



SLOVENSKI STANDARD SIST EN ISO 12215-9:2018

01-december-2018

Nadomešča:
SIST EN ISO 12215-9:2012

**Mala plovila - Konstrukcija trupa in zahtevane lastnosti - 9. del: Dodatni pribor
jadrnic (ISO 12215-9:2012)**

Small craft - Hull construction and scantlings - Part 9: Sailing craft appendages (ISO 12215-9:2012)

Kleine Wasserfahrzeuge - (Rumpfbauweise und Dimensionierung) - Teil 9: Anhänge von Segelbooten (ISO 12215-9:2012)

Petits navires - Construction de coques et échantillonnage - Partie 9: Appendices des bateaux à voiles (ISO 12215-9:2012)

Ta slovenski standard je istoveten z: EN ISO 12215-9:2018

ICS:

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

SIST EN ISO 12215-9:2018 en,fr,de

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN ISO 12215-9:2018](#)

<https://standards.iteh.ai/catalog/standards/sist/ec1263c7-8ff4-4737-be2f-d2e091aa684c/sist-en-iso-12215-9-2018>

EUROPEAN STANDARD

EN ISO 12215-9

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2018

ICS 47.080

Supersedes EN ISO 12215-9:2012

English Version

Small craft - Hull construction and scantlings - Part 9: Sailing craft appendages (ISO 12215-9:2012)

Petits navires - Construction de coques et
échantillonnage - Partie 9: Appendices des bateaux à
voiles (ISO 12215-9:2012)

Kleine Wasserfahrzeuge - Rumpfbauweise und
Dimensionierung - Teil 9: Anhänge von Segelbooten
(ISO 12215-9:2012)

This European Standard was approved by CEN on 16 April 2018.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents	Page
European foreword.....	3
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of Directive 2013/53/EU aimed to be covered.....	4

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN ISO 12215-9:2018

<https://standards.iteh.ai/catalog/standards/sist/ec1263c7-8ff4-4737-be2f-d2e091aa684c/sist-en-iso-12215-9-2018>

European foreword

The text of ISO 12215-9:2012 has been prepared by Technical Committee ISO/TC 188 “Small craft” of the International Organization for Standardization (ISO) and has been taken over as EN ISO 12215-9:2018.

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 April 2019, and conflicting national standards shall be withdrawn at the latest by April 2019.

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

This document supersedes EN ISO 12215-9:2012.

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 EU Directive 2013/53/EU.

For relationship with EU Directive 2013/53/EU, 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, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

[SIST EN ISO 12215-9:2018](https://standards.iteh.ai/standards/4737-be2f-d2e091aa684c/sist-en-iso-12215-9-2018)

<https://standards.iteh.ai/standards/4737-be2f-d2e091aa684c/sist-en-iso-12215-9-2018>

Endorsement notice

The text of ISO 12215-9:2012 has been approved by CEN as EN ISO 12215-9:2018 without any modification.

Annex ZA (informative)

Relationship between this European Standard and the Essential Requirements of Directive 2013/53/EU aimed to be covered

This European standard has been prepared under a Commission's standardization request M/542 C(2015) 8736 final to provide one voluntary means of conforming to Essential Requirements of Directive 2013/53/EU.

Once this standard is cited in the Official Journal of the European Union under that Directive, 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 corresponding Essential Requirements of that Directive and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Annex I of Directive 2013/53/EU

Essential Requirements of Directive 2013/53/EU	Clause(s)/sub-clause(s) of this EN	Remarks/Notes
Annex I, Part A, 2.5 - Owner's manual	7.7.1, D.3.4, F.2.4.2	These clauses specify warnings and information to be included in the owner's manual, if relevant.
Annex I, Part A, 3.1 - Structure	All clauses	<p>This part of ISO 12215 provides requirements for the strength of monohull sailing boat appendages with conventional keel configurations. It deals with the design stresses and structural efficiency of the keel and its connections.</p> <p>The load cases correspond to those for most conventional keel configurations; however they may not be appropriate in all cases and designers or builders still need to ensure the suitability of their designs.</p> <p>Scantlings derived from this standard are primarily intended to apply to recreational sailing craft. Dimensioning is regarded as reflecting current practice provided the craft is correctly handled and operated at speeds appropriate to the prevailing sea state.</p>

WARNING 1 — Presumption of conformity stays valid only as long as a reference to this European Standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2 — Other Union legislation may be applicable to the product(s) falling within the scope of this standard.

