
**Small craft — Determination of
maximum propulsion power rating
using manoeuvring speed —**

**Part 2:
Craft with a length of hull between 8 m
and 24 m**

*Petits navires — Détermination de la puissance maximale de
propulsion en utilisant la vitesse de manoeuvre —*

Partie 2: Navires d'une longueur de coque comprise entre 8 m et 24 m



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Published in Switzerland

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the voluntary nature of Standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 188, *Small craft*, Subcommittee SC 2, *Engines and propulsion systems*.

A list of all parts in the ISO 11592 (series) can be found on the ISO website.

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Small craft — Determination of maximum propulsion power rating using manoeuvring speed —

Part 2: Craft with a length of hull between 8 m and 24 m

1 Scope

This document specifies the requirements for determining the maximum propulsion power rating using manoeuvring speed for engine-driven craft with a length of the hull (L_H , as defined in ISO 8666) between 8 m and 24 m.

This document is applicable to craft with a calculated Froude number (F_n) $\geq 1,1$.

This document is not applicable to:

- inflatable craft, as defined by ISO 6185-4;
- craft designed and constructed solely for competitive racing (racing craft);
- craft primarily designed not to be engine driven.

This document does not specify craft constructional strength requirements related to maximum propulsion power rating and does not guarantee stability under all conditions of seaway, wind, wakes and waves.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 7010:—¹⁾, *Graphical symbols — Safety colours and safety signs — Registered safety signs*

ISO 8666:2016, *Small craft — Principal data*

ISO 10087:2019, *Small craft — Craft identification — Coding system*

ISO 10240:—²⁾, *Small craft — Owner's manual*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

1) Under preparation (revision of ISO 7010:2011). Stage at the time of publication: ISO/FDIS 7010:2019.

2) Under preparation (revision of ISO 10240:2004). Stage at the time of publication: ISO/DIS 10240:2019.

3.1 engine power

engine manufacturer's declared power

Note 1 to entry: Engine power rated as specified in ISO 8665.

3.2 craft speed

speed of the craft through the water

3.3 propulsion

transformation of mechanical power to a force to move the craft through the water

Note 1 to entry: This is normally accomplished with a propeller but other devices can be used, such as a propulsive nozzle (waterjet).

3.4 Froude number

F_n

speed to length ratio, calculated as follows:

$$F_n = \frac{v_{\max}}{\sqrt{g \times L_{WL}}}$$

where

$v_{\max}$ is the maximum craft speed, expressed in metres per second (m/s);

g is the gravitational constant, $g = 9,8 \text{ m/s}^2$;

L_{WL} is the waterline length (as defined in ISO 8666), expressed in metres (m).

3.5 maximum manoeuvring speed

maximum speed (knots) at which the craft successfully passes all required tests

3.6 maximum craft speed

$v_{\max}$

average maximum speed (knots) of the craft when tested on a straight course in two opposite directions

3.7 maximum test speed limit

$v_{t \max}$

maximum speed, limited to 70 knots, at which the craft is tested when $v_{\max}$ is greater than $v_{t \max}$

$$v_{t \max} = 3L_H + 24$$

where L_H is the length of hull, as defined in ISO 8666.

4 General requirements

4.1 The maximum propulsion power rating shall be derived using the results of the tests specified in [Clause 6](#) and [Clause 7](#). These tests shall be used for determining the maximum manoeuvring speed.

4.2 Craft fitted with steering means other than a steering wheel shall pass the avoidance line test specified in [Clause 7](#).

4.3 Craft fitted with a steering wheel shall pass the quick turn test specified in [Clause 6](#).

4.4 The craft shall pass the tests at no less than 85 % of maximum craft speed ($v_{\max}$) or the maximum test speed limit ($v_{t \max}$), whichever is the lower, with the most powerful engine recommended by the craft manufacturer.

$v_{t \max}$ shall not be more than 70 knots.

