RULES
FOR THE CLASSIFICATION OF SHIPS

Part 3 – HULL EQUIPMENT
July 2020

Amendments No. 2
January 2022

CROATIAN REGISTER OF SHIPPING

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By the decision of the General Committee of Croatian Register of Shipping,

Amendments No. 2 to the
RULES FOR THE CLASSIFICATION OF SHIPS
Part 3 – HULL EQUIPMENT

have been adopted on 20th December 2021 and shall enter into force on 1st January 2022

INTRODUCTORY NOTES

These amendments shall be read together with the requirements in the Rules for the Classification of Ships, Part 3 – Hull Equipment, edition July 2020, as amended by Amendments No. 1, edition January 2021.

Table 1 contains review of amendments, where items changed or added in relating to previous edition are given, with short description of each modification or addition. All major changes throughout the text are shaded.

This Part of the Rules includes the requirements of the following international Organisations:

International Maritime Organization (IMO)

Conventions: International Convention for the Safety of Life at Sea 1974 (SOLAS 1974) and all subsequent amendments up to and including the 2010 amendments (MSC.291(87))
Protocol of 1988 relating to the International Convention for the Safety of Life at Sea 1974, as amended (SOLAS PROT 1988)
International Convention for the Prevention of Pollution from Ships 1973, as modified by the Protocol of 1978 thereto (MARPOL 73/78) and all subsequent amendments up to and including the 2006 amendments (MEPC.141(54)).

International Association of Classification Societies (IACS)

Unified Requirements (UR):
A1 (Rev.7, Sep 2020), A1 (Rev.7, Corr.1, Sep 2021), A2 (Rev.5, Sep 2020), A3 (Rev.1, Jun 2019), L4 (Rev.3, Corr.1 2011), M42 (Rev.4, 2011), S8 (Rev.4, 2010), S9 (Rev.6, 2010), S10 (Rev.6, Sep 2019), S21 (Rev.5, 2010), S21A (Rev.1, May 2015, Corr.2, Mar 2019), S26 (Rev.4, 2010), S27 (Rev.6, 2013)

Unified Interpretations (UI):
LL20 (Rev.1, 2008), LL21 (Rev.1, 2008), LL36 (Rev.2, 2008), LL50 (Rev.5, 2008), LL62 (Rev.1, Corr.1, 2010), LL70 (2005), SC113 (1996), SC138 (1998), SC153 (Corr.1, Dec 2019), SC156 (Rev.2, Jan 2021), SC190 (Rev.1, Apr 2019), SC191 (Rev. 8, Apr 2019), SC212 (Corr.3, Dec 2019), SC220 (Rev.1, Corr.2, Mar 2017)

Recommendations (Rec.):
Rec.10 (Rev.4, Sep 2020), Rec.13 (Rev.3, July 2020), Rec.14 (Rev.2, Corr.1, 2005), Rec.79 (Rev.1, 2014), Rec.90 (Rev.1, Apr 2019), Rec.91 (Rev.3, Apr 2019)

TABLE 1 – REVIEW OF AMENDMENTS

This review comprises amendments in relation to the Rules for the Classification of Ships, Part 3 – Hull Equipment, edition July 2020, as amended by Amendments No. 1, edition January 2021.

ITEM	*DESCRIPTION OF THE AMENDMENTS*
SECTION 3 ANCHORING ARRANGEMENT	
Table 3.1.2-1	Has been amended to include changes of IACS Rec. No.10, Rev.4, Sep 2020.
Table 3.1.2-2	Has been amended to include changes of IACS Rec. No.10, Rev.4, Sep 2020.
Item 3.2.1	Has been amended to include changes of IACS UR A1, Rev.7, Sep 2020 and UR A1, Corr.1, Sep 2021.
Figure 3.2.1	Has been changed and renumbered to include changes of IACS UR A1, Rev.7, Sep 2020.
Figure 3.2.1-2	Has been added to include changes of IACS UR A1, Rev.7, Sep 2020.
Item 3.2.2	Has been amended to include changes of IACS UR A1, Rev.7, Sep 2020.
Item 3.2.6	Has been added to include recommendations of IACS Rec. No.10 for fishing vessels operating in unrestricted service.
Item 3.5.8	Has been amended to include changes of IACS UR A1, Rev.7, Sep 2020.
SECTION 4 MOORING ARRANGEMENT	
Item 4.1.1	Has been amended to include changes of IACS Rec. No.10, Rev.4, Sep 2020.
Item 4.1.3	Has been amended to include changes of IACS Rec. No.10, Rev.4, Sep 2020.
Item 4.1.5	Has been amended to include changes of IACS Rec. No.10, Rev.4, Sep 2020.
Item 4.1.7	Has been amended to include changes of IACS Rec. No.10, Rev.4, Sep 2020.
Item 4.2.1	Has been amended to include changes of IACS Rec. No.10, Rev.4, Sep 2020.
SECTION 5 TOWING ARRANGEMENT	
Item 5.6.1	Has been amended to include changes of IACS UR A2, Rev.5, Sep 2020.
Sub-item 5.6.2.1	Has been amended to include changes of IACS UR A2, Rev.5, Sep 2020.
Sub-item 5.6.2.3	Has been amended to include changes of IACS UR A2, Rev.5, Sep 2020.
Sub-item 5.6.2.4	Has been amended to include changes of IACS UR A2, Rev.5, Sep 2020.
Sub-item 5.6.2.5.3	Has been amended to include changes of IACS UR A2, Rev.5, Sep 2020.
Sub-item 5.6.2.6	Has been amended to include changes of IACS UR A2, Rev.5, Sep 2020.
Sub-item 5.6.3.1	Has been amended to include changes of IACS UR A2, Rev.5, Sep 2020.
Sub-item 5.6.3.3	Has been amended to include changes of IACS UR A2, Rev.5, Sep 2020.
Sub-item 5.6.3.4	Has been amended to include changes of IACS UR A2, Rev.5, Sep 2020.
Sub-item 5.6.3.5.1	Has been corrected to comply with IACS UR A2, Rev.5, Sep 2020.
Sub-item 5.6.3.5.3	Has been amended to include changes of IACS UR A2, Rev.5, Sep 2020.
Sub-item 5.6.3.6	Has been amended to include changes of IACS UR A2, Rev.5, Sep 2020.
Sub-item 5.6.4.2	Has been amended to include changes of IACS UR A2, Rev.5, Sep 2020.
Item 5.6.5	Has been amended to include changes of IACS UR A2, Rev.5, Sep 2020.
Item 5.7.1	Has been amended to include changes of IACS Rec. No.13, Rev.3, July 2020.
Item 5.7.2	Has been amended to include changes of IACS Rec. No.13, Rev.3, July 2020.

