SLOVENSKI STANDARD
oSIST prEN ISO 12217-1:2021

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Mala plovila - Stabilnost in ocena vzgona ter kategorizacija - 1. del: Čolni razen jadrnic s trupom, večjim ali enakim 6 m (ISO/FDIS 12217-1:2020)

Small craft - Stability and buoyancy assessment and categorization - Part 1: Non-sailing boats of hull length greater than or equal to 6 m (ISO/FDIS 12217-1:2020)

Kleine Wasserfahrzeuge - Stabilitäts- und Auftriebsbewertung und Kategorisierung - Teil 1: Nicht-Segelboote ab 6 m Rumpflänge (ISO/FDIS 12217-1:2020)

Petits navires - Évaluation et catégorisation de la stabilité et de la flottabilité - Partie 1: Bateaux à propulsion non vélique d'une longueur de coque supérieure ou égale à 6 m (ISO/FDIS 12217-1:2020)

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12217-1**

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Small craft — Stability and buoyancy assessment and categorization —

Part 1:
Non-sailing boats of hull length greater than or equal to 6 m

Petits navires — Évaluation et catégorisation de la stabilité et de la flottabilité —
Partie 1: Bateaux à propulsion non vélique d'une longueur de coque supérieure ou égale à 6 m

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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).

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).

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.

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 fourth edition of ISO 12217-1 cancels and replaces the third edition (ISO 12217-1:2015), of which it constitutes a minor revision. The changes compared to the previous edition are as follows:

— all normative references have been updated and dated;

— the “allowance for the maximum mass of optional equipment and fittings not included in the manufacturer’s basic outfit” has been moved from 3.4.4 (maximum load) to 3.4.5 (maximum load condition);

— in Annex J, the calculation worksheet No. 1 has been corrected to reflect the above;

— minor editorial changes throughout the document.

A list of all parts in the ISO 12217 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.

Introduction

This document enables the determination of the limiting environmental conditions for which an individual boat has been designed.

It enables the boat to be assigned to a design category appropriate to its design and maximum load. The design categories used align with those in the Recreational Craft Directive of the European Union, EU Directive 2013/53/EU.

The design category given in respect of stability and buoyancy is that for which the boat satisfies all the requirements according to 5.3, as summarized in Annex I.

Small craft — Stability and buoyancy assessment and categorization —

Part 1:
Non-sailing boats of hull length greater than or equal to 6 m

CAUTION — Compliance with this document does not guarantee total safety or total freedom of risk from capsize or sinking.

IMPORTANT — The electronic file of this document contains colours which are considered to be useful for the correct understanding of the document. Users should therefore consider printing this document using a colour printer.

1 Scope

This document specifies methods for evaluating the stability and buoyancy of intact (i.e. undamaged) boats. The flotation characteristics of boats susceptible to swamping are also encompassed.

The evaluation of stability and buoyancy properties using this document will enable the boat to be assigned to a design category (A, B, C or D) appropriate to its design and maximum total load.

This document is principally applicable to boats propelled by human or mechanical power of 6 m up to 24 m hull length. However, it can also be applied to boats of under 6 m if they do not attain the desired design category specified in ISO 12217-3 and they are decked and have quick-draining recesses which comply with ISO 11812.

In relation to habitable multihulls, this document includes assessment of susceptibility to inversion, definition of viable means of escape and requirements for inverted flotation.

This document excludes:

— inflatable and rigid-inflatable boats covered by ISO 6185, except for references made in ISO 6185 to specific clauses of ISO 12217;

— personal watercraft covered by ISO 13590 and other similar powered craft;

— gondolas and pedalos;

— sailing surfboards;

— surfboards, including powered surfboards;

— hydrofoils and hovercraft when not operating in the displacement mode; and

— submersibles.

NOTE Displacement mode means that the boat is only supported by hydrostatic forces.

It does not include or evaluate the effects on stability of towing, fishing, dredging or lifting operations, which need to be separately considered if appropriate.

