RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

RULES

Part N Ships Carrying Liquefied Gases in Bulk

2018 AMENDMENT NO.1

Rule No.100 29 June 2018

Resolved by Technical Committee on 31 January 2018

An asterisk (*) after the title of a requirement indicates that there is also relevant information in the corresponding Guidance.

Rule No.100 29 June 2018
AMENDMENT TO THE RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

"Rules for the survey and construction of steel ships" has been partly amended as follows:

Part N SHIPS CARRYING LIQUEFIED GASES IN BULK

Amendment 1-1

Chapter 3 SHIP ARRANGEMENTS

3.2 Accommodation, Service and Machinery Spaces and Control Stations (*IGC Code* 3.2)

Paragraph 3.2.5 has been amended as follows.

3.2.5 Windows and Sidescuttles*

Windows and sidescuttles facing the cargo area and on the sides of the superstructures and deckhouses within the limits specified in **3.2.4**, except wheelhouse windows, are to be constructed to *A*-60 class. Wheelhouse windows are to be constructed to not less than *A*-0 class (for external fire load)~~.~~, except in cases where *A*-0 class construction is not deemed necessary by the Society. Sidescuttles in the shell below the uppermost continuous deck and in the first tier of the superstructure or deckhouse is to be of fixed (non-opening) type.

EFFECTIVE DATE AND APPLICATION (Amendment 1-1)

1. The effective date of the amendments is 29 June 2018.

Amendment 1-2

Chapter 4 CARGO CONTAINMENT

4.21 Type *A* Independent Tanks (*IGC Code* 4.21)

4.21.1 Design Basis

1 Type *A* independent tanks are tanks primarily designed using classical ship-structural analysis procedures in accordance with recognized standards. Where such tanks are primarily constructed of plane surfaces, the design vapour pressure P_0 is to be less than 0.07 *MPa*.

2 If the cargo temperature at atmospheric pressure is below -10°C, a complete secondary barrier is to be provided as required in **4.5**. The secondary barrier is to be designed in accordance with **4.6**.

4.21.2 Structural Analysis*

1 A structural analysis is to be performed taking into account the internal pressure as indicated in **4.13.2**, and the interaction loads with the supporting and keying system as well as a reasonable part of the ship's hull.

2 For parts, such as supporting structures, not otherwise covered by the requirements of this Part, stresses are to be determined by direct calculations, taking into account the loads referred to in **4.12** to **4.15** as far as applicable, and the ship deflection in way of supporting structures.

3 The tanks with supports are to be designed for the accidental loads specified in **4.15**. These loads need not be combined with each other or with environmental loads.

4.21.3 Ultimate Design Condition*

Sub-paragraph -2 has been amended as follows.

1 For tanks primarily constructed of plane surfaces, the nominal membrane stresses for primary and secondary members (stiffeners, web frames, stringers, girders), when calculated by classical analysis procedures, are to not exceed the lower of R_m /2.66 or R_e /1.33 for nickel steels, carbon-manganese steels, austenitic steels and aluminium alloys, where R_m and R_e are defined in **4.18.1-3**. However, if detailed calculations are carried out for the primary members, the equivalent stress σ_C, as defined in **4.18.1-4**, may be increased over that indicated above to a stress acceptable to the Society. Calculations are to take into account the effects of bending, shear, axial and torsional deformation as well as the hull/cargo tank interaction forces due to the deflection of the double bottom and cargo tank bottoms.

2 Tank boundary scantlings are to meet at least the requirements ~~**of Chapter 14, Part C of the Rules** for deep tanks~~ <u>as deemed appropriate by the Society</u> taking into account the internal pressure as indicated in **4.13.2** and any corrosion allowance required by **4.3.5**.

3 The cargo tank structure is to be reviewed against potential buckling.

EFFECTIVE DATE AND APPLICATION (Amendment 1-2)

1. The effective date of the amendments is 29 December 2018.

2. Notwithstanding the amendments to the Rules, the current requirements apply to ships other than ships that fall under the following:

(1) for which the date of contract for construction is on or after the effective date; or

(2) the keels of which are laid or which are at *a similar stage of construction* on or after 1 July 2016.

(Note) The term "*a similar stage of construction*" means the stage at which the construction identifiable with a specific ship begins and the assembly of that ship has commenced comprising at least 50 *tonnes* or 1% of the estimated mass of all structural material, whichever is the less.