3 ANCHORING ARRANGEMENT

■ **Head 3.1 GENERAL PROVISIONS,** Table 3.1.2-1 Anchoring and mooring equipment has been amended and should be read as follows:

Table 3.1.2-1 Anchoring and mooring equipment

Equipment letter	Equipment number		Stockless bower anchor			Stud link chain cables				Stream wire or chain		Tow line [2]		Mooring line [3]		
							Min. diameter									
	Exc.	Not exc.	No.	Mass per anchor	Stream anchor	Total length	Mild steel CRS-L1	Special quality CRS-L2	Extra special quality CRS-L3	Length	Breaking strength	Minimum length	Ship design minimum breaking load	No.	Length of each line	Ship design minimum breaking load
				[kg]	[kg]	[m]	[mm]	[mm]	[mm]	[m]	[kN]	[m]	[kN]		[m]	[kN]
A1	10	15	2	35	-	110	[1]	-	-	-	-	-	-	2	30	29
A2	15	20	2	50	-	137,5		-	-	-	-	-	-	2	30	29
A3	20	25	2	65		165		-	-	-	-	-	-	2	40	29
A4	25	30	2	80	-	165	11	-	-	-	-	-	-	2	50	29
A5	30	40	2	105	35	192,5	11	-	-	55	55	120	65	2	50	29
A6	40	50	2	135	45	192,5	12,5	-	-	70	60	150	81	2	60	29
A7	50	70	2	180	60	220	14	12,5	-	80	64.7	180	98	3	80	37
A8	70	90	2	240	80	220	16	14	-	85	73.5	180	98	3	100	40
A9	90	110	2	300	100	247,5	17,5	16	-	85	80	180	98	3	110	42
B1	110	130	2	360	120	247,5	19	17,5	-	90	89.2	180	98	3	110	48
B2	130	150	2	420	140	275	20,5	17,5	-	90	98.1	180	98	3	120	53
B3	150	175	2	480	165	275	22	19	-	90	107.9	180	98	3	120	59
B4	175	205	2	570	190	302,5	24	20,5	-	90	117.7	180	112	3	120	64
B5	205	240	2	660	-	302,5	26	22	20,5	-		180	129	4	120	69
B6	240	280	2	780	-	330	28	24	22	-		180	150	4	120	75
B7	280	320	2	900	-	357,5	30	26	24	-		180	174	4	140	80
B8	320	360	2	1020	-	357,5	32	28	24	-	-	180	207	4	140	85
B9	360	400	2	1140	-	385	34	30	26	-	-	180	224	4	140	96
C1	400	450	2	1290	-	385	36	32	28	-	-	180	250	4	140	107
C2	450	500	2	1440	-	412,5	38	34	30	-	-	180	277	4	140	117
C3	500	550	2	1590	-	412,5	40	34	30	-	-	190	306	4	160	134
C4	550	600	2	1740		440	42	36	32			190	338	4	160	143
C5	600	660	2	1920		440	44	38	34			190	370	4	160	160
C6	660	720	2	2100		440	46	40	36			190	406	4	160	171
C7	720	780	2	2280		467,5	48	42	36			190	441	4	170	187
C8	780	840	2	2460		467,5	50	44	38			190	479	4	170	202
C9	840	910	2	2640		467,5	52	46	40			190	518	4	170	218
1	10	80		850		95	4	8	2			90	59		70	35
D2	980	1060	2	3060		495	56	50	44			200	603	4	180	250
D3	1060	1140	2	3300		495	58	50	46			200	647	4	180	272

Table 3.1.2-1 - continued

Equipment letter	Equipment number		Stockless bower anchor			Stud link chain cables				Stream wire or chain		Tow line [2]		Mooring line [3]		
	Exc.	Not exc.	No.	Mass per anchor	Stream anchor	Total length	Min. diameter: Mild steel CRS-L1	Min. diameter: Special quality CRS-L2	Min. diameter: Extra special quality CRS-L3	Length	Breaking strength	Minimum length	Ship design minimum breaking load	No.	Length of each line	Ship design minimum breaking load
				[kg]	[kg]	[m]	[mm]	[mm]	[mm]	[m]	[kN]	[m]	[kN]		[m]	[kN]
D4	1140	1220	2	3540		522,5	60	52	46			200	691	4	180	293
D5	1220	1300	2	3780		522,5	62	54	48			200	738	4	180	309
D6	1300	1390	2	4050		522,5	64	56	50			200	786	4	180	336
D7	1390	1480	2	4320		550	66	58	50			200	836	4	180	352
D8	1480	1570	2	4590		550	68	60	52			220	888	5	190	352
D9	1570	1670	2	4890		550	70	62	54			220	941	5	190	362
E1	1670	1790	2	5250		577,5	73	64	56			220	1024	5	190	384
E2	1790	1930	2	5610		577,5	76	66	58			220	1109	5	190	411
E3	1930	2080	2	6000		577,5	78	68	60			220	1168	5[4]	190[4]	437[4]
E4	2080	2230	2	6450		605	81	70	62			240	1259			
E5	2230	2380	2	6900		605	84	73	64			240	1356			
E6	2380	2530	2	7350		605	87	76	66			240	1453			
E7	2530	2700	2	2700	-	632,5	90	78	68	-	-	260	1471			
E8	2700	2870	2	8300	-	632,5	92	81	70	-	-	260	1471			
E9	2870	3040	2	8700	-	632,5	95	84	73	-	-	260	1471			
F1	3040	3210	2	9300	-	660	97	84	76	-	-	280	1471			
F2	3210	3400	2	9900	-	660	100	87	78	-	-	280	1471			
F3	3400	3600	2	10500	-	660	102	90	78	-	-	280	1471			
F4	3600	3800	2	11100	-	687,5	105	92	81	-	-	300	1471			
F5	3800	4000	2	11700	-	687,5	107	95	84	-	-	300	1471			
F6	4000	4200	2	12300	-	687,5	111	97	87	-	-	300	1471			
F7	4200	4400	2	12900	-	715	114	100	87	-	-	300	1471			
F8	4400	4600	2	13500	-	715	117	102	90	-	-	300	1471			
F9	4600	4800	2	14100	-	715	120	105	92	-	-	300	1471			
G1	4800	4800	2	14700	-	742,5	122	107	95	-	-	300	1471			
G2	5000	5000	2	15400	-	742,5	124	111	97	-	-	300	1471			
G3	5200	5200	2	16100	-	742,5	127	111	97	-	-	300	1471			
G4	5500	5800	2	16900	-	742,5	130	114	100	-	-	300	1471			
G5	5800	6100	2	17800	-	742,5	132	117	102	-	-	300	1471			
G6	6100	6500	2	18800	-	742,5	-	120	107	-	-	300	1471			
G7	6500	6900	2	20000	-	770	-	124	111	-	-	300	1471			
G8	6900	7400	2	21500	-	770	-	127	114	-	-	300	1471			
G9	7400	7900	2	23000	-	770	-	132	117	-	-	300.	1471			
H1	7900	8400	2	24500	-	770	-	137	122	-	-	300	1471			
H2	8400	8900	2	26000	-	770	-	142	127	-	-	300	1471			
H3	8900	9400	2	27500	-	770		147	132	-	-	300	1471			
H4	9400	10000	2	29000	-	770		152	132	-	-	300	1471			
H5	10000	10700	2	31000	-	770	-	-	137	-	-					
H6	10700	11500	2	33000	-	770	-	-	142	-	-					
H7	11500	12400	2	35500	-	770	-	-	147	-	-					
H8	12400	13400	2	38500	-	770	-	-	152	-						
H9	13400	14600	2	42000	-	770	-	-	157	-	-					
I1	14600	16000	2	46000	-	770	-	-	162	-	-					

