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JAPANESE INDUSTRIAL STANDARD

**Performance Test Method of
Small Size Air Cooled
Gasoline Engines for Land Use**

JIS B 8017—1987

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by

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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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Performance Test Method of
Small Size Air Cooled
Gasoline Engines for Land Use

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1. Scope

This Japanese Industrial Standard specifies the performance test method of small size air cooled gasoline engines, hereinafter referred to as the "engine", for agriculture and engineering, and for general land use power.

Remark: The units and numerical values shown in { } in this Standard, are in accordance with the conventional system of units and, shown as informative reference.

2. Definitions

For the purposes of this Standard main terms are in accordance with JIS B 0108, JIS B 0109 and JIS B 0110, and for others the following apply:

- (1) gross brake power The brake power measured on an engine test bed by equipped with only auxiliaries required for operation of engine (auxiliaries equipping condition A of Table 1).
- (2) net brake power The brake power measured by equipped with all auxiliaries required for operation of ordinary uses of engine (auxiliaries equipping condition B of Table 1).
- (3) continuous rated power The value designated by the engine manufacturer, hereinafter referred to as the "manufacturer", as the brake power capable of operating continuously for not less than 5 h.
Further, loading of 110 % can be permitted.

Applicable Standards:

JIS B 0108-Glossary of Terms Relating to Reciprocating Internal-Combustion Engines

JIS B 0109-Glossary of Terms Relating to Reciprocating Internal-Combustion Engines (Main Parts)

JIS B 0110-Glossary of Terms Relating to Reciprocating Internal-Combustion Engines (Attachments)

JIS Z 8806-Methods of Humidity Measurement

Reference Standard:

ISO 1584 Road vehicles - Engine test code - Net power

- (4) continuous rated speed The value designated by the manufacturer, meaning the number of revolutions when the continuous rated power is designated.
- (5) 4/4 load The case where the continuous rated power is being generated at the continuous rated speed, hereinafter referred to as the "rated speed", under the standard atmospheric conditions.
- (6) 11/10 load, 3/4 load, 2/4 load, 1/4 load and no-load The cases where the ratios of powers to continuous rated power are respectively 11/10, 3/4, 2/4, 1/4 and 0 at the rated speed under the standard atmospheric conditions.
- (7) maximum power The power capable of operating stably for one minute at the power corresponding to the recommended upper limit speed on the curve which is connected with power points at full opening of throttle valve at each speed under the standard atmospheric conditions.

3. Test Items

Concerning the net brake power, tests on the following items shall be carried out. Concerning the gross brake power, only the maximum power operation shall be carried out.

- (1) Load operation test
- (2) Continuous operation test
- (3) 11/10 load operation test
- (4) Maximum power operation test
- (5) Speed governing performance test (only for one having speed governor)

4. Preparation for Test

Concerning the specimen engine, fuel, lubricating oil and instruments for test, the following preparation shall be carried out.

- (1) Specimen Engine The specimen engine shall be sampled from the manufacturing engines.
 - (a) Elements of Engine The elements of engine shall be recorded on the elements table of small size air cooled gasoline engine for land use shown in Attached Table 1.
 - (b) Arrangement of Engine Each part shall be arranged according to the arrangement gist designated by manufacturer before starting of test and, recorded on the arrangement table of the form shown in Attached Table 2.

- (2) Auxiliaries The auxiliaries at measuring the gross brake power and net brake power shall be as shown in Table 1 and the state, recorded in the operating test result table of the form shown in Attached Table 3.

The auxiliaries shall be attached in the same state as the actually equipped state as far as possible.

Further, the auxiliaries attached to the engine but required only for working of working machine or the like, shall be removed during the test. In the case where it is impossible to remove, the power to be absorbed by it under no-load state and it may be added to the brake power at the standard atmospheric conditions specified in 7.

Table 1. Auxiliaries at Measuring Gross Brake Power and Net Brake Power

Auxiliary	Existence of auxiliary		Remark
	Gross brake power (equipping condition A)	Net brake power (equipping condition B)	
Air cleaner	×	○	
Intake preheating apparatus	×	○	
Intake apparatus	△	○	
Cooling fan	○ ⁽¹⁾	○	
	×	×	For example, bearing power distributor
Exhaust silencer	×	○	
Exhaust apparatus	△	○	
Charging generator	×	○	The charging generator may be not connected to accumulator
Fuel pump	×	○	
Clutch and speed-change gear	×	×	These may be attached dependently upon structure of engine

Notes ⁽¹⁾ It is the functional part(s) required at least for measurement of brake power.

⁽²⁾ Instead of cooling fan, the required cooling wind may be supplied from outer part.

Remark: ○ mark indicates that it is equipped at testing. However, it is not arranged on the engine, it may be not equipped.

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△ mark indicates that laboratory equipment is used.

- (3) Breaking-in The operation shall be carried out according to the designation of manufacturer.
If there is no designation, after breaking-in exceeding 4 h, instrumentation of full-open powers and specific fuel consumptions at several times shall be carried out and after having become possible to reproduce within 2 %, the instrumentation, begun.
- (4) Fuel and Lubricating Oil
- (a) Fuel The fuel to be used shall be affirmed that it complies with the specifications designated by manufacturer.
For the fuel, the specific gravity (in the case where the lubricating oil is used with being mixed with the fuel, the specific gravity of only fuel) and the temperature shall be measured and the octane number, low level heating value (LHV), kJ/g {kcal/kg} and fractional distillation value according to research method shall be recorded, as required, in Attached Tables 3 and 4.
- (b) Lubricating Oil The lubricating oil shall be affirmed that it complies with the specifications designated by manufacturer. The specific gravity and temperature shall be measured and the brand and, as required, the kinematic viscosity, recorded.
- (5) Instruments for Test The calibrated instruments shall be used.

5. Measuring Conditions

- 5.1 Accuracy of Measurements The accuracy of measurements shall be as shown in Table 2.

Table 2. Accuracy of Measurements

Measuring range	No.	Measuring item	Definition	Symbol	Unit	Accuracy
General	1	Engine power shaft torque		T	$\frac{\text{N}\cdot\text{m}}{\{\text{kgf}\cdot\text{m}\}}$	$\pm 2 \%$
	2	Engine power shaft speed		N_d	min^{-1}	$\pm 2 \%$
	3	Brake power		P	$\text{kW} \{\text{PS}\}$	$\pm 3 \%$
Pressure	1	Atmospheric pressure		p_a	$\frac{\text{kPa}}{\{\text{mmHg}\}}$	$\pm 0.5 \%$
	2	Lubricating oil pressure	Oil pressure at definite points of lubricating oil system (concerning respective circuits before and after the filter, cooler, etc.)		$\frac{\text{kPa}}{\{\text{kgf}/\text{cm}^2\}}$	$\pm 5 \%$
Temperature	1	Intake temperature		θ	$^{\circ}\text{C}$	$\pm 2^{\circ}\text{C}$
	2	Exhaust temperature			$^{\circ}\text{C}$	$\pm 25^{\circ}\text{C}$
	3	Lubricating oil temperature	Oil temperature at definite point of lubricating oil system		$^{\circ}\text{C}$	$\pm 2^{\circ}\text{C}$
	4	Fuel temperature	Temperature at definite point of fuel system	θ_f	$^{\circ}\text{C}$	$\pm 5^{\circ}\text{C}$
	5	Temperature at washer of spark plug			$^{\circ}\text{C}$	$\pm 2 \%$