

JIS

JAPANESE INDUSTRIAL STANDARD

**Test Method of Performance
of Small Size Diesel Engines
for Land Use**

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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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Test Method of Performance
of Small Size Diesel Engines
for Land Use

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1. Scope

This Japanese Industrial Standard specifies the test method of performance of small size general power diesel engines mainly for agricultural and industrial use and for land use, hereafter referred to as the "engines".

Remark: The units and numerical values given in { } in this Standard are based on the traditional unit system and are appended for informative reference.

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 B 8006-Pressure Measurements of Performance for Reciprocating Internal Combustion Engines

JIS B 8007-Temperature Measurements of Performance for Reciprocating Internal Combustion Engines

JIS D 1101-Diesel Engine Smoke Measurement

JIS D 8004-Reflection Type Smokemeters for Automobile Diesel Engine

JIS K 2204-Gas Oil

JIS Z 8806-Methods of Humidity Measurement

Reference Standard:

ISO 1585 Road vehicles-Engines test code-Net power

2. Definitions

For the main terms used in this Standard the definitions in JIS B 0108, JIS B 0109 and JIS B 0110 apply, and the rest of the terms shall be as follows:

- (1) variable speed engine A powered engine used mainly with rotational speed varied.

Example: For tractor, for forklift

- (2) constant speed engine An powered engine used mainly at an approximately constant rotational speed.

Example: For generator

- (3) rated power A brake power for a variable speed engine designated by the manufacturer as the power to be generated by the engine at the rated rotational speed.

- (4) rated rotational speed A rotational speed the value of which the manufacturer specifies in designating the rated power.

- (5) continuous rated power A brake power designated by the manufacturer in conjunction with the continuous rated rotational speed as the power which the constant speed engine is capable of using continuously under the maintenance conditions specified by the manufacturer and a 10 % overload of which it is capable of sustaining temporarily.

- (6) continuous rated rotational speed A rotational speed designated by the manufacturer in conjunction with the continuous rated power together with the value specified by him.

- (7) maximum power The maximum brake power the constant speed engine is capable of generating within the bounds of the continuous rated power.

- (8) gross brake power The brake power generated by the engine equipped only with attachments required for operation of an engine (Installing condition A of Table 1, as measured on the engine test stand.

- (9) net brake power The brake power generated by the engine equipped with attachments required for a specific use of the engine and influencing its power (Installing condition B of Table 1) as measured on the engine test stand.

Table 1. Attachment Equipping Conditions

Attachment	Installing condition A (gross brake power)	Installing condition B (net brake power)
Inlet system		
Inlet manifold or inlet pipe	○	○
Crankcase emission control system	—	○
Air cleaner ⁽²⁾	—	○
Inlet air silencer	—	○
Speed limiter	×	○
Inlet manifold heater	○	○
Exhaust system		
Exhaust manifold or exhaust pipe	○	○
Connecting tube	×	○
Exhaust silencer	×	○
Tail tube	×	○
Exhaust brake ⁽⁶⁾	×	○
Fuel supply system ⁽⁷⁾		
Filter	△	○
Prefilter	△	○
Cooling system (Liquid cooling type)		
Radiator	×	○ ⁽⁹⁾ ⁽¹⁰⁾
Fan	×	○ ⁽¹¹⁾ ⁽¹²⁾
Fan cowl	×	○
Circulating pump	○	○ ⁽¹³⁾
Thermostat ⁽¹⁴⁾	○	○
(Air cooling type)		
Baffle plate	○	○
Fan	○	○
Temperature regulator	×	○
Lubricating-oil cooler	○	○
Electrical equipment ⁽¹⁵⁾	—	○
Supercharging system		
Supercharger	○	○
Charge cooler ⁽¹⁶⁾	○	○
Cooling liquid pump or fan ⁽¹⁷⁾	○	○
Cooling liquid flow rate regulator	×	○