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 2896:2001, *Rigid cellular plastics — Determination of water absorption*

ISO 3864-1:2011, *Graphical symbols — Safety colours and safety signs — Part 1: Design principles for safety signs and safety markings*

ISO 6185-4:2011, *Inflatable boats — Part 4: Boats with a hull length of between 8 m and 24 m with a motor power rating of 15 kW and greater*

ISO 8666:2020, *Small craft — Principal data*

ISO 9093:—[1], *Small craft — Seacocks and through-hull fittings*

ISO 10240:2019, *Small craft — Owner's manual*

ISO 11812:2020, *Small craft — Watertight or quick-draining recesses and cockpits*

ISO 12216:2020, *Small craft — Windows, portlights, hatches, deadlights and doors — Strength and watertightness requirements*

ISO 12217-2:—[2], *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:—[3], *Small craft — Stability and buoyancy assessment and categorization — Part 3: Boats of hull length less than 6 m*

ISO 14946:—[4], *Small craft — Maximum load capacity*

ISO 15083:2020, *Small craft — Bilge-pumping systems*

ISO 15085:2003+Amd 2:2017, *Small craft — Man-overboard prevention and recovery*

3 Terms and definitions

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

NOTE The meanings of certain symbols used in the definitions are given in Clause 4.

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/

1) Under preparation, revision of ISO 9093-1:1994 and ISO 9093-2:2002. Stage at the time of publication of this FDIS: ISO/FDIS 9093:2020. At publication of ISO 12217-1, the publication date of ISO 9093 will be updated and this footnote removed.

2) Under preparation, revision of ISO 12217-2:2015. Stage at the time of publication of this FDIS: ISO/FDIS 12217-2:2020. At publication of ISO 12217-1, the publication date of ISO 12217-2 will be updated and this footnote removed.

3) Under preparation, revision of ISO 12217-3:2015. Stage at the time of publication of this FDIS: ISO/FDIS 12217-3:2020. At publication of ISO 12217-1, the publication date of ISO 12217-3 will be updated and this footnote removed.

4) Under preparation, revision of ISO 14946:2001. Stage at the time of publication of this FDIS: ISO/FDIS 14946.2:2020. At publication of ISO 12217-1, the publication date of ISO 14946 will be updated and this footnote removed.

3.1 Primary

3.1.1
design category
description of the sea and wind conditions for which a boat is assessed to be suitable

Note 1 to entry: See also 7.2.

3.1.2
non-sailing boat
boat for which the primary means of propulsion is other than by wind power, having *reference sail area* (3.3.8) $A_S < 0{,}07(m_{LDC})^{2/3}$, where m_{LDC} is the mass of the boat in the maximum load condition, expressed in kilograms

3.1.3
recess
volume open to the air that might retain water within the range of loading conditions and corresponding trims

EXAMPLE Cockpits, wells, open volumes or areas bounded by bulwarks or coamings.

Note 1 to entry: Cabins, shelters or lockers provided with closures according to the requirements of ISO 12216 are not recesses.

Note 2 to entry: Cockpits that are open aft to the sea are considered to be recesses. Flush decks without bulwarks or coamings are not recesses.

3.1.4
quick-draining recess
recess fulfilling all the requirements of ISO 11812 for “quick-draining cockpits and recesses”

Note 1 to entry: According to its characteristics, a cockpit may be considered to be quick-draining for one design category, but not for a higher category.

3.1.5
watertight recess
recess fulfilling all the requirements of ISO 11812 for “watertight cockpits and recesses”

Note 1 to entry: This term only implies requirements in respect of watertightness and sill heights, but not those for drainage.

3.1.6
fully enclosed boat
boat in which the horizontal projection of the sheerline area comprises any combination of

— watertight deck and superstructure, and/or

— quick-draining recesses complying with ISO 11812, and/or

— watertight recesses complying with ISO 11812 with a combined volume of less than $(L_H\ B_H\ F_M)/40$, and

all closing appliances have their degree of watertightness in accordance with ISO 12216

Note 1 to entry: The size of recesses permitted for boats of design category A, B or some boats of design category C is restricted by the requirements of 6.5.

3.1.7
partially protected boat
boat which does not fulfil the definition of a fully-enclosed boat and in which the plan projected area of decking, cabins, shelters, outboard engine wells or other rigid covers which are watertight from above according to ISO 12216 and which immediately shed water directly overboard (i.e. not via drains) and

