RULES FOR BUILDING AND CLASSING

HIGH-SPEED CRAFT
2018

NOTICE NO. 1 – July 2018

The following Rule Changes were approved by the ABS Rules Committee on 1 June 2018 and become **EFFECTIVE AS OF 1 JULY 2018.**

(See http://www.eagle.org for the consolidated version of the Rules for Building and Classing High-Speed Craft 2018, with all Notices and Corrigenda incorporated.)

Notes - *The date in the parentheses means the date that the Rule becomes effective for new construction based on the contract date for construction, unless otherwise noted. (See 1-1-4/3.3 of the ABS Rules for Conditions of Classification – High-Speed Craft (Part 1).)*

PART 3 HULL CONSTRUCTION AND EQUIPMENT

CHAPTER 2 HULL STRUCTURES AND ARRANGEMENTS

SECTION 12 PROTECTIVE COATINGS

5 Protection of Steel

(Revise Paragraph 3-2-12/5.1, as follows:)

5.3 All Spaces *(1 July 2018)*

Unless otherwise approved, all steel surfaces are to be suitably coated with paint and/or cathodic protection as applicable. For more details, refer to the ABS *Guidance Notes on Cathodic Protection of Ships* and the ABS *Guidance Notes on the Application and Inspection of Marine Coating Systems*.

PART 3 HULL CONSTRUCTION AND EQUIPMENT

CHAPTER 5 EQUIPMENT

SECTION 1 ANCHORING, MOORING, AND TOWING EQUIPMENT

(Revise Subsection 3-5-1/1, as follows:)

1 General *(1 July 2018)*

All craft are to have a complete equipment of anchor(s) and chains. The symbol Ⓔ, a condition of classification, placed after the symbols of classification in the *Record*, thus: ✠ **A1** Ⓔ, indicates that the equipment of the craft is in compliance with the requirements of these *Rules*, and tested in accordance with 3-5-1/7, or with requirements, which have been specially approved for the particular service. The following is an example:

✠ A1 Ⓔ, HSC, OE, ✠ AMS

Cables which are intended to form part of the equipment are not to be used as deck chains when the craft is launched. The inboard ends of the cables of the bower anchors are to be secured by efficient means (see 3-5-1/15). Anchors and their cables are to be connected and positioned, ready for use. Means are to be provided for stopping each cable as it is paid out, and the windlass should be capable of heaving in either cable. Suitable arrangements are to be provided for securing the anchors and stowing the cables. See 3-5-1/16.

Equipment Number calculations for unconventional vessels with unique topside arrangements or operational profiles may be specially considered. Such consideration may include accounting for additional wind areas of widely separated deckhouses or superstructures in the equipment number calculations or equipment sizing based on direct calculations. However, in no case may direct calculations be used to reduce the equipment size to be less than that required by 3-5-1/3.

3 Calculation of EN

(Revise Paragraph 3-5-1/3.1, as follows:)

3.1 Monohulls *(1 July 2018)*

The basic Equipment Number (EN) is to be obtained from the following equation for use in determining required equipment.

$$EN = k\Delta^{2/3} + m(Ba + \Sigma bh) + nA$$

where

k = 1.0 (1.0, 1.012)

m = 2 (2, 0.186)

n = 0.1 (0.1, 0.00929)

Δ = molded displacement, in metric tons (long tons), at the summer load waterline.

B = molded breadth, as defined in 3-1-1/5, in m (ft)

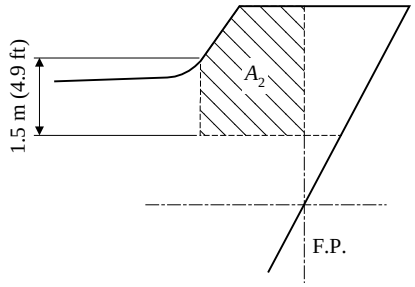
h = effective height, in m (ft), from the Summer Load waterline to the top of the uppermost house; for the lowest tier h is to be measured at centerline from the upper deck or from a notional deck line where there is local discontinuity in the upper deck, as shown in 3-5-1/Figure 1A

h_1, h_2, h_3, ... as shown in 3-5-1/Figure 1A. In the calculation of h, sheer and trim may be neglected.

a = freeboard, in m (ft), from the light waterline amidships.

h_1, h_2, h_3… = height, in m (ft), on the centerline of each tier of houses having a breadth greater than $B/4$.

A = profile area, in m^2 (ft^2), of the hull, superstructure and houses above the summer load waterline which are within L (see 3-1-1/3). Superstructures or deckhouses having a breadth at any point no greater than $0.25B$ may be excluded. Screens and bulwarks more than 1.5 m (4.9 ft) in height are to be regarded as parts of houses when calculating 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, except as specified by 3-5-1/17.3. With regard to determining A, when a bulwark is more than 1.5 m (4.9 ft) high, the area shown below as A_2 should be included in A.



b = breadth, in m (ft), of the widest superstructure or deckhouse on each tier.

11 Windlass Support Structure and Cable Stopper

11.3 Support Structure

11.3.1 Operating Loads

(Revise Item 3-5-1/11.3.1(c), as follows:)

11.3.1(c) Allowable Stress (1 July 2018). The stresses, based on gross thickness, in the structures supporting the windlass and chain stopper are not to exceed the following values:

- Normal stress: 100% of the specified minimum yield stress of the material
- Shear stress: 60% of the specified minimum yield stress of the material

11.3.2 Sea Loads *(2014)*

(Revise Item 3-5-1/11.3.2(d), as follows:)

11.3.2(d) Allowable Stress (1 July 2018)

i) *Bolts.* The safety factor against bolt proof strength is to be not less than 2.0.

ii) *Supporting Structures.* The stresses, based on gross thickness, in the above deck framing and the hull structure supporting the windlass and chain stopper are not to exceed the following values:

- Normal stress 100% of the yield strength of the material
- Shear stress 60% of the yield strength of the material

(Renumber Subsection 3-5-1/15 as 3-5-1/14.)

