Amendment on 26 December 2024
Resolved by Technical Committee on 23 July 2024

# Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 1)

**Object of Amendment**

Rules for the Survey and Construction of Steel Ships Parts A and C

**Reason for Amendment**

In response to its recent comprehensive revision of Part C of the Rules, the Society has received various feedback, including requests for clarification and suggestions for improvement, from relevant industry members. After reviewing this feedback, the Society decided to incorporate some of the suggestions it received and amend relevant requirements accordingly.

**Outline of Amendment**

(1) Clarifies for which decks the notation of "HELIDK" may be affixed and clarifies the scope of evaluation of structural members subject to helicopter loads.
(2) Specifies that the old Part C may still be applied to the hull structure requirements for ships whose length $L_c$ is less than 200 $m$ and for which the date of contract for construction is before 1 January 2028.
(3) Specifies the loads acting on enclosed decks in accommodation spaces or navigation bridges and specifies associated minimum thickness requirements.
(4) Revises the criteria for fatigue strength assessments of longitudinal end connections.
(5) Specifies simplified assessments of stress due to relative displacement in fatigue strength assessments at the longitudinal end connections of the transverse bulkheads of container carriers
(6) Revises requirements for steel coil loads and strength assessments with respect to multi-tiered loading.
(7) Clarifies the application of minimum thickness requirements for PCC and Ro-Ro ships.
(8) Clarifies some definitions and corrects inconsistencies in wording.

**Effective Date and Application**

Amendments other than (4), (5) and (6):

Effective date of the amendment is 26 December 2024.

Amendments (4), (5) and (6):

1. The amendment applies to ships for which the date of contract for construction is on or after 26 June 2025.
2. Notwithstanding the provision of preceding 1, the amendment may apply, upon request, to ships for which the date of contract for construction is before the effective date.

ID: DH24-04

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

# Amended-Original Requirements Comparison Table
## (Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 1))

| Amended | Original | Remarks |
|---|---|---|
| **RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS**<br>**Part A GENERAL RULES**<br>**Chapter 1 GENERAL**<br>**1.2 Class Notations**<br>**1.2.4 Hull Construction and Equipment, etc.***<br>**29** For ships with helidecks as defined in **3.2.26, Part R** and subject to the provisions of **10.4.6, Part 1, Part C**, the notation of "*HELIDK*" is affixed to the Classification Characters.<br>EFFECTIVE DATE AND APPLICATION<br>**1.** The effective date of the amendment is 26 December 2024. | **RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS**<br>**Part A GENERAL RULES**<br>**Chapter 1 GENERAL**<br>**1.2 Class Notations**<br>**1.2.4 Hull Construction and Equipment, etc.***<br>**29** For ships strengthened for helidecks deemed as appropriate by the Society, in accordance with the provisions of **10.4.6, Part 1, Part C**, the notation of "*HELIDK*" is affixed to the Classification Characters. | Clarifies for which decks the notation "HELIDK" may be affixed. |

# Amended-Original Requirements Comparison Table
# (Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 1))

| Amended | Original | Remarks |
|---|---|---|
| **RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS**<br>**Part C HULL CONSTRUCTION AND EQUIPMENT**<br>**Part 1 GENERAL HULL REQUIREMENTS**<br>**Chapter 1 GENERAL**<br>**1.1 General**<br>**1.1.2 Application**<br>**1.1.2.1 General**<br>**1** The requirements in **Part C** apply to ships constructed of welded steel structures, composed of stiffened plate panels, having a length *L* (as defined in **2.1.2, Part A**) of not less than 90 *m*, and intended for unrestricted service. However, the hull structure requirements for ships complying with either the following **(1)** or **(2)** may be in accordance with those specified in **Part C of the Rules for the Survey and Construction of Steel Ships** applied to ships for which the date of contract for construction was before 1 July 2023 (hereinafter referred to as “**Old Part C**”).<br>(1) Sister ships of ships subject to **Old Part C** for which | **RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS**<br>**Part C HULL CONSTRUCTION AND EQUIPMENT**<br>**Part 1 GENERAL HULL REQUIREMENTS**<br>**Chapter 1 GENERAL**<br>**1.1 General**<br>**1.1.2 Application**<br>**1.1.2.1 General**<br>**1** The requirements in **Part C** apply to ships constructed of welded steel structures, composed of stiffened plate panels, having a length *L* (as defined in **2.1.2, Part A**) of not less than 90 *m*, and intended for unrestricted service. | Extends application of old Part C. |

| Amended | Original | Remarks |
|---|---|---|
| the date of contract for construction was before 1 January 2025<br>(2) Ships for which the date of contract for construction is before 1 January 2028 and whose length $L_c$ is less than 200 $m$.<br>When **Old Part C** is applied, "*Advanced Structural Rules*" (abbreviated to *ASR*) defined in **1.2.1-4, Part A** is not to be affixed.<br>**2** Hull construction, equipment and scantlings of ships to be classed for restricted service may be appropriately modified depending on the condition of service in accordance with **Annex 1.1 "Special Requirements for Restricted Service"**. | **2** Hull construction, equipment and scantlings of ships to be classed for restricted service may be appropriately modified depending on the condition of service in accordance with **Annex 1.1 "Special Requirements for Restricted Service"**. | |

# Amended-Original Requirements Comparison Table
# (Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 1))

| Amended | Original | Remarks |
|---|---|---|

## Chapter 4 LOADS

### 4.4 Loads to be Considered in Local Strength

### 4.4.3 Testing Condition

Table 4.4.3-2 Design Testing Water Head Height $z_{ST}$

| Compartment | $z_{ST}$ |
|---|---|
| (Omitted) | |
| Cargo oil tanks | $z_{ST} = \max(z_{top} + h_{air}, z_{top} + 2.4, z_{top} + z_{PV})^{(3)}$ |
| (Omitted) | |
| Ballast ducts | $z_{ST} = \max(z_{bp}, z_{P\underline{R}V})$ |
| Fuel oil tanks | $z_{ST} = \max(z_{top} + h_{air}, z_{top} + 2.4, z_{top} + z_{PV}, z_{bd})^{(3)}$ |
| Cargo tanks of ships carrying dangerous chemicals in bulk(2) | $z_{ST} = \max(z_{top} + 2.4, z_{top} + z_{PV})^{(3)}$ |
| (Omitted) | |
| Notes:<br>$z_{top}$: $Z$ coordinate of the top of tank ($m$) (the highest point of the tank excluding small hatchways)<br>$z_{bd}$: $Z$ coordinate of the bulkhead deck ($m$)<br>$\underline{z_{PRV}}$: $Z$ coordinate of the test water head ($m$) corresponding to the setting of pressure relief valve<br>$z_{PV}$: Height of the test water head ($m$) corresponding to the design vapour pressure<br>$z_{hc}$: $Z$ coordinate of the top of hatch coaming ($m$)<br>$z_c$: $Z$ coordinate of the top of chain pipe ($m$)<br>$z_{bp}$: $Z$ coordinate of the test water head ($m$) corresponding to maximum pressure of ballast pump<br>$h_{air}$: Height of the air pipe or overflow pipe ($m$) above the top of the tank | |
| (Omitted) | |

Remarks: Clarifies definitions of test water head corresponding to ballast duct

| Amended | Original | Remarks |
|---|---|---|

## 4.6 Loads to be Considered in Strength Assessment by Cargo Hold Analysis

### 4.6.4 Testing Condition

Table 4.6.4-2 Design Testing Water Head Height $z_{ST}$

| Compartment | $z_{ST}$ |
|---|---|
| (Omitted) | |
| Cargo oil tanks | $z_{ST} = \max(z_{top} + h_{air}, z_{top} + 2.4, z_{top} + z_{PV})^{(3)}$ |
| (Omitted) | |
| Ballast ducts | $z_{ST} = \max(z_{bp}, z_{P\underline{R}V})$ |
| Fuel oil tanks | $z_{ST} = \max(z_{top} + h_{air}, z_{top} + 2.4, z_{top} + z_{PV}, z_{bd})^{(3)}$ |
| Cargo tanks of ships carrying dangerous chemicals in bulk(2) | $z_{ST} = \max(z_{top} + 2.4, z_{top} + z_{PV})^{(3)}$ |
| (Omitted) | |

Notes:
$z_{top}$: $Z$ coordinate of the top of tank ($m$) (highest point of tank excluding small hatchways)
$z_{bd}$: $Z$ coordinate of the bulkhead deck ($m$)
$z_{PRV}$: $Z$ coordinate of the test water head ($m$) corresponding to the setting of pressure relief valve
$z_{PV}$: Height of the test water head ($m$) corresponding to the design vapour pressure
$z_{hc}$: $Z$ coordinate ($m$) at the top of the hatch coaming
$z_c$: $Z$ coordinate ($m$) at the top of chain pipe
$z_{bp}$: $Z$ coordinate of the test water head ($m$) corresponding to maximum pressure of ballast pump
$h_{air}$: Height of the air pipe or overflow pipe ($m$) above the top of the tank

(Omitted)

# Amended-Original Requirements Comparison Table
## (Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 1))

| Amended | Original | Remarks |
|---|---|---|
| **4.8 Loads to be Considered in Additional Structural Requirements**<br>**4.8.3 Helicopter Load**<br>**4.8.3.1**<br>The helicopter loads acting on helicopter decks and helicopter landing area are to be in accordance with **3.2.7-1(1), Part P**. | **4.8 Loads to be Considered in Additional Structural Requirements**<br>**4.8.3 Helicopter Load**<br>**4.8.3.1**<br>The helicopter load acting on helicopter decks and hatch covers also used as helicopter decks is to be in accordance with **3.2.7-1(1), Part P**. | Clarifies scope of evaluation of structural members subject to helicopter loads |
| **4.9 Loads to be Considered in Structures other than Cargo Region**<br>**4.9.1 General**<br>**4.9.1.1 General**<br>**1** Loads to be considered in the requirements for structures outside cargo region in **Chapter 11** are to be as specified in this **4.9**.<br>**2** Loads in the maximum load condition are to be in accordance with **4.9.2**.<br>**4.9.2 Maximum Load Condition**<br>**4.9.2.1 General**<br>**1** Green sea pressure acting on the superstructure end bulkheads and boundary walls of deckhouse is to be in accordance with **4.9.2.2**.<br>**2** Loads acting on the superstructure above the freeboard deck, deck of the deckhouse, etc. are to be in accordance with | **4.9 Loads to be Considered in Structures other than Cargo Region**<br>**4.9.1 General**<br>**4.9.1.1 General**<br>**1** Loads to be considered in the requirements for structures outside cargo region in **Chapter 11** are to be as specified in this **4.9**.<br>**2** Loads in the maximum load condition are to be in accordance with **4.9.2**.<br>**4.9.2 Maximum Load Condition**<br>**4.9.2.1 General**<br>**1** Green sea pressure acting on the superstructure end bulkheads and boundary walls of deckhouse is to be in accordance with **4.9.2.2**.<br>**2** Loads acting on the superstructure above the freeboard deck, deck of the deckhouse, etc. are to be in accordance with | Specifies loads acting on enclosed decks in accommodation or navigation spaces |

| Amended | Original | Remarks |
|---|---|---|
| **4.9.2.3**.<br>**4.9.2.2 Green Sea Pressure Acting on Superstructure End Bulkheads and Boundary Walls of Deckhouse**<br>**1** Green sea pressure $P_{GW}$ ($kN/m^2$) acting on the superstructure end bulkhead and boundary walls of the deckhouse is to be in accordance with the following **(1)** and **(2)**.<br>((1) and (2) are omitted.)<br>**4.9.2.3 Green Sea Pressure and Vertical Bending Moment Acting on Superstructure, Deckhouse Deck, Etc. in way of Freeboard Deck**<br>Green sea pressure specified in **4.4.2** and **4.5.2** is to be considered.<br>**4.9.2.4 Pressure Acting on Superstructure Decks and Tops of Deckhouses in Accommodation or Navigation Spaces**<br>On the first and second enclosed superstructure decks and tops of deckhouses in accommodation or navigation spaces above the freeboard deck, the pressure is to be 12.8 ($kN/m^2$). | **4.9.2.3**.<br>**4.9.2.2 Green Sea Pressure Acting on Superstructure End Bulkheads and Boundary Walls of Deckhouse**<br>**1** Green sea pressure $P_{GW}$ ($kN/m^2$) acting on the superstructure end bulkhead and boundary walls of the deckhouse is to be in accordance with the following **(1)** and **(2)**.<br>((1) and (2) are omitted.)<br>**4.9.2.3 Green Sea Pressure and Vertical Bending Moment Acting on Superstructure, Deckhouse Deck, Etc. in way of Freeboard Deck**<br>Green sea pressure specified in **4.4.2** and **4.5.2** is to be considered.<br>**(Newly added)** | |

# Amended-Original Requirements Comparison Table
# (Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 1))

| Amended | Original | Remarks |
|---|---|---|
| **Chapter 9 FATIGUE**<br>Symbols<br>For symbols not specified in this Chapter, refer to **1.4**.<br>$\underline{T_{FD}}$: Fatigue design life (years) specified by the designer, but not to be taken less than 25 *years*.<br>**9.1 General**<br>**9.1.2 Application of Fatigue Strength Assessment**<br>**9.1.2.1 General**<br>**1** This Chapter provides the requirements for fatigue strength assessment of hot spots specified in **9.2** assuming an operating period equal to the fatigue design life $\underline{T_{FD}}$ of the ship.<br>(-2 to -4 are omitted.)<br>**9.1.4 Assumptions**<br>**9.1.4.1 General**<br>The following assumptions **(1)** to **(9)** are made in the fatigue strength assessment specified in this Chapter.<br>(1) A linear cumulative damage model (i.e. Miner's rule) given in **9.5.5** is used in the calculation of fatigue damage.<br>(2) Fatigue design life $\underline{T_{FD}}$ is taken not less than 25 *years*.<br>((3) to (9) are omitted.) | **Chapter 9 FATIGUE**<br>Symbols<br>For symbols not specified in this Chapter, refer to **1.4**.<br>$\underline{T_{DF}}$: Fatigue design life (years) specified by the designer, but not to be taken less than 25 *years*.<br>**9.1 General**<br>**9.1.2 Application of Fatigue Strength Assessment**<br>**9.1.2.1 General**<br>**1** This Chapter provides the requirements for fatigue strength assessment of hot spots specified in **9.2** assuming an operating period equal to the fatigue design life $\underline{T_{DF}}$ of the ship.<br>(-2 to -4 are omitted.)<br>**9.1.4 Assumptions**<br>**9.1.4.1 General**<br>The following assumptions **(1)** to **(9)** are made in the fatigue strength assessment specified in this Chapter.<br>(1) A linear cumulative damage model (i.e. Miner's rule) given in **9.5.5** is used in the calculation of fatigue damage.<br>(2) Fatigue design life $\underline{T_{DF}}$ is taken not less than 25 *years*.<br>((3) to (9) are omitted.) | Clarifies definitions by specifying reference to be made to 9.5.4.2<br>Corrects inconsistencies in wording: Not $T_{DF}$ but $T_{FD}$ |