— comprises at least one-third of the plan projected area of the sheerline, and

— includes all the area within $L_H/3$ from the bow, and

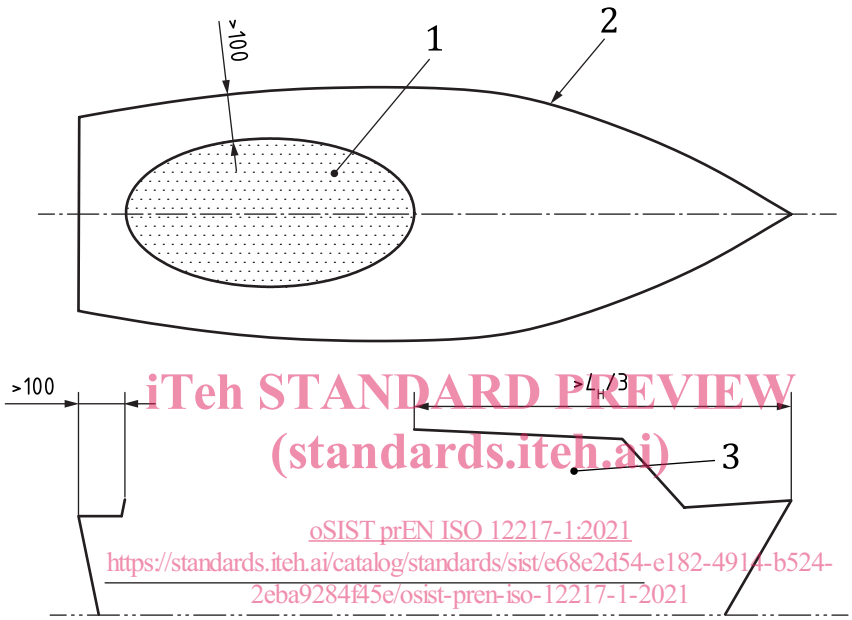
— includes at least 100 mm inboard from the sheerline,

except that the area of any watertight recesses with a total volume of less than $(L_H\ B_H\ F_M)/40$ might shed water via drains

Note 1 to entry: This is illustrated in Figure 1.

Note 2 to entry: Outboard engine wells are considered to provide a covering suitable for this purpose.

Dimensions in millimetres



Key

1 recess area open from above (less than two-thirds of total sheerline area)

2 sheerline

3 open shelter or enclosed cabin

Figure 1 — Partially protected boat

3.1.8
habitable boat

boat having a fully enclosed cabin with rigid roof fitted with one or more bunks, benches, pipecots, hammocks or similar locations that can be used for sleeping when the boat is under way

Note 1 to entry: A boat is considered to be “habitable” if a fabric closure is used instead of a rigid door, or the cabin has fabric sides.

Note 2 to entry: The following are not considered to render a boat “habitable”:

— a cockpit tent, or

— an open-sided cuddy intended to provide limited protection from spray, provided it is not fitted with fabric closures all round.

Note 3 to entry: Locations used for sleeping have minimum dimensions of 1,5 m diagonal length, 0,4 m width at the widest point, and with a minimum headroom of 0,4 m over the length. The cabin sole and compartments designated by the builder to be used exclusively for storage and referenced in the owner’s manual are not included.

3.2 Downflooding

3.2.1
downflooding opening
opening in the hull or deck (including the edge of a recess) that might admit water into the interior or bilge of a boat, or a recess, apart from those excluded in 6.1.1.6

3.2.2
downflooding angle
ϕ_D
angle of heel at which downflooding openings (apart from those excluded in 6.1.1.6) become immersed, when the boat is in calm water and in the appropriate loading condition at design trim

Note 1 to entry: Where openings are not symmetrical about the centreline of the boat, the case resulting in the smallest angle is used.

Note 2 to entry: The following are specifically considered:

— ϕ_D is the downflooding angle to any downflooding opening

— ϕ_{DA} is the angle of heel at which openings which are not marked "KEEP SHUT WHEN UNDER WAY" having a combined total area, expressed in square centimetres (cm^2), greater than the number represented by $1{,}2L_H B_H F_M$ first become immersed;

Note 3 to entry: Downflooding angle is expressed in degrees.

3.2.3
downflooding height
h_D
smallest height above the waterline to any downflooding opening, apart from those excluded in 6.1.1.6, when the boat is upright in calm water and in the maximum load condition, measured to the critical downflooding point which might be within pipes or ducts inside the hull

Note 1 to entry: Downflooding height is expressed in metres.

Note 2 to entry: See Figure D.1 c).

3.3 Dimensions, areas and angles

3.3.1
length of hull
L_H
length of the hull measured according to ISO 8666

Note 1 to entry: Length of hull is expressed in metres.

3.3.2
length waterline
L_{WL}
waterline length measured according to ISO 8666 when the boat is upright in calm water, in the appropriate loading condition and at design trim

Note 1 to entry: For multihull boats, L_{WL} relates to that of the longest individual hull.

Note 2 to entry: Length waterline is expressed in metres.

