C C S 通 函

Circular

中国船级社
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发：本社船舶验船师，船厂、船舶设计院、船东

关于执行 MSC/Circ.1175 通函的通知

今年 5 月海安会 80 次会议通过了与拖带和系泊相关的船用设备、舾装件与支撑船体结构的 MSC/Circ.1175 通函（该通函附录的技术要求附于本通函后供使用）。

该通函与国际船级社协会的 UR A2(Rev.1)的差别主要体现在设计载荷方面，IMO 的要求比 IACS 的要求更符合实际，故此 IACS 已决定将该 UR 暂时撤销。

鉴于此，我社决定自本通函下发之日起停止执行现行《钢质海船入级与建造规范》第 2 篇第 3 章第 6 节关于锚泊、系泊设备及其支撑结构的强度要求，并开始执行本通函附录的要求。

特此通知。

附件：MSC/Circ.1175 号通函附录（中、英文）

（注：本通函由本社执行检验单位通知所辖区域的船厂、船舶设计院、船东。本通函已在本社网站(www.ccs.org.cn) 上发布）

MSC/Circ.1175 号通函附录（中译文）

与拖带和系泊相关的船用设备、舾装件与船体支撑结构

1 应用

1.1 根据 2005 年通过的 MSC 194（80）决议对 1974 SOLAS 公约的规则 II－1/3－8 所作的修正，除高速船、海洋平台以外的所有新造排水型船舶，应具有足够安全工作负荷的布置、设备与舾装件，以便能安全承担船舶正常操作时的所有拖带与系泊操作。布置、设备与舾装件应满足主管当局或主管当局认可组织的适当要求。

1.2 本通函的目的是提供用于拖带与系泊的船用舾装件与支撑结构的设计与构造标准，建议主管当局给予实施。本通函的规定不是船用拖索或系泊索的要求或批准标准。

1.3 拖带与系泊兼用的设备应满足 3 和 4 的规定。

2 定义

2.1 船用舾装件：正常系泊船舶用的系缆桩与缆柱、系缆器、立式滚轮、导缆孔以及用于正常拖带船舶的类似部件。其他部件如绞盘、绞车等不包含在本通函要求中。任何船舶舾装件与支撑结构的焊接、螺栓或其他紧固方式是船舶舾装件的组成部分，应满足该船舶舾装件所适用的任何工业标准。

2.2 支撑船体结构：在其上或其内安装船舶舾装件并直接承受作用在船舶舾装件上的力的部分船体结构。用于上述正常拖带、系泊操作的绞盘、绞车等的支撑船体结构也应符合本通函的规定。

2.3 工业标准系指船舶在该国建造的国家主管当局认可的国际或国家标准。

3 拖带舾装件

3.1 强度

用于正常拖带操作的船舶舾装件与其支撑结构的强度应符合 3.2-3.6 的规定。

3.2 布置

拖带用的船舶舾装件应位于甲板结构的纵梁、横梁和/或桁材上，以有效分布拖带负荷。其他等效布置（如巴拿马导缆孔等）可以接受。

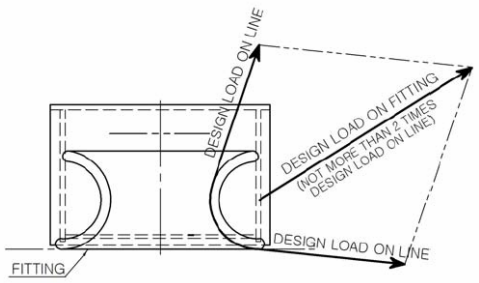
3.3 载荷考虑

(1) 用于正常拖带操作（如港区/移船）的设计负荷应为拖带与系泊布置图标明的预定的最大拖带负荷（如系柱静拖力）的 1.25 倍，设计负荷应通过按照拖带与系泊布置图显示布置的拖索施加。

(2) 对于其他拖带服务（如伴航 escort），作用于每个舾装件的设计负荷应为基于舾装数 EN(按附录计算)的表 1 规定的拖索的公称破断强度，设计负荷应通过按照拖带与系泊布置图显示布置的拖索施加。

