INTERNATIONAL STANDARD

ISO 8665

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Small craft — Marine propulsion reciprocating internal combustion engines — Power measurements and declarations

Petits navires — Moteurs marins de propulsion alternatifs à combustion interne — Mesurage et déclaration de la puissance

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 8665 was prepared by Technical Committee ISO/TC 188, *Small craft*.

This third edition cancels and replaces the second edition (ISO 8665:1994), which has been technically revised.

Small craft — Marine propulsion reciprocating internal combustion engines — Power measurements and declarations

1 Scope

This International Standard specifies the requirements additional to ISO 15550 for determining the power of marine propulsion reciprocating internal combustion (RIC) engines when presented for documenting and checking of the declared (rated) power published by the manufacturer.

This International Standard applies to engines used for propulsion of recreational craft and other small craft of up to 24 m hull length.

This International Standard is to be used in conjunction with ISO 15550.

NOTE For determination of power for exhaust emission tests according to ISO 8178, ISO 14396 applies.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3104:1994, *Petroleum products — Transparent and opaque liquids — Determination of kinematic viscosity and calculation of dynamic viscosity*

ISO 3675:1998, *Crude petroleum and liquid petroleum products — Laboratory determination of density — Hydrometer method*

ISO 5165:1998, *Petroleum products — Determination of the ignition quality of diesel fuels — Cetane engine method*

ISO 15550:2002, *Internal combustion engines — Determination and method for the measurement of engine power — General requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 15550 and the following apply.

3.1
declared engine speed
⟨spark-ignition engines without speed governor⟩ speed at the mid-point of the full throttle speed range recommended by the manufacturer for propeller selection

4 Symbols

For the purposes of this document, the symbols given in ISO 15550:2002, Table 2, apply.

5 Standard reference conditions

The standard reference conditions used in ISO 15550:2002, Clause 5, apply.

6 Test methods

6.1 General

Test method 2 according to ISO 15550:2002, 6.3, applies.

6.2 Test conditions

ISO 15550:2002, 6.3.4.1 to 6.3.4.14, applies with the following additions.

6.2.1 The test engine or propulsion system shall be representative of the manufacturer's production units. All auxiliaries fitted shall be listed and described.

6.2.2 All equipment and auxiliaries not required by ISO 15550:2002, Table 1, column 3, shall be removed before the test.

Auxiliaries not necessary for propulsion of the craft in which the engine is intended to be installed and which may be mounted on the engine shall be removed for the test.

The following auxiliaries are given as examples:

— air-conditioning system compressor;

— flush/bilge pump.

Where auxiliaries cannot be removed they shall be operated under no-load conditions.

6.2.3 Fuel used for power measurement of spark-ignition engines shall conform to the engine manufacturer's recommendation.

6.2.4 Fuel used for power measurement of diesel (compression-ignition) engines shall meet the following specification:

Table 1

Property	Units	Limits		Method
		min.	max.	
Density at 15 °C	kg/m^3	835	845	ISO 3675:1998
Viscosity at 40 °C	mm^2/s	2,5	3,6	ISO 3104:1994
Cetane number	—	49,0	53,0	ISO 5165:1998

For diesel (compression-ignition) engines operating on distillate fuel, the fuel temperature shall be (313 ± 3) K.

NOTE This requirement is not applicable to diesel engines running on intermediate or heavy fuels.

6.2.5 Lubricating oil used shall conform to the engine manufacturer's recommendations. Record the lubricating oil type and, if applicable, viscosity of lubricant.

6.2.6 For outboard engines the cowl, if supplied as standard equipment, shall be regarded as a part of the air inlet system.

6.2.7 If the exhaust system as delivered is not complete, the back-pressure at the declared engine speed shall be within ± 0,75 kPa of the maximum back-pressure at which the declared power can be achieved, as specified by the manufacturer.

If the exhaust system as delivered is complete, the laboratory exhaust system shall maintain the exhaust pressure at the unit outlet within ± 0,75 kPa of the barometric pressure at the test bed.

6.2.8 If the engine air inlet is connected to a laboratory air system, the system shall supply air to the engine within ± 0,75 kPa of the barometric pressure at the test bed.

6.2.9 For liquid-cooled engines, the temperature of the coolant at the raw-water inlet shall be maintained at 298 K ± 15 K (25 °C ± 15 °C) except that for engines with charge air cooler the temperature shall be maintained at 298 K ± 5 K (25 °C ± 5 °C).

The raw-water coolant inlet pressure shall not exceed 50 kPa. Propulsion systems not fitted with a raw-water pump are exempted from this requirement.

The coolant outlet temperature shall be within the range specified by the manufacturer if such a range is specified.

