Notice No.1

Rules and Regulations for the
Classification of Ships, July 2017

The status of this Rule set is amended as shown and is now to be read in conjunction with this and prior Notices. Any corrigenda included in the Notice are effective immediately. Please note that paragraphs, Tables and Figures are not shown in their entirety.

Please note that corrigenda amends to paragraphs, Tables and Figures are not shown in their entirety.

Issue date: September 2017

Amendments to	Effective date	Mandatory Instrument
Part 1, Chapter 3, Section 17	Corrigendum	N/A
Part 3, Chapter 1, Section 7	Corrigendum	N/A
Part 3, Chapter 3, Section 4	Corrigenda	N/A
Part 3, Chapter 4, Sections 6 & 7	Corrigenda	N/A
Part 3, Chapter 8, Section 1	Corrigendum	N/A
Part 3, Chapter 11, Section 9	Corrigendum	N/A
Part 3, Chapter 13, Sections 2, 7 & 8	Corrigenda	N/A
Part 3, Chapter 14, Sections 1 & 8	Corrigenda	N/A
Part 4, Chapter 1, Section 4	Corrigendum	N/A
Part 4, Chapter 2, Section 2	Corrigenda	N/A
Part 4, Chapter 4, Section 1	Corrigendum	N/A
Part 4, Chapter 8, Section 16	Corrigenda	N/A
Part 5, Chapter 1, Section 6	Corrigendum	N/A
Part 5, Chapter 2, Section 11	Corrigenda	N/A
Part 5, Chapter 5, Sections 3 & 5	Corrigenda	N/A
Part 5, Chapter 9, Section 5	Corrigenda	N/A
Part 5, Chapter 12, Sections 1 & 2	Corrigenda	N/A
Part 5, Chapter 16, Section 3	Corrigenda	N/A
Part 5, Chapter 19, Sections 2, 4, 6 & 7	Corrigenda	N/A
Part 5, Chapter 20, Section 2	Corrigenda	N/A
Part 6, Chapter 2, Sections 6 & 9	Corrigenda	N/A
Part 7, Chapter 11, Section 3	Corrigenda	N/A
Part 7, Chapter 12, Section 4	Corrigendum	N/A
Part 8, Chapter 2, Section 11	Corrigendum	N/A

Lloyd's Register

Part 1, Chapter 3
Periodical Survey Regulations

■   *Section 17*
Screwshafts, tube shafts and propellers

17.2   **Definitions**

17.2.3   **Lubricating oil analysis**. Lubricating oil analysis is to be carried out at regular intervals not exceeding six months. The documentation on lubricating oil analysis is to be available on board. Oil samples, to be submitted for the analysis, ~~should~~ are to be taken under service conditions.

Part 3, Chapter 1
General

■ *Section 7*
Equipment Number

7.1   Calculation of Equipment Number

7.1.1   The equipment of anchors and chain cables specified in *Pt 3, Ch 13, 7 Equipment* is based on an `Equipment Number' which is to be calculated as follows:

$$Equipment\ Number = \Delta^{2/3} + 2BH + \frac{A}{10} \qquad Equipment\ Number = \Delta^{2/3} + 2BH + \frac{A}{10}$$

Part 3, Chapter 3
Structural Design

■ *Section 4*
Bulkhead requirements

4.7   Separation and protection of tanks

4.7.8   For vessels which do not comply with the accidental fuel oil outflow performance standard given in MARPOL Annex 1, *Regulation 12A – Oil fuel tank protection*, fuel oil tanks are to be bounded by double bottom and double side tanks or void spaces such that the distance between the fuel oil tank boundary and the shell plating is not less than that given in *Table 3.4.2 Fuel oil tank boundary requirements* and *Figure 3.4.1 Fuel oil tank boundary lines*. For double hull oil tankers where the requirements of *Pt 4, Ch 9, 1.2 Application and ship arrangement 1.2.17* conflict with this requirement *Pt 4, Ch 9, 1.2 Application and ship arrangement 1.2.17* is to take precedent. Alternatively the accidental oil outflow performance standard specified in MARPOL Annex 1 *Regulation 12A – Oil fuel tank protection* may be complied with.