4.5 The craft shall be equipped with a warning label in accordance with [Clause 9](#), and provide information in the owner's manual in accordance with [Clause 10](#), if:

- a) $v_{\max} < v_{t \max}$ and the craft fails to pass the avoidance line test and/or the quick turn test at 100 % $v_{\max}$, provided it passes the tests at not less than 85 % $v_{\max}$, or
- b) $v_{\max} \geq v_{t \max}$ and the craft passes the avoidance line test and/or the quick turn test at 100 % $v_{t \max}$.

Additionally, craft requiring a warning label shall have a speed measuring device visible from the helm station(s).

4.6 If the maximum manoeuvring speed is less than required in [4.4](#), the craft manufacturer shall change the installed engine(s) to an engine(s) giving a lower power output, or modify the craft in order to comply with [4.4](#).

5 Test procedures

5.1 Purpose of the tests

Determination of maximum manoeuvring speed at which the craft complies with the avoidance line test and/or the quick turn test.

5.2 Craft preparation

5.2.1 The craft shall be in the performance test mass condition (m_p), as defined in ISO 8666, rigged with equipment for safe operation of craft, engine and operator.

5.2.2 The maximum craft speed, $v_{\max}$, shall be determined by no less than two timed passages over a measured distance in both directions, or by any other suitable and accepted means of craft speed measurement accurate within one knot of true craft speed.

5.2.3 The craft shall be equipped with engine(s) giving the maximum engine power recommended by the craft manufacturer (see [4.4](#) and [4.6](#)).

5.2.4 Equipment shall be installed in accordance with the equipment manufacturer's recommendations.

5.2.5 During the test, the speed should be measured with an accuracy of $\pm$ one knot.

5.2.6 A steering system with the lowest ratio (quickest turn) offered on the craft model shall be installed. For propeller-driven craft, the craft manufacturers' or the engine manufacturer's recommended propeller shall be mounted. If different propellers are offered, the propeller providing maximum craft speed shall be used.

5.2.7 If the maximum engine power can be met with a single or multiple engines, the craft shall be tested with the configuration giving the maximum speed.

5.2.8 If changing the position of the propulsion unit can be accomplished without the use of tools, then the position for mounting the propulsion unit giving the highest speed shall be determined and recorded.

The test shall be conducted in such position and in accordance with the installation instructions from the propulsion unit manufacturer.

5.2.9 Craft bottom, engine and propeller (if applicable) shall be clean and in as-new condition.

5.2.10 Stabilizers may be activated if needed to attain maximum craft speed.

5.2.11 The propulsion unit trim angle, or other hull trim devices, if installed, shall be adjusted to provide maximum craft speed, without loss of directional control, i.e. without excessive porpoising, chine walking or propeller ventilation or cavitation.

NOTE Porpoising is the self-sustaining cyclic vertical oscillation of a craft as a result of pitching up and down. Chine walking is a violent, often rapid, side to side oscillation.

5.3 Test conditions

5.3.1 Testing shall be conducted on calm water with the wind speed below 18 km/h (10 knots) and maximum wave height of $L_H/75$ m or 0,2 m whichever is higher.

NOTE Wave height is the vertical distance between the lowest point of a wave to the highest point.

5.3.2 Operator skill and familiarity with a particular craft and engine combination will affect the test results. Therefore, the operator should make a number of practice runs at any throttle setting before running any test.

5.3.3 The craft test speed shall not exceed $v_{\max}$ or $v_{t \max}$, whichever is less.

5.3.4 Begin the test sequences at low craft speed and increase incrementally until the maximum manoeuvring speed is safely reached by the operator.

6 Quick turn test

6.1 Operate the craft straight ahead. Turn the steering wheel 180° or to the limit of rotation, whichever is less, in one direction in 0,5 s or less and hold it at that position without changing the throttle or trim settings during or after the wheel is turned. The test shall be repeated in both port and starboard turns.