(Add new Subsections 3-5-1/15 and 3-5-1/16, as follows:)

15 Securing of the Inboard Ends of Chain Cables *(1 July 2018)*

Arrangements are to be provided for securing the inboard ends of the bower anchor chain cables. The chain cables are to be secured to structures by a fastening able to withstand a force not less than 15% nor more than 30% of the breaking load of the chain cable. The fastening is to be provided with a mean suitable to permit, in case of emergency, an easy slipping of the chain cables to sea, operable from an accessible position outside the chain locker.

16 Securing of Stowed Anchors *(1 July 2018)*

Arrangements are to be provided for securing the anchors and stowing the cables. To hold the anchor tight in against the hull or the anchor pocket, respectively, anchor lashings (e.g., a "devil's claw") are to be fitted. Anchor lashings are to be designed to resist a load at least corresponding to twice the anchor mass plus 10 m (32.8 ft) of cable without exceeding 40% of the yield strength of the material.

(Revise Subsection 3-5-1/17, as follows:)

17 Mooring and Towing Equipment *(1 July 2018)*

17.1 All Craft

Hawsers and towlines and requirements for associated equipment and arrangements as described in in 3-5-1/17.9 and 3-5-1/17.11_are not required as a condition of classification. The hawsers and towlines listed in 3-5-1/Table 2 and 3-5-1/Table 3 are intended as a minimum guide.

17.3 Mooring Lines

The mooring lines for craft with Equipment Number EN of less than or equal to 2000 are given in 3-5-1/17.3.1. For other craft, the mooring lines are given in 3-5-1/17.3.2.

The Equipment Number EN is to be calculated in compliance with 3-5-1/3. Deck cargo as given by the loading manual is to be included for the determination of side-projected area *A*.

17.3.1 Mooring Lines for Craft with EN ≤ 2000

The minimum mooring lines for craft having an Equipment Number EN of less than or equal to 2000 are given in 3-5-1/Table 2 is intended as a guide.

For craft having an *A/EN* ratio greater than 0.9 for SI or MKS units (9.7 for US units), the number of hawsers given in 3-5-1/Table 2 is to be increased by the number given below:

A/EN Ratio		Increase number of hawsers by
SI Units MKS Units	U.S. Units	
Above 0.9 up to 1.1	above 9.7 up to 11.8	1
Above 1.1 up to 1.2	above 11.8 up to 12.9	2
above 1.2	above 12.9	3

17.3.2 Mooring Lines for Craft with EN > 2000

The minimum strength and number of mooring lines for craft with an Equipment Number *EN* > 2000 are given in 3-5-1/17.3.2(a) and 3-5-1/17.3.2(b), respectively, and is intended as a guide. The length of mooring lines is given by 3-5-1/17.3.3.

The strength of mooring lines and the number of head, stern, and breast lines (see Note below defining head, stern, and breast lines) for craft with an Equipment Number $EN > 2000$ are based on the side-projected area A_1. Side projected area A_1 should be calculated similar to the side-projected area A according to 3-5-1/3 but considering the following conditions:

- The lightest draft of usual loading conditions is to be considered if the ratio of the freeboard in the lightest draft and the full load condition is equal to or above two. Usual loading conditions are loading conditions as given by the trim and stability booklet that are expected to regularly occur during operation and, in particular, that exclude light weight conditions, propeller inspection conditions, etc.
- Wind shielding of the pier may be considered for the calculation of the side-projected area A_1 unless the craft is intended to be regularly moored to jetty type piers. A height of the pier surface of 3 m (9.8 ft) over waterline may be assumed (i.e., the lower part of the side-projected area with a height of 3 m (9.8 ft) above the waterline) for the considered loading condition and may be disregarded for the calculation of the side-projected area A_1.
- Deck cargo as given by the loading manual is to be included for the determination of side-projected area A_1. Deck cargo may not need to be considered if a usual light draft condition without cargo on deck generates a larger side-projected area A_1 than the full load condition with cargo on deck. The larger of both side-projected areas is to be chosen as side-projected area A_1.

The mooring lines as given here under are based on a maximum current speed of 1.0 m/s (3.3 ft/s) and the following maximum wind speed v_w, in m/s (ft/s):

v_w	=	$25.0 - 0.002\,(A_1 - 2000)$ m/s	for passenger craft, ferries, and car carriers with $2000\ m^2 < A_1 \le 4000\ m^2$
	=	21.0 m/s	for passenger craft, ferries, and car carriers with $A_1 > 4000\ m^2$
	=	25.0 m/s	for other craft
	=	$82.0 - 0.00061\,(A_1 - 21528)$ ft/s	for passenger craft, ferries, and car carriers with $21528\ ft^2 < A_1 \le 43056\ ft^2$
	=	68.9 ft/s	for passenger craft, ferries, and car carriers with $A_1 > 43056\ ft^2$
	=	82.0 ft/s	for other craft

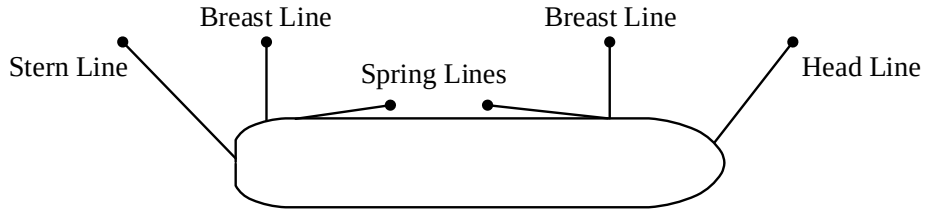
The wind speed is considered representative of a 30 second mean speed from any direction and at a height of 10 m (32.8 ft) above the ground. The current speed is considered representative of the maximum current speed acting on bow or stern (±10°) and at a depth of one-half of the mean draft. Furthermore, it is considered that craft are moored to solid piers that provide shielding against cross current.

Additional loads caused by, e.g., higher wind or current speeds, cross currents, additional wave loads, or reduced shielding from non-solid piers may need to be particularly considered. Furthermore, it should be observed that unbeneficial mooring layouts can considerably increase the loads on single mooring lines.