# Amended-Original Requirements Comparison Table
# (Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 1))

| Amended | Original | Remarks |
|---|---|---|
| **9.5 Fatigue Strength Assessment**<br>Symbols<br>For symbols not specified in this **9.5**, refer to **1.4**.<br>(*i*) Suffix which denotes wave condition *HM*, *FM*, *BR*-*P*, *BR*-*S*, *BP*-*P* or *BP*-*S* specified in **4.7.2.2**:<br>"$i$1" denotes wave condition *HM*-1, *FM*-1, *BR*-1*P*, *BR*-1*S*, *BP*-1*P* or *BP*-1*S*<br>"$i$2" denotes wave conditions *HM*-2, *FM*-2, *BR*-2*P*, *BR*-2*S*, *BP*-2*P* or *BP*-2*S*<br>(*j*) Suffix which denotes loading condition<br>$T_D$: Design life, to be taken as 25 *years*<br>$\underline{T_{FD}}$: Fatigue design life, not to be taken less than 25 *years*<br>(Omitted)<br>**9.5.2 Reference Stress for Fatigue Strength Assessment**<br>**9.5.2.2 Equivalent Stress Range**<br>The equivalent stress range $\Delta\sigma_{eq,(j)}$ (*N/mm*$^2$) corresponding to the stress range $\Delta\sigma_{hs,(j)}$ (*N/mm*$^2$) in each loading condition is to be obtained from the following formula:<br>$\Delta\sigma_{eq,(j)} = \Delta\sigma_{hs,(j)}{}^{\frac{3}{4}}\sigma_{max,(j)}{}^{\frac{1}{4}}$<br>$\Delta\sigma_{hs,(j)}$: Hot spot stress range (*N/mm*$^2$) for loading condition $(j)$ <u>(*See* **9.5.4.2**)</u><br>$\sigma_{max,(j)}$: Maximum hot spot stress (*N/mm*$^2$) for loading condition ($j$) taken as follows. Where $\Delta\sigma_{hs,(j)}$is greater than $2\sigma_Y$, $\sigma_{max,(j)}$ is to be | **9.5 Fatigue Strength Assessment**<br>Symbols<br>For symbols not specified in this **9.5**, refer to **1.4**.<br>(*i*) Suffix which denotes wave condition *HM*, *FM*, *BR*-*P*, *BR*-*S*, *BP*-*P* or *BP*-*S* specified in **4.7.2.2**:<br>"$i$1" denotes wave condition *HM*-1, *FM*-1, *BR*-1*P*, *BR*-1*S*, *BP*-1*P* or *BP*-1*S*<br>"$i$2" denotes wave conditions *HM*-2, *FM*-2, *BR*-2*P*, *BR*-2*S*, *BP*-2*P* or *BP*-2*S*<br>(*j*) Suffix which denotes loading condition<br>$T_D$: Design life, to be taken as 25 *years*<br>$\underline{T_{DF}}$: Fatigue design life, not to be taken less than 25 *years*<br>(Omitted)<br>**9.5.2 Reference Stress for Fatigue Strength Assessment**<br>**9.5.2.2 Equivalent Stress Range**<br>The equivalent stress range $\Delta\sigma_{eq,(j)}$ (*N/mm*$^2$) corresponding to the stress range $\Delta\sigma_{hs,(j)}$ (*N/mm*$^2$) in each loading condition is to be obtained from the following formula:<br>$\Delta\sigma_{eq,(j)} = \Delta\sigma_{hs,(j)}{}^{\frac{3}{4}}\sigma_{max,(j)}{}^{\frac{1}{4}}$<br>$\Delta\sigma_{hs,(j)}$: Hot spot stress range (*N/mm*$^2$) for loading condition $(j)$<br>$\sigma_{max,(j)}$: Maximum hot spot stress (*N/mm*$^2$) for loading condition ($j$) taken as follows. Where $\Delta\sigma_{hs,(j)}$is greater than $2\sigma_Y$, $\sigma_{max,(j)}$ is to be | |

| Amended | Original | Remarks |
|---|---|---|
| $\Delta\sigma_{hs,(j)}/2$:<br>(Omitted)<br>**9.5.4.2 Cumulative Fatigue Damage**<br>**1** The cumulative fatigue damage is to be calculated from the following formula:<br>$D = f_{vib} \cdot \sum_{j} \alpha_{(j)} \cdot D_{(j)}$<br>(Omitted)<br>$D_{(j)}$: Cumulative fatigue damage for the fatigue design life for loading condition (*j*) calculated by the following formula:<br>$D_{(j)} = \frac{\underline{T_{FD}} - T_C}{\underline{T_{FD}}} D_{air,(j)} + \frac{T_C}{\underline{T_{FD}}} D_{cor,(j)}$<br>$T_C$: Time in corrosive environment according to **Table 9.5.4-1**.<br>$D_{air,(j)}$: Cumulative fatigue damage in the in-air environment for the fatigue design life for loading condition (*j*).<br>$D_{cor,(j)}$: Cumulative fatigue damage in the corrosive environment for the fatigue design life for loading condition (j).<br>Where:<br>$D_{air,(j)}$ and $D_{cor,(j)}$ are calculated by the following procedure:<br>$D_{air,(j)} = \sum_{k=1}^{K} \frac{N_{FD}}{N_{air}\left(\overline{\Delta\sigma}_{eq(j),k}\right)} \cdot P_{k(j)}$ | $\Delta\sigma_{hs,(j)}/2$:<br>(Omitted)<br>**9.5.4.2 Cumulative Fatigue Damage**<br>**1** The cumulative fatigue damage is to be calculated from the following formula:<br>$D = f_{vib} \cdot \sum_{j} \alpha_{(j)} \cdot D_{(j)}$<br>(Omitted)<br>$D_{(j)}$: Cumulative fatigue damage for the fatigue design life for loading condition (*j*) calculated by the following formula:<br>$D_{(j)} = \frac{\underline{T_{DF}} - T_C}{\underline{T_{DF}}} D_{air,(j)} + \frac{T_C}{\underline{T_{DF}}} D_{cor,(j)}$<br>$T_C$: Time in corrosive environment according to **Table 9.5.4-1**.<br>$D_{air,(j)}$: Cumulative fatigue damage in the in-air environment for the fatigue design life for loading condition (*j*).<br>$D_{cor,(j)}$: Cumulative fatigue damage in the corrosive environment for the fatigue design life for loading condition (j).<br>Where:<br>$D_{air,(j)}$ and $D_{cor,(j)}$ are calculated by the following procedure:<br>$D_{air,(j)} = \sum_{k=1}^{K} \frac{N_{FD}}{N_{air}\left(\overline{\Delta\sigma}_{eq(j),k}\right)} \cdot P_{k(j)}$ | |

| Amended | Original | Remarks |
|---|---|---|
| $D_{cor,(j)} = \sum_{k=1}^{K} \frac{N_{FD}}{N_{cor}\left(\overline{\Delta\sigma}_{eq(j),k}\right)} \cdot P_{k(j)}$<br>(Omitted)<br>$\overline{\Delta\sigma}_{eq(j),k}$ : Equivalent stress range $(N/mm^2)$ corresponding to the hot spot stress range $\Delta\sigma_{hs,(j)} = \overline{\Delta\sigma}_{(j)k}$ for loading condition (*j*) according to **9.5.2.2**. Where $\overline{\Delta\sigma}_{(j)k}$ is as follows:<br>(Omitted)<br>$N_{FD}$: Total number of cycles in the fatigue design life $T_{FD}$.<br>$N_{FD} = \frac{60 \times 60 \times 24 \times 365.25}{4\log L_c} \cdot f_D \cdot \underline{T_{FD}}$<br>$f_D$: Ship's operation rate, taken as 0.85<br>$K$: Not less than 300 | $D_{cor,(j)} = \sum_{k=1}^{K} \frac{N_{FD}}{N_{cor}\left(\overline{\Delta\sigma}_{eq(j),k}\right)} \cdot P_{k(j)}$<br>(Omitted)<br>$\overline{\Delta\sigma}_{eq(j),k}$ : Equivalent stress range $(N/mm^2)$ corresponding to the hot spot stress range $\Delta\sigma_{hs,(j)} = \overline{\Delta\sigma}_{(j)k}$ for loading condition (*j*) according to **9.5.2.2**. Where $\overline{\Delta\sigma}_{(j)k}$ is as follows:<br>(Omitted)<br>$N_{FD}$: Total number of cycles in the fatigue design life $T_{FD}$.<br>$N_{FD} = \frac{60 \times 60 \times 24 \times 365.25}{4\log L_c} \cdot f_D \cdot \underline{T_{DF}}$<br>$f_D$: Ship's operation rate, taken as 0.85<br>$K$: Not less than 300 | |
| EFFECTIVE DATE AND APPLICATION<br>**1.** The effective date of the amendment is 26 December 2024. | | |
| **9.5.5 Fatigue Strength Assessment Criterion**<br>**9.5.5.1 Fatigue Strength Assessment Criterion**<br>The fatigue strength assessment criterion (acceptance criterion) is to be as follows:<br>$\underline{\eta \cdot \eta_l^3 \cdot D \leq 1.0}$<br>$D$: Fatigue damage obtained from **9.5.4.2** | **9.5.5 Fatigue Strength Assessment Criterion**<br>**9.5.5.1 Fatigue Strength Assessment Criterion**<br>The fatigue strength assessment criterion (acceptance criterion) is to be as follows:<br>$\underline{\eta \cdot D \leq 1.0}$<br>$D$ : Fatigue damage obtained from **9.5.4.2** | Revises criteria for fatigue strength assessments of longitudinal end connections. |

| Amended | Original | Remarks |
|---|---|---|
| $\eta$: Correction factor of fatigue damage based on fatigue load used in the assessment, as given in **Table 9.5.5-1**.<br>$\eta_l$: Correction factor of fatigue damage, as given in the following:<br>(1) As given in the following **(a)** and **(b)** for longitudinal end connections:<br>(a) 1.44 for side longitudinals installed between $0.3T_{SC}$ and $T_{SC}$<br>(b) 1.0 for longitudinals other than above<br>(2) 1.0 for connections of platings and girders and the free edge of the base material | $\eta$ : Correction factor of fatigue damage based on fatigue load used in the assessment, as given in **table 9.5.5-1**. | |
| EFFECTIVE DATE AND APPLICATION<br>**1.** The effective date of the amendment is 26 June 2025.<br>**2.** Notwithstanding the amendments to the Rules, the current requirements apply to ships for which the date of contract for construction is before the effective date.<br>**3.** Notwithstanding the provision of preceding **2.**, the amendments to the Rules may apply to ships for which the date of contract for construction is before the effective date upon requests. | | |

| Amended | Original | Remarks |
|---|---|---|
| **Chapter 10 ADDITIONAL STRUCTURAL REQUIREMENTS**<br>**10.4 Deck Structure**<br>**10.4.6 Decks Subject to Helicopter Loads**<br>**10.4.6.1 Application**<br>This **10.4.6** is to be applied to helicopter decks as defined in **3.2.26, Part R** and helicopter landing areas as defined in **3.2.55, Part R**.<br>**10.4.6.2 Longitudinals and Beams of Decks Subject to Helicopter Loads**<br>The section moduli of the longitudinals and beams of a deck subject to helicopter loads are not to be less than that obtained by the following formula:<br>$C_{safety}\frac{M}{\sigma_Y}\times 10^3\ (cm^3)$<br>$\sigma_Y$: Specified minimum yield stress ($N/mm^2$)<br>$C_{safety}$: Safety factor taken as 1.25.<br>$M$: Maximum bending moment ($kN\text{-}m$) acting on the longitudinals and beams. This value is to be the value of **(1)** or **(2)** below, whichever is greater. However, this value is to be specified in **(1)** when $\ell_1 \geq \ell$.<br>(1) When a load of helicopter acts (*See* **Fig. 10.4.6-1(a)**) | **Chapter 10 ADDITIONAL STRUCTURAL REQUIREMENTS**<br>**10.4 Deck Structure**<br>**10.4.6 Helicopter Decks**<br>**10.4.6.1 Application**<br>This **10.4.6** is to be applied to helicopter decks and hatch covers which are also used as helicopter decks of ships that the class notation "*HELIDK*" is affixed to classification characters.<br>**10.4.6.2 Longitudinals and Beams of Helicopter Decks**<br>The section modulus of the longitudinals and beams of a helicopter deck is not to be less than that obtained by the following formula:<br>$C_{safety}\frac{M}{\sigma_Y}\times 10^3\ (cm^3)$<br>$\sigma_Y$: Specified minimum yield stress ($N/mm^2$)<br>$C_{safety}$: Safety factor taken as 1.25.<br>$M$: Maximum bending moment ($kN\text{-}m$) acting on the longitudinals and beams. This value is to be the value of **(1)** or **(2)** below, whichever is greater. However, this value is to be specified in **(1)** when $\ell_1 \geq \ell$.<br>(1) When a load of helicopter acts (*See* **Fig. 10.4.6-1(a)**) | Clarifies scope of evaluation of structural members subject to helicopter loads |