[1] Chain cables or wire ropes may be used, chain cable breaking load or actual breaking strength of rope being not less than 44 kN.
[2] Towing lines are recommendations only.
[3] Guidance for mooring lines for ships with equipment number $En > 2000$ is given in *IACS Rec. No.10*.
[4] Value is applicable for ships with equipment number $1930 < En \leq 2000$.

■ **Head 3.1 GENERAL PROVISIONS,** Table 3.1.2-2 Equipment for fishing vessels has been amended and should be read as follows:

Table 3.1.2-2 Equipment for fishing vessels

Equipment letter	Equipment number		Stockless bower anchors		Stud link chain cables for anchors			Mooring line		
						Min. diameter				
	Exceeding	Not exceeding	Number	Mass anchor	Total length	Mild steel CRS-L1	Special quality CRS-L2	Number	Minimum length of each line	Ship design minimum breaking load
				[kg]	[m]	[mm]	[mm]		[m]	[kN]
a1		to 30	2	70	137.5	[1)]	-	2	40	25
a2	30	40	2	80	165	11.0	-	2	50	29
a3	40	50	2	100	192.5	11.0	-	2	60	29
a4	50	60	2	120	192.5	12,5	-	2	60	29
a5	60	70	2	140	192.5	12.5	-	2	80	29
a6	70	80	2	160	220	14	12.5	2	100	34
a7	80	90	2	180	220	14	12.5	2	100	36.8
a8	90	100	2	210	220	16	14	2	110	36.8
a9	100	110	2	240	220	16	14	2	110	39
b1	110	120	2	270	247.5	17.5	16	2	110	39
b2	120	130	2	300	247.5	17.5	16	2	110	44
b3	130	140	2	340	275	19	17,5	2	120	44
b4	140	150	2	390	275	19	17,5	2	120	49
b5	150	175	2	480	275	22	19	2	120	54
b6	175	205	2	570	302.5	24	20,5	2	120	59
b7	205	240	2	660	302.5	26	22	2	120	64
b8	240	280	2	780	330	28	24	3	120	71
b9	280	320	2	900	357.5	30	26	3	140	78
c1	320	360	2	1020	357.5	32	28	3	140	85.8
c2	360	400	2	1140	385	34	30	3	140	93
c3	400	450	2	1290	385	36	32	3	140	101
c4	450	500	2	1440	412.5	38	34	3	140	108
c5	500	550	2	1590	412.5	40	34	4	160	113
c6	550	600	2	1740	440	42	36	4	160	118
c7	600	660	2	1920	440	44	38	4	160	123
c8	660	720	2	2100	440	46	40	4	160	127

[1)] Chain cables or wire ropes may be used, cable breaking load or minimum breaking strength of wire rope being no less than 44 kN.

■ **Head 3.2 EQUIPMENT NUMBER,** item 3.2.1 has been amended and should be read as follows:

3.2.1 The equipment of anchors and chain cables for ships of unrestricted service is to be as given in Table 3.1.2-1 and is to be based on an Equipment Number *En* calculated as follows:

$$EN = \Delta^{2/3} + 2(hB + S_{fun}) + 0.1A$$

where:

Δ = moulded displacement, in [t], to the summer load waterline,

B = moulded breadth, in [m],

h = effective height, in [m], from the summer load waterline to the top of the uppermost house,

$h = a + \Sigma h_i$

a = vertical distance at hull side from the summer load waterline amidships to the upper deck, in [m],+

h_i = height, in [m], on the centreline of each tier of houses having a breadth greater than $B/4$, for the lowest tier h_1 is to be measured at centreline from the upper deck or from a notional deck line where there is local discontinuity in the upper deck, see Fig. 3.2.1-1 for an example,

A = side projected area, in [m^2], of the hull, superstructures and houses and funnels above the summer load waterline which are within the equipment length of the ship and also have a breadth greater than $B/4$. The side projected area of the funnel is considered in A when A_{FS} is greater than zero. In this case, the side projected

area of the funnel should be calculated between the upper deck, or notional deck line where there is local discontinuity in the upper deck, and the effective height h_F.

S_{fun} = effective front projected area of the funnel, in [m²], defined as:

$$S_{fun} = A_{FS} - S_{shield}$$

A_{FS} = front projected area of the funnel, in [m²], calculated between the upper deck at centreline, or notional deck line where there is local discontinuity in the upper deck, and the effective height h_F.

A_{FS} is taken equal to zero if the funnel breadth is less than or equal to $B/4$ at all elevations along the funnel height.

h_F = effective height of the funnel, in [m], measured from the upper deck at centreline, or notional deck line where there is local discontinuity in the upper deck, and the top of the funnel. The top of the funnel may be taken at the level where the funnel breadth reaches $B/4$.

S_{shield} = the section of front projected area A_{FS}, in [m²], which is shielded by all deck houses having breadth greater than $B/4$. If there are more than one shielded section, the individual shielded sections i.e $S_{shield1}$, $S_{shield\ 2}$ etc as shown in figure 2 to be added together. To determine S_{shield}, the deckhouse breadth is assumed B for all deck houses having breadth greater than $B/4$ as shown for $S_{shield1}$, $S_{shield2}$ in Fig. 3.2.1-2.