3.3.3
beam of hull
B_H
maximum beam of the hull using the method of ISO 8666; for catamaran and trimaran boats, maximum beam across the outer hulls

Note 1 to entry: Beam of hull is expressed in metres.

3.3.4
beam waterline
B_{WL}
greatest beam measured according to ISO 8666 at the waterline in calm water, which for multihull boats is the sum of the maximum waterline beams of all hulls, the boat being upright, in the appropriate loading condition and at design trim

Note 1 to entry: Beam waterline is expressed in metres.

3.3.5
freeboard amidships
F_M
distance of the sheerline or deck above the waterline at $L_{WL}/2$ measured according to ISO 8666, the boat being upright, in the appropriate loading condition and at design trim

Note 1 to entry: Freeboard amidships is expressed in metres.

Note 2 to entry: Where no loading condition is specified, maximum load condition should be assumed.

3.3.6
draught of canoe body
T_C
draught of the main buoyant part of the hull(s) below the waterline, as defined in ISO 8666, the boat being upright in the appropriate loading condition and at design trim

Note 1 to entry: Draught of canoe body excludes appendages such as rudders or skegs, and is expressed in metres.

3.3.7
windage area
A_{LV}
projected profile area of hull, superstructures, deckhouses, outboard motors and spars above the waterline at the appropriate loading condition, the boat being upright

Note 1 to entry: Canopies and screens that can be erected when under way in bad weather are included, e.g. cockpit dodgers, pram hoods.

Note 2 to entry: Windage area is expressed in square metres.

3.3.8
reference sail area
A_S
actual profile area of sails set abaft a mast, plus the maximum profile areas of all masts, plus reference triangle area(s) forward of each mast as defined in ISO 8666

Note 1 to entry: Sail area is expressed in square metres.

3.3.9
angle of vanishing stability
ϕ_V
angle of heel nearest the upright (other than upright) in the appropriate loading condition at which the transverse stability righting moment is zero

Note 1 to entry: This is determined assuming that there is no offset load, and that all potential downflooding openings are considered to be watertight.

Note 2 to entry: Where a boat has recesses which are not quick-draining, ϕ_V is to be taken as the downflooding angle to these recesses, unless the loss of buoyancy due to such recesses is fully accounted for in determining ϕ_V.

Note 3 to entry: Angle of vanishing stability is expressed in degrees.

3.4 Condition, mass and volume

3.4.1
empty craft condition
empty boat including fittings and equipment as listed below but excluding all optional equipment and fittings not included in the manufacturer's basic outfit:

a) structure: comprising all the structural parts, including any fixed ballast keel and/or drop keel/centreboard/daggerboard(s) and rudder(s);

b) ballast: any fixed ballast installed;

c) internal structure and accommodation: bulkheads and partitions, insulation, lining, built-in furniture, flotation material, windows, hatches and doors, permanently installed mattresses and upholstery materials;

d) permanently installed engine(s) and fuel system: comprising inboard engine(s), including all supplies and controls as needed for their operation, permanently installed fuel systems, including tanks;

e) fluids in permanently installed systems: residual working fluids as needed for their operation (see examples below), but excluding contents of fluid ballast systems and tanks, and main storage tanks which are included in maximum load

EXAMPLES Fluids in hot or cold water, fuel, lubricating or hydraulic oil systems.

f) internal equipment, including:

— all items of equipment permanently attached to the craft, e.g. tanks, toilet system(s), water transfer equipment;

— bilge pumping system(s), cooking and heating devices, cooling equipment, ventilation system(s);

— electrical installation and equipment, including permanently installed batteries mounted in the position intended by the builder;

— fixed navigational and electronic equipment;

— fixed fire fighting equipment, where fitted;

g) external equipment, including:

— all permanently attached standard or specified deck fittings, e.g. guardrails, pulpits and pushpits, bowsprits and their attachments, bathing platforms, boarding ladders, steering equipment, winches, sprayhood(s);

— awning(s), cockpit tables, gratings, signal mast(s), where fitted;

— mast(s), boom(s), standing and running rigging, in the stowed position ready for use; all standing and running rigging in place

Note 1 to entry: The mass in the empty craft condition is denoted by m_{EC} and is expressed in kilograms.

3.4.2
light craft condition
empty craft condition plus *standard equipment* (3.5.12) plus removable ballast (whether solid or liquid) when supplied and/or intended by the manufacturer to be carried when the boat is afloat, with elements positioned as follows: