



**SLOVENSKI STANDARD**  
**SIST EN ISO 12215-6:2008**

**01-julij-2008**

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**Mala plovila - Konstrukcija trupa in zahtevane lastnosti - 6. del: Struktura in podrobnosti (ISO 12215-6:2008)**

Small craft - Hull construction and scantlings - Part 6: Structural arrangements and details (ISO 12215-6:2008)

Kleine Wasserfahrzeuge - Rumpfbauweise und Dimensionierung - Teil 6: Bauanordnung und Details (ISO 12215-6:2008)

Petits navires - Construction de coques et échantillonnages - Partie 6: Dispositions et détails de construction (ISO 12215-6:2008)

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**Ta slovenski standard je istoveten z: EN ISO 12215-6:2008**

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**ICS:**

47.020.10	Ladijski trupi in njihovi konstrukcijski elementi	Hulls and their structure elements
47.080	Čolni	Small craft

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**en,fr,de**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN ISO 12215-6**

April 2008

ICS 47.080

English Version

**Small craft - Hull construction and scantlings - Part 6: Structural arrangements and details (ISO 12215-6:2008)**

Petits navires - Construction de coques et échantillonnages  
- Partie 6: Dispositions et détails de construction (ISO  
12215-6:2008)

Kleine Wasserfahrzeuge - Rumpfbauweise und  
Dimensionierung - Teil 6: Bauanordnung und Details (ISO  
12215-6:2008)

This European Standard was approved by CEN on 3 February 2008.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

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## Foreword

This document (EN ISO 12215-6:2008) has been prepared by Technical Committee ISO/TC 188 "Small craft" in collaboration with Technical Committee CEN/SS T01 "Shipbuilding and maritime structures", the secretariat of which is held by CMC.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2008, and conflicting national standards shall be withdrawn at the latest by October 2008.

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

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EC Directive.

For relationship with EC Directive, see informative Annex ZA, which is an integral part of this document.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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The text of ISO 12215-6:2008 has been approved by CEN as a EN ISO 12215-6:2008 without any modification.

## Annex ZA (informative)

### Relationship between this International Standard and the Essential Requirements of EU Directive 94/25/EC

This International Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide one means of conforming to Essential Requirements of the New Approach Directive 94/25/EC as amended by Directive 2003/44/EC.

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the relevant Essential Requirements of that Directive and associated EFTA regulations.

**Table ZA.1 — Correspondence between this International Standard and Directive 94/25/EC as amended by Directive 2003/44/EC**

Clauses/sub-clauses of this international Standard	Corresponding annexes/paragraphs of EU Directive 94/25/EC as amended by Directive 2003/44/EC	Comments
All clauses	Annex I, Part A, Clause 3.1, Structure  <a href="https://standards.iteh.ai/catalog/standards/sist/3bd51101-3b25-4d6a-91ac-7e4137c74cff/sist-en-iso-12215-6-2008">https://standards.iteh.ai/catalog/standards/sist/3bd51101-3b25-4d6a-91ac-7e4137c74cff/sist-en-iso-12215-6-2008</a>	The standard provides structural details for monohull and multihull craft constructed from fibre reinforced plastics, aluminium or steel alloys, wood or similar suitable materials.

**WARNING — Other requirements and other EU Directives may be applicable to the products falling within the scope of this standard.**

INTERNATIONAL  
STANDARD

ISO  
12215-6

First edition  
2008-04-01

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**Small craft — Hull construction and  
scantlings —**

**Part 6:  
Structural arrangements and details**

*Petits navires — Construction de coques et échantillonnages —*

*Partie 6: Dispositions et détails de construction*

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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.

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 12215-6 was prepared by Technical Committee ISO/TC 188, *Small craft*.

