

ISO 12215-8:2009-05 (E)

Small craft - Hull construction and scantlings - Part 8: Rudders

Contents		Page
Foreword		v
Introduction		vi
1	Scope	1
2	Normative references	1
3	Terms and definitions	1
4	Symbols	2
5	Design stresses	4
5.1	Rudder material	4
6	Rudder and steering arrangement, rudder types	5
6.1	General	5
6.2	Rudder types	6
7	Design rudder force calculation	10
7.1	General	10
7.2	Force F1 and corresponding load case	11
7.3	Force F2 and corresponding load case	12
8	Rudder bending moment and reactions at bearings	13
8.1	General	13
8.2	Analysis of spade rudder (Type I)	13
8.3	Analysis of skeg rudders (Types II to V)	14
9	Rudder design torque, T	16
10	Rudder and rudder stock design	17
10.1	Load bearing parts of the rudder	17
10.2	Metal rudder stock material	17
10.3	Design stress for metal rudder stock	18
10.4	Required diameter for solid circular metal rudder stocks	18
10.5	Vertical variation of the diameter of a Type I rudder (spade)	18
10.6	Round tubular stocks	19
10.7	Non-circular metal rudder stocks	20
10.8	Simple non-isotropic rudder stocks (e.g. wood or FRP)	21
10.9	Complex structural rudders and rudder stocks in composite	21
10.10	Check of deflection of Type I rudder stocks between bearings	21
11	Equivalent diameter at the level of notches	22
12	Rudder bearings, pintles and gudgeons	22
12.1	Bearing arrangement	22
12.2	Clearance between stock and bearings	23
13	Rudder stock structure and rudder construction	24
13.1	Rudder stock structure	24
13.2	Rudder construction	24
13.3	FRP rudder blades	24
13.4	Non-FRP rudder blades	25
14	Skeg structure	25

14.1	General	25
14.2	Design stress	25
Annex A (normative) Metal for rudder stock		26
Annex B (normative) Complex composite rudder stock design		30
Annex C (normative) Complete calculation for rudders with skeg		32
Annex D (informative) Geometrical properties of some typical rudder blade shapes		36
Annex E (informative) Vertical variation of diameter for Type I rudders		39
Annex F (informative) Type I rudders -- Deflection of stock between bearings		41
Bibliography		44