

<b>STN</b>	<b>Malé plavidlá Konštrukcia trupu a dimenzovanie Časť 10: Zaťaženie a príslušenstvo takeláže plachetníc (ISO 12215-10: 2020)</b>	<b>STN EN ISO 12215-10</b>  32 0871
------------	---	---

Small craft - Hull construction and scantlings - Part 10: Rig loads and rig attachment in sailing craft (ISO 12215-10:2020)

Táto norma obsahuje anglickú verziu európskej normy.  
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 04/21

Obsahuje: EN ISO 12215-10:2020, ISO 12215-10:2020

**132298**



EUROPEAN STANDARD

**EN ISO 12215-10**

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2020

ICS 47.080

English Version

**Small craft - Hull construction and scantlings - Part 10: Rig loads and rig attachment in sailing craft (ISO 12215-10:2020)**

Petit navires - Construction de la coque et échantillonnage - Partie 10: Charges dans le gréement et points d'attache du gréement dans les bateaux à voiles (ISO 12215-10:2020)

Kleine Wasserfahrzeuge - Rumpfbauweise und Dimensionierung - Teil 10: Takelagelasten und Takelagezubehör von Segelbooten (ISO 12215-10:2020)

This European Standard was approved by CEN on 22 February 2020.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, 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**

<b>Contents</b>	<b>Page</b>
<b>European foreword.....</b>	<b>3</b>

## **European foreword**

This document (EN ISO 12215-10:2020) has been prepared by Technical Committee ISO/TC 188 "Small craft" in collaboration with CCMC.

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 May 2021, and conflicting national standards shall be withdrawn at the latest by May 2021.

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 has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## **Endorsement notice**

The text of ISO 12215-10:2020 has been approved by CEN as EN ISO 12215-10:2020 without any modification.

# INTERNATIONAL STANDARD

# ISO 12215-10

First edition  
2020-11

---

---

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

### **Part 10: Rig loads and rig attachment in sailing craft**

*Petit navires — Construction de la coque et échantillonnage —*

*Partie 10: Charges dans le gréement et points d'attache du gréement  
dans les bateaux à voiles*



Reference number  
ISO 12215-10:2020(E)

© ISO 2020

**ISO 12215-10:2020(E)****COPYRIGHT PROTECTED DOCUMENT**

© ISO 2020

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

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

Published in Switzerland

# Contents

Page

<b>Foreword</b> .....	<b>v</b>
<b>Introduction</b> .....	<b>vi</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Symbols</b> .....	<b>3</b>
<b>5 Application of the document</b> .....	<b>4</b>
5.1 General.....	4
5.2 The simplified method.....	4
5.3 The developed method.....	4
5.4 Steps of the methods and corresponding clauses of this document.....	5
<b>6 Simplified and developed methods — Design stresses</b> .....	<b>6</b>
6.1 General.....	6
6.2 Design load vs safety factor.....	7
<b>7 Developed method — General assessments, design moment</b> .....	<b>8</b>
7.1 General.....	8
7.1.1 General topics on rigging design.....	8
7.1.2 Sail configurations:.....	9
7.1.3 Rigging loads and adjustment information to be provided.....	9
7.2 Design moment $M_D$ : righting or heeling moment.....	10
7.2.1 General.....	10
7.2.2 Principle of design.....	10
7.2.3 Topics on multihulls/form stable sailing craft corresponding to case b) i.e. with $M_{H1} < M_{RUP1}$ .....	13
7.2.4 Downwind longitudinal force $F_{ADOWN}$ and nose trimming moment $M_{HDOWN}$ , running under spinnaker alone — "Normal" ( $S_{c6}$ ) or "exceptional" ( $S_{c8}$ ).....	14
7.2.5 Maximum righting moment $M_{RMAX}$ , exceptional case, reaching under spinnaker.....	14
7.2.6 Heeling force $F_{ABROACH}$ and heeling moment $M_{HBROACH}$ while broaching under spinnaker, exceptional case.....	14
7.2.7 Minimum sail configuration and righting/heeling moment to be analyzed.....	14
7.3 Rig dimensions, and default values for areas, forces and points of application.....	15
7.4 Wing masts.....	21
7.5 Resultant forces in sails.....	22
<b>8 Loads in rigging elements — Developed method</b> .....	<b>23</b>
8.1 General.....	23
8.2 Force in forestay, inner forestay, mainsail leech and on halyards.....	23
8.2.1 General.....	23
8.2.2 Force in forestay, inner forestay, mainsail leech and on halyards connected with sag.....	24
8.2.3 Force in forestay to balance the longitudinal component of forces from aft set shrouds, fixed/running backstays, mainsail leech.....	24
8.3 Force in backstay, running backstays, or equivalent.....	24
8.3.1 General.....	24
8.3.2 Fractional rig with fixed backstay, no running backstay and aft angled spreaders.....	25
8.3.3 Case of rigs without fixed nor running backstay.....	25
8.4 Compression in the mast step/pillar.....	27
8.4.1 General.....	27
8.4.2 Initial mast compression due to pre-stressing.....	27



