Bulker Q&As and CIs on the IACS CSR Knowledge Centre

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
272	Fig. 10.1.20	Question	plate thickness	2006/11/23	IACS propose to replace the definition of "t = plate thickness in accordance with section 14, E.3.1. (mm)" with "t = thickness of rudder plating, in mm". It is obvious that the reference is missing from the CSR Rules and by IACS' proposal to omit it instead of to complete the Rules means that the rudder plate thickness under the thick flange will be severely undermined. Propose to complete the reference as necessary for the sake of safety of the rudder at the supporting level.	The previous reference in the legend to Fig. 20 of Ch.10 Sec.1 came from the original source of the illustration (different rules as CSR). In the source the Rules were splitted into seperate sections for 'Welded Joints' and 'Rudder and Manoeuvering Arrangements'. The reference lead to the section describing the plate thickness of the rudder. In the CSR both subjects are united under one section. Consequently the reference is obsolete.	
321 attc	10/3.2.1.2	Question	Equipment Number	2007/1/8	Query regarding the formula of EN (Equipment Number) - see attachment.	This is "Typo". We will consider the editorial correction according to your proposal.	Y
462	Table 10.3.1 & 10/3.2.1.1	RCP	Rule Change	2007/6/12	In Chapter 10, Section 3 of CSR for bulk carrier para 2.1.1 refers to ships with equipment number EN greater than 16000, however the data range in 'Table 1: Equipment' only covers EN up to a value of 4600. Requirements for vessels with equipment numbers in the range 4600 to 16000 need to be added to the tabular information. This appears to be an editorial omission in the CSR for bulk carriers. The data tables in the LR Rules for Ships, CSR for tankers and the IACS Mooring & Anchoring requirements (UR A) all cover the full data range up to 16000.	The "Corrigenda" will be issued.	
558	10/1.3.3.2	RCP	Unit displacement due to torsion	2007/10/9	With reference to the technical background document, the requirement Ch10, Sec1, 3.3.2 is according to C.3.2, Sec. 14, Chapter 1, Part 1 of the GL Rules, and based on IACS UR S10, however coefficient of ft, unit displacement due to torsion, differs as follows; GL & UR: 3.14 CSR: 3.17 We think that the value in CSR is not correct. Therefore, we propose the value should be changed to the one in IACS UR S10.	Your comment is noted. We will consider the edditorial correction. **Also Included in Corrigenda 5**	
568	10/1.5.1.4	Question	bending stress	2008/10/27	Reference is made to Ch. 10 Sec. 1 [5.1.4] Strength of rudder body. We assume ths stresses is originating from UR S10.5.1b) Please advice technical bacground for the increase of bending stress form 75 to 90N/mm2.	The technical background for the increase of bending stress form 75 to 90N/mm2 is to consider the bending stress and shear stress due to torsion. However, as the data to verify this increment can not be available. Therefore, we would like to consider the RCP to be in line with the requirements of UR S10, in order to avoid the confusion.	

