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Small craft — Hull construction and scantlings —

Part 7: Determination of loads for multihulls and of their local scantlings using ISO 12215-5

Petits navires — Construction de la coque et échantillonnage —

Partie 7: Détermination des charges des multicoques et de leur échantillonnage local en utilisant l'ISO 12215-5

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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 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.

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

A list of all parts in the ISO 12215 series can be found on the ISO website.

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.

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Introduction

The reason underlying the preparation of this document is that standards and recommended practices for loads on the hull and the dimensioning of small craft differ considerably, thus limiting the general worldwide acceptability of boat scantlings. This document has been set towards the minimal requirements of the current practice.

The dimensioning according to this document is regarded as reflecting current practice, provided the craft is correctly handled in the sense of good seamanship and operated at a speed appropriate to the prevailing sea state in a safe and responsible manner, having due cognisance of the prevailing conditions.

Implementation of this document allows to achieve an overall structural strength that ensures the watertight and weathertight integrity of the craft. This document is intended to be a tool to determine the scantlings of a craft as per minimal requirements. It is not intended to be a structural design procedure.

The mechanical property data supplied as default values in this document make no explicit allowance for deterioration in service nor provide any guarantee that these values can be obtained for any particular craft.

Like the other parts of ISO 12215, this document was developed to assess the structure of recreational craft up to 24 m L_H, but it can also be used, where relevant, for non-recreational craft, workboats or yachts with an IMO load line length of up to 24 m, with the necessary critical mind.

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Small craft — Hull construction and scantlings —

Part 7: Determination of loads for multihulls and of their local scantlings using ISO 12215-5

1 Scope

This document defines the dimensions, local design pressures and global loads acting on multihull craft with a hull length (L_H) or load line length of up to 24 m (see Note). It considers all parts of the craft that are assumed watertight or weathertight when assessing stability, freeboard and buoyancy in accordance with ISO 12217 (all parts). Scantlings corresponding to the local design pressures are then assessed using ISO 12215-5.

NOTE The load line length is defined in the OMI "International Load Lines Convention 1966/2005", it can be smaller than L_H for craft with overhangs. This length also sets up at 24 m the lower limit of several IMO conventions.

This document is applicable to multihulls built from the same materials as in ISO 12215-5, in intact condition, and of the two following types:

— recreational craft, including recreational charter vessels;

— commercial craft and workboats.

It is not applicable to multihull racing craft designed only for professional racing.

This document is applicable to the structures supporting windows, portlights, hatches, deadlights and doors.

For the complete scantlings of the craft, this document is intended to be used in conjunction with ISO 12215-8 for rudders, ISO 12215-9 for appendages of sailing craft and ISO 12215-10 for rig loads and rig attachment in sailing craft. ISO 12215-6 can be used for additional details.

Throughout this document, unless otherwise specified, dimensions are in (m), areas in (m^2), masses in (kg), forces in (N), moments in (Nm), Pressures in (kN/m^2) (1 kN/m^2 = 1 kPa), stresses and elastic modulus in (N/mm^2) (1 N/mm^2 = 1 MPa).

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 8666:2020, *Small craft — Principal data*

ISO 12215-5:2019, *Small craft — Hull construction and scantlings — Part 5: Design pressures for monohulls, design stress, scantlings determination*

ISO 12215-8:2009, *Small craft — Hull construction and scantlings — Part 8: Rudders*

ISO 12215-9:2012, *Small craft — Hull construction and scantlings — Part 9: Sailing craft appendages*

ISO 12215-10:2020, *Small craft — Hull construction and scantlings — Part 10: Rig loads and rig attachments in sailing craft*

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ISO 12217-1:2015, *Small craft — Stability and buoyancy assessment and categorization — Part 1: Non-sailing boats of hull length greater than or equal to 6 m*

ISO 12217-2:2015, *Small craft — Stability and buoyancy assessment and categorization — Part 2: Sailing boats of hull length greater than or equal to 6 m*

ISO 12217-3:2015, *Small craft — Stability and buoyancy assessment and categorization — Part 3: Boats of hull length less than 6 m*

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
multihull
craft with two or more hulls with a connecting *wet deck* (3.8)/crossbeams above the loaded waterline, as opposed to a tunnel boat or scow

Note 1 to entry: See Clause 6 and Figure 2 for the main dimensions of a multihull.

3.2
design categories
description of the sea and wind conditions for which a craft is assessed to be suitable

Note 1 to entry: The design categories are defined in ISO 12217 (all parts).

Note 2 to entry: The definitions of the design categories are in line with the European Recreational Craft Directive 2013/53/EU.

[SOURCE: ISO 12215-5:2019, 3.1.]

3.3
loaded displacement
m_{LDC}
mass of water displaced by the craft, including all appendages, when in fully loaded ready for use condition

Note 1 to entry: The fully loaded ready for use condition is further defined in ISO 8666.

[SOURCE: ISO 12215-5:2019, 3.2.]

3.4
mass in minimum operating conditions
m_{OC}
mass of the craft in minimum operating condition

Note 1 to entry: The minimum operating condition is further defined in ISO 8666.

3.5
sailing craft
craft for which the primary means of propulsion is wind power

Note 1 to entry: It is further defined in ISO 8666.