6.3 Production conformity test/manufacturing tolerance

The declared power shall indicate the average run-in power measured on engines in production. In a production conformity test the measured power at declared speed of any individual marine propulsion engine or propulsion system shall not deviate from the declared power by more than

a) ± 5 % for engines or propulsion systems with speed governors of more than 100 kW declared power, or

b) ± 10 % or ± 0,45 kW, whichever is greater, for all other engines and propulsion systems.

7 Method of power correction

The method of power correction according to ISO 15550:2002, Clause 7, applies.

8 Measurement of exhaust emissions

ISO 15550:2002, Clause 8, does not apply.

9 Test report

9.1 General

ISO 15550:2002, 9.2, applies with the following addition.

The presentation of ISO 15550:2002, 9.2.2.4, Table 13, does not apply and shall be replaced by the following:

— engine speed;

— torque;

— intake air temperature and pressure (see ISO 15550:2002, 6.3.4.3);

— fuel temperature [for diesel (compression-ignition) engines only] (see 6.2.4);

— ambient air temperature of the atmosphere (see ISO 15550:2002, 6.3.4.2);

— barometric pressure at the test bed (see ISO 15550:2002, 6.3.4.2);

— humidity (see ISO 15550:2002, 6.3.4.2);

— power correction factor (see ISO 15550:2002, Clause 7);

— laboratory exhaust system pressure (see 6.2.7);

— lubricating oil temperature (see ISO 15550:2002, 6.3.4.12);

— coolant temperature at raw-water inlet and engine outlet (see 6.3.4.10 in ISO 15550:2002 and 6.2.9 in this International Standard);

— raw-water coolant supply pressure (see 6.2.9);

— exhaust back-pressure (see 6.2.7);

— fuel specification, only required for diesel engines (see 6.2.4).

The following optional data should be recorded where applicable or for safety of operation:

a) lubricating oil pressure;

b) intake air temperature and pressure inside the air intake manifold;

c) exhaust gas temperature;

d) ignition or injection timing or ignition advance curve for engines equipped with electronic control;

e) fuel supply pressure at supply-pump outlet;

f) fuel consumption per unit of time.

9.2 Declaration of data

9.2.1 Declaration of power

A statement of a single value of declared power shall be accompanied by a statement of the declared engine speed.

The declaration of power shall always indicate whether the power is propeller-shaft power or crankshaft power.

9.2.2 Declaration of propeller-shaft power

The propeller-shaft power shall be declared for engines sold with a complete propulsion unit or at the coupling to the propeller shaft of engines sold with reduction and/or reversing gear.

9.2.3 Exhaust back-pressure

The declaration of power shall be accompanied by a statement of maximum permissible exhaust back-pressure at which the declared power can be achieved.

9.2.4 Alternative presentation

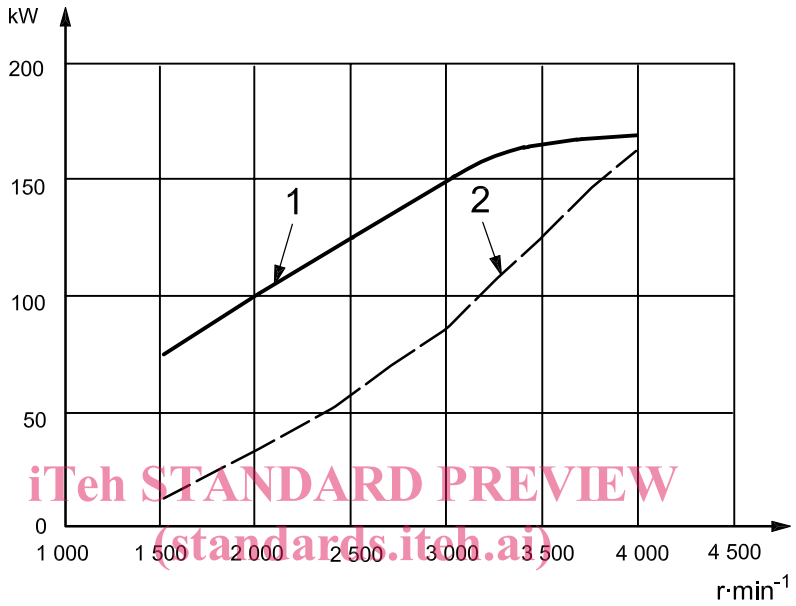
Power and engine speed may alternatively be presented as a power curve (see Annexes A and B).

9.2.5 Reference to ISO 8665

Reference shall be made to ISO 8665.

Annex A
(informative)

Alternative method for presentation of power for engines sold with a complete propulsion unit



Key

1 full load propeller-shaft power

2 propeller-shaft power

Figure A.1 — Propeller-shaft power at full load and propeller-shaft power at calculated propeller load (exponent 2,5)