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
569	10/1.5.2.1	RCP	Thickness of Rudder plating	2007/10/2	Reference is made to Ch. 10 Sec. 1 [5.2.1] Plating thickness of Rudder plating. "The influence of the aspect ratio of the plate panels may be taken into account according to Ch.3." The reference to Ch. 3 is wrong. Please advice if Ca according to Ch. 6 Sec. 1 Symbols may be utilised for this purpose. The requirement of Ch. 10 Sec. 1 [5.2.1] is originating from URS10.5.2. Please note that the aspect ration formulation of UR S10.5.2 is different from that of Ch.6 Sec. 1 Symbols. Please updated the rule formulation and references of Ch. 10 Sec. 1 [5.2.1].	Thank you for your note. We will consider the editorial change in order to be in line with IACS UR S10.5.2. **Also Included In Corrigenda 5**	
589	Table 10.1.1	RCP	The definition for Coefficient Kappa_2 for each rudder profile	2007/10/28	Coefficient kappa_2 for each rudder profiles is defined in Ch10, Sec1, Table1. However, the definition of each rudder profiles is not cleary mentioned. Therefore, it is requested that rudder profiles indiated in Table1 be defined clearly such with figures of Table1 in UR S10.	Your comment is noted. We will consider the editorial correction.	
615	10/1.5.1.4	Question	The effective cross sectional area under consideration	2008/3/5	In the definition of e: lever for torsional moment in Ch10 Sec1 [5.1.4], a-a: is defined as the centre line of the effective cross sectional area under consideration. Please clarify the definition of "the effective cross sectional area under consideration".	This requirement is refered to the centre of the horizontal cross section where the stress levels are evaluated. Hence, the structural weakest horizontal section of the rudder-blade considered i.w.o. the cutout for the rudder-horn.	
616	10/1.5.3.4 & 10/1.5.3.5	CI	Thickness of the horizontal web plates	2008/6/19	1. Ch10 Sec1, 5.3.4 regulates the thickness of the horizontal web plates in the vicinity of the solid parts. Please clarify the definition of "the vicinity of the solid parts". 2. Ch 10 Sec 1, 5.3.5 regulates the thickness of verical web plates welded to the solid part. (1) Please clarify the extent of the vertical web plates to be applied to this requirement. (2) Can different thickness be accepted when justified on the basis of direct calculation as specified in [5.3.4]?	A0: For the horizontal webplates; "in the vicinity" should be interpreted as to extend to the next vertical web from the solid piece. The goal is to assure proper integration of the solid-piece, hence torsional forces are to be properly distributed by means of shear to the next structural members in the rudder-blade. A1: The vertical extend should be interpreted as to extend to the next horizontal web from the solid piece. A2: A thickness reduction due to direct analyses is not allowed.	
618	10/1.5.5.1	RCP	Maximum pintle diameter	2008/5/13	(1) Ch10 Sec1, 5.5.1 refers to 4.4 and 4.6, however, the references to Ch10 Sec1, 4.4 and 4.6 are not appropriate. It seems that the correct references are to Ch10 Sec1, 5.4.4 and 5.4.6. Please clarify the above. (2) According to IACS UR S10, the length of the pintle housing in the gudgeon is not to be less than the maximum pintle diameter. However, such a requirement is not mentioned in CSR. Please add a requirement regarding the length of the pintle housing to [5.5] of CSR for Bulker.	A1: Your understanding is right. We will make an editorial correction. The references will be changed from [4.4] to [5.4.4] and from [4.6] to [5.4.6]. A2: This requirement is given in CH10, Sec1, 5.4.6. which combines URS10.7.1 and URS10.8.2.	
655	10/1.5.3.2	Question	Diameter of rudder stock	2008/4/22	Please amend the diameter of rudder stock in the formula of ws to D1 from d1	This is a typo. We will consider an editorial correction	

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
656	10/1.3.3.3	Question	Light ballast Conditions	2008/5/13	When a vessel is sailing on a light ballast condition, rudder force may not act on the upper part of the rudder above the ballast draft. This gives unfavorable(increased) support force for the neck bearing or upper pintle bearing in case of semi-spade rudder. This should be taken into account as minimum support force like DNV Rules.	We think that a partly submerged semi spade rudder generates less bending moment in the neck bearing than in fully submerged operation. A minimum value for the support force is not to be defined.	
657	10/1.5.1.3	Question	Unit of shear stress	2008/4/22	The unit of shear stress should be N/mm^2.	This is a typo. We will consider an editorial correction.	
658	10/1.5.1.3	Question	Formula for equivalent stress	2008/4/22	Wrong formula for equivalent stress	This is a typo. We will consider an editorial correction	
696	10/1.5.2.1	Question	Influence of the aspect ratio of plate panels	2008/5/28	In Ch.10, Sec.1, [5.2.1] the following sentence is read:"The influence of the aspect ratio of the plate panels may be taken into account according to Ch 3." Q1: Which paragraph in Ch.3 is referred to ? Q2: Isn't it the intention to apply c_a factor as used in the formula in Ch.6 Sec.1, [3.2.1] ?	The wrong reference to chapter 3 is a direct copy of the underlying rules. The formula for the consideration of small aspect ratios for rudder plating is currently not given in the CSR-BC. Without the influence of the aspect ratio the necessary plate thickness is slightly conservative. We will make a rule change proposal to fix this problem. The usage of c_a according to CH6, Sec1 is not applicable for the dimensioning of rudder plating	
749	10/1.5.5.1	Question	Diameter of Pintles	2008/5/30	In CSR for BC, the diameter of pintles is equal to: da = 0.35 (B1 kr)^(1/2), with kr equal to (235/ReH)^e. However, in the UR S10, it is written that the diameter of pintles is equal to: dp = 0.35 (B kp)^(1/2), with kp equal to (SigmaF/235)^e. This two text give two different values: which one is correct?	The formula in CSR BC is correct.	
750	10/1.3.1.1	Question	Diameter of the rudder stock	2008/6/6	The diameter of the rudder stock is supposed to be calculated in m. However, this seems incorrect: the unit should be changed to mm.	Your comment is correct. This correction has been made by "Corrigenda 5" approved by the Council on 15 May.	
751	10/1.3.2.1	Question	The equivalent stress of bending and torsion	2008/6/6	In CSR for BC, the equivalent stress of bending and torsion for the increased rudder stock diameter is not to exceed 118/kr, with kr equal to (235/ReH)^e. However, in the UR S10, it is written that the equivalent stress of bending and torsion for the increased rudder stock diameter is not to exceed 118/K, with K equal to (SigmaF/235)^e. This two text give two opposite values: which one is correct?	The formula in CSR BC is correct.	