- Notes (1) In the case of the two-cycle engine, the test shall be carried out for the engine equipped with the inlet and exhaust systems as normal accessories.
- (2) In the case of the air cleaner provided with an inlet preheater, the test shall be carried out with the preheater blocked.
- (3) In the case where there is a possibility of the engine power being inordinately affected and agreement is made between the parties concerned, the inlet system as normal accessories should be used.
In other cases, after confirming that no variance takes place of 100 Pa {0.75 mmHg} or more from the inlet pressure set for a clean air cleaner, an equivalent inlet system may be used.
- (4) The facilities of the test room may be used to muffle sounds and discharge exhaust air for carrying out the test operation so long as they do not affect the power.
- (5) In the case where it is impossible to produce a normal equipping state due to the condition of the test stand, the connection may be changed to the extent no influence is caused to the power.
In this case, the exhaust pressure measured at a position within 0.15 m downstream from exhaust manifold or exhaust pipe shall vary within 1 kPa {7.5 mmHg} from the set value.
- (6) In the case where an exhaust brake is assembled in the engine, the test shall be carried out with the throttle valve fixed at the full open position.
- (7) In the case where it is required to reproduce a fuel supply pressure for a specific use, the fuel supply pressure may be regulated.
- (8) In the case of an engine in which the cooling system constitutes an inseparable part of the engine body structure, the test shall be carried out with it fitted as it is.
- (9) Cooling may be carried out by means of either the attached radiator or outer equipment. In the case of cooling by outer equipment, the pressure loss and the inlet pressure of circulating pump shall be practically equivalent to those in the case of using the attachments.
- (10) In the case where the radiator is equipped with a shutter, the test shall be carried out with the engine fixed at the full open position.
- (11) In the case where the radiator fan and fan cowl are not mounted in the proper position with respect to the engine, install a separate fan in the proper position relative to the radiator and to the fan cowl, obtain the consumption power of fan by measurement under the suitable rotational speed or by calculation and correct the brake power of engine to the standard condition.

- (¹²) In the case of such structure that the fan can be cut off from power source, cut off the connection with the power source, and in the case of such structure that a slip is possible under the using condition, build up a condition where the slip is made maximum, and then carry out the test.
- (¹³) In the installing condition B, the circulation of cooling liquid shall be carried out using only the circulating pump of engine.
- (¹⁴) The thermostat may be fixed at the full open position.
- (¹⁵) Carry out the test of the charging generator with the power at the lowest limit required for the operation of engine. In the case where the connection of storage battery is required, use a storage battery in an excellent charging condition.
- (¹⁶) In the case of air cooling type inlet air cooler, a heat exchanger attached to the test facility having an equivalent performance in pressure loss and a temperature descent may be used.
- (¹⁷) Drive the cooling liquid pump or fan by means of an engine or an electric motor.

Remark: The mark ○ in the table indicates the attachment, and the mark × the attachment not provided.

The mark — indicates that the equipment of attachments shall be agreed upon by the parties concerned with delivery, and the mark △ indicates that devices other than the appurtenant attachments may be mounted.

3. Kinds and Items of Tests

3.1 Kinds of Test The kinds of test shall be as follows:

- (1) Type Test The type test means a test to judge whether or not the quality of a representative engine of a certain type complies with the quality items indicated in the specifications.
- (2) Delivery Test The delivery test means a test to judge at the time of delivery of products whether or not the quality of the products complies with requirements of the purchaser in terms of the design and manufacture. However for the engines of the same type as that subjected to the type test, part of the test items may be omitted.

3.2 Test Items The test items shall be indicated by the mark ○ in Table 2 as divided by the engine's intended use as a variable speed engine or as a constant speed engine.

The selection of the tests by the gross brake power by the net brake power shall be committed to agreement between the parties concerned with delivery.

Table 2. Test Items

Test item	Use			
	Variable speed engine		Constant speed engine	
	Type test	Delivery test	Type test	Delivery test
Full-load operating test	○	○		
Rated-power operating test	○			
Maximum idling-speed test	○	○	○	○
Loaded operation			○	○
Continuous rated power operating test			○	
Maximum brake power operating test			○	
Speed-governing performance test			○	○

4. Preparation for Test

Preparation shall be made for the specimen engine, fuel, lubricating oil and instruments for test as described below.

- (1) Elements of Engine Elements of engine shall be recorded on the element table for small size diesel engine for land use in the form shown in Attached Table 1.
- (2) Maintenance of Engine Prior to test, servicing shall be carried out according to the maintenance instructions specified by the manufacturer.
- (3) Attachments The attachment installing conditions for performing measurement according to gross brake power and net brake power shall, as a rule, be as specified in Table 1, respectively. However, even the attachments to be mounted as prescribed in the table, if not required for the engine depending upon the design specifications, need not be installed.

In the case where the installing conditions are different from those of Table 1 for special reasons, a statement to that effect shall be made in the operating test result table of small size diesel engine for land use in the form shown in Attached Tables 1 and 2.