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

GUIDANCE

Part N Ships Carrying Liquefied Gases in Bulk

2018 AMENDMENT NO.1

Notice No.52 29 June 2018
Resolved by Technical Committee on 31 January 2018

Notice No.52 29 June 2018
AMENDMENT TO THE GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

"Guidance for the survey and construction of steel ships" has been partly amended as follows:

Part N SHIPS CARRYING LIQUEFIED GASES IN BULK

Amendment 1-1

N3 SHIP ARRANGEMENTS

N3.2 Accommodation, Service and Machinery Spaces and Control Stations

Paragraph N3.2.5 has been added as follows.

N3.2.5 Windows and Sidescuttles

The wording "not deemed necessary by the Society" in **3.2.5, Part N of the Rules** refers to cases where the Administration has decided on the voluntary early implementation of the amendments in resolution *MSC*.411(97) in accordance with *MSC*.1/*Circ*.1549.

EFFECTIVE DATE AND APPLICATION (Amendment 1-1)

1. The effective date of the amendments is 29 June 2018.

Amendment 1-2

N15 FILLING LIMITS FOR CARGO TANKS

N15.4 Determination of Increased Filling Limit

Paragraph N15.4.1 has been amended as follows.

N15.4.1 A Filling Limit Greater than the Limit of 98%

~~For the purpose of the requirements in **15.4.1, Part N of the Rules**, **IACS Rec. No.109** is to be referred for the filling limits.~~

1 With respect to the requirements of **15.4.1-1(1)** and **15.4.1-1(2), Part N of the Rules**, all trim and list conditions within the range of 15° list and $0.015L_f$ trim are to be considered when implementing the requirements.

2 With respect to the requirements of **15.4.1-1(1)** and **15.4.1-1(2), Part N of the Rules**, liquid levels, including operational margins, tolerances of measurement devices and volume expansion in fire scenarios are to be considered when implementing the requirements.

3 With respect to the requirements of **15.4.1-1(2), Part N of the Rules**, PRV inlets are to remain within vapour spaces at minimum distances of 40% of the diameters of suction funnels measured at the centres of the funnels above the liquid levels under conditions of 15° list and 0.015 L_f trim.

4 With respect to the requirements of **15.4.1-1(3), Part N of the Rules**, allowances may be obtained from the following equation:

$$\alpha_t = \sqrt{\alpha_1^2 + \alpha_2^2} + \alpha_3 + \alpha_4 \,(\%)$$

α_1: relative increase in liquid volume due to the tolerance of level gauges (%)

$$\alpha_1 = \frac{dV}{dh} \cdot \frac{\Delta h}{V} \cdot 100$$

$\frac{dV}{dh}$: variation of tank volume per metre filling height at the filling height h (m^3/m)

h: filling height (m) at the filling limit FL to be investigated (FL>98%)

V: accepted total tank volume (m^3)

Δh: liquid level increase due to the maximum tolerance of level gauge (m)

($\Delta h = h \times \Delta Z$, ΔZ: maximum total tolerance of level gauges (%))

α_2: relative increase in liquid volume due to the tolerance of temperature gauges (%)

Any one of the following equation may be used for the calculation.

$$\alpha_2 = \beta \cdot \Delta T$$

β: volumetric thermal expansion coefficient at reference temperature (%/K)

ΔT: maximum tolerance of temperature gauge (K)

$$\alpha_2 = 100 \times \left[1 - \left(\frac{T_C - T_L - \Delta T}{T_C - T_L} \right)^{0.26} \right]$$

T_C: critical temperature of the product (K)

T_L : highest loading temperature of the product (*K*)

α_3: expansion of cargo volume due to pressure rise when pressure relief valves are relieving at maximum flow rate (%)

$$\alpha_3 = \left(\frac{\rho_{PRV}}{\rho_{PRV \cdot 1.2}} - 1 \right) \cdot 100$$