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
752	10/1.4.2.1 & 10/1.4.2.2	Question	The Diameter of coupling bolts	2008/6/6	1/ In CSR for BC, the diameter of coupling bolts is equal to: db = 0.62 [(D^3 kb) / (kr n e)]^(1/2), with kb and kr equal to (235/ReH)^e. However, in the UR S10, it is written that the diameter of coupling bolts is equal to: db = 0.62 [(d^3 Kb) / (Kr n em)]^(1/2), with Kb and Kr equal to (SigmaF/235)^e. This two text give two different values: which one is correct? 2/ In CSR for BC, the thickness of coupling bolts is equal to: tf = 0.62 [(D^3 kf) / (kr n e)]^(1/2), with kf and kr equal to (235/ReH)^e. However, in the UR S10, it is written that the thickness of coupling bolts is equal to: tf = 0.62 [(d^3 Kf) / (Kr n em)]^(1/2), with Kf and Kr equal to (SigmaF/235)^e. This two text give two different values: which one is correct?	The formula in CSR BC is correct.	
753	10/1.4.3.1	Question	The Diameter of coupling bolts	2008/6/6	In CSR for BC, the diameter of coupling bolts is equal to: db = 0.81 D/n^(1/2) (kb/kr)^(1/2), with kb and kr equal to (235/ReH)^e. However, in the UR S10, it is written that the diameter of coupling bolts is equal to: db = 0.81 d/n^(1/2) (Kb/Kr)^(1/2), with Kb and Kr equal to (SigmaF/235)^e. This two text give two different values: which one is correct?	The formula in CSR BC is correct.	
776 attc	10/1.5.1.4	RCP	semi-blade rudder	2008/9/10	Reference is made to an equation in Para. 5.1.4 of Ch. 10, Sec. 1 of the CSR BC about a bending moment MR working on a semi-blade rudder at the cut-out. 2. It has come to our notice that unfortunately the force B1 came into equation by a typographical error and it should be replaced by the force Q1. Please see a supporting document as attached.	Reference is made to the file attachment. This is not an error and need not to be modified.	Y
797	10/1.9.2.5	Question	rudder horn plating	2008/9/10	In the definition of the minimum thickness of the rudder horn plating t = 2.4 (L K)^(1/2), what is the definition of K ?	K is the material factor according to Ch.3, Sec.1, [2.2.1] expect for cast steel: K is the material factor according to Ch. 10, Sec.1, [1.4.2].	
837	10/3.3.9.3	Question	chain cable	2009/1/26	The last sentence in Ch10 Sec3, 3.9.3 requires about chain cable attachment as follows; In an emergency, the attachments are to be easily released from outside the chain locker. Our customers, who are planning to adopt a fixed type attachment without releaser, inquire the technical background of the requirement. Please indicate the technical background of the requirement.	In case of an emergency (Vessel is pressed onto the lee shore by offshore winds) and the capstan is inoperative, the release of the whole chain is the last possibility for a ship to leave the anchorage.	
839 attc	10/1.20 & 1.10	Question	horizontal rudder coupling flange	2009/1/26	Figure 20 of Chapter 10, "Horizontal rudder coupling flange". The right side of the figure (representing the rudder transversal section in way of the coupling) is unclear (perhaps due to rendering of the original image) Moreover, putting formulas for requirements inside a figure is not consistent with what usually done in the CSR for bulk carriers, and prohibits finding such formulas by means of full text searching inside the Rules. Please improve the figure and move the formulas to the textual part of the Rules.	The right side of figure 20 is illegible due to a wrong image format. We will exchange this figure and we will move the definitions in the text. This editorial changes will be incorporated in the next corrigenda. Please find the original figure 20 in the attachment.	Y