■ **Head 3.2 EQUIPMENT NUMBER,** Fig. 3.2.1 has been changed and replaced with Fig. 3.2.1-1 and should be read as follows:

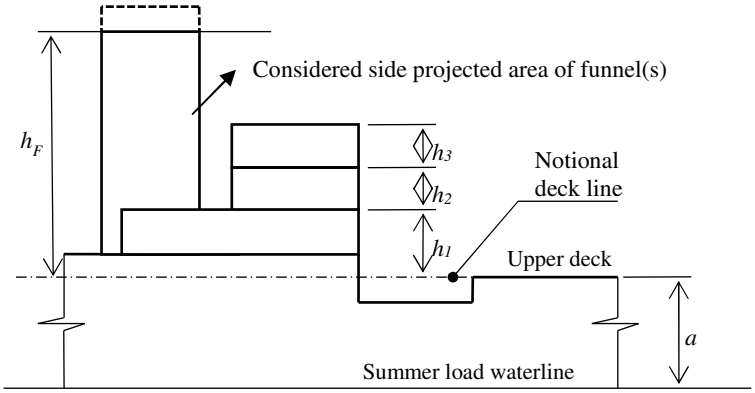

Figure 3.2.1-1

■ **Head 3.2 EQUIPMENT NUMBER,** Fig. 3.2.1-2 has been added and should be read as follows:

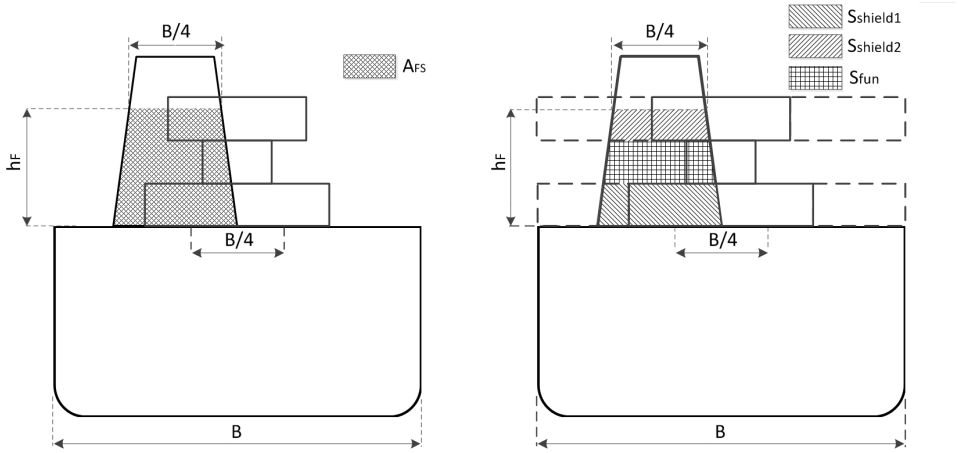

Figure 3.2.1-2

■ **Head 3.2 EQUIPMENT NUMBER,** item 3.2.2 has been amended and should be read as follows:

3.2.2 When calculating *h*, sheer and trim are to be ignored, i.e. *h* is the sum of freeboard amidships plus the height (at centreline) of each tier of houses having a breadth greater than *B*/4.

If a house having a breadth greater than *B*/4 is above a house with a breadth of *B*/4 or less then the wide house is to be included but the narrow house ignored.

Screens or bulwarks 1,5 m or more in height are to be regarded as parts of houses when determining *h* and *A*. The height of the hatch coamings and that of any deck cargo, such as containers, may be disregarded when determining *h* and *A*.

With regard to determining *A*, when a bulwark is more than 1,5 m high, the area shown as A_2 (see Fig. 3.2.2) is to be included in *A*.

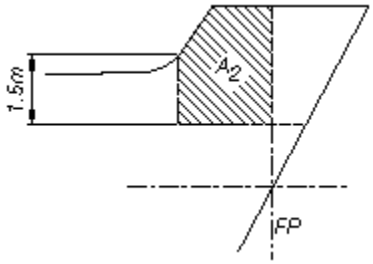

Figure 3.2.2

The equipment length of the vessels is the length between perpendiculars but is not to be less than 96% nor greater than 97% of the extreme length on the summer waterline (measured from the forward end of the waterline).

When several funnels are fitted on the ship, the above parameters are taken as follows:

h_F: effective height of the funnel, in [m], measured from the upper deck, or notional deck line where there is local discontinuity in the upper deck, and the top of the highest funnel. The top of the highest funnel may be taken at the level where the sum of each funnel breadth reaches *B*/4.

A_{FS}: sum of the front projected area of each funnel, in [m²], calculated between the upper deck, or notional deck line where there is local discontinuity in the upper deck, and the effective height h_F. A_{FS} is to be taken equal to zero if the sum of each funnel breadth is less than or equal to *B*/4 at all elevations along the funnels height.

A: side projected area, in [m^2], of the hull, superstructures, houses and funnels above the summer loadwaterline which are within the equipment length of the ship. The total side projected area of the funnels is to be considered in the side projected area of the ship, *A*, when A_{FS} is greater than zero. The shielding effect of funnels in transverse direction may be considered in the total side projected area, i.e., when the side projected areas of two or more funnels fully or partially overlap, the overlapped area needs only to be counted once.

The total length of chain given in Tables 3.1.2-1 and 3.1.2-2 is to be divided in approximately equal parts between the two bower anchors.

■ **Head 3.2 EQUIPMENT NUMBER,** item 3.2.6 has been added and should be read as follows:

3.2.6 The equipment of anchors and chain cables given in Table 3.1.2-2 for fishing vessels operating in unrestricted service is based on the equipment number EN which should be calculated as follows:

$$EN = \Delta^{2/3} + 2Bh + 0.1A$$

where:

Δ = moulded displacement, in [t], to the maximum design waterline,

B = greatest moulded breadth, in [m],

h = effective height, in [m], from the maximum design waterline to the top of the uppermost house.

$= a + \Sigma h_i$

a = distance, in [m], from the maximum design waterline to the upper edge of the uppermost complete deck at the side amidships,

h_i = height, in [m], on the centreline of each tier of houses having breadth greater than *B*/4.

For the lowest tier *h* is measured at centreline from the upper deck or from a notional deck line where there is local discontinuity in the upper deck.

When calculating h, sheer and trim can be ignored.

A = side-projected area, in [m^2], of the hull, within the length of the ship between perpendiculars, and of superstructures and houses above the maximum design waterline having a width greater than $B/4$.

Screens and bulwarks more than 1.5 m in height should be regarded as parts of houses when determining h and A.

■ **Head 3.5 ANCHOR APPLIANCES,** item 3.5.8 Supporting hull structure of anchor windlass and chain stopper has been amended and should be read as follows:

3.5.8 Supporting hull structures of anchor windlass and chain stopper

3.5.8.1 The supporting hull structure of anchor windlass and chain stopper is to be sufficient to accommodate the design and sea loads.

3.5.8.2 The design loads are to be taken not less than:

1. for chain stoppers, 80% of the chain cable breaking load,
2. for windlasses, where no chain stopper is fitted or the chain stopper is attached to the windlass, 80% of the chain cable breaking load,
3. for windlasses, where chain stoppers are fitted but not attached to the windlass, 45% of the chain cable breaking load.

The design loads are to be applied in the direction of the chain cable.

3.5.8.3 The sea loads are to be taken according to 7.14.3.2.

3.5.8.4 The stresses acting on the supporting hull structures of windlass and chain stopper, based on net thickness obtained by deducting the corrosion addition, t_k, given in 3.5.8.5, are not to be greater than the following permissible values:

(a) For strength assessment by means of beam theory or grillage analysis:

Normal stress: 1,.0 R_{eH}

Shear stress: 0,6 R_{eH}

The normal stress is the sum of bending stress and axial stress. The shear stress to be considered corresponds to the shear stress acting perpendicular to the normal stress. No stress concentration factors are to be taken into account.