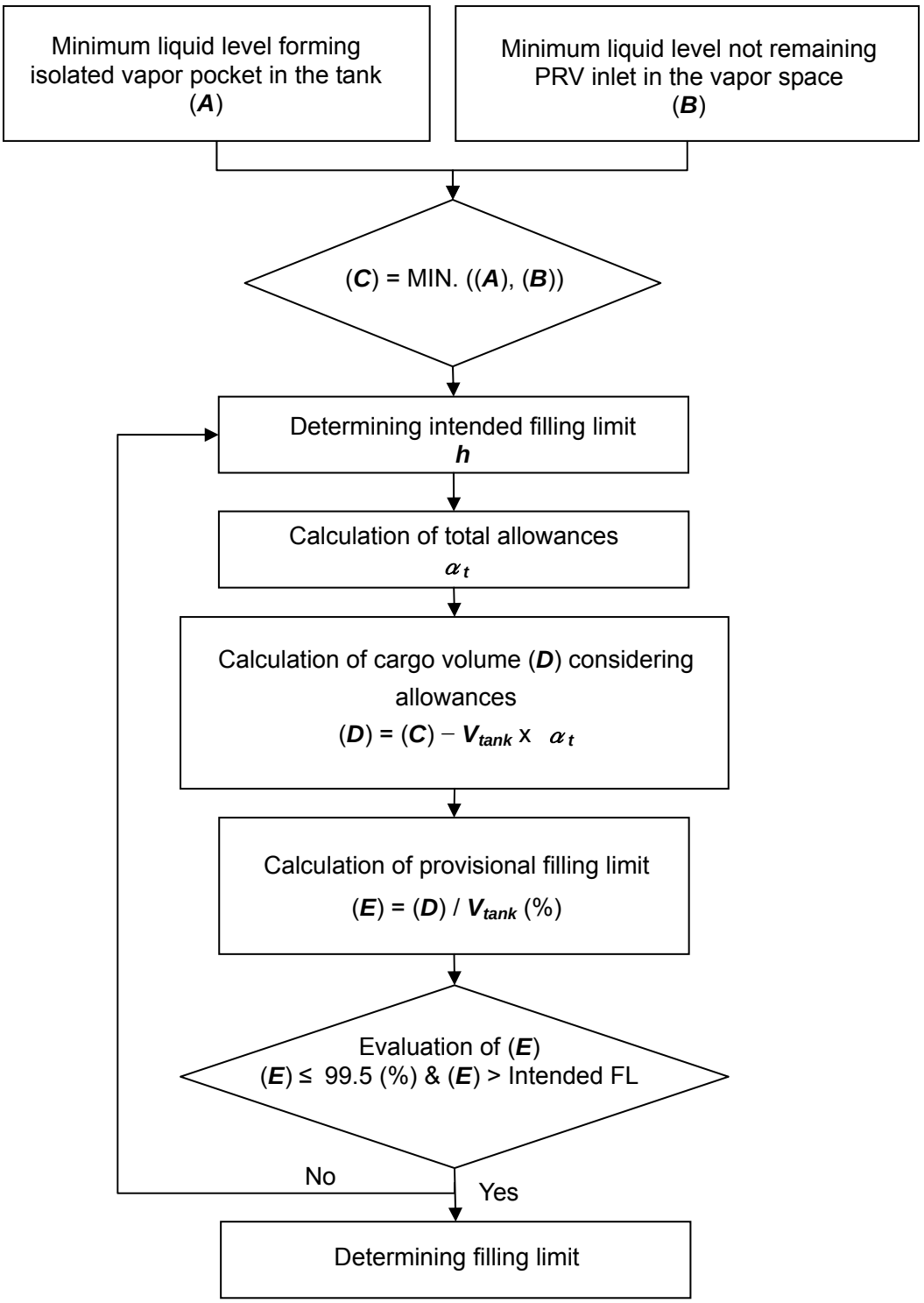
ρ_{PRV} : ρ_R cargo density at reference conditions (i.e., corresponding to the temperature of the cargo at set opening pressure of the pressure relief valve (*PRV*))

$\rho_{PRV \cdot 1.2}$: cargo density corresponding to the temperature of the cargo at 1.2 times the set opening pressure of the pressure relief valve (*PRV*)

α_4 : 0.1% operational margin

Fig.N15.4.1-1 has been added as follows.

Fig.N15.4.1-1 Example flow diagram for filling limit calculations



EFFECTIVE DATE AND APPLICATION (Amendment 1-2)

1. The effective date of the amendments is 29 June 2018.

2. Notwithstanding the amendments to the Guidance, the current requirements apply to ships other than ships for which the application for Classification Survey during Construction is submitted to the Society on and after the effective date.

Amendment 1-3

N16 USE OF CARGO AS FUEL

Section N16.7 has been added as follows.

N16.7 Special Requirements for Gas-fired Internal Combustion Engines

N16.7.1 Arrangements

In applying **16.7.1-4, Part N of the Rules**, pressure relief systems are not to continuously discharge exhaust gas into enclosed spaces.

Annex 3 GUIDANCE FOR HIGH PRESSURE DUAL FUEL DIESEL ENGINES

Chapter 2 CONSTRUCTION AND EQUIPMENT OF HIGH PRESSURE DFD ENGINES

2.3 Safety Systems

Paragraph 2.3.2 has been amended as follows.

2.3.2 Protection against Explosions

1 Relief valves of an approved type are to be provided for the crankcase at least at every crankthrow, and for every separate spaces on the crankcase such as gear case for camshaft or similar drives for protection against explosions.

2 The construction and operating pressure of the relief valves specified in **-1** above are to be determined considering explosions due to gas fuel leaks also.

3 Unless designed with the strength to withstand the worst case overpressure due to ignited gas leaks, scavenge spaces and exhaust system are to be fitted with suitable pressure relief systems.

4 The pressure relief systems specified in the preceding **-3** are not to continuously discharge exhaust gas into enclosed spaces. Venting due to activation of the system is to be led to a non-hazardous location, away from personnel.

~~**4**~~**5** The relief valves for cylinders installed in accordance with the requirements of **2.4.2, Part D of the Rules**, are to be provided with a system to monitor certain closing of the valves as far as practicable.

~~**5**~~**6** Effective gas detecting systems to detect gas fuel leaks are to be fitted at the following locations **(1)** through **(4)**. If the sensors of these gas detecting systems are fitted to the high pressure DFD engine body, they are to be double as far as practicable.

(1) The lower space of each piston or the scavenging air manifolds of the crosshead-type high pressure DFD engines

(2) The crankcase of the trunk piston-type high pressure DFD engines. In this case, the sensors may be required at more than one location depending on the shape of crankcase.

(3) The void space between gas fuel injection lines and shielding systems specified in **2.4.3**, except the case of the same void space common to the void space of protective pipes for the gas fuel supply piping system or ducts specified in **3.2.3-2(1)** to **(3)**.

(4) Other locations considered necessary by the Society.

Annex 4 GUIDANCE FOR LOW PRESSURE DUAL FUEL DIESEL ENGINES

Chapter 2 CONSTRUCTION AND EQUIPMENT OF LOW PRESSURE DFD ENGINES

2.3 Safety Systems

Paragraph 2.3.2 has been amended as follows.

2.3.2 Protection against Explosions

1 Relief valves of an approved type are to be provided for the crankcase at least at every crankthrow, and for separate spaces on the crankcase such as gear case for camshaft or similar drives for protection against explosions.

2 Unless designed with the strength to withstand the worst case overpressure due to ignited gas leaks, suction manifolds and exhaust gas pipes are to be fitted with suitable pressure relief systems.

3 The pressure relief systems specified in the preceding **-2** are not to continuously discharge exhaust gas into enclosed spaces. Venting due to activation of the system is to be led to a non-hazardous location, away from personnel.

~~**3**~~**4** The relief valves for cylinders installed in accordance with the requirements of **2.4.2, Part D of the Rules**, are to be provided with a system to monitor certain closing of the valves as far as practicable.

~~**4**~~**5** Each gas fuel injection line is to be provided with a non-return valve, and if necessary, rupture disks are to be provided between the gas fuel injection line and the non-return valve to prevent the failure of the gas fuel injection lines due to abnormal pressure peak.

~~**5**~~**6** When gas is supplied in a mixture with air through a common manifold, flame arrestors are to be installed before each cylinder head.

~~**6**~~**7** Effective gas detecting systems to detect gas fuel leaks are to be fitted at the following locations **(1)** and **(2)**.

(1) Crankcases. In this case, the sensors may be required at more than one location depending on the shape of the crankcase; and

(2) Other locations considered necessary by the Society.

EFFECTIVE DATE AND APPLICATION (Amendment 1-3)

1. The effective date of the amendments is 29 June 2018.

2. Notwithstanding the amendments to the Guidance, the current requirements apply to pressure relief systems which are installed on ships the keels of which were laid or which were at *a similar stage of construction* before the effective date.

