

# **RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS**

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

**Part C**

**Hull Construction and Equipment**

**Rules for the Survey and Construction of Steel Ships**

**Part C**

**2008**

**AMENDMENT NO.2**

**Guidance for the Survey and Construction of Steel Ships**

**Part C**

**2008**

**AMENDMENT NO.2**

Rule No.36 / Notice No.37      29th May 2008

Resolved by Technical Committee on 1st February 2008

Approved by Board of Directors on 26th February 2008

**ClassNK**  
NIPPON KAIJI KYOKAI

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# **RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS**

**Part C**

**Hull Construction and Equipment**

**RULES**

**2008 AMENDMENT NO.2**

Rule No.36 29th May 2008

Resolved by Technical Committee on 1st February 2008

Approved by Board of Directors on 26th February 2008

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

## Part C HULL CONSTRUCTION AND EQUIPMENT

### Amendment 2-1

### Chapter 1 GENERAL

#### 1.1 General

##### 1.1.11 Application of Steels

Table C1.1 has been amended as follows.

**Table C1.1 Application of Mild Steels for Various Structural Members**

Structural member	Application		Thickness of plate : $t$ (mm)					
			$t \leq 15$	$15 < t \leq 20$	$20 < t \leq 25$	$25 < t \leq 30$	$30 < t \leq 40$	$40 < t \leq 50$
<b>Shell Plating</b>								
Sheer strake at strength deck	within 0.4L amidship	$L_1 \leq 250$	$A^{*1*4}$	$B$	$D$	$E$		
		$L_1 > 250$	$E$					
	within 0.6L amidship excluding the above		$A^{*1*4}$	$B$	$D$	$E$		
	other than those mentioned above		$A^{*1*4}$			$B$	$D$	
Side plating	within 0.4L amidship	within 0.1D downward from the lower surface of strength deck	$A^{*1*4}$	$B$	$D$	$E$		
		other than those mentioned above	$A^{*1*4}$			$B$	$D$	
Bilge strake	within 0.4L amidship	$L_1 > 250$	$D$			$E$		
		ships of $150 < L_1 \leq 250$ , having double bottom structures and ships having single bottom structures	$A^{*1*4}$	$B$	$D$	$E$		
		<del>ships of <math>L_1 \leq 150</math>, having double bottom structures</del>	<del><math>A</math></del>	<del><math>B</math></del>	<del><math>D</math></del>	<del><math>E</math></del>		
	within 0.6L amidship excluding the above		$A^{*1*4}$	$B$	$D$	$E$		
	other than those mentioned above		$A^{*1*4}$			$B$	$D$	
Bottom plating including keel plate	within 0.4L amidship		$A$	$B$	$D$	$E$		
<b>Deck Plating</b>								
Stringer plate in strength deck	within 0.4L amidship	$L_1 \leq 250$	$A^{*2}$	$B$	$D$	$E$		
		$L_1 > 250$	$E$					
	within 0.6L amidship excluding the above		$A$	$B$	$D$	$E$		
	other than those mentioned above		$A$			$B$	$D$	

Structural member	Application		Thickness of plate : $t$ (mm)					
			$t \leq 15$	$15 < t \leq 20$	$20 < t \leq 25$	$25 < t \leq 30$	$30 < t \leq 40$	$40 < t \leq 50$
Strength deck strake adjoining to longitudinal bulkhead	within 0.4L amidship		$A^{*2}$	$B$	$D$		$E$	
	within 0.6L amidship excluding the above		$A$		$B$	$D$		$E$
	other than those mentioned above		$A$			$B$	$D$	
Strength deck other than mentioned above	within 0.4L amidship		$A^{*2}$		$B$	$D$		$E$
Strength deck at cargo hatch corner	container carriers and other ships with similar hatch openings configuration		$A^{*2}$	$B$	$D$		$E$	
	bulk carriers, ore carriers, combination carriers and other ships with similar hatch openings configuration	within 0.6L amidship	$A^{*2}$	$B$	$D$		$E$	
		cargo region excluding the above	$A$		$B$	$D$		$E$
	other than those mentioned above within 0.4L amidship		$A^{*2}$		$B$	$D$		$E$
Deck plating exposed to weather, in general	within 0.4L amidship		$A$			$B$	$D$	
Longitudinal bulkhead plate								
Upper strake in longitudinal bulkhead adjoining to strength deck	within 0.4L amidship		$A$		$B$	$D$		$E$
Other than those mentioned above	within 0.4L amidship		$A$			$B$	$D$	
Longitudinals								
Upper strake in sloping plate of topside tank adjoining to strength deck	within 0.4L amidship		$A$		$B$	$D$		$E$
Longitudinal members above strength deck including bracket and face plate of longitudinals	within 0.4L amidship		$A^{*3}$		$B$	$D$		$E$
Cargo Hatch								
Face plate and web of cargo hatch coaming longitudinally extended on the strength deck	longitudinal members over 0.15L and end brackets and deck house transition	within 0.4L amidship	$D$			$E$		
		within 0.6L amidship excluding the above	$D$					$E$
		other than those mentioned above	$D$					