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
850	Text 10/1.3.3.2	Question	rudder horn	2009/6/16	In addition to the simplified formula for the "Unit displacement of rudder horn" (f_b) a second formula has been introduced, taking the Young Modulus explicitly into consideration. A comparison of the units in this formula shows that the factor 10^8 has to be changed to 10^11. This error leads to an overestimation of the spring constant "Z", which causes an un derestimation of the moment, acting on the lower bearing of the rudder stock Please confirm. We propose to handle this issue as a corrigenda, because the difference in the dimensions of "f_b" is an apparent error.	The only definition of E (Youngs modulus) is found in Ch 1 Sec 4 2.2.1. Here the unit is given as [N/mm^2]. However, in Ch 10 Sec 1 [kN/m^2] is the unit used for E, as can be shown for the definition of G (Modulus of rigidity). The units for G and E have to be the same. When using the unit [kN/m^2] for E, the factor 10^8 is correct. A corrigenda to clarify the definition of E in Ch 10 Sec 1 will be considered.	
893	Text 10/1.8.3.1	question	corrosion allowance	2009/6/26	There appears to be an editorial error in the equation for t(k), the corrosion allowance for nozzle plate thickness t(0) with t(0) greater than 10mm: The present formula is: t(k) = min [0.1 ((t(0) / (sqrt k)) + 0.5) , 3.0] The formula should be revised to: t(k) = min [0.1 ((t(0) / (sqrt k)) + 5.0) , 3.0]	There is an editorial error in the equation of t(k), corrosion allowance for nozzle plate when t(0) is greater than 10mm. The formula should be changed to: t(k) = min [0.1 ((t(0) / (sqrt k)) + 5.0) , 3.0] This modification will be included in the next corrigenda.	
906	Text 10/1.9.2	question	material factor	2009/6/24	The material factor in the scantling equations for rudder horns, in particular those for materials with minimum yield strength less than 235 N/mm^2, are not clearly defined in Ch.10, Sec.1 [9.2] and should be clarified.	The material factor "k" in Ch.10, Sec.1 [9.2.2], [9.2.3] and [9.2.4] and the material factor "K" in Ch.10, Sec.1 [9.2.5] should be replaced with "k(r)" as defined in Ch.10, Sec.1 [1.4.2]. This correction will be made in the next corrigenda.	
922	10	Question	rudder stock reqs	2009/7/16	Please inform us which one is the exact CSR requirement for rudder stock between A and B as below. A : Forged steel for rudder stock shall be weldable type in any case. B : No. Forged steel for rudder stock whether weldable or not can be decided by Builder.	As specified in UR W7, forged steel for rudder stock shall be weldable type in any case.	
951	10/1.9.2	CI	Material factor for rudder horn	2010/3/8	Regarding material factor for rudder horn, there is a discrepancy between KC’s 906 and 797. KC 906 says that material factor k (or K) in 10/1.9.2.2, 9.2.3, 9.2.4 and 9.2.5 should be the factor defined in 10/1.1.4.2. KC 797, however, says that the material factor K in 10/1.9.2.5 should be the factor in 3/1.2.2.1 except for cast steel where the factor should be that in 10/1.1.4.2. We are of opinion that for cast steel the material factor should be in 10/1.9.2.2, 9.2.3, 9.2.4 and 9.2.5 should be the material factor in 10/1.1.4.2 and for others the material factor should be that in 3/1.2.2.1, which are in line with UR S10 and LR Rules. Please clarify.	Your understanding is correct and is applicable to Ch.10 Sec.1 [9.2]. A corrigenda will be issued for this correction.	