Note 2 to entry: In this document, non-sailing craft are considered as motor craft.

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[SOURCE: ISO 12215-5:2019, 3.3.]

3.6
beam of hull
B_H
beam across the outer hulls

Note 1 to entry: The measurement of the beam of hulls is specified in ISO 8666.

3.7
chine beam
B_C
beam at chine of planing hulls

Note 1 to entry: It is further characterized in 6.1.2.

3.8
wet deck
underside area of the structure connecting hulls with an area greater than 5 % L_H B_H

Note 1 to entry: Some *multihulls* (3.1) have no wet deck but just crossbeams. i.e. connecting beams.

3.9
craft speed
V
for motor craft, maximum speed in calm water and m_{LDC} condition that is declared by the manufacturer, expressed in knots

[SOURCE: ISO 12215-5:2019, 3.6.]

3.10
displacement craft
motor craft whose speed is such that $V < 5\sqrt{L_{WL}}$

[SOURCE: ISO 12215-5:2019, 3.7, modified - the definition is reworded.]

3.11
displacement mode
mode of running of a motor craft in the sea such that its mass is mainly supported by buoyancy forces

Note 1 to entry: This is the case where the actual speed in a seaway in m_{LDC} condition is such that its speed/length ratio makes the craft behave as a *displacement craft* (3.10).

[SOURCE: ISO 12215-5:2019, 3.8, modified - in the definition, "craft" is replaced with "motor craft".]

3.12
planing craft
motor craft whose speed is such that $V \geq 5\sqrt{L_{WL}}$

Note 1 to entry: This speed/length ratio limit has been arbitrarily set up in this document, but it can vary from one craft to another according to hull shape and other parameters.

[SOURCE: ISO 12215-5:2019, 3.9, modified - the definition is reworded.]

3.13
planing mode
mode of running of a motor craft in the sea such that a significantly part of its mass is supported by forces coming from dynamic lift due to speed in the water

Note 1 to entry: A *planing craft* (3.12) in calm water runs in planing mode, but it can be obliged to significantly reduce its speed when the sea gets worse, running in that case in *displacement mode* (3.11).

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[SOURCE: ISO 12215-5:2019, 3.10, modified - the definition slightly reworded and "craft" replaced with "motor craft".]

3.14
non-walking area
area of the craft comprising those areas defined in the owner's manual as being both outside of the working deck and where people are not liable to stand or walk in normal or emergency operation, and those of the working deck of a *multihull* (3.1) with an inclination of more than 25° against the horizontal in the longitudinal and transverse directions

Note 1 to entry: All other areas of the working deck, cockpit bottom and superstructures are deemed to be walking areas.

4 Symbols

Unless specifically otherwise defined, the symbols shown in Table 1 are used in this document. The symbols are shown by group type and in alphabetical order.

Unless otherwise specified, all dimensions, measured in m_{LDC} condition, are according to ISO 12217.

Table 1 — Symbols, dimensions, factors, parameters

Symbol	Unit	Designation/Meaning of symbol	Reference/ Clause concerned
General dimensions and data			
B_{BH}	m	Beam between hulls as defined in Table 4	6.1, Fig 2 & Annex D
B_C	m	Chine beam at 0,4 L_{WL} from the origin used for k_{DYNM1} and $P_{BMUP\ BASE}$	6.1.1, Fig 1 & Table 7
B_{CB}	m	Beam between centres of buoyancy	6.1, 12.5 & Fig 2
B_{CP}	m	Beam between upper shrouds chainplates	Annex B
B_{WDx}	m	Beam at the inside of wet deck/beam connection with hulls at section x	6.1.3 & Fig 2
B_H	m	Beam of hull according to 3.6	6.1 & Fig 2
B_{nOHi}	m	Beam at overhang root, n = F(fwd) M(mid), A(Aft), and i = H(Hull), F(Float)	Table 11, Fig 9
L_{nOHi}	m	Length of overhang, n = F(fwd) M(mid), A(Aft), and i = H(Hull), F(Float)	Table 11, Fig 9
D_{ROH}	m	Depth of hull at overhang root	Table 11, Fig 9
D_{WL}		Design Waterline plan or section	6.1.3, Figure 2
h_{SIDEx}	m	Height of mid panel of cockpit side or stiffener below overflow level	Table 5 it. 10
H_{SUPx}	m	Height of mid panel or stiffener above the lesser of Z_{SDTMx} or Z_{SDAMx}	Table 5 it. 10
$L_{C\,i}$	m	Length of crossbeam i	Table 11, Fig 9
L_{BB}	m	Length between main beams centre of inertia	Annex B & C
L_H	m	Length of hull	1
L_{FLOAT}	m	Length of a trimaran float	9.4 & Fig 9
L_{WL}	m	Length of waterline	Fig 2
m_{LDC}	kg	Mass of craft in fully loaded condition	3.3, 9
m_{MO}	kg	Mass in minimum operating condition	3.4, 11
T_C	m	Max canoe body draught (see Figure 2)	Fig 2, 9.3
V	Knots	Craft maximum speed in m_{LDC} condition	3.9, Table 5 it. 2
Panels, stiffeners and local dimensions and data			
A_D	m^2	Panel or stiffener supported area	Table 5 it. 9

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