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## Small craft — Steering wheels

*Petits navires — Barres à roues*

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CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
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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](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of 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 [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 188, *Small craft*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 464, *Small craft*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This first edition of ISO 23411, together with ISO 8848:2020, cancels and replaces ISO 8848:1990, ISO 9775:1990 and ISO 15652:2003, which have been technically revised.

The main changes compared to the previous editions are as follows:

- the steering wheel requirements from ISO 8848:1990, ISO 9775:1990 and ISO 15652:2003 have been consolidated into this document;
- the requirements have been updated to meet current industry practices.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

Previously, steering wheels were addressed in ISO 8848:1990, ISO 9775:1990 and ISO 15652:2003. A review of the steering standards for a merge project found that updates were needed for consistency and to meet current industry practices. This document thus provides a consistent approach for the design and testing of steering wheels for small craft.

Steering wheel size and application was considered in the development of this document for small craft under foreseeable operating conditions. It is recognized that high speed craft experience additional impact loads and these are addressed in the document.

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# Small craft — Steering wheels

## 1 Scope

This document specifies design and testing requirements for steering wheels for small craft.

## 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 25197:2020, *Small craft — Electrical/electronic control systems for steering, shift and throttle*

## 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 <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

### 3.1

#### steering mechanism

device, to which a control element is attached for manual application of a controlling force, and by which the controlling force is fed into a steering system

### 3.2

#### minimum retained system performance

system performance after testing, such that at least 90 % of the engine steering arm travel normally available to each side of the mid-position is obtained by exertion of no more than 27 Nm of torque at the *steering mechanism* (3.1) through the wheel or other normal control

Note 1 to entry: This criterion does not define the steering system performance while the craft is underway, but is rather intended to provide qualitative limits for design and test purposes.

### 3.3

#### steering wheel diameter

##### actual diameter

$D_a$

diameter of the circle formed by the outermost sections of the steering wheel

Note 1 to entry: See [Figure 1](#).

### 3.4

#### steering wheel dish

distance between the two parallel planes formed by the aft rim surface and the forward hub surface of a steering wheel

Note 1 to entry: See [Figure 1](#).

**3.5  
pinch point**

location at which a moving part comes into contact with, or in close proximity to, another part, so that another object at that location would be cut or crushed

**3.6  
craft  
small craft**

recreational boat, and other watercraft using similar equipment, of up to 24 m length of hull ( $L_H$ )

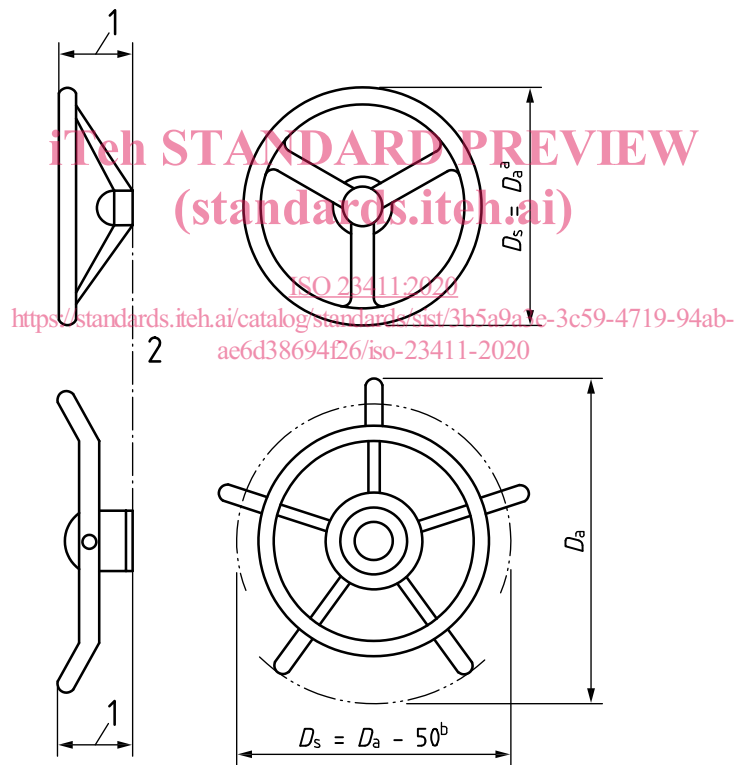
Note 1 to entry: The measurement methodology for the length of hull is defined in ISO 8666.