(3) 应考虑施加给舾装件与支撑船体结构的设计负荷的方式，但总的负荷不必超过上述 3.3（1）或 3.3（2）规定设计负荷的 2 倍，即对于 1 根缆索只考虑不超过 1 次环绕，见图 3. 3（3）。

图 3.3（3）



3.4　船舶舾装件

由船厂根据主管当局接受的工业标准（如 ISO3913《造船－钢质焊接带缆桩》）选择船舶舾装件。如船舶舾装件没有按接受的工业标准选择时，评估该配件的强度及配件与船舶的连接时的设计载荷应符合上述 3.3 的要求。

3.5　船体支撑结构

(1)　布置

船舶舾装件下加强部件（纵梁）的布置应考虑通过拖带连接布置作用在船舶舾装件上的拖带载荷（不小于 3 规定的设计载荷）的方向（横向和垂向）变化。

(2)　拖带载荷的作用点

船舶舾装件上拖带载荷的作用点应是拖索的附着点或拖索方向变化处。

(3)　许用应力

许用弯曲应力：100％所用材料的屈服点；许用剪切应力：60％所用材料的屈服点；计算不考虑应力集中因素。

3.6　安全工作负荷（SWL）

(1)　用于正常拖带操作（港区/移船）的 SWL 应不超过 3.3（1）给定设计负荷的 80％，用于其他拖带操作（如伴航）应不超过 3.3（2）给定的设计负荷。对港区与伴航拖带都使用的舾装件，应取 3.3(1)和 3.3(2)设计负荷的较大者。

(2)　每一船舶舾装件的 SWL 应标记（焊点或等效方法）在用于拖带的甲板舾装件上。

(3)　上述要求的 SWL 适用于单桩形式（1 根缆索在 1 个缆桩上环绕不超过 1 次）。

(4)　5 描述的拖带与系泊布置图应定义拖索的使用方法。

4　系泊舾装件

4.1　强度

用于正常系泊的船舶舾装件与其支撑结构的强度应符合 4.2-4.6 的规定。

4.2　布置

系泊用的船舶舾装件应位于甲板结构（纵梁、横梁和/或桁材）上，以有效分布系泊负荷。其他等效布置（如巴拿马导缆孔等）可以接受。

4.3　载荷考虑

(1)　舾装件和支撑的船体结构的设计负荷应为基于舾装数 EN（按附录计算)的表 1 规定的系索的破断强度 1.25 倍，设计负荷应通过按照拖带与系泊布置图显示布置的系索施加。

(2)　绞车等支撑船体结构的设计负荷应为上述 4.3(1)的系索破断负荷的 1.25 倍和，对绞盘，1.25 倍的最大拉拢力。设计负荷应通过按照拖带与系泊布置图显示布置的系索施加。

(3)　在确定舾装件和支撑船体结构的设计负荷时应考虑施加力的方式，但总的负荷不必超过 4.3(1)规定设计负荷的 2 倍，即对于 1 根缆索只考虑不超过 1 次环绕。

4.4　由船厂根据主管当局接受的工业标准（如 ISO3913《造船－钢质焊接带缆桩》）选择船舶舾装件。如船舶舾装件没有按接受的工业标准选择时，该舾装件应符合等效于上述 4.3 的要求的公认的工业标准。