Note: The following is defined with respect to the purpose of mooring lines, see also figure below:

- *Breast Line:* A mooring line that is deployed perpendicular to the craft, restraining the craft in the off-berth direction.
- *Spring Line:* A mooring line that is deployed almost parallel to the craft, restraining the craft in the fore or aft direction.
- *Head/Stern Line:* A mooring line that is oriented between longitudinal and transverse direction, restraining the craft in the off-berth and in fore or aft direction. The amount of restraint in the fore

or aft and off-berth directions depends on the line angle relative to these directions.



17.3.2(a) Minimum Breaking Strength. The minimum breaking strength, in kN (kgf, lbf), of the mooring lines should be taken as:

$$MBL = 0.1 \cdot A_1 + 350 \quad kN$$

$$MBL = 10.20 \cdot A_1 + 35690 \quad kgf$$

$$MBL = 2.089 \cdot A_1 + 78680 \quad lbf$$

The minimum breaking strength may be limited to 1275 kN (130,000 kgf, 286,600 lbf). However, in this case the moorings are to be considered as not sufficient for environmental conditions given by 3-5-1/17.3.2. For these craft, the acceptable wind speed v_w*, in m/s, can be estimated as follows:

$$MBL^* \geq \left(\frac{21}{v_w}\right)^2 \cdot MBL \qquad \text{for } v_w \text{ in m/s}$$

$$MBL^* \geq \left(\frac{68.9}{v_w}\right)^2 \cdot MBL \qquad \text{for } v_w \text{ in ft/s}$$

where

v_w = wind speed as per 3-5-1/17.3.2

MBL* = breaking strength of the mooring lines intended to be supplied

MBL = breaking strength according to the above formula

However, the minimum breaking strength should not be taken less than corresponding to an acceptable wind speed of 21 m/s (68.9ft/s):

If lines are intended to be supplied for an acceptable wind speed v_w* higher than v_w as per 3-5-1/17.3.2, the minimum breaking strength should be taken as:

$$MBL^* = \left(\frac{v_w^*}{v_w}\right)^2 \cdot MBL$$

17.3.2(b) Number of Mooring Lines. The total number of head, stern, and breast lines (see Note in 3-5-1/17.3.2) should be taken as:

$$n = 8.3 \cdot 10^{-4} \cdot A_1 + 6 \qquad \text{for } A_1 \text{ in m}^2$$

$$n = 7.71 \cdot 10^{-5} \cdot A_1 + 6 \qquad \text{for } A_1 \text{ in ft}^2$$

For oil tankers, chemical tankers, bulk carriers, and ore carriers the total number of head, stern, and breast lines should be taken as:

$$n = 8.3 \cdot 10^{-4} \cdot A_1 + 4 \qquad \text{for } A_1 \text{ in m}^2$$

$$n = 7.71 \cdot 10^{-5} \cdot A_1 + 4 \qquad \text{for } A_1 \text{ in ft}^2$$

The total number of head, stern, and breast lines should be rounded to the nearest whole number.

The number of head, stern, and breast lines may be increased or decreased in conjunction with an adjustment to the strength of the lines. The adjusted strength, MBL*, should be taken as:

$MBL^* = 1.2 \cdot MBL \cdot n/n^* \leq MBL$ for increased number of lines

$MBL^* = MBL \cdot n/n^*$ for reduced number of lines

where

n^* = increased or decreased total number of head, stern and breast lines

n = number of lines for the considered craft type as calculated by the above formulas without rounding.

Similarly, the strength of head, stern, and breast lines may be increased or decreased in conjunction with an adjustment to the number of lines.

The total number of spring lines (see Note in 3-5-1/17.3.2) is not to be taken as less than:

Two lines, where $EN < 5000$

Four lines, where $EN \geq 5000$

The strength of spring lines is to be the same as that of the head, stern, and breast lines. If the number of head, stern, and breast lines is increased in conjunction with an adjustment to the strength of the lines, the number of spring lines is to be likewise increased, but rounded up to the nearest even number.

17.3.3 Length of Mooring Lines

The length of mooring lines for craft with *EN* of less than or equal to 2000 may be taken from 3-5-1/Table 2. For craft with $EN > 2000$ the length of mooring lines may be taken as 200 m (109 fathoms).

The lengths of individual mooring lines may be reduced by up to 7% of the above given lengths, but the total length of mooring lines should not be less than would have resulted had all lines been of equal length.

17.5 Tow line

The tow lines are given in 3-5-1/Table 3 and are intended as a craft's own tow line of a craft being towed by a tug or other craft. For the selection of the tow line from 3-5-1/Table 3, the Equipment Number (EN) is to be taken according to 3-5-1/3.

17.7 Mooring and Tow Line Construction

Tow lines and mooring lines may be of wire, natural fiber, or synthetic fiber construction or of a mixture of wire and fiber. For synthetic fiber ropes it is recommended to use lines with reduced risk of recoil (snap-back) to mitigate the risk of injuries or fatalities in the case of breaking mooring lines.

Notwithstanding the requirements given in 3-5-1/17.3 and 3-5-1/17.5, no fiber rope is to be less than 20 mm (0.79 in) in diameter. For polyamide ropes, the minimum breaking strength is to be increased by 20% and for other synthetic ropes by 10% to account for strength loss due to, among others, aging and wear.

17.9 Mooring Winches

17.9.1

Each winch is to be fitted with brakes with a holding capacity sufficient to prevent unreeling of the mooring line when the rope tension is equal to 80% of the minimum breaking strength of the rope as fitted on the first layer. The winch is to be fitted with brakes that will allow for the reliable setting of the brake rendering load.

17.9.2

For powered winches the maximum hauling tension which can be applied to the mooring line (the reeled first layer) is not be less than 1/4.5 times, nor be more than $^1/_3$ times the rope's minimum breaking strength. For automatic winches, these figures apply when the winch is set to the maximum power with automatic control.

17.9.3

For powered winches on automatic control, the rendering tension that the winch can exert on the mooring line (the reeled first layer) is not to exceed 1.5 times, nor be less than 1.05 times the hauling tension for that particular power setting of the winch. The winch is to be marked with the range of rope strength for which it is designed.