| Amended | Original | Remarks |
|---|---|---|
| $M = \frac{7P\ell}{40}$<br>(2) When two loads of helicopter act (*See* **Fig. 10.4.6-1(b)**)<br>$M = \frac{P(\ell - \ell_1)(7\ell - 3\ell_1)}{20\ell}$<br>$P$: Load of helicopter (*kN*) (*See* **4.8.3.1**)<br>$\ell$: Spacing of longitudinals and beams (*m*)<br>$\ell_1$: Distance (*m*) between loads of helicopter *P* acting on longitudinals and beams | $M = \frac{7P\ell}{40}$<br>(2) When two loads of helicopter act (*See* **Fig. 10.4.6-1(b)**)<br>$M = \frac{P(\ell - \ell_1)(7\ell - 3\ell_1)}{20\ell}$<br>$P$: Load of helicopter (*kN*) (*See* **4.8.3.1**)<br>$\ell$: Spacing of longitudinals and beams (*m*)<br>$\ell_1$: Distance (*m*) between loads of helicopter *P* acting on longitudinals and beams | |
| **10.4.6.3 Thickness of Deck Plates Subject to Helicopter Loads**<br>The thickness of the deck plate subject to helicopter loads is to be according to either the following **(1)** or **(2)**.<br>(1) Where the centre-to-centre distance of the helicopter loads in the panel is not less than $2S + 0.3$.<br>$C\sqrt{\frac{2S - 0.3}{2S + 0.3} \cdot P \times 10^3}$ (*mm*)<br>$C$: Coefficient according to the following formula:<br>$C = \frac{1}{2}\sqrt{\frac{C_{coll}C_{load}}{\sigma_Y}}$<br>$C_{coll}$: Safety coefficient for plastic collapse of the plate to be taken as 1.7.<br>$C_{load}$: Safety coefficient for dynamic effect of ship motion to be taken as 1.2.<br>$S$: Spacing (*m*) of longitudinals and beams | **10.4.6.3 Thickness of Helicopter Deck Plates**<br>The thickness of the helicopter deck plate is to be according to either the following **(1)** or **(2)**.<br>(1) Where the centre-to-centre distance of the helicopter loads in the panel is not less than $2S + 0.3$.<br>$C\sqrt{\frac{2S - 0.3}{2S + 0.3} \cdot P \times 10^3}$ (*mm*)<br>$C$: Coefficient according to the following formula:<br>$C = \frac{1}{2}\sqrt{\frac{C_{coll}C_{load}}{\sigma_Y}}$<br>$C_{coll}$: Safety coefficient for plastic collapse of the plate to be taken as 1.7.<br>$C_{load}$: Safety coefficient for dynamic effect of ship motion to be taken as 1.2.<br>$S$: Spacing (*m*) of longitudinals and beams | |

| Amended | Original | Remarks |
|---|---|---|
| $P$: Load (*kN*) of helicopter (*See* **4.8.3.1**)<br>(2) Where the centre-to-centre distance of the helicopter loads in the panel is less than $2S+0.3$ (*See* **Fig. 10.4.6-2**)<br>$C\sqrt{\frac{2S-0.3}{2S+0.3+e}\cdot 2P\times 10^3}$ $(mm)$<br>$C$, $S$, $P$: As specified in **(1)** above.<br>$e$: Centre-to-centre distance (*m*) of the helicopter loads in the panel (*See* **Fig. 10.4.6-2**) | $P$: Load (*kN*) of helicopter (*See* **4.8.3.1**)<br>(2) Where the centre-to-centre distance of the helicopter loads in the panel is less than $2S+0.3$ (*See* **Fig. 10.4.6-2**)<br>$C\sqrt{\frac{2S-0.3}{2S+0.3+e}\cdot 2P\times 10^3}$ $(mm)$<br>$C$, $S$, $P$: As specified in **(1)** above.<br>$e$: Centre-to-centre distance (*m*) of the helicopter loads in the panel (*See* **Fig. 10.4.6-2**) | |
| **Chapter 11 STRUCTURES OUTSIDE CARGO REGION**<br>**11.3 Superstructures and Deckhouses**<br>**11.3.1 General**<br>**11.3.1.1 Scantlings of Plates, Stiffeners and Primary Supporting Members**<br>**1** Unless specifically specified in this **11.3**, the scantlings of plates, stiffeners and primary supporting members are to be in accordance with **6.3.2**, **6.4.2** and **7.2**.<br>**2** The thicknesses (gross scantlings) of the first and second enclosed superstructure decks and tops of deckhouses in accommodation or navigation spaces above the freeboard deck are to be not less than 5.5 *mm*. | **Chapter 11 STRUCTURES OUTSIDE CARGO REGION**<br>**11.3 Superstructures and Deckhouses**<br>**11.3.1 General**<br>**11.3.1.1 Scantlings of Plates, Stiffeners and Primary Supporting Members**<br>Unless specifically specified in this **11.3**, the scantlings of plates, stiffeners and primary supporting members are to be in accordance with **6.3.2**, **6.4.2** and **7.2**.<br>(Newly added) | Specifies minimum thickness requirements for enclosed decks in accommodation or navigation spaces |

| Amended | Original | Remarks |
|---|---|---|
| **Chapter 14 EQUIPMENT**<br>**14.6 Hatch Cover**<br>**14.6.2 General Requirement**<br>**14.6.2.1 General**<br>**1** Primary supporting members and secondary stiffeners of hatch covers are to be continuous over the breadth and length of hatch covers. When this is impractical, appropriate arrangements are to be adopted to ensure sufficient load carrying capacity and sniped end connections are not to be allowed.<br>**2** The spacing of primary supporting members parallel to the direction of secondary stiffeners is not to exceed 1/3 of the span of the primary supporting members. When strength calculation is carried out by finite element method, this requirement is not applied.<br>**3** Secondary stiffeners of hatch coamings are to be continuous over the breadth and length of said hatch coamings.<br>**4** Where hatch covers are subject to helicopter loads, they are to comply with the requirements in **10.4.6**. | **Chapter 14 EQUIPMENT**<br>**14.6 Hatch Cover**<br>**14.6.2 General Requirement**<br>**14.6.2.1 General**<br>**1** Primary supporting members and secondary stiffeners of hatch covers are to be continuous over the breadth and length of hatch covers. When this is impractical, appropriate arrangements are to be adopted to ensure sufficient load carrying capacity and sniped end connections are not to be allowed.<br>**2** The spacing of primary supporting members parallel to the direction of secondary stiffeners is not to exceed 1/3 of the span of the primary supporting members. When strength calculation is carried out by finite element method, this requirement is not applied.<br>**3** Secondary stiffeners of hatch coamings are to be continuous over the breadth and length of said hatch coamings.<br>**4** Where hatch covers serve as helicopter decks, it is to comply with the requirements in **10.4.6**. | Clarifies scope of evaluation of structural members subject to helicopter loads |

# Amended-Original Requirements Comparison Table

# (Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 1))

| Amended | Original | Remarks |
|---|---|---|
| EFFECTIVE DATE AND APPLICATION<br>1. The effective date of the amendment is 26 December 2024. | | |
| **Part 2-1 CONTAINER CARRIERS**<br>**Chapter 4 LOADS**<br>**4.6 Loads to be Considered in Fatigue**<br>**4.6.2 Cyclic Load Condition**<br>**4.6.2.1 General**<br>**1** The loads to be considered in the assessment of torsional fatigue strength by whole ship analysis specified in **9.4** are to be in accordance with the requirements of **4.6.3** instead of the requirements of **4.7.2, Part 1**. However, where deemed necessary by the Society, consideration of loads not in accordance with **4.6.3** may be required.<br>**2** The loads to be considered in the simplified stress analysis and finite element analysis specified in **9.3, Part 1** and **9.4, Part 1** are to be in accordance with **4.6.4** in addition to the requirements of **4.7, Part 1**. | **Part 2-1 CONTAINER CARRIERS**<br>**Chapter 4 LOADS**<br>**4.6 Loads to be Considered in Fatigue**<br>**4.6.2 Cyclic Load Condition**<br>**4.6.2.1 General**<br>**1** The loads to be considered in the assessment of torsional fatigue strength by whole ship analysis specified in **9.3** are to be in accordance with the requirements of **4.6.3** instead of the requirements of **4.7.2, Part 1**. However, where deemed necessary by the Society, consideration of loads not in accordance with **4.6.3** may be required.<br>**2** The loads to be considered in the simplified stress analysis and finite element analysis specified in **9.3, Part 1** and **9.4, Part 1** are to be in accordance with **4.6.4** in addition to the requirements of **4.7, Part 1**. | Changes numbering due to the addition of 9.3 |

# Amended-Original Requirements Comparison Table

## (Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 1))

| Amended | Original | Remarks |
|---|---|---|
| EFFECTIVE DATE AND APPLICATION<br>**1.** The effective date of this amendment is 26 June 2025.<br>**2.** Notwithstanding the amendments to the Rules, the current requirements apply to ships for which the date of contract for construction is before the effective date.<br>**3.** Notwithstanding the provision of preceding **2.**, the amendments to the Rules may apply to ships for which the date of contract for construction is before the effective date upon requests. | | |
| **4.6.3 Loads to be Considered in Torsional Fatigue Strength Assessment by Whole Ship Analysis**<br>**4.6.3.1 Loading Conditions**<br>**1** In assessing fatigue strength, loading conditions to be considered in which the most important stress state that acts on the hull for a long period of time are to be selected.<br>**2** As a loading condition corresponding to the loading condition of **-1** above for typical container carriers, only the condition where the container cargo is loaded almost homogeneously in each cargo hold is to be considered. In this case, the draught is the value obtained by multiplying the scantling draught by 0.82.<br>**3** The values obtained from **Table 4.6.3-1** may be used for the metacentric height $GM$ ($m$), the height of the centre of | **4.6.3 Loads to be Considered in Torsional Fatigue Strength Assessment by Whole Ship Analysis**<br>**4.6.3.1 Loading Conditions**<br>**1** In assessing fatigue strength, loading conditions to be considered in which the most important stress state that acts on the hull for a long period of time are to be selected.<br>**2** The requirements of **4.6.3.2** specify the loads corresponding to the loading condition of **-1** above in general container carriers. It is assumed that the container cargo is loaded almost homogeneously in each cargo hold, and the draught is the value obtained by multiplying the scantling draught by 0.82.<br>(Newly added) | Clarifies definitions of some of the parameters used for fatigue strength assessments of container carriers |

| Amended | Original | Remarks |
|---|---|---|
| gravity of the ship $Z_G$ (*m*) and the radius of gyration $K_{xx}$ (*m*) in the loading conditions specified in **-2** above. | | |
| **4.6.3.2 Hull Girder Loads** | **4.6.3.2 Hull Girder Loads** | |
| **1** Vertical still water bending moment $M_{SV}$ is to be calculated in accordance with the following formula.<br>$M_{SV} = C_{F\_SV} M_{SV\_max}$<br>$C_{F\_SV}$: Coefficient considering the effects of the loading condition, to be taken as 0.8.<br>$M_{SV\_max}$: Permissible maximum vertical still water bending moment (*kN-m*) specified in **4.2.2.2** | **1** Vertical still water bending moment $M_{SV}$ is to be calculated in accordance with the following formula.<br>$M_{SV} = C_{F\_SV} M_{SV\_max}$<br>$C_{F\_SV}$: Coefficient considering the effects of the loading condition, to be taken as 0.8.<br>$M_{SV\_max}$: Permissible maximum vertical still water bending moment (*kN-m*) specified in **4.2.2.2** | |
| **2** The vertical wave bending moment $M_{WV-h}$ (*kN-m*) in the hogging condition and the vertical wave bending moment $M_{WV-s}$ (*kN-m*) in the sagging condition are to be in accordance with **Table 4.6.3-2**. | **2** The vertical wave bending moment $M_{WV-h}$ (*kN-m*) in the hogging condition and the vertical wave bending moment $M_{WV-s}$ (*kN-m*) in the sagging condition are to be in accordance with **Table 4.6.3-1**. | |
| **3** The horizontal wave bending moments $M_{WH1}$ and $M_{WH2}$ (*kN-m*) are to be in accordance with **Table 4.6.3-3**. | **3** The horizontal wave bending moments $M_{WH1}$ and $M_{WH2}$ (*kN-m*) are to be in accordance with **Table 4.6.3-2**. | |
| **4** The wave torsional moments $M_{WT1}$ and $M_{WT2}$ (*kN-m*) are to be in accordance with **Table 4.6.3-4**. | **4** The wave torsional moments $M_{WT1}$ and $M_{WT2}$ (*kN-m*) are to be in accordance with **Table 4.6.3-3**. | |
| Table 4.6.3-2 Vertical Wave Bending Moments $M_{WV-h}$ and $M_{WV-s}$<br>(Omitted) | Table 4.6.3-1 Vertical Wave Bending Moments $M_{WV-h}$ and $M_{WV-s}$<br>(Omitted) | |
| Table 4.6.3-3 Horizontal Wave Bending Moments $M_{WH1}$ and $M_{WH2}$<br>(Omitted) | Table 4.6.3-2 Horizontal Wave Bending Moments $M_{WH1}$ and $M_{WH2}$<br>(Omitted) | |