4.5　船体支撑结构

(1)　布置

船舶舾装件下加强部件（纵梁）的布置应考虑通过系泊连接布置而作用在船舶舾装件上的系泊载荷（不小于 4.3 规定的设计载荷）的方向（横向和垂向）变化。

(2)　系泊载荷的作用点

船舶舾装件上系泊载荷的作用点应是系索的附着点或系索方向变化处。

(3) 许用应力

许用弯曲应力：100％所用材料的屈服点；许用剪切应力：60％所用材料的屈服点；计算不考虑应力集中因素。

4.6 安全工作负荷（SWL）

(1) SWL 应不超过 4.3 给定设计负荷的 80％。

(2) 每一船舶舾装件的 SWL 应标记（点焊或等效方法）在该舾装件上。

(3) 上述要求的 SWL 适用于单桩形式（1 根缆索在 1 个缆桩上环绕不超过 1 次）。

(4) 5 描述的拖带与系泊布置图应规定系索的使用方法。

5 拖带与系泊布置图

5.1 每个船舶舾装件根据其预定用途而确定的 SWL 应在拖带布置图上注明，该布置图应配备在船上以指导船长。

5.2 布置图应包括每个船舶舾装件的如下信息：

船上位置；

舾装件类型；

安全工作负荷 SWL；

用途（系泊/港区拖带/伴航拖带）；及

拖缆或系泊索的施加载荷的方法，包括对角度变化范围的限制。

表 1 系索和拖索

舾装数		拖索*	系索
超过	不超过	破断负荷(kN)	破断负荷(kN)
50	70	98	34
70	90	98	37
90	110	98	39
110	130	98	44
130	150	98	49
150	175	98	54
175	205	112	59
205	240	129	64
240	280	150	69
280	320	174	74
320	360	207	78
360	400	224	88
400	450	250	98
450	500	277	108
500	550	306	123
550	600	338	132
600	660	370	147
660	720	406	157
720	780	441	172
780	840	480	186
840	910	518	202
910	980	559	216
980	1060	603	230
1060	1140	647	250

1140	1220	691	270
1220	1300	738	284
1300	1390	786	284
1390	1480	836	324
1480	1570	888	324
1570	1670	941	333
1670	1790	1002	353
1790	1930	1109	378
1930	2080	1168	402
2080	2230	1259	422
2230	2380	1356	451
2380	2530	1453	480
2530	2700	1471	480
2700	2870	1471	490
2870	3040	1471	500
3040	3210	1471	520
3210	3400	1471	554
3400	3600	1471	588
3600	3800	1471	618
3800	4000	1471	647
4000	4200	1471	647
4200	4400	1471	657
4400	4600	1471	667
4600	4800	1471	677
4800	5000	1471	686
5000	5200	1471	686
5200	5500	1471	696
5500	5800	1471	706
5800	6100	1471	706
6100	6500		716
6500	6900		725
6900	7400		725
7400	7900		725
7900	8400		736
8400	8900		736
8900	9400		736
9400	10000		736
10000	10700		736
10700	11500		736
11500	12400		736
12400	13400		736
13400	14600		736
14600	16000		736

＊ 提供 3.3（2）涉及的信息而且船上配备这样的拖索不是本指南必需要求的。

附录

舾装数（EN）

舾装数 EN 按下式计算:

$$EN=\Delta^{\frac{2}{3}}+2.0hB+\frac{A}{10}$$

式中: Δ——夏季载重线下的型排水量, t;

B——船宽, m;

h——从夏季载重水线到最上层舱室顶部的有效高度, m; 对最下层的层高 h_i 从上甲板中心线量起, 或具有不连续上甲板时, 从上甲板最低线及其平行于升高部分甲板的延伸线量起, 即:

$$h=a+\sum h_i$$

其中：a——从船中夏季载重水线至上甲板的距离，m;

h_i——各层宽度大于 $B/4$ 的舱室，在其中心线处量计的高度，m;

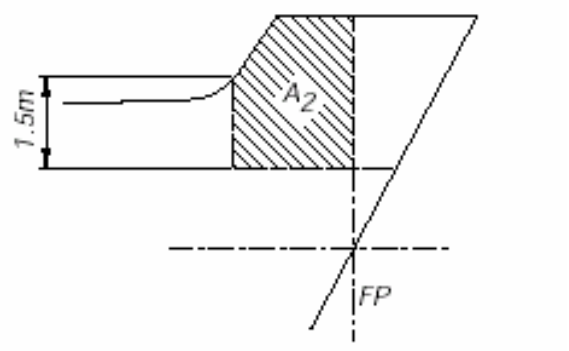
A——船长L范围内夏季载重水线以上的船体部分和上层建筑以及各层宽度大于$B/4$ 的甲板室的侧投影面积的总和，m^2。

注

1 计算 h 和 A 时, 不必计及舷弧和纵倾。

2 如宽度大于 $B/4$ 的甲板室位于宽度等于或小于 $B/4$ 的甲板室之上时, 则应计入宽的甲板室而略去狭的甲板室

3 凡是超过 1.5m高度的挡风板和舷墙, 均应视为上层建筑或甲板室的一部分，并纳入h和的计算。计算h和A时可不考虑舱口围板高度和集装箱之类甲板货的高度。在确定A时，对高度超过 1.5m的舷墙, 下图中的A_2部分应纳入A之中。