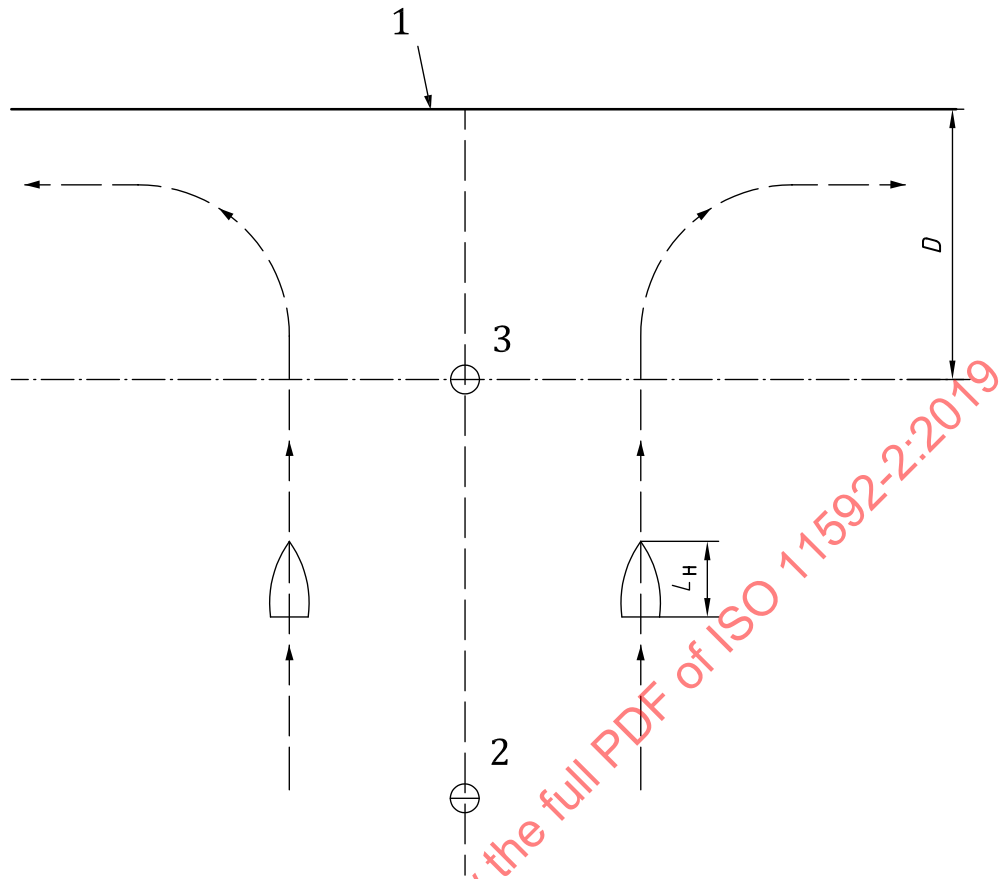
6.2 To pass the test successfully, the craft shall complete a 90° turn without the operator's loss of control of the craft and no difficulty maintaining position at the helm.

6.3 The maximum speed at which the craft pass the test shall be verified by no fewer than two passes in both directions (180° apart) by a suitable means of craft speed measurement accurate within $\pm$ one knot of craft true speed.

7 Avoidance line test

7.1 Operate the craft, straight ahead on a course parallel to the line between marker A and marker B, as shown in [Figure 1](#).

7.2 Execute a turn when the bow of the craft reaches marker B, as shown in [Figure 1](#), without reducing the craft speed and without crossing the avoidance line, and assume a course parallel to the avoidance line.

**Key**

- 1 avoidance line (marked with a minimum of three buoys or equivalent)
- 2 buoy or equivalent
- 3 buoy or equivalent

Figure 1 — Avoidance line test course

7.3 To pass the test successfully, the craft shall complete three consecutive turns to port side and three consecutive turns to starboard side without the operator's loss of control of the craft and no difficulty for the operator to maintain position at the helm.

7.4 The distance, D , in meters (m), from the avoidance line at which turns are initiated shall be:

- a) for craft with a maximum speed of ≤ 30 knots (56 km/h): $D = 6 \times L_H$;
- b) for craft with a maximum speed above 30 knots (56 km/h): $D = 6L_H + (0,1 \times L_H + 1,2) (V - 30)$.

where

V is the speed (knots), and is the lower of $v_{\max}$ or $v_{t \max}$;

L_H is the length of the hull (metres), as defined in ISO 8666.