17.11 Mooring and Towing Arrangement

17.11.1 Mooring Arrangement

Mooring lines in the same service (e.g., breast lines, see Note in 3-5-1/17.11.2) should be of the same characteristic in terms of strength and elasticity.

As far as possible, a sufficient number of mooring winches are to be fitted to allow for all mooring lines to be belayed on winches. This allows for an efficient distribution of the load to all mooring lines in the same service and for the mooring lines to shed load before they break. If the mooring arrangement is designed such that mooring lines are partly to be belayed on bitts or bollards, these lines are considered to be not as effective as the mooring lines belayed on winches.

Mooring lines are to have a lead as straight as is practicable from the mooring drum to the fairlead.

At points of change in direction, sufficiently large radii of the contact surface of a rope on a fitting are to be provided to minimize the wear experienced by mooring lines and as recommended by the rope manufacturer for the rope type intended to be used.

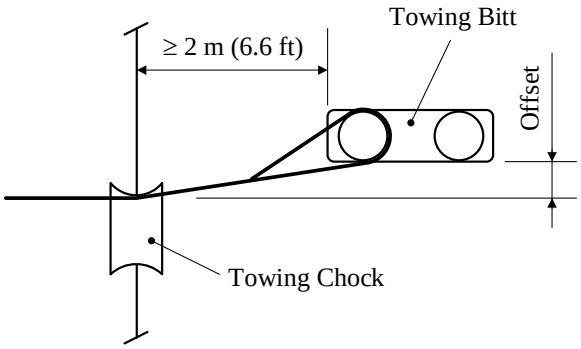
17.11.2 Towing Arrangement

Towing lines, in general, should be led through a closed chock. The use of open fairleads with rollers or closed roller fairleads is to be avoided.

For towing purposes, at least one chock is to be provided close to centerline of the craft forward and aft. It is also beneficial to provide additional chocks on port and starboard side at the transom and at the bow.

Towing lines are to have a straight lead from the towing bitt or bollard to the chock.

For the purpose of towing, bitts or bollards serving a chock are to be located slightly offset and in a distance of at least 2 m (6.6 ft) away from the chock, see figure below:



As far as practicable, warping drums are to be positioned not more than 20 m (65.6 ft) away from the chock, measured along the path of the line.

Attention is to be given to the arrangement of the equipment for towing and mooring operations in order to prevent interference of mooring and towing lines as far as practicable. It is beneficial to provide dedicated towing arrangements separate from the mooring equipment.

For all craft, it is recommended to provide towing arrangements fore and aft of sufficient strength for ‘other towing’ service as defined in 3-2-6/1.6.2(b).

19 Bollard, Fairlead and Chocks

(Revise Paragraph 3-5-1/19.3, as follows:)

19.3 Shipboard Fittings *(1 July 2018)*

The size of shipboard fittings is to be in accordance with recognized standards (e.g., ISO 13795 Ships and marine technology – Ship's mooring and towing fittings – Welded steel bollards for sea-going vessels) or comply with the requirements given in 3-5-1/19.3.1 and 3-5-1/19.3.2. For shipboard fittings not in accordance with recognized standard the corrosion addition, t_c, and the wear allowance, t_w, given in 3-2-7/4.7 of the *Steel Vessel Rules*, respectively, are to be considered. The design load used to assess shipboard fittings and their attachments to the hull are to be in accordance with the requirements as specified in 3-2-7/4 of the *Steel Vessel Rules*.

19.3.1 Mooring Operations

Shipboard fittings may be selected from a recognized national or international standard. The Safe Working Load (SWL) is to be suitable for mooring lines with a minimum breaking strength that is not less than that according to 3-5-1/Table 2 (see Notes in 3-2-7/4.3.1 of the *Steel Vessel Rules*).

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 craft is to be in accordance with requirements related to mooring in 3-2-7/4.3 and 3-2-7/4.5 of the *Steel Vessel Rules*. 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 3-2-7/4.7.2 of the *Steel Vessel Rules*. A wear down allowance is to be included as defined in 3-2-7/4.7.3 of the *Steel Vessel Rules*. Consideration may be given to accepting load tests 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.

19.3.2 Towing Operations

Shipboard fittings may be selected from a recognized industry standard and are to be at least based on the following loads:

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

ii) For other towing service, the minimum breaking strength of the tow line according to 3-5-1/Table 3 (see Notes in 3-2-7/4.3.2 for other towing services),

iii) For fittings intended to be used for, both, normal and other towing operations, the greater of the loads according to *i)* and *ii)*.

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 craft is to be in accordance with requirements related to towing in 3-2-7/4.3 and 3-2-7/4.5 of the *Steel Vessel Rules*. 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 3-2-7/4.7.2 of the *Steel Vessel Rules*. A wear down allowance is to be included as defined in 3-2-7/4.7.3 of the *Steel Vessel Rules*. Consideration may be given to accepting load tests as alternative to strength assessment by calculations.

(Revise Paragraph 3-5-1/19.5, as follows:)

19.5 Safe Working Load (SWL) and Towing Load (TOW) *(1 July 2018)*

The requirements on SWL apply for a single post basis (no more than one turn of one cable).

19.5.1 Mooring Operations

i) The Safe Working Load (SWL) is the load limit for mooring purpose.

ii) Unless a greater SWL is requested by the applicant according to 3-2-7/4.3.3 of the *Steel Vessel Rules*, the SWL is not to exceed the minimum breaking strength of the mooring line according to 3-5-1/Table 2, see Notes in 3-2-7/4.3.1 of the *Steel Vessel Rules*.

iii) The SWL, in tonnes, of each shipboard fitting is to be marked (by weld bead or equivalent) on the fittings used for mooring. For fittings intended to be used for both mooring and towing, TOW, in tonnes, according to 3-5-1/19.5.2 is to be marked in addition to SWL.

iv) The above requirements on SWL apply for the use with no more than one mooring line.

v) The towing and mooring arrangements plan mentioned in 3-5-1/19.7 is to define the method of use of mooring lines.