**ISO 12215-10:2020(E)**

8.4.3	Mast compression due to heeling or broaching.....	28
8.4.4	Design compression in the mast step/pillar.....	28
8.4.5	Detail topics on mast step/pillar.....	28
8.5	Final design load on rig elements.....	28
<b>9</b>	<b>Structural components to be assessed — Simplified or developed method.....</b>	<b>29</b>
9.1	General.....	29
9.2	Mast steps and mast pillars and their connection to the craft's structure.....	29
9.3	Chainplates and their connections to the craft's structure.....	29
9.4	Design details of chainplates and their connection to the structure.....	30
9.4.1	General.....	30
9.4.2	Strapped FRP chainplates.....	30
<b>10</b>	<b>Application of the simplified method.....</b>	<b>31</b>
<b>11</b>	<b>Application of the developed method.....</b>	<b>31</b>
11.1	General.....	31
11.2	General guidance for assessment by 3-D numerical procedures.....	31
11.2.1	General.....	31
11.2.2	Material properties.....	32
11.2.3	Boundary assumptions.....	32
11.2.4	Load application.....	32
11.2.5	Model idealization.....	32
11.3	Assessment by 'strength of materials' based methods.....	32
<b>12</b>	<b>Application of this document.....</b>	<b>32</b>
<b>13</b>	<b>Information in the owner's manual.....</b>	<b>32</b>
<b>14</b>	<b>Information to the boat builder.....</b>	<b>33</b>
<b>Annex A</b> (informative)	<b>Application sheet of ISO 12215-10.....</b>	<b>34</b>
<b>Annex B</b> (informative)	<b>Information on metals and bolts.....</b>	<b>36</b>
<b>Annex C</b> (normative)	<b>Simplified "established practice" for mast step/pillar assessment.....</b>	<b>40</b>
<b>Annex D</b> (normative)	<b>Simplified "established practice" for the assessment of chainplates and their connection.....</b>	<b>47</b>
<b>Annex E</b> (informative)	<b>Simplified "established practice" calculation of transverse rig elements — Examples.....</b>	<b>69</b>
<b>Bibliography</b>	.....	<b>77</b>

## 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 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](http://www.iso.org/members.html).

**ISO 12215-10:2020(E)****Introduction**

The reason underlying the preparation of the ISO 12215 series is that scantlings rules and recommended practices for small craft differ considerably, thus limiting the general worldwide acceptability of craft.

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 equipped and operated at a speed appropriate to the prevailing sea state.

This document is not a design standard and designers/builders are strongly cautioned from attempting to design craft such that nearly all structural components only just comply.

The connection between the rig attachment and the structure is required to be stronger than the rig attachment itself. It is therefore considered that unforeseen overload will not entail its detachment from the structure, and that the watertight integrity will be maintained.

# Small craft — Hull construction and scantlings —

## Part 10: Rig loads and rig attachment in sailing craft

### 1 Scope

This document specifies methods for the determination of:

- the design loads and design stresses on rig elements; and
- the loads and scantlings of rig attachments and mast steps/pillars;

on monohull and multihulls sailing craft.

It also gives, in Annexes, "established practices" for the assessment of mast steps/pillars or chainplates

NOTE 1 Other engineering methods can be used provided the design loads and design stresses are used.

This document is applicable to craft with a hull length  $L_H$  up to 24 m but it can also be applied to craft up to 24 m load line length.

NOTE 2 The load line length is defined in the OMI "International Load Lines Convention 1966/2005", it is smaller than  $L_H$ . This length also sets up, at 24 m, the lower limit of several IMO conventions.

Scantlings derived from this document are primarily intended to apply to recreational craft, including charter vessels.

This document is not applicable to racing craft designed only for professional racing.

This document only considers the loads exerted when sailing. Any loads that may result from other situations are not considered in this document.

Throughout this document, and unless otherwise specified, dimensions are in (m), areas in ( $m^2$ ), masses in (kg), forces in (N), moments in (N m), stresses and elastic modulus in  $N/mm^2$  ( $1 N / mm^2 = 1 Mpa$ ). Unless otherwise stated, the craft is assessed in fully loaded ready for use condition.

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

**koniec náhľadu – text ďalej pokračuje v platenej verzii STN**