8 Documentation

The following parameters shall be documented:

- name and type of craft;

- craft manufacturer;
- craft identification number (CIN) according to ISO 10087;
- load conditions;
- propulsion type;
- number of engines;
- engine power and their specification and make;
- propeller, manufacturer, article number, type, diameter/pitch, number of blades;
- outboard mounting vertical position (if applicable);
- hull antifouling system (if applicable);
- trim devices (trim tabs, stern drives, etc.) parameters;
- rudder dimensions (if applicable);
- steering system ratio;
- thrusters (if applicable);
- result of the tests expressed as the maximum manoeuvring speed, in knots, at which the craft successfully passed the avoidance line test and/or the quick turn test;
- date and location of test.

9 Warning labels

9.1 Craft tested and meeting the criteria in accordance with [4.5 a\)](#) shall have the following warning label:

“SUDDEN, SHARP TURNS ABOVE XX knots (YY km/h) MAY CAUSE LOSS OF BOAT CONTROL, WHICH COULD RESULT IN SERIOUS INJURY OR DEATH. REDUCE SPEED BEFORE ATTEMPTING A SUDDEN SHARP TURN. READ OWNER'S MANUAL FOR ADDITIONAL INFORMATION.”

The declared craft manoeuvring speed in the warning message shall be the lower of the speeds for which the craft fulfilled the avoidance line test and the quick turn test.

9.2 Craft tested and meeting the criteria in accordance with [4.5 b\)](#) shall have the following warning label:

“THIS CRAFT HAS ONLY BEEN MANOEUVRE-TESTED FOR SPEEDS UP TO XX knots (YY km/h).

SUDDEN, SHARP TURNS ABOVE XX knots (YY km/h) MAY CAUSE LOSS OF BOAT CONTROL, WHICH COULD RESULT IN SERIOUS INJURY OR DEATH. REDUCE SPEED BEFORE ATTEMPTING A SUDDEN SHARP TURN. READ OWNER'S MANUAL FOR ADDITIONAL INFORMATION.”

The declared craft speed in the warning message shall be the maximum test speed at which the craft has been tested.

9.3 Warning labels shall be posted on the craft, in a legible manner, and in a location visible to the operator from the helm position(s).

9.4 Warning labels shall have a general warning sign in accordance with ISO 7010-W001.

9.5 If electronic means are used to display the warning, it shall be continuously and clearly visible by the operator from the helm position(s) when the craft is operating above the manoeuvring speed.

10 Owner's manual

The owner's manual provided with the craft shall be in accordance with ISO 10240, and shall include at least the following additional information:

- a) information on maximum manoeuvring speed XX knots (YY km/h) and any required warning labels, see [Clause 9](#);
- b) information of maximum recommended engine power, as well as a warning not to install engine(s) with power output higher than recommended by the manufacturer, which could cause loss of craft control and result in serious injury or death.

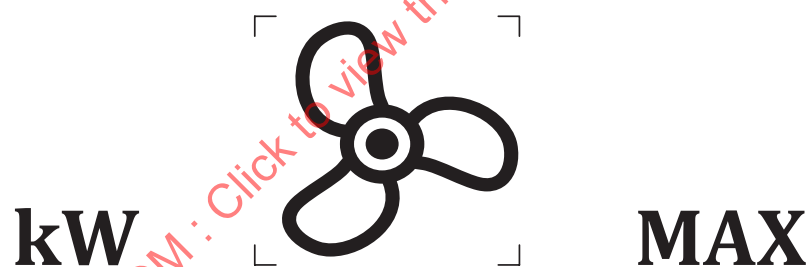
11 Engine power label

Engine driven craft tested according to this document shall display the maximum recommended engine power rating on a permanent label or on the builder's plate.

For outboard powered craft, this label shall be located so as to be easily visible to the operator.

For all other powered craft, it shall be located in the cockpit interior or in the engine compartment of the craft.

The label shall give the maximum engine power rating of the craft as determined in accordance with this document. The maximum engine power rating indicated on the label shall be expressed by the propeller symbol ISO 7000-3646, and/or in a language acceptable in the country of use. See [Figure 2](#).



Propeller symbol ISO 7000-3646.

Figure 2 — Maximum engine power indication label