19.5.2 Towing Operations

i) The Safe Towing Load (TOW) is the load limit for towing purpose.

ii) TOW used for normal towing operations is not to exceed 80% of the design load per 3-2-7/4.3.2 of the *Steel Vessel Rules* for normal towing operations.

iii) TOW used for other towing operations is not to exceed 80% of the design load according to 3-2-7/4.3.2 of the *Steel Vessel Rules* for other towing service.

iv) For fittings used for both normal and other towing operations, the greater of the safe towing loads according to *ii)* and *iii)* is to be used.

v) For fittings intended to be used for both towing and mooring, the requirements in 3-2-7/4 of the *Steel Vessel Rules* and 3-5-1/19 applicable to mooring are to be applied relative to mooring operations.

vi) TOW, in tonnes, of each shipboard fitting is to be marked (by weld bead or equivalent) on the fittings used for towing. For fittings intended to be used for both towing and mooring, SWL, in tonnes, according to 3-5-1/19.5.1 is to be marked in addition to TOW.

vii) 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.

viii) The towing and mooring arrangements plan mentioned in 3-5-1/19.7 is to define the method of use of towing lines.

19.5.3 Marking and Plan

19.5.3(a) Marking. The SWL of each shipboard fitting is to be marked (by weld bead or equivalent) on the fittings used for towing/mooring.

19.5.3(b) Plan. The towing and mooring arrangements plan mentioned in 3-5-1/19.7 is to define the method of use of mooring lines and/or towing lines.

(Revise Paragraph 3-5-1/19.7, as follows:)

19.7 Towing and Mooring Arrangements Plan *(1 July 2018)*

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

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

- Location on the craft;
- Fitting type;
- SWL and TOW;
- Purpose (mooring/harbor towing/*other* towing); and
- Manner of applying towing or mooring line load including limiting fleet angles.

The above information is to be incorporated into the pilot card in order to provide the pilot proper information on harbor/other towing operations.

In addition, the towing and mooring arrangement plan is to include the following general information:

- The arrangement of mooring lines showing number of lines (N);
- The minimum breaking strength of each mooring line (MBL);
- The acceptable environmental conditions as given in 3-5-1/17.3.2 for the recommended minimum breaking strength of mooring lines for vessels with Equipment Number EN > 2000:
  - 30 second mean wind speed from any direction (v_W or v_W* according to 3-5-1/17.3.2)
  - Maximum current speed acting on bow or stern (±10°)

(Revise 3-5-1/Table 1, as follows:)

TABLE 1
Equipment for Self-propelled Ocean-going Craft *(1 July 2018)*

SI, MKS Units

The weight per anchor of bower anchors given in 3-5-1/Table 1 is for anchors of equal weight. The weight of individual anchors may vary 7% plus or minus from the tabular weight provided that the combined weight of all anchors is not less than that required for anchors of equal weight. The total length of chain required to be carried on board, as given in 3-5-1/Table 1, is to be reasonably divided between the two bower anchors.

		Stockless Bower Anchors		*Chain Cable Stud Link Bower Chain*			
					Diameter		
Equipment Numeral	*Equipment Number**	*Number*	*Mass per Anchor, kg*	*Length, m*	*Normal-Strength Steel (Grade 1), mm*	*High-Strength Steel (Grade 2), mm*	*Extra High-Strength Steel (Grade 3), mm*
UA1	30	2	75	192.5	12.5	—	—
UA2	40	2	100	192.5	12.5	—	—
UA3	50	2	120	192.5	12.5	—	—
UA4	60	2	140	192.5	12.5	—	—
UA5	70	2	160	220	14	12.5	—
UA6	80	2	180	220	14	12.5	—
UA7	90	2	210	220	16	14	—
UA8	100	2	240	220	16	14	—
UA9	110	2	270	247.5	17.5	16	—
UA10	120	2	300	247.5	17.5	16	—
UA11	130	2	340	275	19	16	—
UA12	140	2	390	275	20.5	17.5	—
U6	150	2	480	275	22	19	—
U7	175	2	570	302.5	24	20.5	—
U8	205	2	660	302.5	26	22	20.5
U9	240	2	780	330	28	24	22
U10	280	2	900	357.5	30	26	24
U11	320	2	1020	357.5	32	28	24
U12	360	2	1140	385	34	30	26
U13	400	2	1290	385	36	32	28
U14	450	2	1440	412.5	38	34	30
U15	500	2	1590	412.5	40	34	30
U16	550	2	1740	440	42	36	32
U17	600	2	1920	440	44	38	34
U18	660	2	2100	440	46	40	36
U19	720	2	2280	467.5	48	42	36
U20	780	2	2460	467.5	50	44	38
U21	840	2	2640	467.5	52	46	40
U22	910	2	2850	495	54	48	42
U23	980	2	3060	495	56	50	44
U24	1060	2	3300	495	58	50	46
U25	1140	2	3540	522.5	60	52	46
U26	1220	2	3780	522.5	62	54	48
U27	1300	2	4050	522.5	64	56	50
U28	1390	2	4320	550	66	58	50
U29	1480	2	4590	550	68	60	52
U30	1570	2	4890	550	70	62	54

TABLE 1 (continued)
Equipment for Self-propelled Ocean-going Craft *(1 July 2018)*