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td>Table 4.6.3-4 Wave Torsional Moments $M_{WT1}$ and $M_{WT2}$<br>(Omitted)</td><td>Table 4.6.3-3 Wave Torsional Moments $M_{WT1}$ and $M_{WT2}$<br>(Omitted)</td><td></td></tr>
<tr><td colspan="2">Table 4.6.3-1 Simplified Formulae for Parameters
<table>
<tr><th>Loading condition</th><th>Draught amidships $T_{LC}$ ($m$)</th><th>$Z$ coordinate at the centre of gravity of the ship $z_G$($m$)</th><th>Metacentric height $GM$($m$)</th><th>Radius of gyration $K_{xx}$ ($m$)</th></tr>
<tr><td>Container cargo homogeneously loaded condition</td><td>$0.82T_{SC}$</td><td>$0.25\frac{B}{C_{B\_LC}}$</td><td>$\frac{T_{LC}}{2}+\frac{B^2}{T_{LC}C_{B\_LC}}\frac{3C_{W\_LC}-1}{24}-z_G$</td><td>$0.38B$</td></tr>
</table></td><td>Clarifies definitions of the parameters used for fatigue strength assessments of container carriers</td></tr>
<tr><td><b>4.6.4 Loads to be Considered in Fatigue Strength Assessment by Simplified Stress Analysis and Finite Element Analysis Using Partial Structural Model</b><br><b>4.6.4.1 Loading Conditions</b><br><b>1</b> In assessing fatigue strength, loading conditions to be considered the most important stress state that acts on the hull for a long period of time are to be selected.<br><b>2</b> As a loading condition corresponding to the loading condition of <b>-1</b> above for typical container carriers, only the condition where the container cargo is loaded almost homogeneously in each cargo hold is to be considered. In this case, the draught is the value obtained by multiplying the scantling draught by 0.82.<br><b>3</b> The values obtained from <b>Table 4.6.3-1</b> may be used for the metacentric height $GM$ ($m$), the height of the centre of gravity of the ship $Z_G$ ($m$) and the radius of gyration $K_{xx}$ ($m$) in the loading conditions specified in <b>-2</b> above.</td><td><b>4.6.4 Loads to be Considered in Fatigue Strength Assessment by Simplified Stress Analysis and Finite Element Analysis Using Partial Structural Model</b><br><b>4.6.4.1 Loading Conditions</b><br><b>1</b> In assessing fatigue strength, loading conditions to be considered the most important stress state that acts on the hull for a long period of time are to be selected.<br><b>2</b> The requirements of <b>4.6.4.2</b>, <b>4.6.4.3</b> and <b>4.6.4.4</b> are the loads corresponding to the loading condition of <b>-1</b> above in general container carriers. It is assumed that the container cargo is loaded almost homogeneously in each cargo hold, and the draught is the value obtained by multiplying the scantling draught by 0.82.<br>(Newly added)</td><td>Clarifies definitions of the parameters used for fatigue strength assessments of container carriers</td></tr>
</table>

| Amended | Original | Remarks |
|---|---|---|
| **(Deleted)** | **4.6.4.2 External Pressure due to Seawater**<br>In applying **4.7.2.4, Part 1**, the draught $T_{LC}$ (*m*) is to be the value obtained by multiplying the scantling draught by 0.82. | |
| **(Deleted)** | **4.6.4.3 Internal Pressure due to Ballast, Container Cargo, Etc.**<br>When calculating the acceleration in applying **4.7.2.5, Part 1** and **4.7.2.7, Part 1**, various parameters such as the metacentric height $GM$ are to be determined based on the loading condition specified in **4.6.4.1-2**. | |
| **4.6.4.2 Hull Girder Loads**<br>**1** Vertical still water bending moment $M_{SV}$ is to be in accordance with the requirements of **4.6.3.2-1** instead of the requirements of **4.7.2.10, Part 1**.<br>**2** The vertical wave bending moment in hogging condition $M_{WV-h}$ (*kN-m*) and vertical wave bending moment $M_{WV-s}$ (*kN-m*) in sagging condition are to be determined in accordance with the requirements of **4.6.3.2-2** instead of the requirements of **4.7.2.10, Part 1**.<br>**3** When calculating the horizontal bending moment $M_{WH}$, it is necessary to apply **4.7.2.10, Part_1** and use the value obtained by multiplying the structural draught $T_{LC}$ (*m*) by 0.82. | **4.6.4.4 Hull Girder Loads**<br>**1** Vertical still water bending moment $M_{SV}$ is to be in accordance with the requirements of **4.6.3.2-1** instead of the requirements of **4.7.2.10, Part 1**.<br>**2** The vertical wave bending moment in hogging condition $M_{WV-h}$ (*kN-m*) and vertical wave bending moment $M_{WV-s}$ (*kN-m*) in sagging condition are to be determined in accordance with the requirements of **4.6.3.2-2** instead of the requirements of **4.7.2.10, Part 1**.<br>**3** When calculating the horizontal bending moment $M_{WH}$, it is necessary to apply **4.7.2.10, Part1** and use the value obtained by multiplying the structural draught $T_{LC}$ (*m*) by 0.82. | |

Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 1))

| Amended | Original | Remarks |
|---|---|---|
| **Chapter 9 FATIGUE**<br>**9.1 General**<br>**9.1.2 Assumptions**<br>**9.1.2.1 Assumptions**<br>The following assumptions **(1)** to **(9)** are made in the fatigue strength assessment.<br>(1) A linear cumulative damage model (i.e. Miner's rule) given in **9.5.4, Part 1** is used in the calculation of fatigue damage.<br>(2) Fatigue design life $\underline{T_{FD}}$ is taken not less than 25 *years*.<br>((3) to (9) are omitted.) | **Chapter 9 FATIGUE**<br>**9.1 General**<br>**9.1.2 Assumptions**<br>**9.1.2.1 Assumptions**<br>The following assumptions **(1)** to **(9)** are made in the fatigue strength assessment.<br>(1) A linear cumulative damage model (i.e. Miner's rule) given in **9.5.4, Part 1** is used in the calculation of fatigue damage.<br>(2) Fatigue design life $\underline{T_{DF}}$ is taken not less than 25 *years*.<br>((3) to (9) are omitted.) | Corrects inconsistencies in wording: Not $T_{DF}$ but $T_{FD}$ |
| EFFECTIVE DATE AND APPLICATION<br>**1.** The effective date of the amendment is 26 December 2024. | | |

| Amended | Original | Remarks |
|---|---|---|
| **9.1.2.1 Assumptions**<br>The following assumptions **(1)** to **(9)** are made in the fatigue strength assessment.<br>((1) and (2) are omitted.)<br>(3) Hull girder load for torsional strength assessment is determined at the $10^{-2}$ probability level of exceedance.<br>(4) Stresses are assessed by the net scantlings $t_{n25}$, according to **9.4**.<br>(5) Hot spot stress is used for fatigue strength assessment of weld toes and the free edge of members.<br>(6) Excluding exceptional cases, fatigue strength assessment of welds is made for the weld toe. For the welded joints where loads are carried to the weld, the welded joints are to be in accordance with the detail design standards specified in **9.5** and **9.6, Part 1** or weld root fatigue strength is to be assessed in accordance with the requirement in **9.7, Part 1**.<br>((7) to (9) are omitted.) | **9.1.2.1 Assumptions**<br>The following assumptions **(1)** to **(9)** are made in the fatigue strength assessment.<br>((1) and (2) are omitted.)<br>(3) Hull girder load for torsional strength assessment is determined at the $10^{-2}$ probability level of exceedance.<br>(4) Stresses are assessed by the net scantlings $t_{n25}$, according to **9.3**.<br>(5) Hot spot stress is used for fatigue strength assessment of weld toes and the free edge of members.<br>(6) Excluding exceptional cases, fatigue strength assessment of welds is made for the weld toe. For the welded joints where loads are carried to the weld, the welded joints are to be in accordance with the detail design standards specified in **9.4** and **9.6, Part 1** or weld root fatigue strength is to be assessed in accordance with the requirement in **9.7, Part 1**.<br>((7) to (9) are omitted.) | Changes numbering due to the addition of 9.3 |
| **9.2 Hot Spots to Assess**<br>**9.2.1 Hot Spots to be Assessed by Finite Element Analysis**<br>**9.2.1.1 Structural Details to be Assessed by Fatigue Strength Assessment**<br>**1** The hot spots to be assessed for fatigue strength by finite element analysis according to **9.4** are shown in **Table** | **9.2 Hot Spots to Assess**<br>**9.2.1 Hot Spots to be Assessed by Finite Element Analysis**<br>**9.2.1.1 Structural Details to be Assessed by Fatigue Strength Assessment**<br>**1** The hot spots to be assessed for fatigue strength by finite element analysis according to **9.3** are shown in **Table** | |

| Amended | Original | Remarks |
|---|---|---|
| **9.2.1-1**.<br>**2** The assessment is to be carried out throughout the length of ship. | **9.2.1-1**.<br>**2** The assessment is to be carried out throughout the length of ship. | |
| **9.3 Fatigue Strength Assessment of Longitudinal End Connections**<br>**9.3.1 General**<br>**9.3.1.1**<br>The end geometries of web stiffeners in way of the end connections of side longitudinals installed between 0.82$T_{SC}$ and $T_{SC}$ are to be maintained as that of the side longitudinal just below 0.82$T_{SC}$. | **(Newly added)** | Revises criteria for fatigue strength assessments of longitudinal end connections |
| **9.3.2 Loading Conditions and Fractions of Time to be Considered**<br>**9.3.2.1**<br>**1** Standard loading conditions and fractions of time are to be as given in **Table 9.3.2-1**.<br>**2** Notwithstanding **-1** above, an appropriate combination is to be considered in cases where considering loading conditions and fractions of time other than those given in **Table 9.3.2-1**. | **(Newly added)** | Clarifies definitions of the parameters used for fatigue strength assessments of container carriers |

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td>Table 9.3.2-1 Standard Loading Conditions and Fractions of Time
<table>
<tr><th>Loading condition</th><th>Fraction of time $\alpha_{(j)}$</th></tr>
<tr><td>Container cargo homogeneously loaded condition 1<br>(Ballast tank fully loaded condition)</td><td>50 %</td></tr>
<tr><td>Container cargo homogeneously loaded condition 2<br>(Ballast tank empty condition)</td><td>50 %</td></tr>
</table></td><td></td><td></td></tr>
<tr><td><b>9.3.3 Simplified Assessment of the Effect of Relative Displacement at Ends of Transverse Bulkheads</b><br><b>9.3.3.1</b><br><b>1</b> Instead of directly considering the stress due to relative displacement specified in <b>9.3.5, Part 1</b>, multiplying fatigue damage calculated not considering the stress due to relative displacement by three may be allowed. However, in the case of side longitudinals, it is assumed that soft-shaped backing brackets are fitted.<br><b>2</b> If the requirement specified in <b>-1</b> above is not followed, the effect of stress due to relative displacement specified in <b>9.3.5, Part 1</b> is to be considered using finite element analysis.</td><td><b>(Newly added)</b></td><td>Specifies simplified assessments of stress due to relative displacement in fatigue strength assessments at the longitudinal end connections of the transverse bulkheads of container carriers</td></tr>
</table>

| Amended | Original | Remarks |
|---|---|---|
| **9.4 Torsional Fatigue Strength Assessment**<br>**9.4.1 General**<br>**9.4.1.1 General**<br>The requirements of the evaluation method for hot spot stresses of plate and girder joints and the free edge of base materials by very fine finite element analysis of torsional fatigue strength assessment is specified in 9.4. The hot spot stress takes into account structural discontinuities due to the structural details of joints but does not consider local stress concentrations due to the presence of welds.<br>**9.4.1.2 Confirmation of Calculation Method and Accuracy of Analysis**<br>(Omitted)<br>**9.4.1.3 Strength Assessment Based on Advanced Analysis**<br>In the application of 9.4, the strength assessment based on an advanced analysis, such as direct load analysis, may be conducted when deemed appropriate by the Society. However, when the hot spot stress is calculated from the stress obtained by the analysis, no other methods than those specified in 9.4 are to be adopted.<br>**9.4.1.4 Types of Hot Spot Stress**<br>(Omitted) | **9.3 Torsional Fatigue Strength Assessment**<br>**9.3.1 General**<br>**9.3.1.1 General**<br>The requirements of the evaluation method for hot spot stresses of plate and girder joints and the free edge of base materials by very fine finite element analysis of torsional fatigue strength assessment is specified in 9.3. The hot spot stress takes into account structural discontinuities due to the structural details of joints but does not consider local stress concentrations due to the presence of welds.<br>**9.3.1.2 Confirmation of Calculation Method and Accuracy of Analysis**<br>(Omitted)<br>**9.3.1.3 Strength Assessment Based on Advanced Analysis**<br>In the application of 9.3, the strength assessment based on an advanced analysis, such as direct load analysis, may be conducted when deemed appropriate by the Society. However, when the hot spot stress is calculated from the stress obtained by the analysis, no other methods than those specified in 9.3 are to be adopted.<br>**9.3.1.4 Types of Hot Spot Stress**<br>(Omitted) | Changes numbering due to the addition of 9.3 |

# Amended-Original Requirements Comparison Table
## (Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 1))

| Amended | Original | Remarks |
|---|---|---|
| **9.4.1.5 Evaluation Procedure**<br>The procedures for the fatigue strength assessment are to be in accordance with the following **(1)** to **(4)**: (*See* **Fig. 9.4.1-1**)<br>(Omitted) | **9.3.1.5 Evaluation Procedure**<br>The procedures for the fatigue strength assessment are to be in accordance with the following **(1)** to **(4)**: (*See* **Fig. 9.3.1-1**)<br>(Omitted) | |
| Fig. 9.4.1-1 Evaluation Procedure<br>(Omitted) | Fig. 9.3.1-1 Evaluation Procedure<br>(Omitted) | |
| **9.4.2 Finite Element Method** | **9.3.2 Finite Element Method** | |
| **9.4.2.1 General**<br>(Omitted) | **9.3.2.1 General**<br>(Omitted) | |
| **9.4.2.2 Extent of Model**<br>(Omitted) | **9.3.2.2 Extent of Model**<br>(Omitted) | |
| **9.4.2.3 Members to be Modelled, Element Types, Mesh Size, and Notes on Modelling**<br>Members to be modelled, element types, mesh size, and notes on modelling are shown in **9.4.2.3, Part 1**, **9.4.2.4, Part 1**, **9.4.2.7, Part 1** and **9.4.2.8, Part 1**, respectively. | **9.3.2.3 Members to be Modelled, Element Types, Mesh Size, and Notes on Modelling**<br>Members to be modelled, element types, mesh size, and notes on modelling are shown in **9.4.2.3, Part 1, 9.4.2.4, Part 1,9.4.2.7, Part 1** and **9.4.2.8, Part 1**, respectively. | |
| **9.4.2.4 Corrosion Model**<br>(Omitted) | **9.3.2.4 Corrosion Model**<br>(Omitted) | |

# Amended-Original Requirements Comparison Table
# (Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 1))

| Amended | Original | Remarks |
|---|---|---|
| **9.4.3 Modelling Procedure**<br>**9.4.3.1 Modelling Procedure**<br>(Omitted)<br>**9.4.4 Boundary Conditions and Load Conditions**<br>**9.4.4.1 Boundary Conditions**<br>(-1 to -3 are omitted.)<br>**4** The standard boundary conditions are in accordance with the following **(1)** to **(3)**:<br>(1) The boundary conditions for the standard torsional moment are as shown in **Fig. 9.4.4-1**.<br>(2) The boundary conditions for the standard vertical bending moment are as shown in **Fig. 9.4.4-2**.<br>(3) The boundary conditions for the standard horizontal bending moment are as shown in **Fig. 9.4.4-3**.<br>Fig. 9.4.4-1 Boundary Conditions of Torsional Moment<br>(Omitted)<br>Fig. 9.4.4-2 Boundary Conditions of Vertical Bending Moments and Load Conditions<br>(Omitted)<br>Fig. 9.4.4-3 Boundary Conditions of Horizontal Bending Moments and Load Conditions<br>(Omitted) | **9.3.3 Modelling Procedure**<br>**9.3.3.1 Modelling Procedure**<br>(Omitted)<br>**9.3.4 Boundary Conditions and Load Conditions**<br>**9.3.4.1 Boundary Conditions**<br>(-1 to -3 are omitted.)<br>**4** The standard boundary conditions are in accordance with the following **(1)** to **(3)**:<br>(1) The boundary conditions for the standard torsional moment are as shown in **Fig. 9.3.4-1**.<br>(2) The boundary conditions for the standard vertical bending moment are as shown in **Fig. 9.3.4-2**.<br>(3) The boundary conditions for the standard horizontal bending moment are as shown in **Fig. 9.3.4-3**.<br>Fig. 9.3.4-1 Boundary Conditions of Torsional Moment<br>(Omitted)<br>Fig. 9.3.4-2 Boundary Conditions of Vertical Bending Moments and Load Conditions<br>(Omitted)<br>Fig. 9.3.4-3 Boundary Conditions of Horizontal Bending Moments and Load Conditions<br>(Omitted) | |

| Amended | Original | Remarks |
|---|---|---|
| **9.4.4.2 Load Conditions**<br>**1** (Omitted)<br>**2** (Omitted)<br>**3** Torsional moments are to be applied to structural models in accordance with the following **(1)** to **(3)**:<br>(1) Torsional moments acting on hull girders are to be applied to structural models as a series of bulkhead torsional moments resulting in a stepped curve. An approximated torsional step moment curve is shown in **Fig. 9.4.4-4**.<br>(2) Torsional moments applied to bulkheads are the net change in torsional moment over the effective range of the bulkhead. The effective range of a bulkhead is the distance between the midpoints of the two adjacent bulkheads. The torsional moments at bulkhead $i$ (*kN-m*) are specified as the following formulae: (*See* **Fig. 9.4.4-5**)<br>$\delta M_{WT1i} = M_{WT1}\|_{\frac{1}{2}(X_i+X_{i+1})} - M_{WT1}\|_{\frac{1}{2}(X_{i-1}+X_i)}$<br>$\delta M_{WT2i} = M_{WT2}\|_{\frac{1}{2}(X_i+X_{i+1})} - M_{WT2}\|_{\frac{1}{2}(X_{i-1}+X_i)}$<br>$X_i$: $X$-coordinate of bulkhead $i$<br>(3) Torsional moments for bulkheads are to be reproduced by two equivalent shear forces on each side. An example of a method for applying shear force is shown in **Fig. 9.4.4-6**.<br>**4** When analysing the vertical and horizontal bending moments applied, a method applying unit moments is to be used as the standard. Stresses corresponding to the moments | **9.3.4.2 Load Conditions**<br>**1** (Omitted)<br>**2** (Omitted)<br>**3** Torsional moments are to be applied to structural models in accordance with the following **(1)** to **(3)**:<br>(1) Torsional moments acting on hull girders are to be applied to structural models as a series of bulkhead torsional moments resulting in a stepped curve. An approximated torsional step moment curve is shown in **Fig. 9.3.4-4**.<br>(2) Torsional moments applied to bulkheads are the net change in torsional moment over the effective range of the bulkhead. The effective range of a bulkhead is the distance between the midpoints of the two adjacent bulkheads. The torsional moments at bulkhead $i$ (*kN-m*) are specified as the following formulae: (*See* **Fig. 9.3.4-5**)<br>$\delta M_{WT1i} = M_{WT1}\|_{\frac{1}{2}(X_i+X_{i+1})} - M_{WT1}\|_{\frac{1}{2}(X_{i-1}+X_i)}$<br>$\delta M_{WT2i} = M_{WT2}\|_{\frac{1}{2}(X_i+X_{i+1})} - M_{WT2}\|_{\frac{1}{2}(X_{i-1}+X_i)}$<br>$X_i$: $X$-coordinate of bulkhead $i$<br>(3) Torsional moments for bulkheads are to be reproduced by two equivalent shear forces on each side. An example of a method for applying shear force is shown in **Fig. 9.3.4-6**.<br>**4** When analysing the vertical and horizontal bending moments applied, a method applying unit moments is to be used as the standard. Stresses corresponding to the moments | |

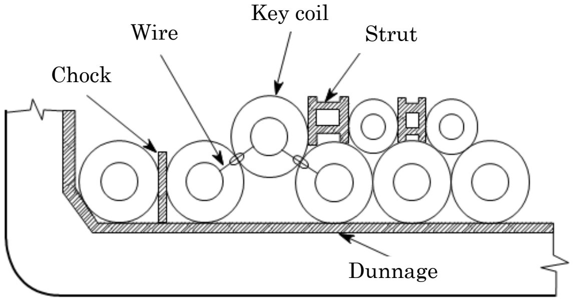
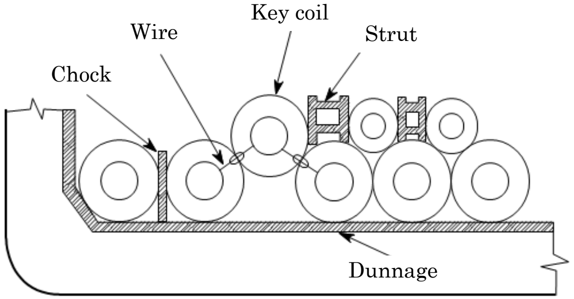
| Amended | Original | Remarks |
|---|---|---|
| prescribed in **4.6.3.2** are to be calculated based on the stresses obtained through structural analysis with unit moments applied. (*See* **Fig.9.4.4-2** and **Fig.9.4.4-3**)<br>Fig. 9.4.4-4 Torsional Moments Acting on Hull Girders (Approximated Step Curve)<br>(Omitted)<br>Fig. 9.4.4-5 Torsional Moment Applied to Bulkhead $i$<br>(Omitted)<br>Fig. 9.4.4-6 Torsional Moment Reproduction Due to Shear Force<br>(Omitted)<br>**9.4.5 Hot Spot Stresses**<br>**9.4.5.1 Resultant Stress Range and Mean Stress**<br>**1** (Omitted)<br>**2** The resultant stress range in the direction orthogonal and parallel to the weld line is to be obtained based on the stresses obtained by the finite element analysis specified in **9.4**. The orthogonal direction to the weld line is represented by the $x$-direction and the parallel direction is represented by the $y$-direction.<br>**3** (Omitted)<br>**4** (Omitted) | prescribed in **4.6.3.2** are to be calculated based on the stresses obtained through structural analysis with unit moments applied. (*See* **Fig.9.3.4-2** and **Fig.9.3.4-3**)<br>Fig. 9.3.4-4 Torsional Moments Acting on Hull Girders (Approximated Step Curve)<br>(Omitted)<br>Fig. 9.3.4-5 Torsional Moment Applied to Bulkhead $i$<br>(Omitted)<br>Fig. 9.3.4-6 Torsional Moment Reproduction Due to Shear Force<br>(Omitted)<br>**9.3.5 Hot Spot Stresses**<br>**9.3.5.1 Resultant Stress Range and Mean Stress**<br>**1** (Omitted)<br>**2** The resultant stress range in the direction orthogonal and parallel to the weld line is to be obtained based on the stresses obtained by the finite element analysis specified in **9.3**. The orthogonal direction to the weld line is represented by the $x$-direction and the parallel direction is represented by the $y$-direction.<br>**3** (Omitted)<br>**4** (Omitted) | |

Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 1))

| Amended | Original | Remarks |
|---|---|---|
| **9.4.5.2 Hot Spot Locations and Stress Readout Points, Stress Readout Method and Hot Spot Stresses**<br>The hot spot locations and stress readout points, stress readout method, and stress reference points and hot spot stresses are to be in accordance with **9.4.5.2, Part 1**, **9.4.5.3, Part 1** and **9.4.5.4, Part 1**, respectively. | **9.3.5.2 Hot Spot Locations and Stress Readout Points, Stress Readout Method and Hot Spot Stresses**<br>The hot spot locations and stress readout points, stress readout method, and stress reference points and hot spot stresses are to be in accordance with **9.4.5.2, Part 1**, **9.4.5.3, Part 1** and **9.4.5.4, Part 1**, respectively. | |
| **9.4.5.3 Weld Root Fatigue Strength Assessment**<br>(Omitted) | **9.3.5.3 Weld Root Fatigue Strength Assessment**<br>(Omitted) | |
| **9.5 Detailed Design Standards** | **9.4 Detailed Design Standards** | |
| **9.5.1 General** | **9.4.1 General** | |
| **9.5.1.1 General**<br>(Omitted) | **9.4.1.1 General**<br>(Omitted) | |

Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 1))

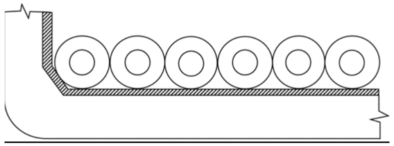
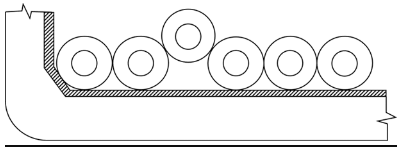
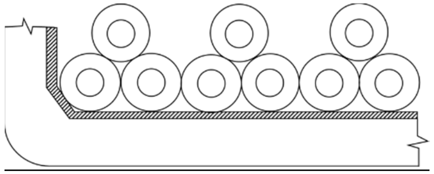
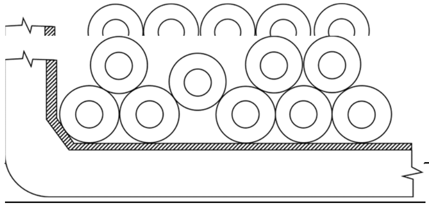
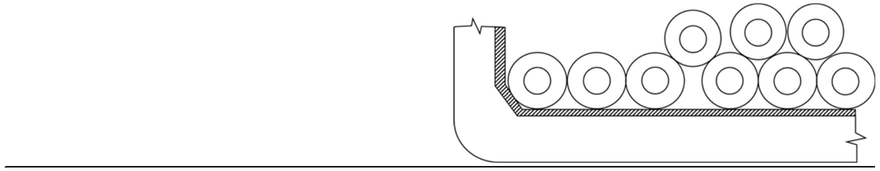
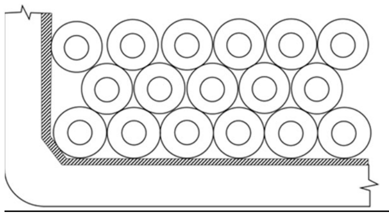
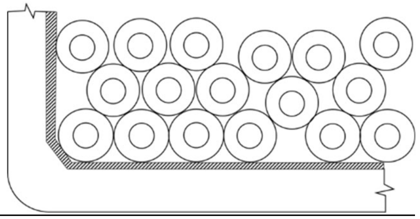
| Amended | Original | Remarks |
|---|---|---|
| **Part 2-5 GENERAL CARGO SHIPS AND REFRIGERATED CARGO SHIPS**<br>**Chapter 4 LOADS** | **Part 2-5 GENERAL CARGO SHIPS AND REFRIGERATED CARGO SHIPS**<br>**Chapter 4 LOADS** | Revises requirements for steel coil loads and strength assessments with respect to multi-tiered loading |
| **4.4 Loads to be Considered in Additional Structural Requirements** | **4.4 Loads to be Considered in Additional Structural Requirements** | |
| **4.4.2 Maximum Load Condition** | **4.4.2 Maximum Load Condition** | |
| **4.4.2.1 Steel Coils**<br>**1** The requirements are given by assuming the following **(1)** to **(5)**. | **4.4.2.1 Steel Coils**<br>**1** The requirements are given by assuming the following **(1)** to **(5)**. | |
| (1) It is assumed that steel coil cores are arranged in the longitudinal direction and loaded securing as shown in **Fig. 4.4.2-1**. | (1) It is assumed that steel coil cores are arranged in the longitudinal direction and loaded securing as shown in **Fig. 4.4.2-1**. | |
| (2) When one and a half-tiered loading is included in the design conditions, only one steel coil is assumed for the second tier adjacent to the bottom steel coil. Examples of steel coil arrangements are given in **Table 4.4.2-1**. | (2) When two or more steel coils are loaded, it is assumed that only the bottom steel coil is in contact with the hopper slant plate, the longitudinal bulkhead, or the side frame. | |
| (3) When two-tiered loading is included in the design conditions, it is assumed that only the bottom steel coil is in contact with the longitudinal bulkhead or side frame. It is assumed as the design condition that either only the bottom tier or also the second tier is in contact with the bilge hopper plating. | (Newly added) | |
| (4) When three-tiered loading is included in the design | (Newly added) | |

| Amended | Original | Remarks |
|---|---|---|
| conditions, it is assumed that at least two of the tiers are in contact with the bilge hopper plating, the longitudinal bulkhead or the side frame. | | |
| (5) There are two types of steel coil arrangements for inner bottoms: one is when the floor position is considered, and the other is when the floor position is not considered. | (3) There are two types of steel coil arrangements for inner bottoms: one is when the floor position is considered, and the other is when the floor position is not considered. | |
| (6) All steel coils have the same characteristics. | (4) All steel coils have the same characteristics. | |
| (7) In the case where does not fall under **(1)** to **(6)** above, the loads are to be determined by an appropriate method. | (5) In the case where does not fall under **(1)** to **(4)** above, the loads are to be determined by an appropriate method. | |
| Fig. 4.4.2-1 Example of Securing Means for Steel Coils<br><br> | Fig. 4.4.2-1 Example of Securing Means for Steel Coils<br><br> | |