Existing paragraph 4.7.8 has been renumbered 4.7.9.

| Table 3.4.2 Fuel tank boundary requirements		
Fuel oil tank capacity (C), m³	Minimum double side width (d_s), metres	Minimum double bottom depth (d_b), metres
$C \geq 5000$	$d_s = 0{,}5 + \dfrac{C}{20000}$ or $d_s = 2{,}0$ whichever is the lesser, but not less than 1,0	$d_b = \dfrac{B}{20}$ or $d_b = 2{,}0$ whichever is the lesser, but not less than 0,76
$600 \leq C < 5000$	$d_s = 0{,}4 + \dfrac{2{,}4C}{20000}$ or $d_s = 1{,}0$ whichever is the greater, *see* Note	$d_b = \dfrac{B}{20}$ or $d_b = 2{,}0$ whichever is the lesser, but not less than 0,76
$C < 600$	$d_s = 0$	$d_b = 0$
Symbols		
C = the ship's total volume of fuel oil, including that of small fuel oil tanks, in m³, at 98 per cent tank filling		
d_b = the distance, in metres, between the bottom of the fuel oil tank and the moulded line of the bottom shell plating. In the turn of bilge area and at locations without a clearly defined turn of bilge, the fuel oil tank boundary line shall run parallel to the line of the midship flat bottom as shown in *Figure 3.4.2 Definition of* d_b		
d_s = the distance, in metres, between the side of the fuel oil tank and the moulded line of the side shell plating, *see Figure 3.4.1 Fuel oil tank boundary lines*		
Note *1.* However, for individual tanks with a fuel oil capacity of less than 500 m³, the minimum distance is 0,76 m.		
Note *2.* Fuel oil tanks with a maximum individual capacity not greater than 30 m³ need not comply with the requirements of this Table, provided the aggregate capacity of such excluded tanks is not greater than 600 m³.		
Note *3.* Suction wells in fuel oil tanks may protrude into the double bottom below the boundary line defined by the distance d_b, provided that such wells are as small as practicable and the distance between the well bottom and the bottom shell plating is not less than 0,5d_b.		
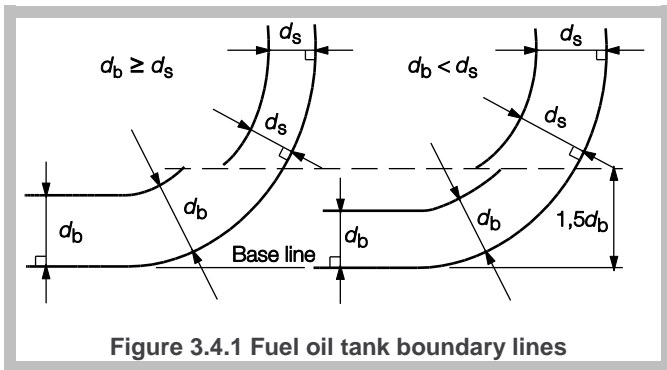
Figure 3.4.1 Fuel oil tank boundary lines
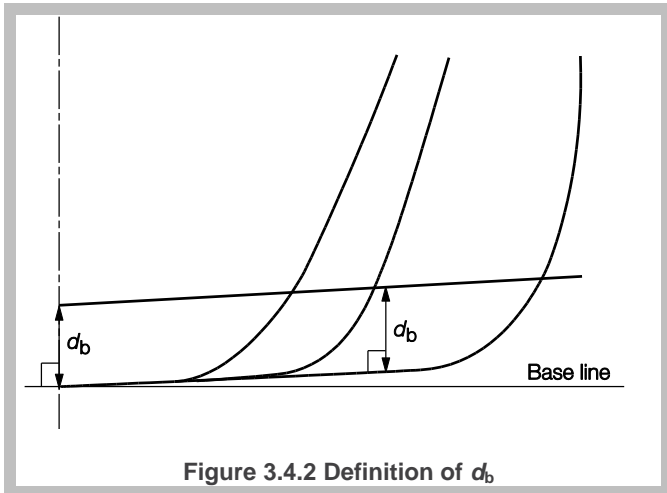
Figure 3.4.2 Definition of d_b

Part 3, Chapter 4
Longitudinal Strength

■ *Section 6*
Hull shear strength

6.3 Design wave shear force

6.3.1 The design hull wave shear force, Q_w, at any position along the ship is given by:
(b) Negative shear force
K_1 = Intermediate values of K_1 are to be ~~obtained~~ determined by linear interpolation

■ *Section 7*
Hull buckling strength

7.4 Design stress

Table 4.7.2 Elastic critical buckling strength of plating

Mode	Elastic critical buckling stress, N/mm^2
(b) Compression of plating with transverse stiffeners (perpendicular to compressive stress), *see* Note	$\sigma_E = 0.9c\left[1+\left(\dfrac{s}{1000S}\right)2\right]2E\left(\dfrac{t_p}{S}\right)^2$ $\sigma_E = 0.9c\left[1+\left(\dfrac{s}{1000S}\right)^2\right]^2 E\left(\dfrac{t_p}{s}\right)^2$

(c) Shear, *see* Note	$\tau_E = 3{,}6\left[1{,}335+\left(\dfrac{s}{1000S}\right)2\right]E\left(\dfrac{t_p}{S}\right)^2$	$\tau_E = 3{,}6\left[1{,}335+\left(\dfrac{s}{1000S}\right)^2\right]E\left(\dfrac{t_p}{S}\right)^2$