SI, MKS Units

		Stockless Bower Anchors		*Chain Cable Stud Link Bower Chain*			
					Diameter		
Equipment Numeral	*Equipment Number**	*Number*	*Mass per Anchor, kg*	*Length, m*	*Normal-Strength Steel (Grade 1), mm*	*High-Strength Steel (Grade 2), mm*	*Extra High-Strength Steel (Grade 3), mm*
U31	1670	2	5250	577.5	73	64	56
U32	1790	2	5610	577.5	76	66	58
U33	1930	2	6000	577.5	78	68	60
U34	2080	2	6450	605	81	70	62
U35	2230	2	6900	605	84	73	64
U36	2380	2	7350	605	87	76	66
U37	2530	2	7800	632.5	90	78	68
U38	2700	2	8300	632.5	92	81	70
U39	2870	2	8700	632.5	95	84	73
U40	3040	2	9300	660	97	84	76
U41	3210	2	9900	660	100	87	78
U42	3400	2	10500	600	102	90	78
U43	3600	2	11100	687.5	105	92	81
U44	3800	2	11700	687.5	107	95	84
U45	4000	2	12300	687.5	111	97	87
U46	4200	2	12900	715	114	100	87
U47	4400	2	13500	715	117	102	90
U48	4600	2	14100	715	120	105	92
U49	4800	2	14700	742.5	122	107	95
U50	5000	2	15400	742.5	124	111	97
U51	5200	2	16100	742.5	127	111	97
U52	5500	2	16900	742.5	130	114	100
U53	5800	2	17800	742.5	132	117	102
U54	6100	2	18800	742.5	—	120	107
U55	6500	2	20000	770	—	124	111
U56	6900	2	21500	770	—	127	114
U57	7400	2	23000	770	—	132	117
U58	7900	2	24500	770	—	137	122
U59	8400	2	26000	770	—	142	127
U60	8900	2	27500	770	—	147	132
U61	9400	2	29000	770	—	152	132
U62	10000	2	31000	770	—	—	137
U63	10700	2	33000	770	—	—	142
U64	11500	2	35500	770	—	—	147
U65	12400	2	38500	770	—	—	152
U66	13400	2	42000	770	—	—	157
U67	14600	2	46000	770	—	—	162

* For intermediate values of equipment number use equipment complement in sizes and weights given for the lower equipment number in the table.

TABLE 1
Equipment for Self-propelled Ocean-going Craft *(1 July 2018)*

US Units

The weight per anchor of bower anchors given in 3-5-1/Table 1 is for anchors of equal weight. The weight of individual anchors may vary 7% plus or minus from the tabular weight, provided that the combined weight of all anchors is not less than that required for anchors of equal weight. The total length of chain required to be carried onboard, as given in 3-5-1/Table 1, is to be reasonably divided between the two bower anchors.

		Stockless Bower Anchors		*Chain Cable Stud Link Bower Chain*			
					Diameter		
Equipment Numeral	*Equipment Number**	*Number*	*Mass per Anchor, pounds*	*Length, fathoms*	*Normal-Strength Steel (Grade 1), inches*	*High-Strength Steel (Grade 2), inches*	*Extra High-Strength Steel (Grade 3), inches*
UA1	30	2	165	105	1/2	—	—
UA2	40	2	220	105	1/2	—	—
UA3	50	2	265	105	1/2	—	—
UA4	60	2	310	105	1/2	—	—
UA5	70	2	350	120	9/16	1/2	—
UA6	80	2	400	120	9/16	1/2	—
UA7	90	2	460	120	5/8	9/16	—
UA8	100	2	530	120	5/8	9/16	—
UA9	110	2	595	135	11/16	5/8	—
UA10	120	2	670	135	11/16	5/8	—
UA11	130	2	750	150	3/4	11/16	—
UA12	140	2	860	150	13/16	11/16	—
U6	150	2	1060	150	7/8	3/4	—
U7	175	2	1255	165	15/16	13/16	—
U8	205	2	1455	165	1	7/8	13/16
U9	240	2	1720	180	1 1/8	15/16	7/8
U10	280	2	1985	195	1 3/16	1	15/16
U11	320	2	2250	195	1 1/4	1 1/8	15/16
U12	360	2	2510	210	1 5/16	1 3/16	1
U13	400	2	2840	210	1 7/16	1 1/4	1 1/8
U14	450	2	3170	225	1 1/2	1 5/16	1 3/16
U15	500	2	3500	225	1 9/16	1 5/16	1 3/16
U16	550	2	3830	240	1 5/8	1 7/16	1 1/4
U17	600	2	4230	240	1 3/4	1 1/2	1 5/16
U18	660	2	4630	240	1 13/16	1 9/16	1 7/16
U19	720	2	5020	255	1 7/8	1 5/8	1 7/16
U20	780	2	5420	255	2	1 3/4	1 1/2
U21	840	2	5820	255	2 1/16	1 13/16	1 9/16
U22	910	2	6280	270	2 1/8	1 7/8	1 5/8
U23	980	2	6740	270	2 3/16	1 15/16	1 3/4
U24	1060	2	7270	270	2 5/16	2	1 13/16
U25	1140	2	7800	285	2 3/8	2 1/16	1 13/16
U26	1220	2	8330	285	2 7/16	2 1/8	1 7/8
U27	1300	2	8930	285	2 1/2	2 3/16	2
U28	1390	2	9520	300	2 5/8	2 5/16	2
U29	1480	2	10120	300	2 11/16	2 3/8	2 1/16
U30	1570	2	10800	300	2 3/4	2 7/16	2 1/8

TABLE 1 (continued)
Equipment for Self-propelled Ocean-going Craft *(1 July 2018)*