INTERNATIONAL
STANDARD

ISO
12215-9

First edition
2012-06-15

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

Part 9:
Sailing craft appendages

Petits navires — Construction de la coque et échantillonnage —

Partie 9: Appendices des bateaux à voiles

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN ISO 12215-9:2018

<https://standards.iteh.ai/catalog/standards/sist/ec1263c7-8ff4-4737-be2f-d2e091aa684c/sist-en-iso-12215-9-2018>



Reference number
ISO 12215-9:2012(E)

© ISO 2012

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN ISO 12215-9:2018

<https://standards.iteh.ai/catalog/standards/sist/ec1263c7-8ff4-4737-be2f-d2e091aa684c/sist-en-iso-12215-9-2018>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2012

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword	iv
Introduction.....	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Symbols.....	3
5 Design stresses	4
6 Structural components to be assessed	6
7 Load cases	6
7.1 General	6
7.2 Load case 1 — Fixed keel at 90° knockdown	7
7.3 Load case 2 — Canted keel steady load at 30° heel with dynamic overload factor	8
7.4 Load case 3 — Keelboat vertical pounding	9
7.5 Load case 4 — Keelboat longitudinal impact	10
7.6 Load case 5 — Centreboard on capsize recoverable dinghies	11
7.7 Load case 6 — Centreboard or dagger board upwind	11
7.8 Other load cases.....	12
8 Computational methods	15
8.1 General	15
8.2 General guidance for assessment by 3D numerical procedures	15
8.3 Assessment by strength of materials/non-computational-based methods	16
9 Compliance	16
Annex A (normative) Application declaration.....	18
Annex B (informative) Information on metal for appendages and fasteners and “established practice” for fastening and welding	19
Annex C (informative) “Established practice” structural arrangement for ballast keels	30
Annex D (informative) “Established practice” calculation of keel fin strength (fixed or canting) and fixed ballast keel connected by bolts	44
Annex E (informative) Geometrical properties of some typical appendage foil shapes	61
Annex F (informative) Simplified fatigue strength assessment.....	64
Bibliography.....	76

ISO 12215-9:2012(E)

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 12215-9 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*:

- TC1 STANDARD PREVIEW
(standards.iteh.ai)
- *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 craft appendages*

Introduction

The reason underlying the preparation of 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 craft.

The loss of a keel leading to craft capsize is one of the major casualty hazards on sailing craft and therefore the structural efficiency of all elements of the keel and its connection to the craft is paramount.

This part of ISO 12215 specifies the design loads and their associated stress factors. The user then has a choice between one or the other of the following available options for assessing the structural arrangement.

- a) Use of advanced engineering methods which allow the structure to be modelled as three-dimensional: suitable methods include finite element analysis and subsets thereof such as matrix displacement or framework methods. General guidance is provided on modelling assumptions within this part of ISO 12215.
- b) Use of simplified, generally two-dimensional, "strength of materials"-based stress equations: These are presented in Annexes B to F and, if this option is chosen, use of the equations will be necessary to fulfil the requirements of this part of ISO 12215.

This part of ISO 12215 has been developed applying present practice and sound engineering principles. The design loads and criteria of this part of ISO 12215 may be used with the scantling determination equations of this part of ISO 12215 or using equivalent engineering methods as indicated in a), above.

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

During the latter stages of the development of the ISO 12215 series, and after publication of key parts, a number of authorities adopted this International Standard for the assessment of high-performance racing yachts. While, in theory, a category A blue-water cruising yacht could experience the same loads as a competitive racing yacht, the latter has not been the principal focus of ISO 12215. Consequently, designers are strongly cautioned against attempting to design high-performance racing craft such that nearly all structural components only just comply.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN ISO 12215-9:2018

<https://standards.iteh.ai/catalog/standards/sist/ec1263c7-8ff4-4737-be2f-d2e091aa684c/sist-en-iso-12215-9-2018>

Small craft — Hull construction and scantlings —

Part 9: Sailing craft appendages

1 Scope

This part of ISO 12215 defines the loads and specifies the scantlings of sailing craft appendages on monohull sailing craft with a length of hull, L_H , of up to 24 m, measured according to ISO 8666. It gives

- design stresses,
- the structural components to be assessed,
- load cases and design loads for keel, centreboard and their attachments,
- computational methods and modelling guidance, and
- the means for compliance with its provisions.