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
1017 attc	Table 10.3.3	RCP	Minimum breaking strength of mooring lines	2010/2/16	Editorial correction of values in the equipment number table: Minimum breaking strength of mooring lines corresponds to equipment number as defined in Ch.10 Sec.3, Tab.3, and Tab.3 originates from IACS Recommendations, No.10, Tab.5. Therefore, the minimum breaking strength of mooring lines in the both tables are coincident, however, some of the values are different as attached. Accordingly, please correct the wrong values in CSR as defined in Recommendations, No.10.	You are right. Tab. 3 will be modified accordingly in the next Corrigenda.	Y
1028	10/1.3.3.2	Question	TB of unit displacement formulae f_b and f_t	2010/3/12	Coefficients of rudder horn formulae in Ch.10, Sec.1, 3.3.2 Please clarify the technical background of the unit displacement formulae f_b and f_t. f_b : This formula has been delivered by multiplying the maximum displacement of cantilever beam by coefficient 1.3. Please show the technical background of the coefficient 1.3. f_t for steel : This formula has been delivered by substituting torsional stiffness factor J_th into the general formula of f_t. The coefficient obtained by the substitution 3.168(=7.92 * 4 / 10) does not match the coefficient 3.14 used in this formula. Please show the technical background of the coefficient 3.14.	f_b and f_t in Ch.10 Sec.1 [3.3.2] are in line with UR S10.	
1034	10/3.3.2.4	RCP	Installation of spare anchor onboard	2010/2/24	In order to follow the relevant requirement of UR A1.4.2, please add a following sentence to Ch.10, Sec.3, 3.2.4 of CSR Bulk Carriers. "Installation of the spare anchor on board is not compulsorily required." Otherwise please revise Table 1 in Ch.10, Sec.3 of CSR Bulk Carriers in the same way as Table 11.4.1 in Sec.11 of CSR Oil Tankers.	The installation of the spare anchor is not compulsory required. The text is in line with UR A1 and kept as is.	

KC#321

Please confirm that Δ2/3 is incorrect and that it should be replaced by $\Delta^{2/3}$ in the formula of EN (Equipment Number).

KC#776Q

Attachment to IACS KC Question about M_R in 10/1.5.1.4 of CSR BC Rule

1. When Figure 4 in 10/1.3.3.3 is taken as a model for calculation, the maximum bending moment M_R can be calculated as follows:

$$M_R = C_{R2} \cdot (f_1 + f_2/2) + C_{R3} \cdot f_3, \qquad \text{in N m}$$
$$\approx C_{R2} \cdot f_1 + C_{R2} \cdot f_2/2$$
$$= C_{R2} \cdot f_1 + Q_1 \cdot f_2/2$$

$Q_1 = C_{R2}$, in N
C_{R2} : Partial rudder force, in N, of the partial rudder area A_2
C_{R3} : Partial rudder force, in N, of the partial rudder area A_3
f_1 : As defined in Fig 10
f_2 : As defined in Fig 10, referring to centre of area A_2,
f_3 : As defined in Fig 4, referring to centre of area A_3,
A_3 : Area as defined in Fig 4

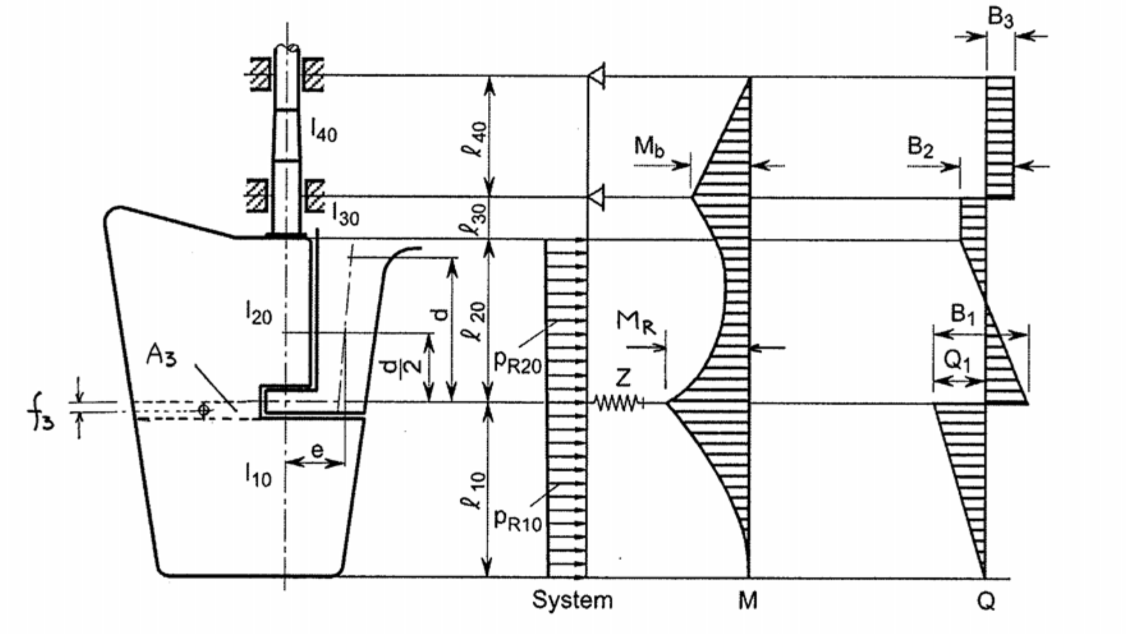


Figure 4: Semi-spade rudder (with 1-elastic support)