US Units

Equipment Numeral	*Equipment Number**	*Stockless Bower Anchors*		*Chain Cable Stud Link Bower Chain*			
					Diameter		
		Number	*Mass per Anchor, pounds*	*Length, fathoms*	*Normal-Strength Steel (Grade 1), inches*	*High-Strength Steel (Grade 2), inches*	*Extra High-Strength Steel (Grade 3), inches*
U31	1670	2	11600	315	2 7/8	2 1/2	2 3/16
U32	1790	2	12400	315	3	2 5/8	2 5/16
U33	1930	2	13200	315	3 1/16	2 11/16	2 3/8
U34	2080	2	14200	330	3 3/16	2 3/4	2 7/16
U35	2230	2	15200	330	3 5/16	2 7/8	2 1/2
U36	2380	2	16200	330	3 7/16	3	2 5/8
U37	2530	2	17200	345	3 9/16	3 1/16	2 11/16
U38	2700	2	18300	345	3 5/8	3 3/16	2 3/4
U39	2870	2	19200	345	3 3/4	3 5/16	2 7/8
U40	3040	2	20500	360	3 7/8	3 5/16	3
U41	3210	2	21800	360	3 15/16	3 7/16	3 1/16
U42	3400	2	23100	360	4	3 9/16	3 1/16
U43	3600	2	24500	375	4 1/8	3 5/8	3 3/16
U44	3800	2	25800	375	4 1/4	3 3/4	3 5/16
U45	4000	2	27100	375	4 3/8	3 7/8	3 7/16
U46	4200	2	28400	390	4 1/2	3 15/16	3 7/16
U47	4400	2	29800	390	4 5/8	4	3 9/16
U48	4600	2	31100	390	4 3/4	4 1/8	3 5/8
U49	4800	2	32400	405	4 3/4	4 1/4	3 3/4
U50	5000	2	33900	405	4 7/8	4 3/8	3 7/8
U51	5200	2	35500	405	5	4 3/8	3 7/8
U52	5500	2	37200	405	5 1/8	4 1/2	3 15/16
U53	5800	2	39200	405	5 1/8	4 5/8	4
U54	6100	2	41400	405	—	4 3/4	4 1/4
U55	6500	2	44000	420	—	4 7/8	4 3/8
U56	6900	2	47400	420	—	5	4 1/2
U57	7400	2	50700	420	—	5 1/8	4 5/8
U58	7900	2	54000	420	—	5 3/8	4 3/4
U59	8400	2	57300	420	—	5 5/8	5
U60	8900	2	60600	420	—	5 3/4	5 1/8
U61	9400	2	63900	420	—	6	5 1/8
U62	10000	2	68000	420	—	—	5 3/8
U63	10700	2	72500	420	—	—	5 5/8
U64	11500	2	78000	420	—	—	5 3/4
U65	12400	2	85000	420	—	—	6
U66	13400	2	92500	420	—	—	6 1/8
U67	14600	2	101500	420	—	—	6 3/8

* For intermediate values of equipment number use equipment complement in sizes and weights given for the lower equipment number in the table.

(Delete existing 3-5-1/Table 2 and add new 3-5-1/Tables 2 and 3, as follows:)

TABLE 2
Mooring Lines for Self-propelled Ocean-going Craft with *EN* ≤ 2000 *(1 July 2018)*

Equipment Number		*Mooring Lines*					
Exceeding	*Not Exceeding*	*Number*	*Minimum Length of Each Line* *		*Minimum Breaking Strength*		
			(m)	*(fathoms)*	*(kN)*	*(kgf)*	*(lbf)*
50	70	3	80	44	37	3750	8300
70	90	3	100	55	40	4000	9000
90	110	3	110	60	42	4500	9400
110	130	3	110	60	48	5000	10800
130	150	3	120	66	53	5400	11900
150	175	3	120	66	59	6000	13300
175	205	3	120	66	64	6500	14400
205	240	4	120	66	69	7000	15500
240	280	4	120	66	75	7500	16900
280	320	4	140	77	80	8000	18000
320	360	4	140	77	85	8500	19100
360	400	4	140	77	96	9500	21600
400	450	4	140	77	107	11000	24100
450	500	4	140	77	117	12000	26300
500	550	4	160	87	134	13500	30100
550	600	4	160	87	143	14500	32100
600	660	4	160	87	160	16500	36000
660	720	4	160	87	171	17500	38400
720	780	4	170	93	187	19000	42000
780	840	4	170	93	202	20500	45400
840	910	4	170	93	218	22000	49000
910	980	4	170	93	235	24000	52800
980	1060	4	180	98	250	25500	56200
1060	1140	4	180	98	272	27500	61100
1140	1220	4	180	98	293	30000	65900
1220	1300	4	180	98	309	31500	69500
1300	1390	4	180	98	336	34500	75500
1390	1480	4	180	98	352	36000	79100
1480	1570	5	190	104	352	36000	79100
1570	1670	5	190	104	362	37000	81400
1670	1790	5	190	104	384	39000	86300
1790	1930	5	190	104	411	42000	92400
1930	2000	5	190	104	437	44500	98200

* 3-5-1/17.3.3 is to be observed.

TABLE 3
Tow Lines for Self-propelled Ocean-going Craft *(1 July 2018)*

Equipment Number		*Tow Line*				
Exceeding	*Not Exceeding*	*Minimum Length*		*Minimum Breaking Strength*		
		(m)	*(ft)*	*(kN)*	*(kgf)*	*(lbf)*
50	70	180	98	98	10000	22000
70	90	180	98	98	10000	22000
90	110	180	98	98	10000	22000
110	130	180	98	98	10000	22000
130	150	180	98	98	10000	22000
150	175	180	98	98	10000	22000
175	205	180	98	112	11400	25100
205	240	180	98	129	13200	29100
240	280	180	98	150	15300	33700
280	320	180	98	174	17700	39000
320	360	180	98	207	21100	46500
360	400	180	98	224	22800	50300
400	450	180	98	250	25500	56200
450	500	180	98	277	28200	62200
500	550	190	104	306	31200	68800
550	600	190	104	338	34500	76000
600	660	190	104	370	37800	83300
660	720	190	104	406	41400	91200
720	780	190	104	441	45000	99200
780	840	190	104	479	48900	107800
840	910	190	104	518	52800	116400
910	980	190	104	559	57000	125600
980	1060	200	109	603	61500	135500
1060	1140	200	109	647	66000	145500
1140	1220	200	109	691	70500	155400
1220	1300	200	109	738	75300	166000
1300	1390	200	109	786	80100	176500
1390	1480	200	109	836	85200	187800
1480	1570	220	120	888	90600	199700
1570	1670	220	120	941	96000	211500
1670	1790	220	120	1024	104400	230000
1790	1930	220	120	1109	113100	249500
1930	2080	220	120	1168	119100	262500
2080	2230	240	131	1259	128400	283000
2230	2380	240	131	1356	138300	305000
2380	2530	240	131	1453	148200	326500
2530	2700	260	142	1471	150000	330500
2700	2870	260	142	1471	150000	330500
2870	3040	260	142	1471	150000	330500
3040	3210	280	153	1471	150000	330500
3210	3400	280	153	1471	150000	330500
3400	3600	280	153	1471	150000	330500
3600	---	300	164	1471	150000	330500

PART 4 CRAFT SYSTEMS AND MACHINERY

CHAPTER 1 GENERAL

SECTION 1 CLASSIFICATION OF MACHINERY

15 Astern Propulsion Power

(Revise Paragraph 4-1-1/15.1, as follows:)

15.1 General *(1 July 2018)*

Sufficient power for going astern is to be provided to secure proper control of the craft in all normal circumstances. The astern power of the main propelling machinery is to be capable of maintaining in free route astern at least 70% of the ahead rpm corresponding to the maximum continuous ahead power. For main propulsion systems with reversing gears, controllable pitch propellers or electric propulsion drive, running astern is not to lead to overload of the propulsion machinery.

