DIN EN ISO 12215-10:2021-05 (E)

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

Contents

Page

European foreword 4

Foreword 5

Introduction 6

1 Scope 7

2 Normative references 7

3 Termsanddefinitions 7

4 Symbols 9

5 Application of the document 10
5.1 General 10
5.2 The simplified method 10
5.3 The developed method 10
5.4 Steps of the methods and corresponding clauses of this document 11

6 Simplifiedanddevelopedmethods--Designstresses 12
6.1 General 12
6.2 Design load vs safety factor 13

7 Developed method -- General assessments, design moment 14
7.1 General 14
7.1.1 General topics on rigging design 14
7.1.2 Sail configurations: 15
7.1.3 Rigging loads and adjustment information to be provided 15
7.2 Design moment MD: righting or heeling moment 16
7.2.1 General 16
7.2.2 Principle of design 16
7.2.3 Topics on multihulls/form stable sailing craft corresponding to case b) i.e. with MH1 < MR UP1 19
7.2.4 Downwind longitudinal force FADOWN and nose trimming moment MHDOWN, running under spinnaker alone -- "Normal" (Sc6) or "exceptional" (Sc8) 20
7.2.5 Maximum righting moment MRMAX, exceptional case, reaching under spinnaker 20
7.2.6 Heeling force FABROACH and heeling moment MHBROACH while broaching under spinnaker, exceptional case 20
7.2.7 Minimum sail configuration and righting/heeling moment to be analyzed 20
7.3 Rig dimensions, and default values for areas, forces and points of application 21
7.4 Wing masts 27
7.5 Resultant forces in sails 28

8 Loads in rigging elements -- Developed method 29
8.1 General 29
8.2 Force in forestay, inner forestay, mainsail leech and on halyards 29
8.2.1 General 29
8.2.2 Force in forestay, inner forestay, mainsail leech and on halyards connected with sag 30
8.2.3 Force in forestay to balance the longitudinal component of forces from aft set shrouds, fixed/running backstays, mainsail leech 30

8.3 Force in backstay, running backstays, or equivalent ... 30
8.3.1 General ... 30
8.3.2 Fractional rig with fixed backstay, no running backstay and aft angled spreaders ... 31
8.3.3 Case of rigs without fixed nor running backstay ... 31
8.4 Compression in the mast step/pillar ... 33
8.4.1 General ... 33
8.4.2 Initial mast compression due to pre-stressing ... 33
8.4.3 Mast compression due to heeling or broaching ... 34
8.4.4 Design compression in the mast step/pillar ... 34
8.4.5 Detail topics on mast step/pillar ... 34
8.5 Final design load on rig elements ... 34

9 Structuralcomponentstobeassessed--Simplifiedordevelopedmethod ... 35
9.1 General ... 35
9.2 Mast steps and mast pillars and their connection to the craft's structure ... 35
9.3 Chainplates and their connections to the craft's structure ... 35
9.4 Design details of chainplates and their connection to the structure ... 36
9.4.1 General ... 36
9.4.2 Strapped FRP chainplates ... 36

10 Applicationofthesimplifiedmethod ... 37

11 Application of the developed method ... 37
11.1 General ... 37
11.2 General guidance for assessment by 3-D numerical procedures ... 37
11.2.1 General ... 37
11.2.2 Material properties ... 38
11.2.3 Boundary assumptions ... 38
11.2.4 Load application ... 38
11.2.5 Model idealization ... 38
11.3 Assessment by `strength of materials' based methods ... 38

12 Application of this document ... 38

13 Information in the owner's manual ... 38

14 Information to the boat builder ... 39

Annex A (informative) Application sheet of ISO 12215-10 ... 40

Annex B (informative) Information on metals and bolts ... 42

Annex C (normative)Simplified"establishedpractice"formaststep/pillarassessment ... 46

Annex D (normative)Simplified"establishedpractice"fortheassessmentof chainplates and their connection ... 53

Annex E (informative)Simplified"establishedpractice"calculationof transverserig elements -- Examples ... 75

Bibliography ... 83