ISO 12215 consists of the following parts, under the general title *Small craft — Hull construction and scantlings*:

- *Part 1: Materials: Thermosetting resins, glass-fibre reinforcement, reference laminate*
- *Part 2: Materials: Core materials for sandwich construction, embedded materials*
- *Part 3: Materials: Steel, aluminium alloys, wood, other materials*
- *Part 4: Workshop and manufacturing*
- *Part 5: Design pressures for monohulls, design stresses, scantlings determination*
- *Part 6: Structural arrangements and details*
- *Part 7: Scantling determination of multihulls*
- *Part 8: Rudders*
- *Part 9: Sailing boats — Appendages and rig attachments*

**ISO 12215-6:2008(E)****Introduction**

The underlying reason for preparing this part of ISO 12215 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 boats.

The objective of this part of ISO 12215 is to achieve an overall structural strength that ensures the watertight and weathertight integrity of the craft.

This part of ISO 12215 is considered to have been developed with the application of current practice and sound engineering principles.

Considering future development in technology and boat types, as well as small craft currently outside the scope of this part of ISO 12215, and provided that methods supported by appropriate technology exist, consideration may be given to their use so long as equivalent strength to this part of ISO 12215 is achieved.

Dimensioning in accordance with this part of ISO 12215 is regarded as reflecting current practice, provided that the craft is correctly handled in the sense of good seamanship and that it is equipped and operated at a speed appropriate to the prevailing sea state.

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# Small craft — Hull construction and scantlings —

## Part 6: Structural arrangements and details

### 1 Scope

This part of ISO 12215 concerns structural details and structural components not explicitly included in ISO 12215-5, ISO 12215-7, ISO 12215-8 and ISO 12215-9. It applies to monohull and multihull small craft constructed from fibre reinforced plastics (FRP), aluminium or steel alloys, wood or other suitable boat building material, with a hull length, in accordance with ISO 8666, of up to 24 m.

This part of ISO 12215 fulfils two functions. Firstly, it supports ISO 12215-5 by providing further explanations and calculation procedures and formulae. Secondly, it gives a number of examples of arrangements and structural details which illustrate principles of good practice. These principles provide a standard against which alternative arrangements and structural details can be benchmarked, using the equivalence criteria specified in this part of ISO 12215.

NOTE Scantlings derived from this part of ISO 12215 are primarily intended to apply to recreational craft including recreational charter vessels and might not be suitable for performance racing craft.

### 2 Normative references

[SIST EN ISO 12215-6:2008](https://standards.iteh.ai/catalog/standards/sist/3bd510b7-3b23-4d6a-9fae-7e4137c74cff/sist-en-iso-12215-6-2008)

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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 8666, *Small craft — Principal data*

ISO 12215-5:2008, *Small craft — Hull construction and scantlings — Part 5: Design pressures for monohulls, design stresses, scantlings determination*

ISO 12215-7, *Small craft — Hull construction and scantlings — Part 7: Scantling determination of multihulls*

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

ISO 12215-9, *Small craft — Hull construction and scantlings — Part 9: Appendages and rig attachment*

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

### 3 Terms and definitions

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

#### 3.1

##### loaded displacement mass

$m_{LDC}$

mass of the craft, including all appendages, when in the fully-loaded ready-for-use condition, as defined in ISO 8666

## ISO 12215-6:2008(E)

## 3.2

**sailing craft**

craft for which the primary means of propulsion is by wind power, and for which  $A_S > 0,07(m_{LDC})^{2/3}$  where

$A_S$  is the total profile area of all sails that can be set at one time when sailing closed hauled, as defined in ISO 8666, expressed in m<sup>2</sup>;

$m_{LDC}$  is the loaded displacement, as defined in ISO 8666, expressed in kg.

NOTE In this part of ISO 12215, non-sailing craft are referred to as motor craft.

## 3.3

**grid  
grillage**

set of transverse stiffeners that intersect a set of longitudinal stiffeners

## 3.4

**secondary stiffener**

stiffening element that directly supports the plating

NOTE In a stiffener grillage, secondary stiffeners usually correspond to stiffeners having the lower second moment of area, e.g. stringers, frames, partial bulkheads. The spacing of secondary stiffeners generally corresponds to the shortest unsupported span of the attached plating. In the case of stiffeners with a substantial base width (i.e. top hat stiffeners), the stiffener spacing will be the unsupported panel span plus this base width.