# Amended-Original Requirements Comparison Table
# (Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 1))

| Amended | Original | Remarks |
|---|---|---|
| Table 4.4.2-1 Example of Loading Conditions for Each Loading Tier | | Revises requirements for steel coil loads and strength assessments with respect to multi-tiered loading |

## Table 4.4.2-1 Example of Loading Conditions for Each Loading Tier

| Number of Tiers | | Example | |
|---|---|---|---|
| Single-tiered loading | $n_1 = 1$ | ・Without Key Coil<br> | ・With Key Coil<br> |
| Multi-tiered loading | $n_1 = 1.5$ |  | |
| | $n_1 = 2$ |  |  |
| | $n_1 = 3$ | <br> | |

## Amended-Original Requirements Comparison Table

## (Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 1))

| Amended | Original | Remarks |
|---|---|---|
| **2** The total load $F_{SC}$ (*kN*) of the steel coil acting on the hull is to be calculated by the following formula. However, it is not to be less than 0.<br>$F_{SC} = F_{SCs} + F_{SCd}$<br>$F_{SCs}$: Static load (*kN*), as specified in **Table 4.4.2-2**.<br>$F_{SCd}$: Dynamic load (*kN*), as specified in **Table 4.4.2-3**. | **2** The total load $F_{SC}$ (*kN*) of the steel coil acting on the hull is to be calculated by the following formula. However, it is to not be less than 0.<br>$F_{SC} = F_{SCs} + F_{SCd}$<br>$F_{SCs}$: Static load (*kN*), as specified in **Table 4.4.2-1**.<br>$F_{SCd}$: Dynamic load (*kN*), as specified in **Table 4.4.2-2**. | Revises requirements for steel coil loads and strength assessments with respect to multi-tiered loading |

| Amended | Original | Remarks |
|---|---|---|
| Table 4.4.2-~~1~~2 Static Load of Steel Coil $F_{SCs}$ | | Revises requirements for steel coil loads and strength assessments with respect to multi-tiered loading |

### Table 4.4.2-~~1~~2 Static Load of Steel Coil $F_{SCs}$

| Members | $n_2$ and $n_3$ | $F_{SCs}$ ($kN$) |
|---|---|---|
| Inner bottom plating | $n_2 \leq 10$ and $n_3 \leq 5$ | $C_{SC1} W_{SC} \frac{n_1 n_2}{n_3} g$ |
| | $n_2 > 10$ or $n_3 > 5$ | $C_{SC1} W_{SC} n_1 \frac{\ell}{\ell_{st}} g$ |
| ~~Hopper tank sloping~~ Bilge hopper plating | $n_2 \leq 10$ and $n_3 \leq 5$ | $C_{SC2} W_{SC} \frac{n_2}{n_3} g \cdot \cos\alpha$ |
| | $n_2 > 10$ or $n_3 > 5$ | $C_{SC2} W_{SC} \frac{\ell}{\ell_{st}} g \cdot \cos\alpha$ |
| Longitudinal bulkheads and side frames | *NA* | 0 |

Notes:

$n_1$: Number of loading stages of steel coil

$n_2$: The load point per panel (the number of dunnages for a single panel), as specified in **4.4.2.2-3**.

$n_3$: Number of dunnage threads supporting one row of steel coils

$W_{SC}$: Mass of one steel coil ($t$)

$C_{SC1}$: Coefficient as follows:

$C_{SC1} = 1.4$ for single-tiered loading secured with one or more key coils

$C_{SC1} = 1.0$ for multi-tiered loading or single-tired loading without key coils

$C_{SC2}$: Coefficient, as follows:

~~$C_{SC2} = 3.2$ for single-tiered stacking or multi-tiered stacking in which the key coil is arranged in the second or third position from the bilge tank sloping or inner hull~~

~~$C_{SC2} = 2.0$ for all other cases~~

$C_{SC2} = 1.0$ for single-tiered loading

$C_{SC2} = 1.1$ for one and a half-tiered loading or two-tiered loading, or for single-tiered loading and also the case where a key coil is placed in the second position from the bilge hopper plating

$C_{SC2} = 1.2$ for three-tiered loading

$\ell$: Distance between floors ($m$) (*See* **Fig. 4.4.2-2**)

$\ell_{st}$: Steel coil length ($m$) (*See* **Fig. 4.4.2-2**)

$\alpha$: The angle between the inner bottom plating and the bilge hopper ~~tank sloping~~ plating($rad$)

## Amended-Original Requirements Comparison Table
## (Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 1))

| Amended | Original | Remarks |
|---|---|---|

### Table 4.4.2-~~2~~3 Dynamic Load $F_{SCd}$

| Members | Load in waves $F_{SCd}$ (*kN*) | |
|---|---|---|
| Inner bottoms | $\frac{F_{SCs}}{g} C_{WDz} a_{Ze-SC}$ | |
| Bilge hopper plating<br>~~Hopper tank sloping~~ | Case 1 | $\frac{F_{SCs}}{g} C_{WDz} a_{Ze-SC} \cdot \cos\alpha$ |
| | Case 2 | ~~$\frac{F_{SCs}}{\cos\alpha} \cos(\lvert\theta - \alpha\rvert)$~~<br>$C_{SC3} W_{SC} \frac{n_1 n_2}{n_3} g \sin\theta \cdot \cos\left(\min\left(\frac{\pi}{2} - \alpha, \frac{\pi}{4}\right)\right)$ |
| Longitudinal bulkheads | $n_2 \leq 10$ and $n_3 \leq 5$ | $C_{SC3} W_{SC} \frac{n_1 n_2}{n_3} g \sin\theta$ |
| | $n_2 > 10$ or $n_3 > 5$ | $C_{SC3} W_{SC} n_1 \frac{\ell}{\ell_{st}} g \sin\theta$ |
| Side frames | $C_{SC3} W_{SC} \frac{n_1}{n_4} g \sin\theta$ | |

Notes:

$C_{WDz}$: Coefficient of each load condition, specified in **Table 4.4.2-8, Part 1**

$a_{Ze-SC}$ : Envelope acceleration in vertical direction (*m/s*$^2$) at the centre of gravity of steel coil in the cargo hold to be considered, as calculated in accordance with **4.2.4.1, Part1**$^{(1)}$

$\alpha$, $n_1$, $n_2$, $n_3$, $W_{SC}$, $\ell$, $\ell_{st}$ : As specified in **Table 4.4.2-~~1~~2**

$\theta$: Roll angle (*rad*), as specified in **4.2.2, Part 1**$^{(2)}$.

$C_{SC3}$: Coefficient, as follows:

~~$C_{SC3} = 4.0$~~ $C_{SC3} = 3.2$ for single-tiered stacking or multi-tiered stacking in which the key coil is arranged in the second or third position from the ship side

~~$C_{SC3} = 2.5$~~ $C_{SC3} = 2.0$ for all other cases

$n_4$: The number of side frames that support a single steel coil.

(1) The centre of gravity of steel coil to be considered is in accordance with **Table 4.4.2-~~3~~4**.

(2) The parameters ($GM$, $z_G$, etc.) required to calculate the ship motions and acceleration is in accordance with the values in the full load condition. The values in **Table 4.2.2-1** may be used if the parameters is not available.

Revises requirements for steel coil loads and strength assessments with respect to multi-tiered loading.

# Amended-Original Requirements Comparison Table
# (Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 1))

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td colspan="2">Table 4.4.2-~~3~~4 The Centre of Gravity of Steel Coil
<table>
<tr><th></th><th>The location of the centre of gravity($m$)</th></tr>
<tr><td>The location in longitudinal direction, $x_{sc}$</td><td>Volumetric centre of gravity of cargo hold under consideration</td></tr>
<tr><td>The location in transverse direction, $y_{sc}$</td><td>$\varepsilon\frac{B_H}{4}$</td></tr>
<tr><td colspan="2">Notes:<br>$\varepsilon$ : Coefficient to be taken as:<br>For assessing the members on port side,$\varepsilon = 1.0$<br>For assessing the members on starboard side, $\varepsilon = -1.0$<br>$B_H$ : Breadth of cargo hold ($m$), measured at the mid-length of the cargo hold and at the mid height between lower end of hatch side coaming and inner bottom plating at the centre line, **Table 4.4.2-9, Part 1**.</td></tr>
</table>
</td><td>Revises requirements for steel coil loads and strength assessments with respect to multi-tiered loading.</td></tr>
<tr><td>**3** In applying **-2** above, the number of load points per panel by dunnage $n_2$ and the distance between the load points of dunnage at both ends of each panel $\ell_{lp}$ are to be in accordance with the following **(1)** to **(2)**.<br>(1) Steel coil arrangements that do not consider floor position are to be as specified in **Fig. 4.4.2-2** and **Table 4.4.2-5**.<br>(2) Steel coil arrangements that do consider floor position are to be as specified in the following **(a)** to **(b)**. (*See* **Fig. 4.4.2-3**)<br>(a) The number of load points per panel by dunnage $n_2$ is to be $n_2 = n_3$.<br>(b) The distance between the load points of the dunnage at both ends of each panel $\ell_{lp}$ is to be the distance between the dunnage at both ends supporting a row of steel coils.</td><td>**3** In applying **-2** above, the number of load points per panel by dunnage $n_2$ and the distance between the load points of dunnage at both ends of each panel $\ell_{lp}$ are to be in accordance with the following **(1)** to **(2)**.<br>(1) For steel coil arrangements that do not consider floor position, as specified in **Fig. 4.4.2-2** and **Table 4.4.2-4**.<br>(2) For steel coil arrangements that do consider floor position, as specified in the following **(a)** to **(b)**. (*See* **Fig. 4.4.2-3**)<br>(a) The number of load points per panel by dunnage $n_2$ is to be $n_2 = n_3$.<br>(b) The distance between the load points of the dunnage at both ends of each panel $\ell_{lp}$ is to be the distance between the dunnage at both ends supporting a row of steel coils.</td><td>Revises requirements for steel coil loads and strength assessments with respect to multi-tiered loading.</td></tr>
</table>

# Amended-Original Requirements Comparison Table
## (Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 1))

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr><td colspan="2">

Fig. 4.4.2-2 Loading of Steel Coils on the Inner Bottom without Taking into Consideration the Floor Position

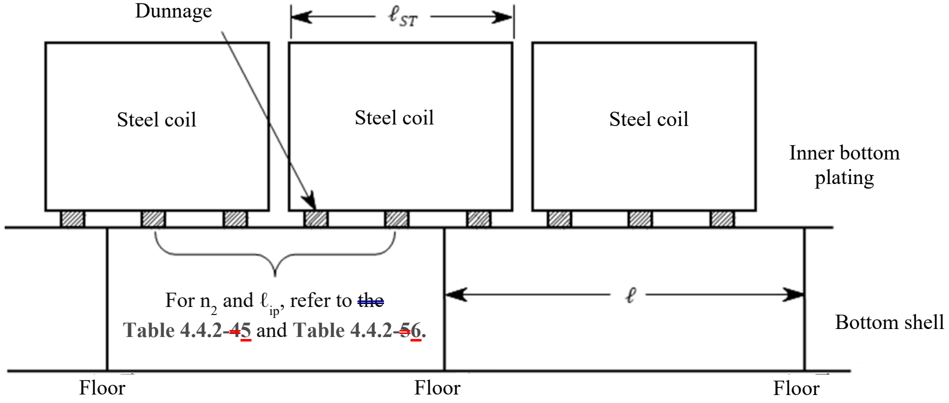
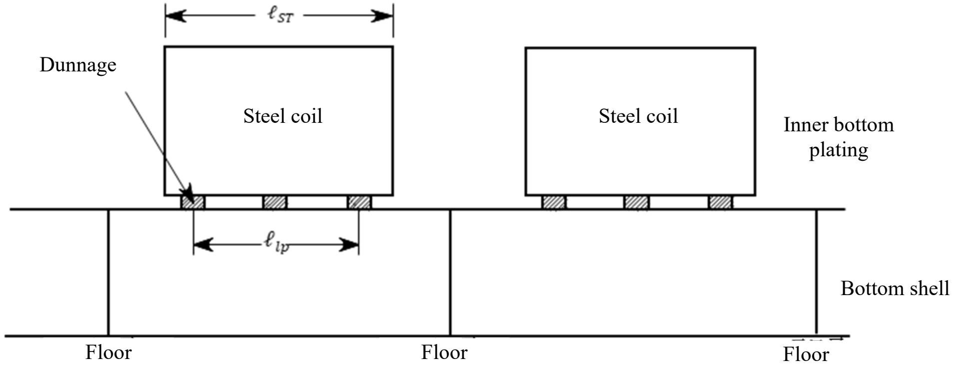


Fig. 4.4.2-3 Loading of Steel Coils on the Inner Bottom Taking into Consideration the Floor Position



</td><td>Revises requirements for steel coil loads and strength assessments with respect to multi-tiered loading.</td></tr>
</table>

| Amended | Original | Remarks |
|---|---|---|
| Table 4.4.2-~~4~~5Number of Load Points Per Panel According to Dunnage $n_2$ | | Revises requirements for steel coil loads and strength assessments with respect to multi-tiered loading. |

