatures and measuring the fuel temperature in the fuel tank and the pump ambient temperature.
- (4) Pumps having a filter shall be tested with the filter attached.

9. Inspection

9.1 Performance Inspection

9.1.1 Dry Suction Pressure Inspection The dry suction pressure shall satisfy the requirement of 5.1.

9.1.2 Shut-Off Delivery Pressure Inspection The shut-off delivery pressure shall satisfy the requirements of 5.2.

9.1.3 Discharge Inspection The discharge shall satisfy the requirements of 5.3.

9.1.4 Airtightness Inspection The airtightness shall satisfy the requirements of 5.5.

9.1.5 Vibration Resistance Inspection The vibration resistance shall satisfy the requirement of 5.6.

9.1.6 Water Resistance Inspection The water resistance shall satisfy the requirement of 5.7.

9.1.7 Durability Inspection The durability shall satisfy the requirements of 5.8. However, the durability test running may be made intermittently until the specified running time is reached.

9.2 Construction Inspection The construction of the pump shall satisfy the requirements of 6.

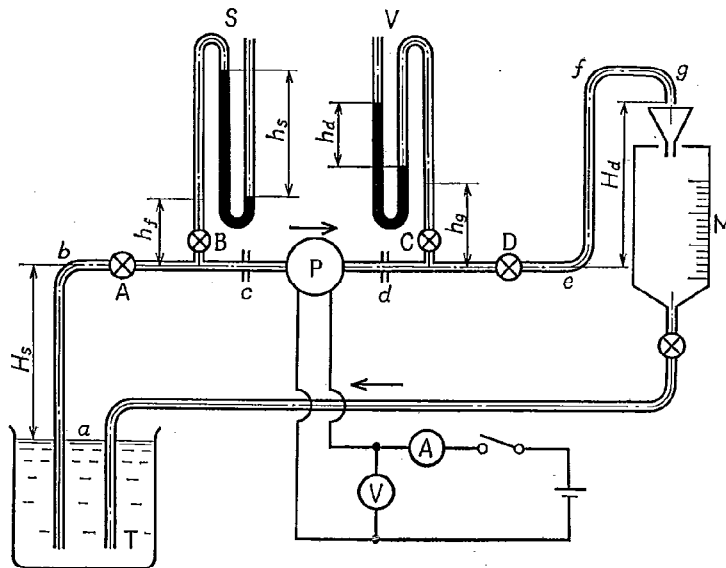
9.3 Appearance Inspection The appearance of the pump shall satisfy the requirements of 7.

10. Marking

Pumps shall be marked with the following items of information by a reliable method for prevention of fading. However, items (4) and (5) may be marked only where they are required.

- (1) Nominal voltage
- (2) Year and month of manufacture or symbol thereof
- (3) Manufacturer's name or mark
- (4) Outlet and inlet (Either one may be marked.)
- (5) Voltage polarity

Attached Fig. 1. Test Apparatus for In-Line Type Fuel Pump (Example)

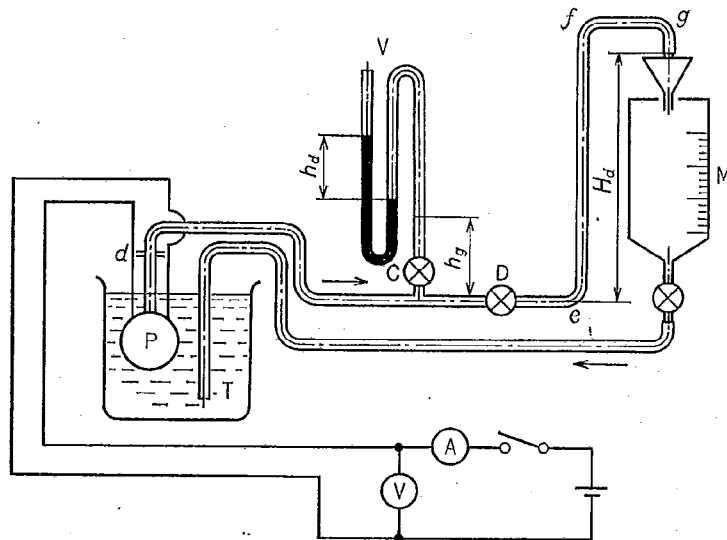


- where H_s : suction head, 500 mm
 H_d : discharge head, 500 mm
 $a, b, c^{(12)}$: suction pipelines, 1500 mm
 $d^{(12)}, e, f, g$: discharge pipelines, 1500 mm
 pipe inner diameter: 6 to 8 mm
 h_s : suction pressure ⁽¹³⁾
 h_f : suction pressure correction quantity
 h_d : discharge pressure ⁽¹³⁾
 h_v : discharge pressure correction quantity
 P : test pump
 T : fuel tank
 M : volume measuring vessel
 S : suction-side manometer or pressure gauge
 V : discharge-side manometer or pressure gauge
 A, B, C, D : cocks ⁽¹⁴⁾ ⁽¹⁵⁾

- Notes ⁽¹²⁾ The pipeline between c and d may be a flexible pipe.
⁽¹³⁾ Pressures h_s and h_d shall respectively be added with correction values by fuel columns h_f and h_v in the transparent tubes leading to S and V,
⁽¹⁴⁾ Cocks A and D shall be sufficiently large relative to the passage area of the pipe.
 Further, cock D shall be capable of easy adjustment of pressure.
⁽¹⁵⁾ Cocks B and C shall be installed near the main pipeline.

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Attached Fig. 2. Test Apparatus for In-Tank Type Fuel Pump (Example)



- where H_a : discharge head, 500 mm
 $d^{(16)}, e, f, g$: discharge pipeline, 1500 mm
 pipe inner diameter: 6 to 8 mm
 h_a : delivery pressure ⁽¹⁷⁾
 h_g : delivery pressure correction quantity
 P : test pump
 T : fuel tank
 M : volume measuring vessel
 V : discharge-side manometer or pressure gauge
 C, D : cocks ⁽¹⁸⁾ ⁽¹⁹⁾

- Nores ⁽¹⁶⁾ The pipeline between P and d may be a flexible pipe.
⁽¹⁷⁾ Pressure h_a shall be added with a correction value by fuel column h_g in the transparent tube leading to v.
⁽¹⁸⁾ Cock c shall be installed near the main pipeline.
⁽¹⁹⁾ Cock D shall be sufficiently large relative to the passage area of the pipe.

Further, it shall be capable of easy adjustment of pressure.

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