## 3.5

**primary stiffener**

stiffening element that supports the secondary stiffening element

NOTE 1 In a stiffener grillage, primary stiffeners usually correspond to stiffeners which have the higher second moment of area, e.g. structural bulkheads, girders, web frames. The spacing of primary stiffeners generally corresponds to the span of secondary stiffeners.

NOTE 2 Some stiffeners, such as bulkheads, deep girders or web frames, may also contribute to resisting global loads.

## 3.6

**stringer**

longitudinal stiffener, generally designated a **secondary stiffener** (3.4), which supports the shell plating

## 3.7

**frame**

transverse stiffener, generally designated a **secondary stiffener** (3.4), which supports the shell plating

## 3.8

**beam**

transverse stiffener, generally designated a **secondary stiffener** (3.4), which supports the deck plating

## 3.9

**web frame**

substantial transverse stiffener, generally designated a **primary stiffener** (3.5), which supports stringers and less substantial girders and is usually connected with substantial deck beams

NOTE The spacing of web frames is usually greater than (or some multiple of) the frame or beam spacing.

## 3.10

**floor**

substantial transverse bottom stiffener, which may be used to link frames and may also be a partial bulkhead

NOTE Floors are often used to support a cabin sole, so the upper edge is generally horizontal. On sailing craft, floors are traditionally used to support ballast keels.

**3.11****girder**

substantial longitudinal stiffening element, generally designated a primary member, which supports bottom transverse frames or floors, other frames and beams

NOTE Bottom girders are sometimes called keelsons.

**3.12****bracket**

stiffening element, usually of triangular shape, used to reinforce the connection of two stiffeners and to reduce their span

NOTE Brackets are also used to transmit local loads.

**4 Symbols**

Unless specifically otherwise defined, the symbols and units used in this part of ISO 12215 are given in Table 1.

NOTE Symbols and units used only in the annexes are not included in Table 1.

**Table 1 — Symbols**

Symbol	Designation	Unit
$A_D$	Design area of plating/stiffener	mm <sup>2</sup>
$b$	Spacing between stiffeners	mm
$b_w$	Width of bonding flange	mm
$B_H$	Beam of hull, in accordance with ISO 8666	m
$D_{max}$	Maximum depth of the boat, in accordance with ISO 8666	m
$E$	Elastic modulus of stiffener	N/mm <sup>2</sup>
$f_1$	Mechanical property coefficient for FRP and aluminium alloys	1
$f_{1w}$	Mechanical property coefficient for wood	1
$I$	Second moment of stiffener	cm <sup>4</sup>
$k_0, \dots, k_2$	Coefficients for reinforcing thickness calculation	1
$k_p, k_{lmin}$	Glue width coefficient	1
$l_u$	Span of stiffeners	mm
$L_H$	Length of hull, in accordance with ISO 8666	m
$L_{WL}$	Length of waterline, in accordance with ISO 8666	m
$m_{LDC}$	Loaded displacement mass, in accordance with ISO 8666	kg
$m_T$	Trailing mass, in accordance with ISO 8666	kg
$P$	Maximum engine power	kW
$t_b$	Bottom plating thickness	mm
$t_{BHD}$	Thickness of plywood bulkhead	mm
$t_w$	Total thickness of top hat web	mm
$V_{max}$	Boat maximum speed in calm water	knot
$\sigma_d$	Design direct stress	N/mm <sup>2</sup>
$\sigma_u$	Ultimate direct strength	N/mm <sup>2</sup>
$\tau_d$	Design shear stress	N/mm <sup>2</sup>
$\tau_u$	Ultimate shear strength	N/mm <sup>2</sup>
$\Psi$	Glass content by mass	1