(Note) The term "*a similar stage of construction*" means the stage at which the construction identifiable with a specific ship begins and the assembly of that ship has commenced comprising at least 50 *tonnes* or 1% of the estimated mass of all structural material, whichever is the less.

Amendment 1-4

Annex 1 GUIDANCE FOR EQUIPMENT AND FITTINGS OF SHIPS CARRYING LIQUEFIED GASES IN BULK

Chapter 12 INSULATION MATERIALS

12.3 Tests and Inspection

12.3.1 Tests and Inspection

By using the test specimens taken with due regard paid to the actual application procedures, tests to verify the test items given in **Table 12.1** are to be conducted by the test procedure as specified in the same Table or suitable other procedure as approved by the Society, and it is to be verified that the specifications and physical properties established by the manufacturer are complied with.

Table 12.1 has been amended as follows.

Table 12.1 Test Items for Insulation Materials

No.	Test item	Procedure of test
1	Compatibility with the cargo	Tensile, compression, shearing, bending test after dipping in the cargo (*DIN 53428*)
2	Solubility in the cargo	Changes in the size and weight of test specimen before and after dipping in the cargo (*DIN 53428*)
3	Absorption of the cargo	Comparison of weight of test specimen or test of water absorbing properties before and after dipping in the cargo (*DIN 53428*)
4	Shrinkage	*ISO 2796, ASTM D 2126*
5	Aging	~~*ASTM D 576* (Comparison of thermal conductivity before and after aging)~~
6	Closed cell content	*ISO 4590, ASTM ~~D 2856~~ D 6226*
7	Density	*ISO 845, ASTM D 1622*
8	Mechanical properties ・Bending strength ・Compression strength ・Tensile strength ・Shearing strength	 *ISO 1209, ASTM C 203, ASTM D790* *ASTM D 695, ASTM D 1621* *ISO 1926, EN 1607, ASTM D 638, ASTM D 1623* *ISO 1922, ASTM C 273*
9	Thermal expansion	*ASTM D 696, ASTM E 831*
10	Abrasion	－
11	Cohesion	~~—~~*ASTM D 1623*
12	Thermal conductivity	*ISO 8302, JIS A 1412, ASTM C 177, ASTM C 518*
13	Resistance to vibration	~~—~~*ISO 10055*
14	Resistance to fire and flame spread	~~*JIS A 9514,*~~ *JIS A 9511, DIN 4102*
15	Resistance to fatigue failure and crack propagation	－

Note:
Of those test items given above, necessary items are to be selected and tested depending on the insulation system. However, at least, the test items 4, 6 (for independent foam material only), 7, 8, 12 and 14 are to be dealt with for all the insulation systems. See **N4.19.3-4** to **-7**.

EFFECTIVE DATE AND APPLICATION (Amendment 1-4)

1. The effective date of the amendments is 29 June 2018.

2. Notwithstanding the amendments to the Guidance, the current requirements apply to ships for which the date of contract for construction is before the effective date.

Amendment 1-5

N4 CARGO CONTAINMENT

N4.21 Type *A* Independent Tanks

Paragraph N4.21.3 has been amended as follows.

N4.21.3 Ultimate Design Condition

1 The definitions of the symbols specified in **N4.21.3** are given in **Table N4.21.3-1**.

Table N4.21.3-1 Definitions

Symbol		Definitions
L	m	Length of ship specified in **2.1.2, Part A of the Rules**
S	m	Spacing of stiffeners
l	m	Spacing of girders
ρ_c	kg/m^3	Maximum cargo density in design temperature among all cargoes fully loaded in cargo tanks
ρ_s	kg/m^3	Sea water density
R_e	N/mm^2	As specified in **4.18.1(3), Part N of the Rules**
R_m	N/mm^2	As specified in **4.18.1(3), Part N of the Rules**
P_0	MPa	Design vapour pressure
P_h	MPa	As specified in **4.13.2-3, Part N of the Rules**
P_{0f}	MPa	P_0 multiplied by 1.2.
P_{hf}	MPa	P_h multiplied by 1.2.
P_S	MPa	Static pressure of cargo liquid obtained from the following formula $P_S = \rho_c z_j g \times 10^{-6}$
P_D	MPa	Dynamic pressure of cargo liquid obtained from the following formula $P_D = \rho_c \sqrt{(x_j a_x)^2 + (y_j a_y)^2 + (z_j a_z)^2} \cdot g \times 10^{-6}$
P_{Dh}	MPa	Dynamic pressure of cargo liquid in harbor condition obtained from the following formula: $P_{Dh} = 0.4 P_D$
a_x , a_y , a_z	m/s^2	As specified in **4.28.2, Part N of the Rules**
x_j , y_j , z_j	m	As specified in **N4.28.1-1(1)**
C		Coefficient according to the type of end connections is given as follows: - Both ends of stiffeners are connected by bracket, lug connection or supported by girders: 1.0 - One end of stiffeners is connected by bracket, lug connection or supported by girders and the other end of stiffeners is unattached: 1.5 - Both ends of stiffeners are unattached: 1.5
σ_{allow}	N/mm^2	The lower of R_m /2.66 or R_e /1.33
g	m/s^2	Acceleration due to gravity to be taken as 9.81
α		Opening ratio of swash bulkhead in cargo tanks
l_t	m	Length of cargo tank