Part 3, Chapter 8
Superstructures, Deckhouses and Bulkwarks

■ *Section 1*
General

1.2 Symbols

1.2.1 The following symbols and definitions are applicable to this Chapter, unless otherwise stated:
L, B, T and C_b = as defined in *Pt 3, Ch 1, 6.1 Principal particulars*
b

Part 3, Chapter 11
Closing Arrangements for Shell, Deck and Bulkheads

■ *Section 9*
Watertight doors in bulkheads below the freeboard deck

9.2 Watertight doors

9.2.3 The scantlings of the frames of the watertight doors are to satisfy the requirements of watertight bulkheads given in item 5 of *Table 1.9.1 Watertight and deep tank bulkhead scantlings* in *Pt 4, Ch 1, 9 Bulkheads* taking into account the arrangement of door stiffeners and securing arrangements.

Part 3, Chapter 13
Ship Control Systems

■ *Section 2*
Rudders

2.6 Rudder force

2.6.1 The lateral rudder force at the centre of pressure is to be determined for both ahead and astern conditions as follows:
K_1 = aspect ratio correction factor

= $\dfrac{\lambda + 2}{3}$ ~~but is not to be taken greater than 2.~~

λ = $\dfrac{h_R{}^2}{A_t}$ but is not to be taken greater than 2.

2.11 Rudder blade

Table 13.2.8 Rudder blade permissible stresses

Item
Rudder blade, clear ~~off~~ of cut-outs

2.15 Cone couplings with special arrangements for mounting and dismounting the couplings

2.15.6 In case of hydraulic pressure connections the required push-up force P_e, for the cone may be determined by the following formula:

$$P_\text{e} = ~~p_\text{req}d_\text{m}\Pi\ell\frac{\theta_t}{2} + 0{,}02~\text{N}$$

$$P_\text{e} = p_\text{req}d_\text{m}\Pi\ell\left(\frac{\theta_t}{2} + 0{,}02\right)\text{N}$$

■ *Section 7*
Equipment

7.6 Towlines and mooring lines for ships over 90 m in length

Table 13.7.2 Equipment – Bower anchors and chain cables

Equipment Number		Equipment Letter	Stockless bower anchors		Stud link chain cables for bower anchors			
					Total length, in metres	Diameter, in mm		
Exceeding	Not Exceeding		Number	Mass of anchor, in kg		Mild steel (Grade 1 or U1)	Special quality steel (Grade U2)	Extra special quality steel (Grade U3)
50	70	A	2	180	220	14	12,5	⊀ 12,5
70	90	B	2	240	220	16	14	⊀ 14
90	110	C	2	300	247,5	17,5	16	⊀ 16
110	130	D	2	360	247,5	19	17,5	⊀ 17,5
130	150	E	2	420	275	20,5	17,5	⊀ 17,5
150	175	F	2	480	275	22	19	⊀ 19
175	205	G	2	570	302,5	24	20,5	⊀ 20,5
600	~~600~~ 660	Q	2	1920	440	44	38	34
9400	10000	I*	2	29000	770	–	152	132
10000	10700	J*	2	31000	770	–	~~157~~ –	137
10700	11500	K*	2	33000	770	–	~~157~~ –	142
11500	12400	L*	2	3500	770	–	~~162~~ –	147

■ *Section 8*
Windlass design and testing

8.2 Calculations

Table 13.8.3 Permissible stress for design load cases

Note 2. Where a component is subjected to a combination of co-existent stresses, F_c is the combined stress which is to be calculated as follows: Combined bending and tension ~~$F_c = 1{,}25f_c + f_{bt}$~~ $F_c = 1{,}25f_t + f_{bt}$

8.11 Structural requirements for windlasses on exposed fore decks

NOTE:
P_y is to be examined from both inboard and
outboard directions separately, see ~~7.8.1.~~ 8.11.2
The sign convention for y_i is reversed when P_y
is from the opposite direction as shown.