(b) For strength assessment by means of finite element analysis:

Von Mises stress: 1,0 R_{eH}

For strength assessment by means of finite element analysis the mesh is to be fine enough to represent the geometry as realistically as possible. The aspect ratios of elements are not to exceed 3. Girders are to be modelled using shell or plane stress elements. Symmetric girder flanges may be modelled by beam or truss elements. The element height of girder webs must not exceed one-third of the web height. In way of small openings in girder webs, the web thickness is to be reduced to a mean thickness over the web height as per *Register's* Rules. Large openings are to be modelled. Stiffeners may be modelled using shell, plane stress, or beam elements. The mesh size of stiffeners is to be fine enough to obtain proper bending stress. If flat bars are modeled using shell or plane stress elements, dummy rod elements are to be modelled at the free edge of the flat bars and the stresses of the dummy elements are to be evaluated. Stresses are to be read from the centre of the individual element. For shell elements the stresses are to be evaluated at the mid plane of the element.

3.5.8.5 The total corrosion addition, t_k, is not to be less than the following values:

(a) Ships covered by Common structural rules for bulk carriers and oil tankers:

t_k: total corrosion addition as defined in these rules.

(b) Other ships:

For the supporting hull structure, the total corrosion addition, t_k, is defined according to the *Register's Rules* for all considered structural members used in the model (e.g. deck structures).

4 MOORING ARRANGEMENT

■ **Head 4.1 GENERAL PROVISIONS,** item 4.1.1 has been amended and should be read as follows:

4.1.1 The number, length and ship design minimum breaking load of mooring ropes are to be determined for all ships according to Table 3.1.2-1 and for fishing vessels according to Table 3.1.2-2, and Table 3.6.2.1-1. The ship design minimum breaking loads specified in tables are valid for wire ropes and ropes of natural fibre (manila) only. See also *IACS Rec. No.10.*

■ **Head 4.1 GENERAL PROVISIONS,** item 4.1.3 has been amended and should be read as follows:

4.1.3 On ships with individual mooring ropes having ship design minimum breaking load exceeding 490 kN according to Table 3.1.2-1, the following ropes may be used:

- with reduced ship design minimum breaking load and an increased number of ropes,

or

- with increased ship design minimum breaking load and a reduced number of ropes.

In such cases the total ship design minimum breaking load of all the mooring ropes is not to be less than the total rope ship design minimum breaking load foreseen according to Table 3.1.2-1. The number of ropes is to not be less than 6, and ship design minimum breaking load of a single rope is not to be lower than 490 kN.

■ **Head 4.1 GENERAL PROVISIONS,** item 4.1.5 has been amended and should be read as follows:

4.1.5 If synthetic-fibre ropes are used, the line design break force as defined in 5.6.1 of a rope F_c is not to be less than:

$F_c = 0{,}0742 \cdot \delta_m \cdot F_t^{8/9}$, [kN]

where:

δ_m = the mean relative elongation to the breaking point of a synthetic rope, in percentages but not less than 30%,

F_t = actual ship design minimum breaking load of a mooring rope, given in Table 3.1.2-1 or 3.1.2-2, in [kN], see also *IACS Recommendation No. 10*.

■ **Head 4.1 GENERAL PROVISIONS,** item 4.1.7 has been added and should be read as follows:

4.1.7 As an alternative to the prescriptive approach, direct mooring analysis may be performed to determine the necessary mooring restraint, i.e. number and strength of mooring lines. Direct analyses allow to optimize mooring equipment and arrangement for the individual ship and the port mooring facilities typical for the considered ship type and size. The requirements of direct analysis are shown in the *IACS Rec. No.10*, Appendix A.

■ **Head 4.2 MOORING ROPES,** item 4.2.1 has been amended and should be read as follows:

4.2.1 Mooring ropes may be made of steel wire, or of natural or synthetic fibres except on ships carrying in bulk flammable liquids with a flash point under 60°.

Operations with steel wire ropes are allowed only on those superstructure decks which are not the top of the cargo tanks and which have no cargo pipelines led over them.

Regardless of the ship design minimum breaking load as specified in Tables 3.1.2-1, 3.1.2-2 or 3.6.2.1-1, fibre ropes with a diameter less than 20 mm are not acceptable.

For polyamide ropes the ship design minimum breaking load should be increased by 20% and for other synthetic ropes by 10% to account for strength loss due to, among others, aging and wear.

5 TOWING ARRANGEMENT

■ **Head 5.6 SHIPBOARD FITTINGS AND SUPPORTING HULL STRUCTURES ASSOCIATED WITH TOWING AND MOORING ON CONVENTIONAL VESSELS,** item 5.6.1 Application and definitions has been amended and should be read as follows:

5.6.1 Application and definitions

Conventional ships are to be provided with arrangements, equipment and fittings of sufficient safe working load to enable the safe conduct of all towing and mooring operations associated with the normal operations of the ship.

This requirement is to apply to design and construction of shipboard fittings and supporting structures used for the normal towing and mooring operations. Normal towing means towing operations necessary for manoeuvring in ports and sheltered waters associated with the normal operations of the ship.

For ships, not subject to SOLAS Regulation II-1/3-4, Paragraph 1, but intended to be fitted with equipment for towing by another ship or a tug, e.g. such as to assist the ship in case of emergency as given in SOLAS Regulation II-1/3-4, Paragraph 2, the requirements designated as 'other towing' in this requirement are to be applied to design and construction of those shipboard fittings and supporting hull structures.

This requirement is not applicable to design and construction of shipboard fittings and supporting hull structures used for special towing services defined as:

- **Escort towing**: Towing service, in particular, for laden oil tankers or LNG carriers, required in specific estuaries. Its main purpose is to control the ship in case of failures of the propulsion or steering system. It should be referred to local escort requirements and guidance given by, e.g., the *Oil Companies International Marine Forum* (OCIMF).
- **Canal transit towing**: Towing service for ships transiting canals, e.g. the Panama Canal. It should be referred to local canal transit requirements.
- **Emergency towing for tankers**: Towing service to assist tankers in case of emergency. For the emergency towing arrangements, ships subject to SOLAS regulation II-1/3-4, Paragraph 1 are to comply with that regulation and resolution *MSC.35(63)* as may be amended.

IACS Recommendation No. 10 "Anchoring, Mooring and Towing Equipment" may be referred to for recommendations concerning mooring and towing.

For the requirements of SOLAS regulation II-1/3-8 relating to towing and mooring equipment, see IACS Unified Interpretation SC212.