Main propulsion systems are to undergo tests to demonstrate the astern response characteristics. The tests are to be carried out at least over the maneuvering range of the propulsion system and from all control positions. A test plan is to be provided by the yard and accepted by the surveyor. If specific operational characteristics have been defined by the manufacturer these shall be included in the test plan. The ability of the machinery, including the blade pitch control system of controllable pitch propellers, to reverse the direction of thrust of the propeller in sufficient time, and so to bring the vessel to rest within a reasonable distance from maximum ahead service speed, is to be demonstrated and recorded during trials.

PART 4 CRAFT SYSTEMS AND MACHINERY

CHAPTER 2 PRIME MOVERS

SECTION 1 INTERNAL COMBUSTION ENGINES AND REDUCTION GEARS

1 General

(Revise Paragraph 4-2-1/1.1, as follows:)

1.1 Construction and Installation *(1 July 2018)*

Internal combustion engines of 100 kW [135 horsepower (hp)] and over and associated reduction gears are to be constructed in accordance with Part 4, Chapters 2 and 3 of the *Steel Vessel Rules* and installed in accordance with the following requirements to the satisfaction of the Surveyor. Engines of less than 100 kW (135 hp) and associated reduction gears are to be constructed and equipped in accordance with good commercial practice, and will be accepted subject to a satisfactory performance test conducted to the satisfaction of the Surveyor after installation.

For engines driving generators, refer to the applicable requirements of 4-6-4/3.17 and 4-6-4/3.19.

Additional requirements for exhaust emission abatement equipment connected to internal combustion engines or boilers are provided in the ABS *Guide for Exhaust Emission Abatement*.

15 Engine Exhaust Systems

(Add new Paragraph 4-2-1/15.7, as follows:)

15.7 Exhaust Emission Abatement Systems *(1 July 2018)*

Where a vessel is fitted with an exhaust emission abatement system and the optional vessel notations detailed under 1/9.3 through 1/9.9 of the ABS *Guide for Exhaust Emission Abatement* are not requested, the installed exhaust emission abatement system is to comply with the minimum requirements prescribed in Section 1, Table 1 of the Guide and is to be verified by an ABS Surveyor during installation. This is applicable to new construction and existing vessel conversions.

PART 4 CRAFT SYSTEMS AND MACHINERY

CHAPTER 4 PUMPS AND PIPING SYSTEMS

SECTION 2 PUMPS, PIPES, VALVES AND FITTINGS

3 Pressure Tests

(Revise Paragraph 4-4-2/3.15, as follows:)

3.15 Hydrostatic Tests of Shell Valves *(1 July 2018)*

All valves intended for installation on the side shell at or below the load waterline, including those at the sea chests, are to be hydrostatically tested before installation and in the presence of the Surveyor.

The valve housing of each valve is to be subjected to a pressure of not to be less than test pressure of 5 bar (5.1 kgf/cm^2, 72.5 psi). No leakage is permitted and holding time as follows:

- 15 seconds for sizes up to 50 mm (2 inch)
- 60 seconds for sizes 75 mm - 150 mm (2.5 inch - 6 inch)
- 120 seconds for sizes 200 mm - 300 mm (8 inch - 12 inch)
- 300 seconds for sizes 350 mm (14 inch) and larger

The valve assembly is to be subjected to a hydrostatic seat leakage test. The test is to be performed with closed valve with the other end open to atmosphere. The pressure is to be applied independently on each side. Test pressure is not to be less than 5 bar (5.1 kgf/cm^2, 72.5 psi). Holding time is 5 minutes for all sizes.

5 Metallic Pipes

5.5 Aluminum Pipe

(Revise Subparagraph 4-4-2/5.5.1, as follows:)

5.5.1 *(1 July 2018)*

Piping containing flammable fluids is to be constructed of steel or other materials approved by ABS. Other equivalent material with a melting point above 930°C (1706°F), and with an elongation above 12% may be accepted.

Aluminum and aluminum alloys which are characterized by low melting points, below 930°C (1706°F), are considered heat sensitive materials and are not to be used to convey flammable fluids, except for such piping as arranged inside cargo tanks or heat exchangers or as otherwise permitted for engine turbine and gearbox installations, see 4-2-1/7.7 of the *Steel Vessel Rules*.

Aluminum pipe is also not to be used for bilge piping within the machinery space or for fire fighting systems. The above is applicable to all craft unless as modified below. See also 4-4-3/5.3, 4-4-4/3.7 and 4-5-1/3.1.

PART 4 CRAFT SYSTEMS AND MACHINERY

CHAPTER 4 PUMPS AND PIPING SYSTEMS

SECTION 4 FUEL OIL AND LUBRICATING OIL SYSTEMS AND TANKS

9 Lubricating Oil Systems

(Revise Paragraph 4-4-4/9.1, as follows:)

9.1 General *(1 July 2018)*

The lubricating systems are to be so arranged that they will function satisfactorily under the conditions specified in 4-1-1/17. Consideration is to be given to all acceptable fill levels in the lube oil sumps and tanks for compliance with this requirement.

The lubricating-oil piping is to be entirely separated from other piping systems. In addition, the requirements of 4-4-4/1.1.2, 4-4-4/1.3 and 4-4-4/1.5 are applicable.

The requirements in 4-4-4/3.7 are also applicable for lubricating-oil tanks. However, arrangements for remotely closing the valve from a position outside of the compartment need not be provided if inadvertent valve closure could result in damage to the running machinery due to lack of lubricating oil. Where the machinery is arranged for automatic shutdown upon loss of lubricating oil, the valve required by 4-4-4/3.7 is to be provided with means to close it from a readily accessible and safe location outside of the compartment in which the valve is located.