Figure 13.8.1 Windlass loading
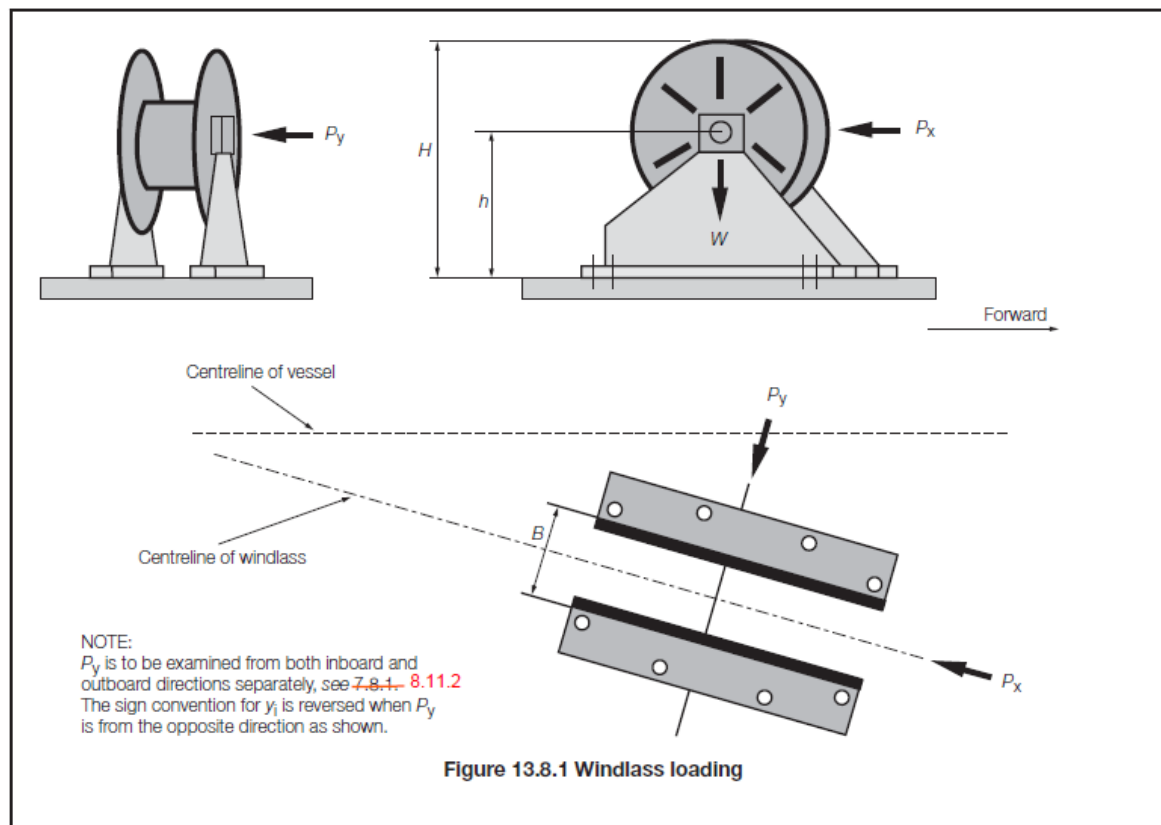
8.11.5   Shear forces F_{xi}, F_{yi} applied to the bolt group i, and the resultant combined force F_i may be calculated from:

$$F_{xi} \quad = \quad \text{~~$(P_x - \alpha\,g\,M)/N$ in kN~~} \qquad (P_x - \mu\,g\,M)/N \text{ in kN}$$

$$F_{yi} \quad = \quad \text{~~$(P_y - \alpha\,g\,M)/N$ in kN~~} \qquad (P_y - \mu\,g\,M)/N \text{ in kN}$$

Part 3, Chapter 14
Cargo Securing Arrangements

■   Section 1
General

1.6   Symbols and definitions

1.6.1   The following definitions are applicable to this Chapter, except where otherwise stated:
a_0 = acceleration parameter

$$\text{~~$f_{HS}(1{,}58 - 0{,}47C_b)\left(\frac{2{,}4}{\sqrt{L}} + \frac{34}{L} - \frac{600}{L^2}\right)$~~} \qquad f_{HS}(1{,}58 - 0{,}47C_b)\left(\frac{2{,}4}{\sqrt{L}} + \frac{34}{L} + \frac{600}{L^2}\right)$$

■   Section 8
Determination of forces for container securing arrangements

8.2   Ship motion, wind and green sea forces acting on containers

8.2.9   A container is considered partially protected from wind if an outboard container partially shields an inboard container as follows:

- An outboard 40ft container is considered to fully protect a longer inboard container.

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- An outboard 20ft container is considered to partially protect a longer inboard container from wind. In this case the full wind force is to be applied over the exposed portion of the longer inboard container when the ~~overlap~~ exposed length is more than 3m. The resulting wind force is to be applied solely to the end wall of the exposed portion.

Part 4, Chapter 1
General Cargo Ships

■ *Section 4*
Deck structure

4.5 Deck openings

Table 1.4.7 Pillars

Symbols
l_p = In single deck ships the section modulus of deck transverses is to be increased by 15 per cent.
l_p = distance, in metres, between centres of two adjacent spans of girders or transverses supported by the pillar

Part 4, Chapter 2
Ferries, Roll On-Roll Off Ships and Passenger Ships

■ *Section 2*
Longitudinal strength

2.5 Design wave shear force

2.5.1 The design vertical wave shear force, Q_w, at any position along the ship is given by:
(b) Negative shear force:
Intermediate values of K_f to be ~~determined~~ obtained by linear interpolation.