The net minimum scantlings of the supporting hull structure are to comply with the requirements given in 5.6.2.5 and 5.6.3.5. The net thicknesses, tnet, are the member thicknesses necessary to obtain the above required minimum net scantlings. The required gross thicknesses are obtained by adding the corrosion addition, tk, given in 5.6.5, to tnet. Shipboard fittings are to comply with the requirements given in 5.6.2.4 and 5.6.3.4. For shipboard fittings not selected from an accepted industry standard the corrosion addition, tk, and the wear allowance, tw, given in 5.6.5 and 5.6.6, respectively, are to be considered.

For the purpose of this requirement:

- Conventional ships means new displacement-type ships of 500 GT and above, excluding high speed craft, special purpose ships, and offshore units of all types. As per MSC.266(84), 'Special purpose ship' means a mechanically self-propelled ship which by reason of its function carries on board more than 12 special personnel.
- Shipboard fittings mean those components limited to the following: bollards and bitts, fairleads, stand rollers, chocks used for the normal mooring of the vessel and the similar components used for the normal towing of the ship. Other components such as capstans, winches, etc. are not covered by the requirements of this Section. Any weld or bolt or equivalent device connecting the shipboard fitting to the supporting structure is part of the shipboard fitting and if selected from an industry standard subject to that standard.
- Supporting hull structures means that part of the ship structure on/in which the shipboard fitting is placed and which is directly submitted to the forces exerted on the shipboard fitting. The supporting hull structure of capstans, winches, etc. used for the normal towing and mooring operations mentioned above is also subject to the requirements of this Section.
- Industry standard means international standard (ISO, etc.) or standards issued by national association which are recognised in the country where the ship is built.
- The nominal **capacity condition** is defined as the theoretical condition where the maximum possible deck cargoes are included in the ship arrangement in their respective positions. For container ships the nominal capacity condition represents the theoretical condition where the maximum possible number of containers is included in the ship arrangement in their respective positions.
- **Ship Design Minimum** Breaking **Load (*MBL*$_{SD}$)** means the minimum breaking load of new, dry mooring lines or tow line for which shipboard fittings and supporting hull structures are designed in order to meet mooring restraint requirements or the towing requirements of other towing service.

- **Line Design Break Force (*LDBF*)** means the minimum force that a new, dry, spliced, mooring line will break at. This is for all synthetic cordage materials.

■ **Head 5.6 SHIPBOARD FITTINGS AND SUPPORTING HULL STRUCTURES ASSOCIATED WITH TOWING AND MOORING ON CONVENTIONAL VESSELS,** sub-item 5.6.2.1 Strength has been amended and should be read as follows:

5.6.2.1 Strength

The strength of shipboard fittings used for normal towing operations at bow, sides and stern and their supporting hull structures are to comply with the requirements of this Section.

Where a ship is equipped with shipboard fittings intended to be used for other towing services, the strength of these fittings and their supporting hull structures are to comply with the requirements of this Section.

For fittings intended to be used for, both, towing and mooring, 5.6.3 applies to mooring.

■ **Head 5.6 SHIPBOARD FITTINGS AND SUPPORTING HULL STRUCTURES ASSOCIATED WITH TOWING AND MOORING ON CONVENTIONAL VESSELS,** sub-item 5.6.2.3 Load considerations has been amended and should be read as follows:

5.6.2.3 Load considerations

The minimum design load applied to supporting hull structures for shipboard fittings is to be:

(1) for normal towing operations, 1.25 times the intended maximum towing load (e.g. static bollard pull) as indicated on the towing and mooring arrangements plan,

(2) for other towing service, the ship design minimum breaking load according to IACS Recommendation No. 10 (see Notes),

(3) for fittings intended to be used for, both, normal and other towing operations, the greater of the design loads according to (1) and (2).

NOTES:

1. *Side projected area including that of deck cargoes as given by the ship nominal capacity condition is to be taken into account for selection of towing lines and the loads applied to shipboard fittings and supporting hull structure. The nominal capacity condition is defined in 5.6.1.*

2. *The increase of the line design break force for synthetic ropes according to IACS Recommendation No. 10 needs not to be taken into account for the loads applied to shipboard fittings and supporting hull structure.*

When a safe towing load TOW greater than that determined according to 5.6.2.6 is requested by the applicant, then the design load is to be increased in accordance with the appropriate TOW/design load relationship given by 5.6.2.3 and 5.6.2.6.

The design load is to be applied to fittings in all directions that may occur by taking into account the arrangement shown on the towing and mooring arrangements plan.

Where the towing line takes a turn at a fitting the total design load applied to the fitting is equal to the resultant of the design loads acting on the line, see Fig. 5.6.2.3.

However, in no case does the design load applied to the fitting need to be greater than twice the design load on the line.

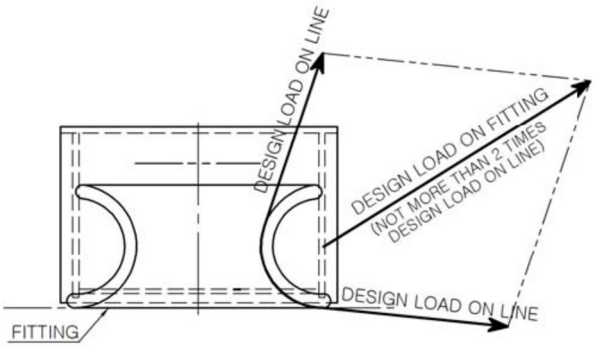

Figure 5.6.2.3

■ **Head 5.6 SHIPBOARD FITTINGS AND SUPPORTING HULL STRUCTURES ASSOCIATED WITH TOWING AND MOORING ON CONVENTIONAL VESSELS,** sub-item 5.6.2.4 Shipboard fitings has been amended and should be read as follows:

5.6.2.4 Shipboard fittings

Shipboard fittings may be selected from an industry standard accepted by the *Register* and at least based on the following loads.

(1) For normal towing operations, the intended maximum towing load (e.g. static bollard pull) as indicated on the towing and mooring arrangements plan,

(2) For other towing service, the ship design minimum breaking load of the tow line according to IACS Recommendation No. 10 (see Notes in 5.6.2.3),

(3) For fittings intended to be used for, both, normal and other towing operations, the greater of the loads according to (1) and (2).

Towing bitts (double bollards) may be chosen for the towing line attached with eye splice if the industry standard distinguishes between different methods to attach the line, i.e. figure-of-eight or eye splice attachment.

When the shipboard fitting is not selected from an accepted industry standard, the strength of the fitting and of its attachment to the ship is to be in accordance with 5.6.2.3 and 5.6.2.5. Towing bitts (double bollards) are required to resist the loads caused by the towing line attached with eye splice. For strength assessment beam theory or finite element analysis using net scantlings is to be applied, as appropriate. Corrosion additions are to be as defined in 5.6.5. A wear down allowance is to be included as defined in 5.6.6. At the discretion of the *Register*, load tests may be accepted as alternative to strength assessment by calculations.

