

This is a preview of "ISO 12215-10:2020". [Click here to purchase the full version from the ANSI store.](#)

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



**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

This is a preview of "ISO 12215-10:2020". Click here to purchase the full version from the ANSI store.

## 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

This is a preview of "ISO 12215-10:2020". [Click here to purchase the full version from the ANSI store.](#)

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>.....</b>	<b>77</b>

This is a preview of "ISO 12215-10:2020". Click here to purchase the full version from the ANSI store.

## 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).

## **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.