Part 4, Chapter 4
Offshore Support Vessels

■ *Section 1*
General

1.1 Application

1.1.1 This Chapter applies to sea-going ships specially designed and constructed to support the operations of offshore installations, including the carriage of specialised stores and cargoes to such facilities. These may be defined as:
(i) **Seismographic ~~research~~ support vessel**: Assigned where special consideration has been given to operations associated with seismographic research and survey.

■   *Section 16*
Longitudinal strength calculations

16.7   Design vertical wave shear force

16.7.3   The design hull wave shear force, Q_w, at any position along the ship is to be taken as:

(b)   Negative shear force

Intermediate values of K_f are to be obtained by linear interpolation.

~~Where~~

   f_{fH} and f_{fS} are defined in *Pt 4, Ch 8, 16.6 Design vertical wave bending moments 16.6.1 ~~Intermediate values to be obtained by linear interpolation~~*

Part 5, Chapter 1
General Requirements for the Design and Construction of Machinery

■ *Section 6*
Quality Assurance Scheme for Machinery

6.4 Acceptance of purchased materials, components and equipment

6.4.1 The manufacturer is to establish and maintain procedures and controls to ensure compliance with LR's requirements for certification of products from its suppliers. The manufacturer is to ensure that purchased products that are required to be certified in accordance with *Ch 3 Rolled Steel Plates, Strip, Sections and Bars* to *Ch 10 Equipment for Mooring and Anchoring* of the Rules for Materials are made at works which have been approved by LR for the type and grade of product being supplied. The manufacturer's system for control of purchased products is to be based on one or a combination of the following alternatives:
(c) Product certification by the ~~manufacturer~~ supplier in accordance with quality processes for control of suppliers of purchased products included within the scope of the manufacturer's QAM Scheme approval. These quality schemes are to ensure compliance with Rule requirements for the purchased products.

Part 5, Chapter 2
Reciprocating Internal Combustion Engines

■ *Section 11*
Factory Acceptance Test and Shipboard Trials of Engines

11.3 Works trials (factory acceptance test)

Table 2.11.1 Scope of works trials for engines

Main engines driving propellers and waterjets		
Trial condition	Duration	Note
90 per cent (~~or maximum~~ of normal continuous power), 75 per cent, 50 per cent and 25 per cent power	–	~~Powers~~ Engine speed in accordance with the nominal propeller curve, sequence to be selected by the manufacturer
Propulsion engines driving power off (PTO) generator		
90 per cent (or normal continuous ~~cruise~~ power), 75 per cent, 50 per cent and 25 per cent power	–	~~For variable speed engines. Powers~~ Engine speed in accordance with the nominal propeller curve or at constant speed *R*, sequence to be selected by the manufacturer
Engines driving mechanical auxiliaries		
75 per cent, 50 per cent and 25 per cent power	–	~~For variable speed engines. Powers~~ Engine speed in accordance with the nominal ~~propeller~~ power consumption curve, sequence to be selected by the manufacturer

Part 5, Chapter 3
Steam Turbines

■ *Section 6*
Control and monitoring of main and auxiliary steam turbines

6.6 Auxiliary steam turbines

Table 3.6.2 Auxiliary engines and auxiliary steam turbines: Alarms and safeguards

Item	Alarm	Note
Overspeed	High	*See ~~Part 5, Ch 4, 4 Design and construction~~ Pt 5, Ch 3, 6.2 Overspeed protective devices*

Part 5, Chapter 5
Gearing

■ *Section 3*
Design

3.1 Symbols

3.1.1 For the purposes of this Chapter the following symbols apply:

u = gear ratio = $\dfrac{Number\,of\,teeth\,in\,wheel}{Number\,of\,teeth\,in\,pinion} \geq 1$

ρ_c = relative radius of curvature at pitch point, in mm

$$= \frac{a\sin\alpha_{tw}u}{\cos\beta_b(1+u)^2}$$

3.3 Tooth loading factors

3.3.3 Dynamic factor, K_v, is to be calculated as follows when all the following conditions are satisfied:

$$\frac{vz_1}{100}\sqrt{\frac{u^2}{1+u^2}} < 10\,\text{m/s}$$

Or this method may also be applied to all types of gears if:

$$\frac{vz_1}{100}\sqrt{\frac{u^2}{1+u^2}} < 3\,\text{m/s}$$

And to helical gears where $\beta > 30^{\circ}$

(a) For spur gears and for helical gears with $\varepsilon_\beta \geq 1$:

$$K_v = 1 + \left(\frac{K_1}{K_A\dfrac{F_t}{b}} + K_2\right)\frac{vz_1}{100}K_3\sqrt{\frac{u^2}{1+u^2}}$$

Factor K_3 is to be in accordance with the following:

If $\dfrac{vz_1}{100}\sqrt{\dfrac{u^2}{1+u^2}} \leq 0,2$ then $K_3 = 2,071 - 0,357\,\dfrac{vz_1}{100}\sqrt{\dfrac{u^2}{1+u^2}}$