■ **Head 5.6 SHIPBOARD FITTINGS AND SUPPORTING HULL STRUCTURES ASSOCIATED WITH TOWING AND MOORING ON CONVENTIONAL VESSELS,** sub-item 5.6.2.5.3 Allowable stress has been amended and should be read as follows:

5.6.2.5.3 Allowable stresses

Allowable stresses under the design load conditions as specified in 5.6.2.3 are as follows:

(1) for strength assessment by means of beam theory or grillage analysis:
normal stress: 1,0 ReH;
shearing stress: 0,6 ReH.
Normal stress is the sum of bending stress and axial stress with the corresponding shearing stress acting perpendicular to the normal stress. No stress concentration factors being taken into account.

(2) for strength assessment by means of finite element analysis:

Von Mises stress: 1,0 R_{eH}.

For strength assessment by means of finite element analysis the mesh is to be fine enough to represent the geometry as realistically as possible. The aspect ratios of elements are not to exceed 3. Girders are to be modelled using shell or plane stress elements. Symmetric girder flanges may be modelled by beam or truss elements. The element height of girder webs must not exceed one-third of the web height. In way of small openings in girder webs the web thickness is to be reduced to a mean thickness over the web height as per *Register's* Rules. Large openings are to be modelled. Stiffeners may be modelled by using shell, plane stress, or beam elements. The mesh size of stiffeners is to be fine enough to obtain proper bending stress. If flat bars are modeled using shell or plane stress elements, dummy rod elements are to be modelled at the free edge of the flat bars and the stresses of the dummy elements are to be evaluated. Stresses are to be read from the centre of the individual element. For shell elements the stresses are to be evaluated at the mid plane of the element.

R_{eH} is the specified minimum yield stress of the material.

■ **Head 5.6 SHIPBOARD FITTINGS AND SUPPORTING HULL STRUCTURES ASSOCIATED WITH TOWING AND MOORING ON CONVENTIONAL VESSELS,** sub-item 5.6.2.6 Safe towing load (TOW)has been amended and should be read as follows:

5.6.2.6 Safe towing load (TOW)

1) The safe towing load (TOW) is the safe load limit of shipboard fittings for towing purpose.
2) TOW used for normal towing operations is not to exceed 80% of the design load per 5.6.2.3 (1).
3) TOW used for other towing operations is not to exceed 80% of the design load according to 5.6.2.3 (2).
4) For fittings used for both normal and other towing operations, the greater of the safe towing loads according to 5.6.2.6.2 and 5.6.2.6.3 is to be used.
5) TOW, in [t], of each shipboard fitting is to be marked (by weld bead or equivalent) on the deck fittings used for towing. For fittings intended to be used for, both, towing and mooring, SWL, in [t], according to 5.6.3.6 is to be marked in addition to TOW.

6) The above requirements on TOW apply for the use with no more than one line. If not otherwise chosen, for towing bitts (double bollards) TOW is the load limit for a towing line attached with eye-splice.

7) The towing and mooring arrangements plan mentioned in 5.6.4 is to define the method of use of towing lines.

■ **Head 5.6 SHIPBOARD FITTINGS AND SUPPORTING HULL STRUCTURES ASSOCIATED WITH TOWING AND MOORING ON CONVENTIONAL VESSELS,** sub-item 5.6.3.1 has been amended and should be read as follows:

5.6.3.1 Strength

The strength of shipboard fittings used for mooring operations and their supporting hull structures as well as the strength of supporting hull structures of winches and capstans is to comply with the requirements of this Section.

For fittings intended to be used for, both, towing and mooring, 5.6.2 applies to towing.

■ **Head 5.6 SHIPBOARD FITTINGS AND SUPPORTING HULL STRUCTURES ASSOCIATED WITH TOWING AND MOORING ON CONVENTIONAL VESSELS,** sub-item 5.6.3.3 Load considerations has been amended and should be read as follows:

5.6.3.3 Load considerations

1) The minimum design load applied to supporting hull structures for shipboard fittings is to be 1.15 times the ship design minimum breaking load according to the Tables 3.1.2-1 and 3.1.2-2 (see Notes). See also IACS Recommendation No. 10.

2) The minimum design load applied to supporting hull structures for winches is to be 1.25 times the intended maximum brake holding load, where the maximum brake holding load is to be assumed not less than 80% of the the ship design minimum breaking load according to the Tables 3.1.2-1 and 3.1.2-2, see Notes. See also IACS Recommendation No. For supporting hull structures of capstans, 1.25 times the maximum hauling-in force is to be taken as the minimum design load.

3) When a safe working load SWL greater than that determined according to 5.6.3.6 is requested by the applicant, then the design load is to be increased in accordance with the appropriate SWL/design load relationship given by 5.6.3.3 and 5.6.3.6.

4) The design load is to be applied to fittings in all directions that may occur by taking into account the arrangement shown on the towing and mooring arrangements plan. Where the mooring line takes a turn at a fitting the total design load applied to the fitting is equal to the resultant of the design loads acting on the line, refer to the Fig. 5.6.2.3. However, in no case does the design load applied to the fitting need to be greater than twice the design load on the line.

NOTES:

1. Side projected area including that of deck cargoes as given by the ship nominal capacity condition is to be taken into account for selection of towing lines and the loads applied to shipboard fittings and supporting hull structure. The nominal capacity condition is defined in 5.6.1. See also IACS Recommendation No. 10.

2. The increase of the line design break force for synthetic ropes according to 4.2 needs not to be taken into account for the loads applied to shipboard fittings and supporting hull structure. See also IACS Recommendation No. 10.

■ **Head 5.6 SHIPBOARD FITTINGS AND SUPPORTING HULL STRUCTURES ASSOCIATED WITH TOWING AND MOORING ON CONVENTIONAL VESSELS,** sub-item 5.6.3.4 Shipboard fittings has been amended and should be read as follows:

5.6.3.4 Shipboard fittings

Shipboard fittings may be selected from an industry standard accepted by the Register and at least based on the ship design minimum breaking load according to the Tables 3.1.2-1 and 3.1.2-2 (see Notes in 5.6.3.3). See also IACS Recommendation No. 10.

Mooring bitts (double bollards) are to be chosen for the mooring line attached in figure-of-eight fashion if the industry standard distinguishes between different methods to attach the line, i.e. figure-of-eight or eye splice attachment.

When the shipboard fitting is not selected from an accepted industry standard, the strength of the fitting and of its attachment to the ship is to be in accordance with 5.6.3.3 and 5.6.3.5. Mooring bitts (double bollards) are required to resist the loads caused by the mooring line attached in figure-of-eight fashion, see Note. For strength assessment beam theory or finite element analysis using net scantlings is to be applied, as appropriate. Corrosion additions are to be as defined in 5.6.5. A wear down allowance is to be included as defined in 5.6.6. At the discretion of the *Register*, load tests may be accepted as alternative to strength assessment by calculations.