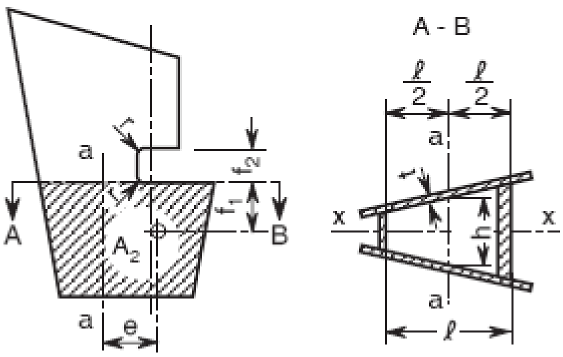


Figure 10: Geometry of rudder

2. Therefore, B_1 in the equation of M_R in 10/1.5.1.4 of CSR BC Rule should be changed to Q_1.

KC#776A

Technical Background

Calculation of the rudder body moment M_R, CSR-BC, CH10, Sec1 [5.1.4]

The cross section under consideration is the lower end (A-B) of the cut out for the pintle.

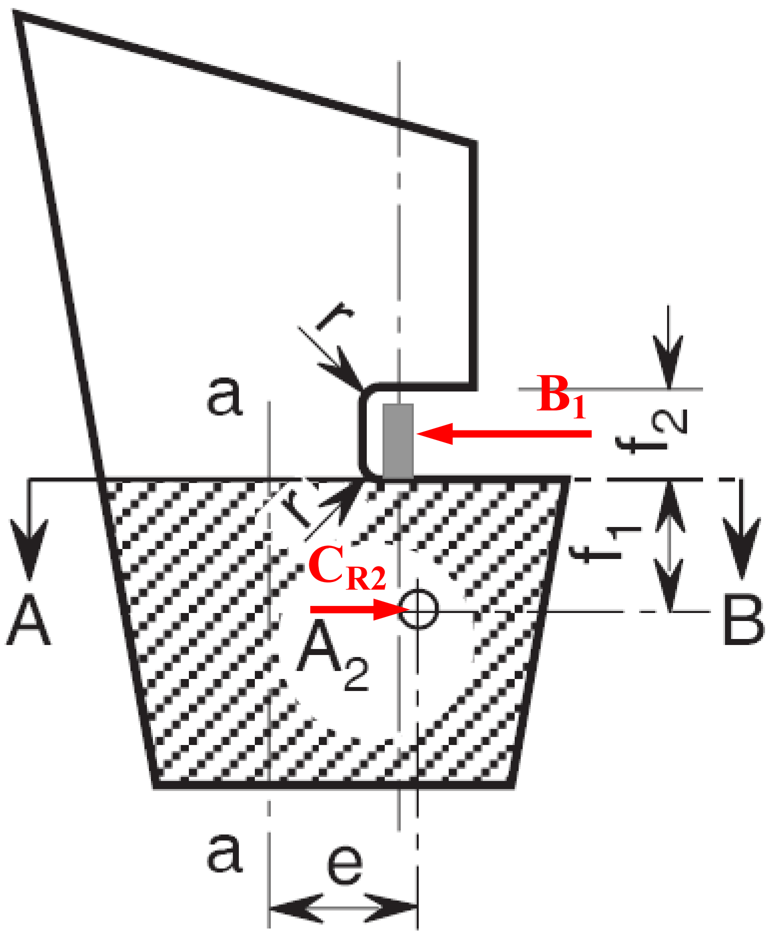
Two bending moments act simultaneously in this section:

1. Partial rudder force C_{R2} of the partial rudder area A_2 below the cross section under consideration (see figure 1) with the lever f_1
2. Horizontal bearing force B1 with the lever $f_2/2$.

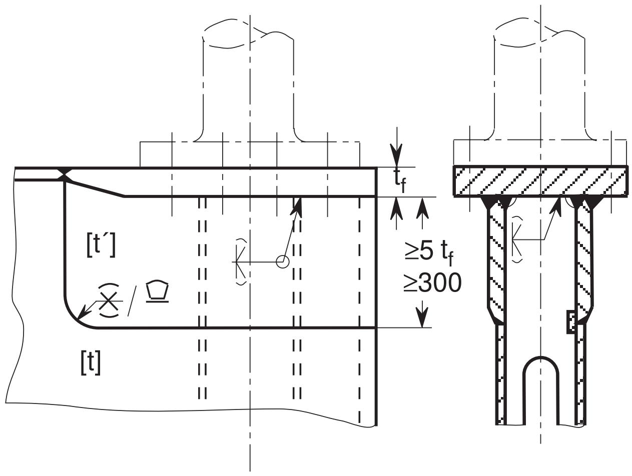
$$M_R = C_{R2} f_1 + B_1 \frac{f_2}{2} \text{ in N.m}$$