If $\dfrac{vz_1}{100}\sqrt{\dfrac{u^2}{1+u^2}} > 0,2$ then $K_3 = 2,071 - 0,357\,\dfrac{vz_1}{100}\sqrt{\dfrac{u^2}{1+u^2}}$

■ *Section 5*
Tests

5.3 Backlash

5.3.1 The normal backlash between any pair of gears should not be less than:

$$\frac{a \cdot \alpha_n}{90000} + 0,1\ \text{mm}$$

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Part 5, Chapter 9
Podded Propulsion Units

■ *Section 5*
Machinery design and construction requirements

5.5 **Bearing lubrication system**

5.5.2 In addition to the requirements detailed in this Section, the requirements of ~~*Pt 5, Ch 14 Machinery Piping Systems*, sub-Sections *Pt 5, Ch 9, 7.1 General*, 8.5, 8.7 and 8.9~~ *Pt 5, Ch 14, 8.1 General requirements, Pt 5, Ch 14, 8.5 Emergency supply for propulsion turbines and propulsion turbo-generators, Pt 5, Ch 14, 8.7 Filters* and *Pt 5, Ch 14, 8.9 Cleanliness of pipes and fittings* are to be complied with.

5.6 **Steering system**

5.6.3 Where more than one podded propulsion unit is fitted, *Pt 5, Ch 19, 2.1 Performance 2.1.2* is considered to be met when:
(b) Each podded propulsion unit is provided with the ability to ~~position~~ be positioned and ~~lock the podded propulsion unit~~ locked in a neutral position after a single failure of its power unit(s) and actuator(s). These arrangements are to be of sufficient strength to hold the podded propulsion unit in position at the ship's manoeuvring speed to be taken as not less than 7 knots, *see also Pt 5, Ch 9, 5.3 Propulsion shafting 5.3.11*. ~~Operating instructions~~ Instructions displayed at the locking mechanism's operating position are to include a ~~direction~~ directive to inform the bridge of any limitation in ship's speed required as a result of the securing mechanism being activated.

5.6.6 For vessels with more than one steerable podded propulsion unit, auxiliary steering gear need not be fitted provided that each podded propulsion unit is capable of being supplied by two identical power units (the podded propulsion unit may be supplied by shared or dedicated power units) and:

Part 5, Chapter 12
Piping Design Requirements

■ *Section 1*
General

1.1 **Application**

1.1.4 The cargo piping systems for chemical tankers are to comply with the relevant Sections of this Chapter where applicable, except where there are specific alternative or additional requirements provided in the *Rules and Regulations for the Construction and Classification of Ships for the Carriage of Liquid Chemicals in Bulk, July 2017*.

■ *Section 2*
Carbon and low alloy steels

2.2 **Wrought steel pipes and bends**

Table 12.2.4 Minimum thickness for steel pipes

External diameter, *D*, in mm	Pipes in general, in mm	Venting, overflow and sounding pipes for structural tanks, in mm	Bilge, ballast and general sea-water pipes, in mm	Bilge, air, overflow and sounding pipes through ballast and fuel tanks, ballast lines through fuel tanks and fuel lines through ballast tanks, in mm	Air, overflow and sounding pipes for fuel oil tanks passing through cargo holds of bulk carriers, in mm
~~98,5-368~~ 298,5-368	5,6	6,3	6,3	8,8	12,5
~~2406,4-457,2~~ 406,4-457,2	6,3	6,3	6,3	8,8	12,5

2.13 **Non-destructive testing**

2.13.1 For details of non-destructive tests on piping systems, other than hydraulic tests, *see ~~Pt 5, Ch 13 Ship Piping Systems~~ Ch 13, 5.5 Non-destructive examination* of the Rules for Materials.

Part 5, Chapter 16
Water jet systems

■ *Section 3*
Design requirements

3.7   Nozzle/steering ~~arrangements~~ systems

3.7.2   Where more than one steerable water jet is fitted, *Pt 5, Ch 19, 2.1 Performance 2.1.2* is considered to be met when:
(b)   Each of the steering systems is provided with the ability to position and lock the steerable water jet in a neutral position after a failure of its power unit(s) and actuator(s). These arrangements are to be of sufficient strength to hold the steerable water jet in position at the ship's manoeuvring speed to be taken as not less than 7 knots. ~~Operating instructions~~ Instructions displayed at the locking mechanism's operating position are to include a ~~direction~~ directive to inform the bridge of any limitation in ship's speed required as a result of the securing mechanism being activated.