NOTE:

With the line attached to a mooring bitt in the usual way (figure-of-eight fashion), either of the two posts of the mooring bitt can be subjected to a force twice as large as that acting on the mooring line. Disregarding this effect, depending on the applied industry standard and fitting size, overload may occur.

■ **Head 5.6 SHIPBOARD FITTINGS AND SUPPORTING HULL STRUCTURES ASSOCIATED WITH TOWING AND MOORING ON CONVENTIONAL VESSELS,** sub-item 5.6.3.5.1 Arrangement has been amended and should be read as follows:

5.6.3.5.1 Arrangement

The arrangement of reinforced members beneath shipboard fittings, winches and capstans is to consider any variation of direction (horizontally and vertically) of the mooring forces acting upon the shipboard fittings, see Fig. 5.6.2.5.1 for a sample arrangement. Proper alignment of fitting and supporting hull structure is to be ensured.

■ **Head 5.6 SHIPBOARD FITTINGS AND SUPPORTING HULL STRUCTURES ASSOCIATED WITH TOWING AND MOORING ON CONVENTIONAL VESSELS,** sub-item 5.6.3.5.3 Allowable stress has been amended and should be read as follows:

5.6.3.5.3 Allowable stresses

Allowable stresses under the design load conditions as specified in 5.6.3.3 are as follows:

(1) for strength assessment by means of beam theory or grillage analysis:
normal stress: 1,0 R_{eH};
shearing stress: 0,6 R_{eH}.
Normal stress is the sum of bending stress and axial stress. No stress concentration factors being taken into account.

(2) for strength assessment by means of finite element analysis:

Von Mises stress: 1,0 R_{eH}.

For strength assessment by means of finite element analysis the mesh is to be fine enough to represent the geometry as realistically as possible. The aspect ratios of elements are not to exceed 3. Girders are to be modelled using shell or plane stress elements. Symmetric girder flanges may be modelled by beam or truss elements. The element height of girder webs must not exceed one-third of the web height. In way of small openings in girder webs the web thickness is to be reduced to a mean thickness over the web height as per Register's Rules. Large openings are to be modelled. Stiffeners may be modelled by using shell, plane stress, or beam elements. The mesh size of stiffeners is to be fine enough to obtain proper bending stress. If flat bars are modeled using shell or plane stress elements, dummy rod elements are to be modelled at the free edge of the flat bars and the stresses of the dummy elements are to be evaluated. Stresses are to be read from the centre of the individual element. For shell elements the stresses are to be evaluated at the mid plane of the element.

ReH is the specified minimum yield stress of the material.

■ **Head 5.6 SHIPBOARD FITTINGS AND SUPPORTING HULL STRUCTURES ASSOCIATED WITH TOWING AND MOORING ON CONVENTIONAL VESSELS,** sub-item 5.6.3.6 Safe working load has been amended and should be read as follows:

5.6.3.6 Safe working load (SWL)

1) The Safe Working Load (SWL) is the safe load limit of shipboard fittings used for mooring purpose.
2) Unless a greater SWL is requested by the applicant according to 5.6.3.3, the SWL is not to exceed the ship design minimum breaking load of the Tables 3.1.2-1 and 3.1.2-2, see Notes in 5.6.3.3. See also IACS Recommendation No. 10.
3) The SWL, in [t], of each shipboard fitting is to be marked (by weld bead or equivalent) on the deck fittings used for mooring. For fittings intended to be used for, both, mooring and towing, TOW, in [t], according to 5.6.2.6 is to be marked in addition to SWL.
4) The above requirements on SWL apply for the use with no more than one mooring line.
5) The towing and mooring arrangements plan mentioned in 5.6.4 is to define the method of use of mooring lines.

■ **Head 5.6 SHIPBOARD FITTINGS AND SUPPORTING HULL STRUCTURES ASSOCIATED WITH TOWING AND MOORING ON CONVENTIONAL VESSELS,** sub-item 5.6.4.2 Safe working load has been amended and should be read as follows:

5.6.4.2 Information provided on the plan is to include in respect of each shipboard fitting:

1. location on the ship;
2. fitting type;
3. SWL/TOW;
4. purpose (mooring/harbour towing/other towing);
5. manner of applying towing or mooring line load including limiting fleet angles i.e. angle of change in direction of a line at the fittings.

Item 3 with respect to items 4 and 5, is subject to approval by the *Register*.

Furthermore, information provided on the plan is to include:

1. the arrangement of mooring lines showing number of lines (N),
2. the ship design minimum breaking load (MBL_{SD}),
3. the acceptable environmental conditions (refer for minimum conditions to IACS Recommendation No. 10 for the recommended ship design minimum breaking load for ships with equipment number $E_n > 2000$:
   - 30 second mean wind speed from any direction (v_W or v_W* according to IACS Recommendation No. 10).
   - maximum current speed acting on bow or stern (±10°)).

■ **Head 5.6 SHIPBOARD FITTINGS AND SUPPORTING HULL STRUCTURES ASSOCIATED WITH TOWING AND MOORING ON CONVENTIONAL VESSELS,** 5.6.5 Corrosion addition has been amended and should be read as follows:

5.6.5 Corrosion addition

The total corrosion addition, t_k, in [mm], is not to be less than the following values:

1. Ships covered by IACS Common Structural Rules for Bulk Carriers and Oil Tankers: tk, total corrosion addition defined in these rules
2. Other ships:
   - for the supporting hull structure, according to the *Register's* Rules for the surrounding structure (e.g. deck structures, bulwark structures).
   - for pedestals and foundations on deck which are not part of a fitting according to an accepted industry standard, 2.0 mm.
   - for shipboard fittings not selected from an accepted industry standard, 2.0 mm.

■ **Head 5.7 EQUIPMENT FOR MOORING AT SINGLE POINT MOORINGS,** item 5.7.1 has been amended and should be read as follows:

5.7.1 Upon request from the owner, *Register* is prepared to certify that the vessel is specially fitted for compliance with Section 4.3 of "Mooring Equipment Guidelines (MEG 4)", published by the *Oil Companies International Marine Forum* (OCIMF), 2018, as amended.

■ **Head 5.7 EQUIPMENT FOR MOORING AT SINGLE POINT MOORINGS,** item 5.7.2 has been amended and should be read as follows:

5.7.2 Plans showing the arrangement should be submitted to the *Register* for review.

The safety factor on yield load for bow chain stoppers and bow fairleads should be a minimum of 2 when the specified safe working load (SWL) is applied as given in Section 4.3 of the Guidelines.

Their foundations and supporting structures should be adequate to withstand 2 x SWL of bow chain stoppers and bow fairleads.

Smit type towing bracket fittings should not be used as bow chain stoppers.

Calculations to demonstrate this capability should be submitted.

The chain bearing surface of the bow fairleads described in 4.3 should have a diameter at least seven times that of the associated chain.

The installation on board the ship should be confirmed by a *Register´s* surveyor.

Compliance with the foregoing should be suitably documented.