1. **2.**

Figure 1 – Forces on ruder body



KC#839



t = plate thickness in accordance with Section 14, E.3.1 [mm]

t_f = actual flange thickness in [mm]

$t' = \frac{t_f}{3} + 5$ [mm] where $t_f < 50$mm

$t' = 3\sqrt{t_f}$ [mm] where $t_f \geq 50$mm

Figure 20: Horizontal rudder coupling flanges

Table 3: Towlines and mooring lines

Equipment number *EN* *A< EN ≤B*		Towline (1)		Mooring lines		
A	*B*	Minimum length, in m	Breaking load, in kN	*N* (2)	Length of each line, in m	Breaking load, in kN
50	70	180	98.1	3	80	34
70	90	180	98.1	3	100	37
90	110	180	98.1	3	110	39
110	130	180	98.1	3	110	44
130	150	180	98.1	3	120	49
150	175	180	98.1	3	120	54
175	205	180	112	3	120	59
205	240	180	129	4	120	64
240	280	180	150	4	120	69
280	320	180	174	4	140	74
320	360	180	207	4	140	78
360	400	180	224	4	140	88
400	450	180	250	4	140	98
450	500	180	277	4	140	108
500	550	190	306	4	160	123
550	600	190	338	4	160	132
600	660	190	371	4	160	147
660	720	190	406	4	160	157
720	780	190	441	4	170	172
780	840	190	480	4	170	186
840	910	190	518	4	170	201
910	980	190	550	4	170	216
980	1060	200	603	4	180	230
1060	1140	200	647	4	180	250
1140	1220	200	692	4	180	270
1220	1300	200	739	4	180	284
1300	1390	200	786	4	180	309
1390	1480	200	836	4	180	324
1480	1570	220	889	5	190	324
1570	1670	220	942	5	190	333
1670	1790	220	1024	5	190	353
1790	1930	220	1109	5	190	378
1930	2080	220	1168	5	190	402
2080	2230	240	1259	5	200	422
2230	2380	240	1356	5	200	451
2380	2530	240	1453	5	200	481
2530	2700	260	1471	6	200	481
2700	2870	260	1471	6	200	490
2870	3040	260	1471	6	200	500
3040	3210	280	1471	6	200	520
3210	3400	280	1471	6	200	554
3400	3600	280	1471	6	200	588

Equipment number *EN* *A*< *EN* ≤*B*		Towline (1)		Mooring lines		
A	*B*	Minimum length, in m	Breaking load, in kN	*N* (2)	Length of each line, in m	Breaking load, in kN
3600	3800	300	1471	6	200	612
3800	4000	300	1471	6	200	647
4000	4200	300	1471	7	200	647
4200	4400	300	1471	7	200	657
4400	4600	300	1471	7	200	667
4600	4800	300	1471	7	200	677
4800	5000	300	1471	7	200	686
5000	5200	300	1471	8	200	686
5200	5500	300	1471	8	200	696
5500	5800	300	1471	8	200	706
5800	6100	300	1471	9	200	706
6100	6500			9	200	716
6500	6900			9	200	726
6900	7400			10	200	726
7400	7900			11	200	726
7900	8400			11	200	735
8400	8900			12	200	735
8900	9400			13	200	735
9400	10000			14	200	735
10000	10700			15	200	735
10700	11500			16	200	735
11500	12400			17	200	735
12400	13400			18	200	735
13400	14600			19	200	735
14600	16000			21	200	735

(1) The towline is not compulsory. It is recommended for ships having length not greater than 180 m.
(2) See [3.5.4].