~~1~~2 The "classical analysis procedures" referred to in the requirements in **4.21.3-1, Part N of the Rules** means ~~the beam theory where the type of stress to be assessed is the combined stress of bending stress and axial stress~~ to meet the following **(1)** to **(7)**. Where openings which cannot be close, excluding vapour spaces at centreline bulkhead, are installed, requirements **(3)** and **(4)** need not be applied.

(1) The thicknesses of tank boundary plates are not to be less than the greater of the values obtained from the following **(a)** and **(b)**:

(a) $3.46S\sqrt{\frac{235}{R_e}h}$ (mm)

h: pressure head as given in the following formula;

$$h = \frac{P}{\rho_s g} \times 10^6 \ (m)$$

P is to be the greatest value of the following P_1, P_2 or P_3. However, P_2 is used only where P_h is set.

P_1: Internal pressure of tank in sea going condition, obtained from the following formula:

$$P_1 = P_0 + P_S + P_D \ (MPa)$$

P_2: Internal pressure of tank in harbour condition, obtained from the following formula:

$$P_2 = P_h + P_S + P_{Dh} \ (MPa)$$

P_3: Maximum static pressure under a 30-degree static heel condition

(b) $3.2S\sqrt{\frac{235}{R_e}h_f}$ (mm)

h_f: Pressure head taking into account a fire scenario, obtained from the following formula:

$$h_f = \frac{P_f}{\rho_s g} \times 10^6 \ (m)$$

P_f is to be greater value of the following P_{f1} and P_{f2}. However, P_{f2} is used only where P_h is set.

P_{f1}: Internal pressure of tank in sea going condition, obtained from the following formula:

$$P_{f1} = P_{0f} + P_S + P_D \ (MPa)$$

P_{f2}: Internal pressure of tank in harbour condition, obtained from the following formula:

$$P_{f2} = P_{hf} + P_S + P_{Dh} \ (MPa)$$

(2) The section moduli of the stiffeners on tank boundary plates are not to be less than those obtained from the following formula:

$$\frac{CSPl^2}{12\sigma_{allow}} \times 10^6 \ (cm^3)$$

$2.33 \cdot \frac{235}{R_e} \cdot CSh_f l^2$ (cm^3)

P and h_f : As specified in **(1)**

(3) The thickness of the centreline bulkhead is not to be less than the greater value of the following **(a)** and **(b)**:

(a) $3.46S\sqrt{\frac{235}{R_e}h_{CL}}$ (mm)

h_{CL} : Pressure head, obtained from the following formula:

$h_{CL} = \frac{P_{CL}}{\rho_s g} \times 10^6$ (m)

P_{CL} is to be the greatest value of the following P_{CL1}, P_{CL2} and P_{CL3}.

P_{CL1}: Tank pressure in sea-going condition obtained from the following formula:

$P_{CL1} = \rho_c y_j a_y g \times 10^{-6}$ (MPa)

P_{CL2}: Static pressure(MPa) from maximum difference between liquid levels of both side of cargo tank under 30-degree static heel condition

P_{CL3}: Internal pressure of cargo tank according to operational limitation as specified in the following. Where operations are limited, operational limitations are to be specified in the loading manual.