[SIST EN ISO 12215-9:2018](https://standards.iteh.ai/catalog/standards/sist/ec1263c7-8ff4-4737-be2f-d2e091aa684c/sist-en-iso-12215-9-2018)

[https://standards.iteh.ai/catalog/standards/sist/ec1263c7-8ff4-4737-be2f-](https://standards.iteh.ai/catalog/standards/sist/ec1263c7-8ff4-4737-be2f-d2e091aa684c/sist-en-iso-12215-9-2018)

2 Normative references [d2e091aa684c/sist-en-iso-12215-9-2018](https://standards.iteh.ai/catalog/standards/sist/ec1263c7-8ff4-4737-be2f-d2e091aa684c/sist-en-iso-12215-9-2018)

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 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs with specified property classes — Coarse thread and fine pitch thread*

ISO 3506-1, *Mechanical properties of corrosion-resistant stainless steel fasteners — Part 1: Bolts, screws and studs*

ISO 8666, *Small craft — Principal data*

ISO 12215-3, *Small craft — Hull construction and scantlings — Part 3: Materials — Steel, aluminium alloys, wood, other materials*

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

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

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

ISO 12215-9:2012(E)

3 Terms and definitions

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

3.1

design category

sea and wind conditions for which a craft is assessed to be suitable, provided the craft is correctly handled in the sense of good seamanship and operated at a speed appropriate to the prevailing sea state

3.1.1

design category A

“ocean category”

category of craft considered suitable to operate in seas with significant wave heights above 4 m and wind speeds in excess of Beaufort Force 8, but excluding abnormal conditions such as hurricanes

3.1.2

design category B

“offshore category”

category of craft considered suitable to operate in seas with significant wave heights up to 4 m and winds of Beaufort Force 8 or less

3.1.3

design category C

“inshore category”

category of craft considered suitable to operate in seas with significant wave heights up to 2 m and a typical steady wind force of Beaufort Force 6 or less

3.1.4

design category D

“sheltered waters category”

category of craft considered suitable to operate in waters with significant wave heights up to and including 0,3 m with occasional waves of 0,5 m height, for example from passing vessels, and a typical steady wind force of Beaufort 4 or less

3.2

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

NOTE 1 The displacement includes all possible options (generator, air conditioning, etc.).

NOTE 2 The loaded displacement mass is expressed in kilograms.

3.3

sailing craft

craft for which the primary means of propulsion is wind power, having $A_S > 0,07(m_{LDC})^{2/3}$ where A_S is the total profile area of all sails that may be set at one time when sailing closed hauled, as defined in ISO 8666 and expressed in square metres

NOTE 1 For the headsails, A_S considers the area of the fore triangle.

NOTE 2 The area of the wing-mast(s) is included in A_S .

3.4

mass of keel

m_{KEEL}

mass of the ballast keel, i.e. keel fin plus bulb, where fitted, and, for twin or multiple keels, of a single keel

NOTE The mass of keel is expressed in kilograms.

4 Symbols

For the purposes of this document, unless specifically otherwise defined, the symbols given in Table 1 apply.

Table 1 — Symbols, coefficients, parameters in the main core of ISO 12215-9

Symbol	Unit	Designation/meaning of symbol	(Sub)clause/table concerned
A_{CB}	m ²	Area of fully deployed centreboard	7.7.1
A_S	m ²	Reference sail area (mainsail + fore triangle + wing mast) as per ISO 12217-2	7.7.1
a	m	Distance along keel centreline, from centre of gravity (CG) of keel to keel junction with hull or tuck	7
c	m	Distance along keel centreline from keel junction to floor mid-height	7
c_a	m	Average value of c for several floors	7.5
e	m	Proportion of the total side force taken by the centreboard	7.7.1
F_i	N	Design force with i according to load case	7
g	m/s ²	Acceleration of gravity = 9,81 m/s ²	7
h_{CE}	m	Height of centre of area of A_S	7.7.1
h_K	m	Height of keel between its bottom and hull connection	7.5.2
h_{F4}	m	Height of application of force F_4 (load case 4)	7.5.2
k_{DC}	1	Design category coefficient	5, Table 2
k_{LC}	1	Load case coefficient	5, Table 3
k_{LD}	1	Length displacement coefficient	7.7.1
k_{MAT}	1	Material coefficient	5, Table 2
L_{WL}	m	Length of waterline in m_{LDC} conditions	7.5.2, 7.7.1
m_{LDC}	kg	See definition 3.2	3.2, 7
m_{KEEL}	kg	See definition 3.4	3.4, 7.4
M_{IJ}	N·m	Design bending moment, with index I and J according to load case	7
st_i	N/mm ²	Stress, which can be σ or τ , and where i can be LIM, d, u, y, yw or yu	5
α	deg.	Angle of attack of centreboard foil	7.7
ϵ_R	%	Elongation at break	Table 2
θ	deg.	Angle between keel axis and centreline for canting keels	7.3