Table 4: Steel wire composition

Breaking load *BL*, in kN	Steel wire components		
	Number of threads	Ultimate tensile strength of threads, in N/mm^2	Composition of wire
BL< 216	72	1420 ÷ 1570	6 strands with 7-fibre core
216 < *BL*< 490	144	1570 ÷ 1770	6 strands with 7-fibre core
BL > 490	216 or 222	1770 ÷ 1960	6 strands with 1-fibre core

3.5.4 Number of mooring lines

When the breaking load of each mooring line is greater than 490 kN, either a greater number of mooring lines than those required in Tab 3 having lower strength, or a lower number of mooring lines than those required in

Table 5
Mooring lines and tow line

EQUIPMENT NUMBER			MOORING LINES				TOW LINE	
Exceeding	Not exceeding	No.	Minimum length of each line (m)	Minimum breaking strength (kN)			minimum length (m)	Breaking strength (kN)
1	*2*	*3*	*4*	*5a*	*5*	*5b**	*6*	*7*
50	70	3	80	34		34.3	180	98
70	90	3	100	37		36.8	180	98
90	110	3	110	39		39.2	180	98
110	130	3	110	44		44.1	180	98
130	150	3	120	49		–	180	98
150	175	3	120	54		–	180	98
175	205	3	120	59		–	180	112
205	240	4	120	64		63.7	180	129
240	280	4	120	69		68.6	180	150
280	320	4	140	74		73.6	180	174
320	360	4	140	78		78.4	180	207
360	400	4	140	88		88.3	180	224
400	450	4	140	98		98.1	180	250
450	500	4	140		108		180	277
500	550	4	160		123		190	306
550	600	4	160		132		190	338
600	660	4	160		147		190	370
660	720	4	160		157		190	406
720	780	4	170		172		190	441
780	840	4	170		186		190	479
840	910	4	170		201		190	518
910	980	4	170		216		190	559
980	1060	4	180		230		200	603
1060	1140	4	180		250		200	647
1140	1220	4	180		270		200	691
1220	1300	4	180		284		200	738
1300	1390	4	180		309		200	786
1390	1480	4	180		324		200	836
1480	1570	5	190		324		220	888
1570	1670	5	190		333		220	941
1670	1790	5	190		353		220	1024
1790	1930	5	190		378		220	1109
1930	2080	5	190		402		220	1168
2080	2230	5	200		422		240	1259
2230	2380	5	200		451		240	1356
2380	2530	5	200		480		240	1453
2530	2700	6	200		480		260	1471
2700	2870	6	200		490		260	1471
2870	3040	6	200		500		260	1471
3040	3210	6	200		520		280	1471
3210	3400	6	200		554		280	1471
3400	3600	6	200		588		280	1471

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No. 10
cont'd

Table 5 (continued)

EQUIPMENT NUMBER			MOORING LINES				TOW LINE	
Exceeding	Not exceeding	No.	Minimum length of each line (m)	Minimum breaking strength (kN)			minimum length (m)	Breaking strength (kN)
1	*2*	*3*	*4*	*5a*	*5*	*5b**	*6*	*7*
3600	3800	6	200		618		300	1471
3800	4000	6	200		647		300	1471
4000	4200	7	200		647		300	1471
4200	4400	7	200		657		300	1471
4400	4600	7	200		667		300	1471
4600	4800	7	200		677		300	1471
4800	5000	7	200		686		300	1471
5000	5200	8	200		686		300	1471
5200	5500	8	200		696		300	1471
5500	5800	8	200		706		300	1471
5800	6100	9	200		706		300	1471
6100	6500	9	200		716			
6500	6900	9	200		726			
6900	7400	10	200		726			
7400	7900	11	200		726			
7900	8400	11	200		736			
8400	8900	12	200		736			
8900	9400	13	200		736			
9400	10000	14	200		736			
10000	10700	15	200		736			
10700	11500	16	200		736			
11500	12400	17	200		736			
12400	13400	18	200		736			
13400	14600	19	200		736			
14600	16000	21	200		736			

* The values of column 5b may be adopted in alternative to the corresponding values of column 5a.

- For individual mooring lines with breaking strength above 490 kN (50000 kg) the latter may be reduced with corresponding increase of the number of the mooring lines and vice versa, provided that the total breaking load of all lines aboard the ship is not less than the Rules value. The number of lines is not to be less than 6 and no one line is to have a strength less than 490 kN (50000 kg).

2.3 Mooring winches*

2.3.1 Each winch should be fitted with drum brakes the strength of which is sufficient to prevent unreeling of the mooring line when the rope tension is equal to 80 percent of the breaking strength of the rope as fitted on the first layer.

2.3.2 For powered winches the maximum hauling tension which can be applied to the mooring line (the reeled first layer) should not be less than 1/4.5 times the rope's breaking strength and not more than 1/3 times the rope's breaking strength. For automatic winches these figures shall apply when the winch is set on the maximum power with automatic control.

* Requirements of this paragraph are to be considered as a guidance.

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