- where asymmetric loading of both side of cargo tanks is not allowed in the harbour condition:
  $P_{CL3} = 0.4P_{CL1}$ (MPa)
- where asymmetric loading of both side of cargo tanks is allowed in the harbour condition:
  $P_{CL3} = P_S + P_{Dh}$ (MPa)
- where asymmetric loading of both side of cargo tanks is allowed in the sea going condition:
  $P_{CL3} = P_S + P_D$ (MPa)

(b) $3.2S\sqrt{\frac{235}{R_e}h_{CL\_A}}$ (mm)

h_{CL_A}: Pressure head taking into account the static pressure of liquid cargo, obtained from the following formula:

$h_{CL\_A} = \frac{P_S}{\rho_s g} \times 10^6$ (m)

(4) The section moduli of stiffeners of centreline bulkhead are not to be less than those obtained from the following formula:

$\frac{CP_{CL}Sl^2}{12\sigma_{allow}} \times 10^6$ (cm^3)

$2.33 \cdot \frac{235}{R_e} \cdot CSh_{CL\_A} l^2$ (cm^3)

P_{CL} and h_{CL_A} : As specified in **(3)**

(5) The thicknesses of transverse swash bulkheads are not to be less than those obtained from the following formula:

$3.46S\sqrt{\frac{235}{R_e}h_{SW}}$ (mm)

h_{SW} : Pressure head taking into consideration sloshing obtained from the following formula:

$h_{SW} = \frac{\rho_c h_{sl}}{\rho_s}$ (m)

h_{sl} : As given by the following formula, not to be taken less than 5.6 *m*

$h_{sl} = \left(0.176 - \frac{0.025}{100}L\right)(1-\alpha)l_t$ (m)

(6) The section moduli of the stiffeners on transverse swash bulkheads are not to be less than those obtained from the following formula:

$\frac{CP_{SW}Sl^2}{12\sigma_{allow}} \times 10^6$ (cm^3)

P_{SW} : sloshing pressure as given by the following formula:

$P_{SW} = \rho_c h_{sl} g \times 10^{-6}$ (MPa)

h_{sl} : As specified in **(5)**

(7) The scantling of girders are to be in accordance with the requirements in **Chapter 29, Part C of the Rules** except where the scantlings of members are determined by direct calculations.

3 Where high density cargoes are partially loaded into cargo tanks, strength assessments are to be carried out taking into account the cargo density and loading height of the cargo in addition to **-2**.

~~**2**~~**4** For the purpose of the requirements in **4.21.3-1, Part N of the Rules**, the allowable stress for the equivalent stress σ_c when detailed stress calculations are made on primary members is to be as given in **Table N4.21.3-2**.

~~**3**~~**5** ~~For the purpose of the requirements in **4.21.3-2, Part N of the Rules**, t~~The corrosion allowance used in **-2** ~~may be reduced or may not be required~~ is to be in accordance with the requirements in **4.3.5, Part N of the Rules**. In structures where the membrane or axial force due to internal pressure can not be neglected, the calculation equation specified in ~~**Chapter 14, Part C of the Rules**~~ **-2** may be used after suitable modification.

6 Scantling of stiffeners specified in **-2** may be decided based on the requirements specified in **1.1.13-7, Part C of the Rules**.

~~**4 In case where no corrosion allowance specified in 4.3.5, Part N of the Rules is required in accordance with the preceding -3, stiffeners may have section modulus more than 1/1.2 of one required in 14.2.3, Part C of the Rules.**~~

Table N4.21.3-2 Allowable Stresses for the Primary Equivalent Stress

Ferrite steels	Austenic steels	Aluminium alloys
$0.79R_e$	$0.84R_e$	$0.79R_e$
$0.53R_m$	$0.42R_m$	$0.42R_m$

Note:
For each member, the smaller of the above values is to be used with R_e and R_m as specified in **4.18.1(3), Part N of the Rules**.

EFFECTIVE DATE AND APPLICATION (Amendment 1-5)

1. The effective date of the amendments is 29 December 2018.

2. Notwithstanding the amendments to the Guidance, the current requirements apply to ships other than ships that fall under the following:
(1) for which the date of contract for construction is on or after the effective date; or
(2) the keels of which are laid or which are at *a similar stage of construction* on or after 1 July 2016.

(Note) The term "*a similar stage of construction*" means the stage at which the construction identifiable with a specific ship begins and the assembly of that ship has commenced comprising at least 50 *tonnes* or 1% of the estimated mass of all structural material, whichever is the less.