Table 4.4.2-~~4~~5Number of Load Points Per Panel According to Dunnage $n_2$

| $n_2$ | $n_3$ | | | |
|---|---|---|---|---|
| | 2 | 3 | 4 | 5 |
| 1 | $0 < \ell/\ell_{st} \le 0.5$ | $0 < \ell/\ell_{st} \le 0.33$ | $0 < \ell/\ell_{st} \le 0.25$ | $0 < \ell/\ell_{st} \le 0.2$ |
| 2 | $0.5 < \ell/\ell_{st} \le 1.2$ | $0.33 < \ell/\ell_{st} \le 0.67$ | $0.25 < \ell/\ell_{st} \le 0.5$ | $0.2 < \ell/\ell_{st} \le 0.4$ |
| 3 | $1.2 < \ell/\ell_{st} \le 1.7$ | $0.67 < \ell/\ell_{st} \le 1.2$ | $0.5 < \ell/\ell_{st} \le 0.75$ | $0.4 < \ell/\ell_{st} \le 0.6$ |
| 4 | $1.7 < \ell/\ell_{st} \le 2.4$ | $1.2 < \ell/\ell_{st} \le 1.53$ | $0.75 < \ell/\ell_{st} \le 1.2$ | $0.6 < \ell/\ell_{st} \le 0.8$ |
| 5 | $2.4 < \ell/\ell_{st} \le 2.9$ | $1.53 < \ell/\ell_{st} \le 1.87$ | $1.2 < \ell/\ell_{st} \le 1.45$ | $0.8 < \ell/\ell_{st} \le 1.2$ |
| 6 | $2.9 < \ell/\ell_{st} \le 3.6$ | $1.87 < \ell/\ell_{st} \le 2.4$ | $1.45 < \ell/\ell_{st} \le 1.7$ | $1.2 < \ell/\ell_{st} \le 1.4$ |
| 7 | $3.6 < \ell/\ell_{st} \le 4.1$ | $2.4 < \ell/\ell_{st} \le 2.73$ | $1.7 < \ell/\ell_{st} \le 1.95$ | $1.4 < \ell/\ell_{st} \le 1.6$ |
| 8 | $4.1 < \ell/\ell_{st} \le 4.8$ | $2.73 < \ell/\ell_{st} \le 3.07$ | $1.95 < \ell/\ell_{st} \le 2.4$ | $1.6 < \ell/\ell_{st} \le 1.8$ |
| 9 | $4.8 < \ell/\ell_{st} \le 5.3$ | $3.07 < \ell/\ell_{st} \le 3.6$ | $2.4 < \ell/\ell_{st} \le 2.65$ | $1.8 < \ell/\ell_{st} \le 2.0$ |
| 10 | $5.3 < \ell/\ell_{st} \le 6.0$ | $3.6 < \ell/\ell_{st} \le 3.93$ | $2.65 < \ell/\ell_{st} \le 2.9$ | $2.0 < \ell/\ell_{st} \le 2.4$ |

Table 4.4.2-~~5~~6Distance Between Load Points of Dunnage on Both Ends of Each Panel $\ell_{lp}$ (*m*)

| $n_2$ | $n_3$ | | | |
|---|---|---|---|---|
| | 2 | 3 | 4 | 5 |
| 1 | Actual width of dunnage | | | |
| 2 | $0.5\ell_{st}$ | $0.33\ell_{st}$ | $0.25\ell_{st}$ | $0.2\ell_{st}$ |
| 3 | $1.2\ell_{st}$ | $0.67\ell_{st}$ | $0.50\ell_{st}$ | $0.4\ell_{st}$ |
| 4 | $1.7\ell_{st}$ | $1.20\ell_{st}$ | $0.75\ell_{st}$ | $0.6\ell_{st}$ |
| 5 | $2.4\ell_{st}$ | $1.53\ell_{st}$ | $1.20\ell_{st}$ | $0.8\ell_{st}$ |
| 6 | $2.9\ell_{st}$ | $1.87\ell_{st}$ | $1.45\ell_{st}$ | $1.2\ell_{st}$ |
| 7 | $3.6\ell_{st}$ | $2.40\ell_{st}$ | $1.70\ell_{st}$ | $1.4\ell_{st}$ |
| 8 | $4.1\ell_{st}$ | $2.73\ell_{st}$ | $1.95\ell_{st}$ | $1.6\ell_{st}$ |
| 9 | $4.8\ell_{st}$ | $3.07\ell_{st}$ | $2.40\ell_{st}$ | $1.8\ell_{st}$ |
| 10 | $5.3\ell_{st}$ | $3.60\ell_{st}$ | $2.65\ell_{st}$ | $2.0\ell_{st}$ |

| Amended | Original | Remarks |
|---|---|---|
| **4** In determining the vertical bending moment $M_{V-HG}$ (*kN-m*) and horizontal bending moment $M_{H-HG}$ (*kN-m*) acting on the hull, the load conditions shown in **Table 4.4.2-7** are to be considered. For load conditions *HF* and *RP*, the requirements of **4.4.2, Part 1** are to be followed. | **4** In determining the vertical bending moment $M_{V-HG}$ (*kN-m*) and horizontal bending moment $M_{H-HG}$ (*kN-m*) acting on the hull, the load conditions shown in **Table 4.4.2-6** are to be considered. For load conditions *HF* and *RP*, the requirements of **4.4.2, Part 1** are to be followed. | Revises requirements for steel coil loads and strength assessments with respect to multi-tiered loading. |

<table>
<tr><th>Amended</th><th>Original</th><th>Remarks</th></tr>
<tr>
<td>Table 4.4.2-7 Load Condition of Hull Girder Load
<table>
<tr><th>Members</th><th colspan="2">Load condition</th></tr>
<tr><td>Inner bottom plating</td><td colspan="2">*HF* and *RP*</td></tr>
<tr><td rowspan="2">Bilge hopper plating</td><td>Case 1</td><td>*HF*</td></tr>
<tr><td>Case 2</td><td>*RP*</td></tr>
<tr><td>Longitudinal bulkheads</td><td colspan="2">*RP*</td></tr>
<tr><td>Side frames</td><td colspan="2">*N/A*</td></tr>
</table>
</td>
<td>Table 4.4.2-6 Load Condition of Hull Girder Load
<table>
<tr><th>Members</th><th>Load condition</th></tr>
<tr><td>Inner bottom plating</td><td>*HF* anr *RP*</td></tr>
<tr><td>Hopper tank sloping</td><td>*RP*</td></tr>
<tr><td>Longitudinal bulkheads</td><td>*RP*</td></tr>
<tr><td>Side frames</td><td>*N/A*</td></tr>
</table>
</td>
<td></td>
</tr>
<tr>
<td>**Chapter 10 ADDITIONAL STRUCTURAL REQUIREMENTS**<br><br>**10.1 Ships Carrying Steel Coils**<br><br>**10.1.3 Bilge Hopper Platings and Longitudinal Frames with Bilge Hopper Platings (Ships with Bilge Hoppers)**<br><br>**10.1.3.1 Bilge Hopper Platings**<br>Bilge hopper plating thickness is to be greater than or equal to the following value. However, this requirement need not to be applied to strakes not in contact with steel coils.<br>$$t = K_1 \sqrt{\frac{F_{SC}}{C_a \sigma_Y}} \times 10^3 (mm)$$<br>Where:<br>$F_{SC}$:The load (*kN*) acting on the hopper slant plate according to **4.4.2.1-2**</td>
<td>**Chapter 10 ADDITIONAL STRUCTURAL REQUIREMENTS**<br><br>**10.1 Ships Carrying Steel Coils**<br><br>**10.1.3 Hopper Slant Plates and Longitudinal Frames with Hopper Slant Plates (Ships with Bilge Hoppers)**<br><br>**10.1.3.1 Hopper Slant Plates**<br>Hopper slant plate thickness is to be greater than or equal to the following value.<br>$$t = K_1 \sqrt{\frac{F_{SC}}{C_a \sigma_Y}} \times 10^3 (mm)$$<br>Where:<br>$F_{SC}$:The load (*kN*) acting on the hopper slant plate according to **4.4.2.1-2**</td>
<td>Revises requirements for steel coil loads and strength assessments with respect to multi-tiered loading.</td>
</tr>
</table>

| Amended | Original | Remarks |
|---|---|---|
| $K_1$: Coefficient according to **10.1.2.1**<br>$C_a$: Axial force influence coefficient according to **6.3.2.1, Part 1**<br>**10.1.3.2 Longitudinal Frames with Bilge Hopper Platings**<br>The section moduli and web plate thicknesses of longitudinal frames with bilge hopper platings are to be greater than or equal to the following values. However, this requirement need not to be applied to longitudinals fitted with plate panels not in contact with steel coils.<br>$Z = K_3 \frac{F_{SC}\ell_{bdg}}{8C_s\sigma_Y} \times 10^3 (cm^3)$, $t_w = \frac{0.5F_{SC}}{d_{shr}\tau_Y} \times 10^3 (mm)$<br>Where:<br>$\sigma_Y$: Specified minimum yield stress ($N/mm^2$)<br>$\tau_Y$: Allowable shear stress ($N/mm^2$)<br>$\sigma_Y/\sqrt{3}$<br>$F_{SC}$: The load ($kN$) acting on the longitudinal frame with bilge hopper plating according to **4.4.2.1-2**, $\ell$ is to be substituted by $\ell_{bdg}$.<br>$K_3$: Coefficient according to **10.1.2.2**<br>$C_s$: Coefficient related to the influence of axial force according to **6.4.2.1, Part 1**<br>$d_{shr}$: Effective shear depth ($mm$) of stiffener according to **3.6.4.2, Part 1** | $K_1$: Coefficient according to **10.1.2.1**<br>$C_a$: Axial force influence coefficient according to **6.3.2.1, Part 1**<br>**10.1.3.2 Longitudinal Frames with Hopper Slant Plates**<br>The section moduli and web plate thicknesses of the web plates of longitudinal frames with hopper slant plates are to be greater than or equal to the following values.<br>$Z = K_3 \frac{F_{SC}\ell_{bdg}}{8C_s\sigma_Y} \times 10^3 (cm^3)$, $t_w = \frac{0.5F_{SC}}{d_{shr}\tau_Y} \times 10^3 (mm)$<br>Where:<br>$\sigma_Y$: Specified minimum yield stress ($N/mm^2$)<br>$\tau_Y$: Allowable shear stress ($N/mm^2$)<br>$\sigma_Y/\sqrt{3}$<br>$F_{SC}$: The load ($kN$) acting on the longitudinal frame with hopper slant plate according to **4.4.2.1-2**, $\ell$ is to be substituted by $\ell_{bdg}$.<br>$K_3$: Coefficient according to **10.1.2.2**<br>$C_s$: Coefficient related to the influence of axial force according to **6.4.2.1, Part 1**<br>$d_{shr}$: Effective shear depth ($mm$) of stiffener according to **3.6.4.2, Part 1** | |

| Amended | Original | Remarks |
|---|---|---|
| **10.1.4 Longitudinal Bulkheads and Longitudinal Frames with Longitudinal Bulkheads (Ships without Bilge Hopper and Ships with Double Side Shells)**<br>**10.1.4.1 Longitudinal Bulkheads**<br>Longitudinal bulkhead thickness is to be greater than or equal to the following value. However, this requirement need not to be applied to strakes not in contact with steel coils.<br>$t = K_1\sqrt{\frac{F_{SC}}{C_a\sigma_Y}\times 10^3}(mm)$<br>Where:<br>$F_{SC}$: Load ($kN$) acting on the longitudinal bulkhead according to **4.4.2.1-2**<br>$K_1$: Coefficient according to **10.1.2.1**.<br>$C_a$: Axial force influence coefficient according to **6.3.2.1, Part 1**.<br>**10.1.4.2 Longitudinal Frames with Longitudinal Bulkheads**<br>The section moduli and plate thicknesses of the web plates of longitudinal frames with longitudinal bulkheads are to be greater than or equal to the following values. However, this requirement need not to be applied to the longitudinals fitted with plate panels not in contact with steel coils.<br>$Z = K_3\frac{F_{SC}\ell_{bdg}}{8C_s\sigma_Y}\times 10^3(cm^3)$, | **10.1.4 Longitudinal Bulkheads and Longitudinal Frames with Longitudinal Bulkheads (Ships without Bilge Hopper and Ships with Double Side Shells)**<br>**10.1.4.1 Longitudinal Bulkheads**<br>Longitudinal bulkhead thickness is to be greater than or equal to the following value.<br>$t = K_1\sqrt{\frac{F_{SC}}{C_a\sigma_Y}\times 10^3}(mm)$<br>Where:<br>$F_{SC}$: Load ($kN$) acting on the longitudinal bulkhead according to **4.4.2.1-2**<br>$K_1$: Coefficient according to **10.1.2.1**.<br>$C_a$: Axial force influence coefficient according to **6.3.2.1, Part 1**.<br>**10.1.4.2 Longitudinal Frames with Longitudinal Bulkheads**<br>The section moduli and plate thicknesses of the web plates of longitudinal frames with longitudinal bulkheads are to be greater than or equal to the following values.<br>$Z = K_3\frac{F_{SC}\ell_{bdg}}{8C_s\sigma_Y}\times 10^3(cm^3)$, | Revises requirements for steel coil loads and strength assessments with respect to multi-tiered loading. |