4 船舶的设备长度等于两柱间长度，但取不小于 96%或不大于 97%夏季载重线最大长度（自水线前缘量起）。

ANNEX

SHIPBOARD EQUIPMENT, FITTINGS AND SUPPORTING HULL STRUCTURES ASSOCIATED WITH TOWING AND MOORING

1 Application

1.1 Under regulation II-1/3-8 of the 1974 SOLAS Convention, as adopted by resolution MSC.194(80) in 2005, new displacement type ships, except high-speed craft and offshore units, shall 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. The arrangements, equipment and fittings shall meet the appropriate requirements of the Administration or an organization recognized by the Administration.

1.2 This circular is intended to provide standards for the design and construction of shipboard fittings and supporting hull structures associated with towing and mooring, which Administrations are recommended to implement. The provisions of this guidance do not require tow lines nor mandate standards for mooring lines onboard the ship.

1.3 Equipment that is used for both towing and mooring should be in accordance with sections 3 and 4.

2 Definitions

For the purpose of this guidance:

2.1 *Shipboard fittings* mean bollards and bitts, fairleads, stand rollers and chocks used for the normal mooring of the ship and similar components used for the normal towing of the ship. Other components such as capstans, winches, etc. are not covered by this guidance. Any weld, bolt or other fastening connecting the shipboard fitting to the supporting hull structure is part of the shipboard fitting and subject to any industry standard applicable to such fitting.

2.2 *Supporting hull structure* 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 hull structure supporting capstans, winches, etc. used for the normal towing and mooring operations mentioned above should also be subject to this guidance.

2.3 *Industry standard* means international or national standards which are recognized in the country where the ship is built, subject to the approval of the Administration.

3 Towing fittings

3.1 Strength

The strength of shipboard fittings used for normal towing operations and their supporting hull structures should comply with the provisions of 3.2 to 3.6.

3.2 Arrangements

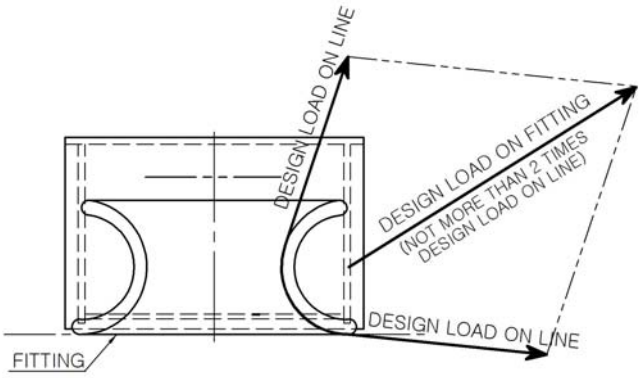
Shipboard fittings for towing should be located on longitudinals, beams and/or girders, which are part of the deck construction so as to facilitate efficient distribution of the towing load. Other equivalent arrangements may be accepted (for Panama chocks, etc.).

3.3 Load considerations

3.3.1 The design load used for normal towing operations (e.g. harbour/manoeuvring) should be 1.25 times the intended maximum towing load (e.g. static bollard pull) as indicated on the towing and mooring arrangements plan. The design load should be applied through the tow line according to the arrangement shown on the towing and mooring arrangements plan.

3.3.2 For other towage service (e.g. escort), the design load used for each fitting should be the nominal breaking strength of the tow line defined in table 1 based on the equipment number (EN) described in the appendix. The design load should be applied through the tow line according to the arrangement shown on the towing and mooring arrangements plan.

3.3.3 The method of application of the design load to the fittings and supporting hull structure should be taken into account such that the total load need not be more than twice the design load specified in 3.3.1 or 3.3.2, i.e. no more than one turn of one line (see figure below).



3.4 Shipboard fittings

The selection of shipboard fittings should be made by the shipyard in accordance with industry standards (e.g. ISO 3913:1977 Shipbuilding-Welded steel bollards) accepted by the Administration. When the shipboard fitting is not selected from an accepted industry standard, the design load used to assess its strength and its attachment to the ship should be in accordance with 3.3 above.