Part 5, Chapter 19
Steering Systems

■ *Section 2*
Performance

2.1   General

2.1.1   Main and auxiliary steering gear for rudder-type steering systems are to meet the performance requirements in *Pt 5, Ch 19, 2.2 Performance requirements for rudder-type steering systems*. Steering performance on ships fitted with steerable podded propulsion systems is to comply with *Pt 5, Ch 9, 5.6 Steering system* in addition to the requirements of this Chapter, as applicable. Steering performance on ships fitted with steerable water jet systems is to comply with *Pt 5, Ch 16, 3.7 Nozzle/steering arrangements* *Pt 5, Ch 16, 3.7 Nozzle/steering system* in addition to the requirements of this Chapter, as applicable. Steering performance on ships fitted with azimuth thruster systems is to comply with *Pt 5, Ch 20, 2.1 General* in addition to the requirements of this Chapter, as applicable.

2.1.3   ~~Main and auxiliary steering gear power units are to be:~~ The main and auxiliary steering gear is to be:

2.2   Performance requirements for rudder-type steering systems

2.2.1   The main steering gear is to be:
(a)   Of adequate strength and capable of putting the rudder over from 35° on one side to 35° on the other side with the ship at its deepest sea-going draught and running ahead at maximum ahead service speed and under the same conditions, from 35° on either side to 30° on the other side in not more than 28 seconds which shall be demonstrated in accordance with *Pt 5, Ch 9, 8 Testing and trials* *Pt 5, Ch 19, 7.2 Trials*; and

■ *Section 4*
Steering control systems

4.1   General

4.1.6   Arrangements for failure detection are to be provided with self-monitoring capabilities. In the event of failure being detected, an audible and individual visual alarm is to be initiated on the navigating bridge. *See Pt 5, Ch 19, 5.3 Monitoring and alarms*. Where ~~the~~ system failure alarms for hydraulic lock, *see Table 19.5.1 Alarms*, are provided, appropriate instructions are to be placed on the navigating bridge to shut down the system at fault.

■ *Section 6*
Emergency power

6.1   General

6.1.1   The requirements of *Pt 5, Ch 19, 6.1 General* apply to steering systems with:
(b)   ~~Podded~~ Steerable podded propulsion units or steerable water jet systems where the power per propulsion unit exceeds ~~2,500 kW~~ 2500 kW and the podded propulsion unit or steerable water jet has a proven steering capability due to vessel velocity even when propulsion power has failed.

■ *Section 7*
Testing and trials

7.2   Trials

7.2.1   The steering gear is to be tested on the trials ~~trip~~ in order to demonstrate to the Surveyor's satisfaction that the requirements of the Rules have been met. The trial is to include the operation of the following:

(a)   ~~The steering gear, including demonstration of the performances required by: *Pt 5, Ch 19, 2.2 Performance requirements for rudder-type steering systems 2.2.1.(a)* and *Pt 5, Ch 19, 2.2 Performance requirements for rudder-type steering systems 2.2.1.(b)* where a rudder type steering system is fitted, or by *Pt 5, Ch 9, 5.6 Steering system 5.6.4.(a)* and *Pt 5, Ch 9, 5.6 Steering system 5.6.5.(b)* where a podded propulsion steering system are fitted, or by *Pt 5, Ch 16, 3.7 Nozzle/steering arrangements 3.7.3.(a)* and *Pt 5, Ch 16, 3.7 Nozzle/steering arrangements 3.7.4.(b)* where water jets steering system is, or by *Pt 5, Ch 20, 2.1 General 2.1.4.(a) Pt 5, Ch 20, 2.1 General 2.1.5.(b)* where an azimuth thruster steering system is fitted:~~
    ○   ~~For the main steering gear trial, the propeller pitch of controllable pitch propellers is to be at the maximum design pitch approved for the maximum continuous ahead RPM;~~
    ○   ~~If the ship cannot be tested at the deepest draught, then the loading condition can be accepted on the conditions that either the rudder is fully submerged (at zero speed waterline) and the vessel is in an acceptable trim condition, or the rudder load and torque at the trial loading condition have been reliably predicted and extrapolated to the full load condition, to the satisfaction of the Administration. In any case, for the main steering gear trial, the speed of the ship corresponding to the maximum continuous revolutions of main engine and maximum design pitch applies;~~