# Amended-Original Requirements Comparison Table
# (Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 1))

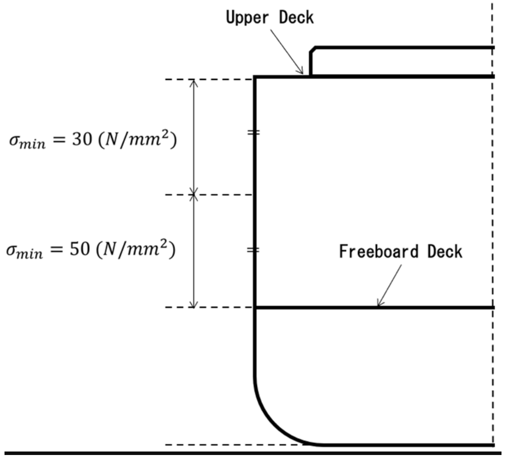
| Amended | Original | Remarks |
|---|---|---|
| $t_w = \frac{0.5F_{SC}}{d_{shr}\tau_Y} \times 10^3 (mm)$<br>Where:<br>$\sigma_Y$: Specified minimum yield stress ($N/mm^2$)<br>$\tau_Y$: Allowable shear stress ($N/mm^2$)<br>$\sigma_Y/\sqrt{3}$<br>$F_{SC}$: Load ($kN$) acting on the longitudinal frame with longitudinal bulkhead according to **4.4.2.1-2**, $\ell$ is to be substituted by $\ell_{bdg}$.<br>$K_3$: Coefficient according to **10.1.2.2**<br>$C_s$: Coefficient related to the influence of axial force according to **6.4.2.1, Part 1**<br>$d_{shr}$: Effective shear depth ($mm$) of stiffener, according to **3.6.4.2, Part 1** | $t_w = \frac{0.5F_{SC}}{d_{shr}\tau_Y} \times 10^3 (mm)$<br>Where:<br>$\sigma_Y$: Specified minimum yield stress ($N/mm^2$)<br>$\tau_Y$: Allowable shear stress ($N/mm^2$)<br>$\sigma_Y/\sqrt{3}$<br>$F_{SC}$: Load ($kN$) acting on the longitudinal frame with longitudinal bulkhead according to **4.4.2.1-2**, $\ell$ is to be substituted by $\ell_{bdg}$.<br>$K_3$: Coefficient according to **10.1.2.2**<br>$C_s$: Coefficient related to the influence of axial force according to **6.4.2.1, Part 1**<br>$d_{shr}$: Effective shear depth ($mm$) of stiffener, according to **3.6.4.2, Part 1** | |
| **10.1.5 Side Frames (Ships Without Bilge Hoppers and Single-Side Ships)**<br>**10.1.5.1 Side Frames**<br>1 In the cases other than three-tiered loading, the section moduli and web thicknesses of side frames are to be greater than or equal to the following values.<br>$Z = 1.2\frac{F_{SC}\ell_{1bdg}}{8\sigma_Y} \times 10^3 (cm^3)$,<br>$t_w = 2.0\frac{0.5F_{SC}}{d_{shr}\tau_Y} \times 10^3 (mm)$<br>$\sigma_Y$: Specified minimum yield stress ($N/mm^2$)<br>$\tau_Y$: Allowable shear stress ($N/mm^2$)<br>$\sigma_Y/\sqrt{3}$ | **10.1.5 Side Frames (Ships Without Bilge Hoppers and Single-Side Ships)**<br>**10.1.5.1 Side Frames**<br>The section moduli and plate thicknesses of side frames are to be greater than or equal to the following values.<br>$Z = 1.2\frac{F_{SC}\ell_{1bdg}}{8\sigma_Y} \times 10^3 (cm^3)$,<br>$t_w = 2.0\frac{0.5F_{SC}}{d_{shr}\tau_Y} \times 10^3 (mm)$<br>$\sigma_Y$: Specified minimum yield stress ($N/mm^2$)<br>$\tau_Y$: Allowable shear stress ($N/mm^2$)<br>$\sigma_Y/\sqrt{3}$ | Revises requirements for steel coil loads and strength assessments with respect to multi-tiered loading. |

| Amended | Original | Remarks |
|---|---|---|
| $F_{SC}$: Load (*kN*) acting on the side frame according to **4.4.2.1-2**<br>$\ell_{1bdg}$: Effective bending span (*m*) of the side frame. Where a bracket is provided, the end of the effective bending span is to be taken to the position where the depth of the side frame and the bracket is equal to $2h_w$ (*See* **Fig. 6.4.3-2, Part 1**).<br>$d_{shr}$: Effective shear depth (*mm*) of stiffener according to **3.6.4.2, Part 1**<br>**2** In the case of three-tiered loading, the section moduli and web thicknesses of side frames are to be treated as simple beams and determined by elastic calculations based on the following conditions:<br>(1) Support conditions are fixed at both ends (positions at deck and inner bottom plate)<br>(2) Permissible stress is to be $\sigma_Y$ and $\tau_Y$ as specified in **-1** above<br>(3) As load conditions, $F_{SC}$ for $n_1 = 3$ as specified in **4.4.2.1-2** for the load acting at the bottom steel coils, and $F_{SC}$ for $n_1 = 1$ and no key coil for the load acting at the third tier are to be considered. | $F_{SC}$: Load (*kN*) acting on the side frame according to **4.4.2.1-2**<br>$\ell_{1bdg}$: Effective bending span (*m*) of the side frame. Where a bracket is provided, the end of the effective bending span is to be taken to the position where the depth of the side frame and the bracket is equal to $2h_w$ (*See* **Fig. 6.4.3-2, Part 1**).<br>$d_{shr}$: Effective shear depth (*mm*) of stiffener according to **3.6.4.2, Part 1** | |
| EFFECTIVE DATE AND APPLICATION<br>**1.** The effective date of this amendment is 26 June 2025.<br>**2.** Notwithstanding the amendments to the Rules, the current requirements apply to ships for which the date of contract for construction is before the effective | | |

| Amended | Original | Remarks |
|---|---|---|
| date.<br>**3.** Notwithstanding the provision of preceding **2.**, the amendments to the Rules may apply to ships for which the date of contract for construction is before the effective date upon requests. | | |
| **Part 2-6 VEHICLES CARRIERS AND ROLL-ON/ROLL-OFF SHIPS**<br>**Chapter 3 STRUCTURAL DESIGN PRINCIPLES**<br>**3.1 Minimum Requirements** | **Part 2-6 VEHICLES CARRIERS AND ROLL-ON/ROLL-OFF SHIPS**<br>**Chapter 3 STRUCTURAL DESIGN PRINCIPLES**<br>**3.1 Minimum Requirements** | Clarifies application of minimum thickness requirements for PCC and Ro-Ro ships |
| **3.1.1 Minimum Thickness**<br>**3.1.1.1 Shell Plating in way of Superstructures**<br>The minimum thickness requirements specified in **3.5.1.1, Part 1** need not be applied to shell plating from a height twice the height $h_s$ above the freeboard deck to the strength deck. However, the thickness of such plating is not to be less than 5.5 *mm*. | **3.1.1 Minimum Thickness** | 3.1.1.1 was moved to 3.1.1.2 and new requirements were added as 3.1.1.1. |
| **3.1.1.2 Structures in Cargo Spaces**<br>For structural members above the freeboard deck in cargo spaces, the minimum thickness requirements in **3.5.1.3, Part 1** need not be applied. | **3.1.1.1 Structure in Cargo space**<br>For the structure of the upper freeboard deck in cargo spaces, the requirements of **3.5, Part 1** may be applied. | (Changed) |

| Amended | Original | Remarks |
|---|---|---|
| **3.1.1.3 Car Deck**<br>The minimum thickness requirements specified in **3.5.1, Part 1** need not be applied to the plates, stiffeners and girders of car decks loaded solely with wheeled vehicles. However, the gross thicknesses of deck plates, and the webs and flanges of stiffeners attached to decks are not to be less than 5 *mm*.<br>**3.1.2 Slenderness Requirements**<br>**3.1.2.1 Shell Plating**<br>The thickness of shell plating of superstructure is not to be less than that obtained from the following formula.<br>Shell plating of transverse framing system:<br>$$t=b\sqrt{\frac{\sigma_Y}{E}}\left(0.9-\sqrt{0.81-\frac{0.8\sigma_{min}}{\sigma_Y}}\right)$$<br>Shell plating of longitudinal framing system:<br>$$t=b\sqrt{\frac{\sigma_Y}{E}}\cdot\left(\frac{0.06\alpha+2.19-\sqrt{(0.06\alpha+2.19)^2-\frac{2\alpha\sigma_{min}(3.7-1.2\alpha)}{\sigma_Y}}}{3.7-1.2\alpha}\right)$$<br>$a$: Length (*mm*) of the longer side of plate<br>$b$: Length (*mm*) of the shorter side of plate<br>$\alpha$: Aspect ratio, to be taken as $a/b$<br>$\sigma_{min}$: Minimum vertical proof stress considered, to be taken as: | **3.1.2 Car Deck**<br>**3.1.2.1 Application**<br>Plates, stiffeners and girders of car decks solely loaded with wheeled vehicles need not comply with the minimum requirements of **3.5, Part1**. However, the plates and stiffeners of such decks are to comply with **3.1.2.2**.<br>**3.1.2.2 Minimum Thickness of the Car Deck**<br>**1** The gross thickness of the car deck is not to be less than 5 *mm*.<br>**2** The gross thickness of web and flange of stiffeners attached to the car deck is not to be less than 5 *mm*.<br>(Newly added) | 3.1.2 was moved to 3.1.1.3 and 3.1.2.2. |

## Amended-Original Requirements Comparison Table
## (Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 1))

| Amended | Original | Remarks |
|---|---|---|
| Shell plating below the midpoint between the freeboard deck and upper deck: 50 ($N/mm^2$)<br>Shell plating above the midpoint between the freeboard deck and upper deck: 30 ($N/mm^2$)<br><br>Fig. 3.1.2-1Minimum Vertical Proof Stress Considered<br><br> <br><br>**3.1.2.2 Car Decks**<br>The slenderness requirements specified in **3.5.2, Part 1** need not be applied to the plates, stiffeners and girders of car decks loaded solely with wheeled vehicles. | | |

Amended-Original Requirements Comparison Table
(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 1))

| Amended | Original | Remarks |
|---|---|---|
| **Chapter 9 FATIGUE**<br>**9.5 Screening Assessment**<br>**9.5.6 Fatigue Strength Assessment**<br>**9.5.6.3 Fatigue Damage Calculation and Fatigue Strength Assessment Criterion**<br>**1** The cumulative fatigue damage $D$ is to be obtained from the following formula:<br>$D=\sum_{j}\alpha_{(j)}\cdot D_{(j)}$<br>$\alpha_{(j)}$: Fraction of time of loading condition (*j*) in the fatigue design life, as given in **Table 9.3.1-1**.<br>$D_{(j)}$: Cumulative fatigue damage for the fatigue design life for loading condition (*j*) calculated by the following formula:<br>$D_{(j)}=\frac{\underline{\underline{T_{FD}}}-T_C}{\underline{T_{FD}}}D_{air,(j)}+\frac{T_C}{\underline{T_{FD}}}D_{cor,(j)}$<br>$D_{air,(j)}$, $D_{cor,(j)}$ : Cumulative fatigue damage in the in-air environment and corrosive environment for the fatigue design life for loading condition (*j*).<br>$D_{air,(j)}=\frac{\underline{N_{FD}}}{K_{2,air}}\frac{\Delta\sigma_{FS,(j)}^{m}}{(\ln N_R)^{m/\xi}}\cdot\mu_{(j)}\cdot\Gamma\left(1+\frac{m}{\xi}\right)$<br>$D_{cor,(j)}=\frac{\underline{N_{FD}}}{K_{2,cor}}\frac{\Delta\sigma_{FS,(j)}^{m}}{(\ln N_R)^{m/\xi}}\cdot\Gamma\left(1+\frac{m}{\xi}\right)$ | **Chapter 9 FATIGUE**<br>**9.5 Screening Assessment**<br>**9.5.6 Fatigue Strength Assessment**<br>**9.5.6.3 Fatigue Damage Calculation and Fatigue Strength Assessment Criterion**<br>**1** The cumulative fatigue damage $D$ is to be obtained from the following formula:<br>$D=\sum_{j}\alpha_{(j)}\cdot D_{(j)}$<br>$\alpha_{(j)}$: Fraction of time of loading condition (*j*) in the fatigue design life, as given in **Table 9.3.1-1**.<br>$D_{(j)}$: Cumulative fatigue damage for the fatigue design life for loading condition (*j*) calculated by the following formula:<br>$D_{(j)}=\frac{\underline{\underline{T_{DF}}}-T_C}{\underline{T_{DF}}}D_{air,(j)}\underset{-}{\cdot}+\frac{T_C}{\underline{T_{DF}}}D_{cor,(j)}$<br>$D_{air,(j)}$, $D_{cor,(j)}$ : Cumulative fatigue damage in the in-air environment and corrosive environment for the fatigue design life for loading condition (*j*).<br>$D_{air,(j)}=\frac{\underline{N_{DF}}}{K_{2,air}}\frac{\Delta\sigma_{FS,(j)}^{m}}{(\ln N_R)^{m/\xi}}\cdot\mu_{(j)}\cdot\Gamma\left(1+\frac{m}{\xi}\right)$<br>$D_{cor,(j)}=\frac{\underline{N_{DF}}}{K_{2,cor}}\frac{\Delta\sigma_{FS,(j)}^{m}}{(\ln N_R)^{m/\xi}}\cdot\Gamma\left(1+\frac{m}{\xi}\right)$ | Corrects inconsistencies in wording: Not $T_{DF}$ but $T_{FD}$ |

Amended-Original Requirements Comparison Table

(Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 1))

| Amended | Original | Remarks |
|---|---|---|
| $\underline{N_{FD}}$: Total number of cycles in the fatigue design life $\underline{T_{DF}}$ .<br>$\underline{N_{FD}} = \frac{60 \times 60 \times 24 \times 365.25}{4\log L_c} \cdot f_D \cdot \underline{T_{FD}}$<br>(Omitted) | $\underline{N_{DF}}$: Total number of cycles in the fatigue design life $\underline{T_{DF}}$ .<br>$\underline{N_{DF}} = \frac{60 \times 60 \times 24 \times 365.25}{4\log L_c} \cdot f_D \cdot \underline{T_{DF}}$<br>(Omitted) | |
| **Part 2-9 SHIPS CARRYING LIQUEFIED GASES IN BULK (INDEPENDENT PRISMATIC TANKS TYPE A/B)**<br>**Chapter 9 FATIGUE**<br>**9.1 General**<br>**9.1.2 Assumptions**<br>**9.1.2.1**<br>The following assumptions **(1)** to **(9)** are made in the fatigue strength assessment specified in this Chapter.<br>(1) A linear cumulative damage model (i.e. Miner's rule) given in **9.5.4, Part 1** is used in the calculation of fatigue damage.<br>(2) Fatigue design life $\underline{T_{FD}}$ is taken not less than 25 *years*.<br>((3) to (9) are omitted.) | **Part 2-9 SHIPS CARRYING LIQUEFIED GASES IN BULK (INDEPENDENT PRISMATIC TANKS TYPE A/B)**<br>**Chapter 9 FATIGUE**<br>**9.1 General**<br>**9.1.2 Assumptions**<br>**9.1.2.1**<br>The following assumptions **(1)** to **(9)** are made in the fatigue strength assessment specified in this Chapter.<br>(1) A linear cumulative damage model (i.e. Miner's rule) given in **9.5.4, Part 1** is used in the calculation of fatigue damage.<br>(2) Fatigue design life $\underline{T_{DF}}$ is taken not less than 25 *years*.<br>((3) to (9) are omitted.) | Corrects inconsistencies in wording: Not $T_{DF}$ but $T_{FD}$ |

# Amended-Original Requirements Comparison Table
# (Amendment related to Part C of the Rules for Survey and Construction of Steel Ships (2024 Amendment 1))

| Amended | Original | Remarks |
|---|---|---|
| EFFECTIVE DATE AND APPLICATION<br>**1.** The effective date of the amendment is 26 December 2024. | | |