3.5 Supporting hull structure

Arrangement

3.5.1 The arrangement of the reinforced members (carling) beneath shipboard fittings should consider any variation of direction (laterally and vertically) of the towing forces (which should be not less than the design load as per 3.3) acting through the arrangement of connection to the shipboard fittings.

Acting point of towing force

3.5.2 The acting point of the towing force on shipboard fittings should be taken at the attachment point of a towing line or at a change in its direction.

Allowable stresses

3.5.3 Allowable bending stress: 100% of the specified yield point for the material used; allowable shearing stress: 60% of the specified yield point for the material used; no stress concentration factors being taken into account.

3.6 Safe working load (SWL)

3.6.1 The SWL used for normal towing operations (harbour/manoeuvring) should not exceed 80% of the design load as given in 3.3.1 and the SWL used for other towing operations (e.g. escort) should not exceed the design load as given in 3.3.2. For fittings used for both harbour and escort purposes, the greater of the design loads of 3.3.1 and 3.3.2 should be used.

3.6.2 The SWL of each shipboard fitting should be marked (by weld bead or equivalent) on the deck fittings used for towing.

3.6.3 The above provisions on SWL apply for a single post basis (no more than one turn of one line).

3.6.4 The towing and mooring arrangements plan described in section 5 should define the method of use of towing lines.

4 Mooring fittings

4.1 Strength

The strength of shipboard fittings used for mooring operations and their supporting hull structures should comply with the provisions of 4.2 to 4.6.

4.2 Arrangements

Shipboard fittings for mooring should be located on longitudinals, beams and/or girders, which are part of the deck construction so as to facilitate efficient distribution of the mooring load. Other equivalent arrangements may be accepted (for Panama chocks, etc.).

4.3 Load considerations

4.3.1 The design load applied to shipboard fittings and supporting hull structures should be 1.25 times the breaking strength of the mooring line provided in accordance with table 1 based on the equipment number (EN) described in the appendix. The design load should be applied through the mooring line according to the arrangement shown on the towing and mooring arrangements plan.

4.3.2 The design load applied to supporting hull structures for winches, etc. should be 1.25 times the breaking strength of the mooring line according to 4.3.1 above and, for capstans, 1.25 times the maximum hauling-in force. The design load should be applied through the mooring line according to the arrangement shown on the towing and mooring arrangements plan.

4.3.3 The method of application of the design load to the fittings and supporting hull structure should be taken into account such that the total load need not be more than twice the design load specified in 4.3.1, i.e. no more than one turn of one line.

4.4 Shipboard fittings

The selection of shipboard fittings should be made by the shipyard in accordance with industry standards (e.g. ISO 3913:1977 Shipbuilding-Welded steel bollards) accepted by the Administration. When the shipboard fitting is not selected from an accepted industry standard, the fittings should be equivalent to a recognized industry standard in compliance with the design load as per 4.3.

4.5 Supporting hull structure

Arrangement

4.5.1 The arrangement of the reinforced members (carling) beneath shipboard fittings should consider any variation of direction (laterally and vertically) of the mooring forces (which should be not less than the design load given in 4.3) acting through the arrangement of connection to the shipboard fittings.

Acting point of mooring force

4.5.2 The acting point of the mooring force on shipboard fittings should be taken at the attachment point of a mooring line or at a change in its direction.

Allowable stresses

4.5.3 Allowable bending stress: 100% of the specified yield point for the material used; allowable shearing stress: 60% of the specified yield point for the material used; no stress concentration factors being taken into account.

4.6 Safe working load (SWL)

4.6.1 The SWL should not exceed 80% of the design load given in 4.3.

4.6.2 The SWL of each shipboard fitting should be marked (by weld bead or equivalent) on the deck fittings used for mooring.

4.6.3 The above provisions on SWL apply for a single post basis (no more than one turn of one line).

4.6.4 The towing and mooring arrangements plan described in section 5 should define the method of use of mooring lines.

5 Towing and mooring arrangements plan

5.1 The SWL for the intended use for each shipboard fitting should be noted in the towing and mooring arrangements plan available on board for the guidance of the Master.

5.2 Information provided on the plan should include in respect of each shipboard fitting:

.1 location on the ship;

.2 fitting type;

.3 SWL;

.4 purpose (mooring/harbour towing/escort towing); and

.5 method of applying load of towing or mooring line including limiting fleet angles.