(a)   The steering gear:
- For the main steering gear trial, the propeller pitch of controllable pitch propellers is to be at the maximum design pitch approved for the maximum continuous ahead RPM;
- If the ship cannot be tested at the deepest draught, then the loading condition can be accepted on the conditions that either the rudder is fully submerged (at zero speed waterline) and the vessel is in an acceptable trim condition, or the rudder torque at the trial loading condition has been reliably predicted and extrapolated to the full load condition, to the satisfaction of the Administration. In any case, for the main steering gear trial, the speed of the ship corresponding to the maximum continuous revolutions of main engine and maximum design pitch applies;
- Depending on the steering system type the performance required by the following is to be demonstrated:
   (i)   Where a rudder type steering system is fitted *see*
   - Pt 5, Ch 19, *2.2 Performance requirements for rudder-type steering systems 2.2.1(a),* and
   - Pt 5, Ch 19, *2.2 Performance requirements for rudder-type steering systems 2.2.2(b)*
   (ii)   Where a podded propulsion steering system is fitted *see*
   - *Pt 5, Ch 9, 5.6 Steering system 5.6.4 (a) and*
   - *Pt 5, Ch 9, 5.6 Steering system 5.6.5 (b)*
   (iii)   Where a water jet steering system is fitted *see*
   - *Pt 5, Ch 16, 3.7 Nozzle/steering systems 3.7.3(a), and*
   - *Pt 5, Ch 16, 3.7 Nozzle/steering systems 3.7.4(b)*
   (iv)   Where an azimuth thruster steering system is fitted *see*
   - *Pt 5, Ch 20, 2.1 General 2.1.4(a), and*
   - *Pt 5, Ch 20, 2.1 General 2.1.5(b):*

Part 5, Chapter 20
Azimuth Thrusters

■ *Section 2*
Performance

2.1   General

2.1.3   Where more than one azimuth thruster is fitted, *Pt 5, Ch 19, 2.1 General 2.1.2* is considered to be met when:

(b)   Each azimuth thruster is provided with the ability to position and lock the azimuth thruster in a neutral position after a failure of its own power unit(s) and actuator(s). These arrangements are to be of sufficient strength to hold the azimuth thruster in position at the ship's manoeuvring speed to be taken as not less than 7 knots. ~~Operating instructions~~ Instructions displayed at the locking mechanism's operating position are to include a ~~direction~~ directive to inform the bridge of any limitation in ship's speed required as a result of the securing mechanism being activated.

Part 6, Chapter 2
Electrical Engineering

■ *Section 1*
  General

1.1 General

1.1.7 Lloyd's Register (hereinafter referred to as 'LR') will be prepared to give consideration to special cases or to arrangements which are equivalent to the Rules. For unconventional designs, *see also ~~Pt 7, Ch 15 Refrigeration Systems and Equipment Serving Provision Stores and Air-Conditioning Installations~~ Pt 7, Ch 14 Requirements for Machinery and Engineering Systems of Unconventional Design*. Consideration will also be given to electrical arrangements of small ships and ships to be assigned class notation for restricted or special services.

■ *Section 6*
  System design – Protection

6.1 General

6.1.10 Overload protection may be omitted from the following:
(a) one line of circuits of the insulated type;

■ *Section 9*
  Rotating machines

9.1 General requirements

9.1.16 The reference insulation system, against which the test samples in *Pt 6, Ch 2, 9.1 General requirements 9.1.15* are to be validated, is to be have been ~~shown~~ demonstrated to be suitable for use in the environmental conditions that the finished machine will be exposed to in service. Documented evidence of such suitability is to be available to the LR Surveyor, at the time these tests are conducted.

Part 7, Chapter 11
Arrangements and Equipment for Environmental Protection (ECO Class Notation)

■ *Section 3*
Supplementary characters

3.5 Environmentally Acceptable Lubricants – EAL character

3.5.1 For assignment of the **EAL** character, the ship shall use Environmentally Acceptable Lubricants (EAL) that comply with the EPA criteria, as defined in Section 2.2.9 of the 2013 ~~Vessle~~ Vessel General Permit (VGP).

3.6 Energy Efficiency Design Index – EEDI-1, EEDI-2, EEDI-3, characters

~~3.6.1 For assignment of the EAL character, the ship shall use Environmentally Acceptable Lubricants (EAL)~~

Existing paragraphs 3.6.2 to 3.6.5 have been renumbered to 3.6.1 to 3.6.4.

Part 7, Chapter 12
Passenger and Crew Accommodation Comfort

■ *Section 4*
Testing

4.3 Noise measurements

4.3.1 Noise measurements are to be conducted in accordance with ISO 2923 and IMO *Resolution MSC.337(91) – Adoption of the Code on Noise Levels on Board Ships – (Adopted on 30 November 2012)The Annex below is consolidated into Resolution MSC.337(91)*. Measurements of noise levels are to be carried out using precision grade sound level meters conforming to ~~IEC 60651~~ IEC 60672-1, Type 1 or 2. Subject to demonstration, equivalent standards are acceptable.

- *Section 11*

  Machinery strengthening requirements for navigation in multi-year ice conditions – Ice Classes PC1, PC2, PC3, PC4, PC5, PC6 and PC7

11.19   Machinery fastening loading accelerations

11.19.4 The combined transverse impact acceleration, a_t, at any point along hull girder, is to be taken as:

F_i =   total force normal to shell plating in the bow area due to oblique ice impact, defined in ~~*Pt 8, Ch 2, 10.19 Design vertical ice force at the bow*~~ *Pt 8, Ch 2, 10.4 Bow area 10.4.3(b)*