[SOURCE: ISO 8666:2020, 3.15, modified – Note 1 to entry has been added.]

**4 General requirements**

**4.1** Steering wheels shall be permanently marked by their manufacturer with the steering wheel diameter and the steering wheel dish measurements (see [Figure 1](#)).

Dimensions in millimetres



**Key**

- 1 steering wheel dish
- 2 forward hub surface

$D_a$  actual diameter

$D_s$  standard diameter for the application of loads

<sup>a</sup> For steering wheels without handgrips,  $D_s = D_a$ .

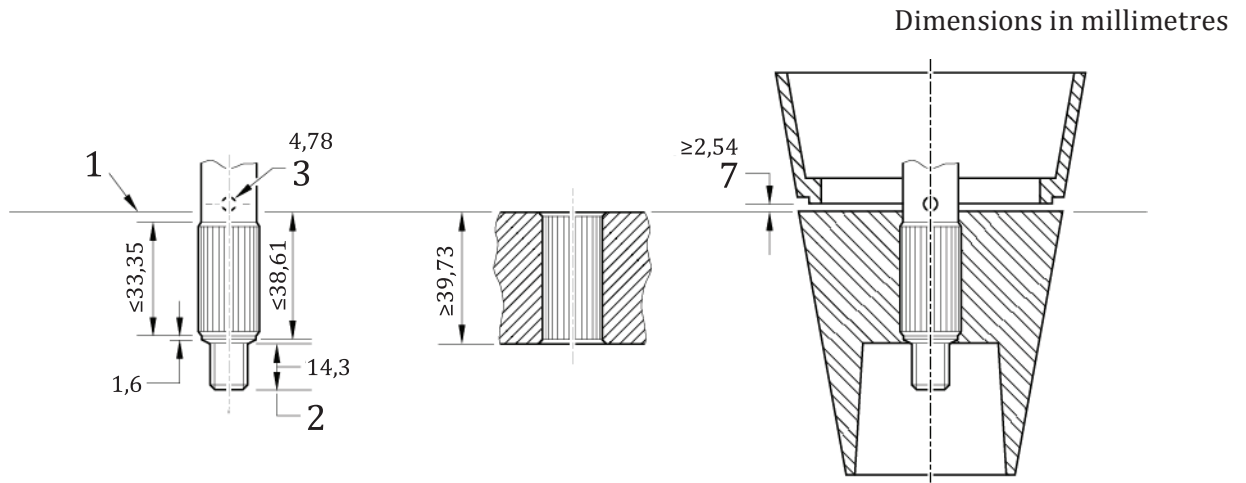
<sup>b</sup> For external spoke steering wheels,  $D_s = D_a - 50$  mm.

NOTE For non-circular steering wheels,  $D_s$  is the largest diameter that can be inscribed in the steering wheel shape.

**Figure 1 — Steering wheel terms**



4.2 Steering wheels and steering mechanism shafts shall be selected to fit each other. Current fit configurations are shown in Figure 2a, 2b, 2c.



Spline data – Shaft

Spline data –Hub

Module	1.14	Module	1.14
# of teeth	19	# of teeth	19
Pressure angle	45°	Pressure angle	45°
Outside diameter	17,78 – 17,45	Outside diameter	17,86 – 17,81
Minor diameter	15,77 – 15,66	Minor diameter	16,15 – 16,00
Pitch diameter	16,64	Pitch diameter	16,64
Tooth thickness @ P.D.	1,47 – 1,44	Tooth thickness @ P.D.	1,47 – 1,44
Base circle diameter	11,77	Base circle diameter	11,77

a) Spine shaft and steering wheel hub