Table 1

MOORING AND TOW LINES

EQUIPMENT NUMBER		MOORING LINES	TOW LINE*
Exceeding	**Not exceeding**	**Minimum breaking strength (kN)**	**Breaking strength (kN)**
1	***2***	***3***	***4***
50	70	34	98
70	90	37	98
90	110	39	98
110	130	44	98
130	150	49	98
150	175	54	98
175	205	59	112
205	240	64	129
240	280	69	150
280	320	74	174
320	360	78	207
360	400	88	224
400	450	98	250
450	500	108	277
500	550	123	306
550	600	132	338
600	660	147	370
660	720	157	406
720	780	172	441
780	840	186	479
840	910	201	518
910	980	216	559
980	1060	230	603
1060	1140	250	647
1140	1220	270	691
1220	1300	284	738
1300	1390	309	786
1390	1480	324	836
1480	1570	324	888
1570	1670	333	941
1670	1790	353	1024
1790	1930	378	1109
1930	2080	402	1168
2080	2230	422	1259
2230	2380	451	1356
2380	2530	480	1453
2530	2700	480	1471
2700	2870	490	1471
2870	3040	500	1471
3040	3210	520	1471
3210	3400	554	1471

EQUIPMENT NUMBER		MOORING LINES	TOW LINE*
Exceeding	**Not exceeding**	**Minimum breaking strength (kN)**	**Breaking strength (kN)**
1	***2***	***3***	***4***
3400	3600	588	1471
3600	3800	618	1471
3800	4000	647	1471
4000	4200	647	1471
4200	4400	657	1471
4400	4600	667	1471
4600	4800	677	1471
4800	5000	686	1471
5000	5200	686	1471
5200	5500	696	1471
5500	5800	706	1471
5800	6100	706	1471
6100	6500	716	
6500	6900	726	
6900	7400	726	
7400	7900	726	
7900	8400	736	
8400	8900	736	
8900	9400	736	
9400	10000	736	
10000	10700	736	
10700	11500	736	
11500	12400	736	
12400	13400	736	
13400	14600	736	
14600	16000	736	

* Information is provided in relation to 3.3.2 and provision onboard of such a line is not necessary under this guidance.

APPENDIX

EQUIPMENT NUMBER

The equipment number (EN) should be calculated as follows:

$$EN = \Delta^{2/3} + 2.0hB + \frac{A}{10}$$

where:

Δ = moulded displacement, in tonnes, to the Summer Load Waterline

B = moulded breadth, in metres

h = effective height, in metres, from the Summer Load Waterline to the top of the uppermost house; for the lowest tier "h" should be measured at centreline from the upper deck or from a notional deck line where there is local discontinuity in the upper deck

$$h = a + \Sigma h_i$$

where:

a = distance, in metres, from the Summer Load Waterline amidships to the upper deck

h_i = height, in metres, on the centreline of each tier of houses having a breadth greater than B/4

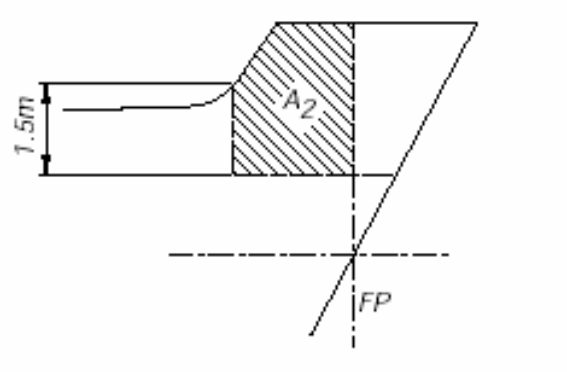
A = area, in square metres, in profile view, of the hull, superstructures and houses above the Summer Load Waterline which are within the equipment length of the ship and also have a breadth greater than B/4

NOTES

1 When calculating h, sheer and trim should 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.

2 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 should be included but the narrow house ignored.

3 Screens or bulwarks 1.5 m or more in height should 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 below as A_2 should be included in A.



4 The equipment length of the ships is the length between perpendiculars but should not be less than 96% nor greater than 97% of the extreme length on the Summer Waterline (measured from the forward end of the waterline).