Structural member	Application	Thickness of plate : $t$ (mm)				
		$t \leq 15$	$15 < t \leq 20$	$20 < t \leq 25$	$25 < t \leq 30$	$30 < t \leq 40$
Stern						
Stern frame, rudderhorn, shaft bracket	—	A	B	D	E	
Rudder						
Rudder plate	—	A	B	D	E	
Other						
Other members than those mentioned above		$A^{*1*4}$				

**Remarks:**

1. For ships with length of  $L_1$  exceeding  $150m$  and single strength deck, single side strakes for ships without inner continuous longitudinal bulkhead(s) between bottom and the strength deck within cargo region are not to be less than grade  $KB$  as defined in **Part K of the Rules**.
2. For ships with length of  $L_1$  exceeding  $150m$  and single strength deck, longitudinal strength members of strength deck plating within  $0.4L$  amidship are not to be less than grade  $KB$  as defined in **Part K of the Rules**.
3. For ships with length of  $L_1$  exceeding  $150m$  and single strength deck, continuous longitudinal strength members above strength deck within  $0.4L$  amidship are not to be less than grade  $KB$  as defined in **Part K of the Rules**.
4. For ships with ice strengthening conforming to **Chapter 5, Part I of the Rules**, shell strakes in way of ice strengthening area for plates are not to be less than grade  $KB$  as defined in **Part K of the Rules**.

**Notes:**

1.  $A, B, D, E$  in **Table C1.1** and  $AH, DH, EH$  in **Table C1.2** refer to the following grades of steel.  
~~(1) A: KA, B: KB, D: KD, E: KE~~  
~~(2) AH: KA32, KA36 and KA40; DH: KD32, KD36 and KD40; EH: KE32, KE36 and KE40~~
2.  $L_1$  in **Table C1.1** and **Table C1.2** is the length ( $m$ ) of ship specified in **2.1.2 Part A** or  $0.97$  times the length ( $m$ ) of the ship on the load line, whichever is smaller.
3. Where the strength deck strake adjoined to the inner skin bulkhead of double hull ships is not a deck stringer plate, the deck strake may be treated as an ordinary strength deck strake.
4. ~~In **Table C1.1** and **Table C1.2**, a~~Applicable areas of bilge strakes is as follows.
  - (1) If the point where the bottom flat line stops being parallel to the centre line of the ship is within  $0.6 L$  amidships, the applicable part is to be taken as  $0.6 L$  amidships.
  - (2) If the point where the bottom flat line stops being parallel to the centre line of the ship is outside  $0.6 L$  amidships, the applicable part is to be taken as is.
5. The type of steel used in way of lower pintle for type D and type E rudders specified in **Chapter 3** and in way of upper part of type C rudder specified in **Chapter 3** is to be approved by the Society.

Table C1.2 has been amended as follows.

**Table C1.2 Application of High Tensile Steels for Various Structural Members**

Structural member	Application		Thickness of plate : $t$ (mm)						
			$t \leq 15$	$15 < t \leq 20$	$20 < t \leq 25$	$25 < t \leq 30$	$30 < t \leq 40$	$40 < t \leq 50$	
Shell plating									
Sheer strake at strength deck	within 0.4L amidship	$L_1 \leq 250$	AH		DH		EH		
		$L_1 > 250$	EH						
	within 0.6L amidship excluding the above		AH			DH		EH	
other than those mentioned above		AH					DH		
Side plating	within 0.4L amidship	within 0.1D downward from the lower surface of strength deck	AH			DH		EH	
		other than those mentioned above	AH					DH	
Bilge strake	within 0.4L amidship	$L_1 > 250$	DH				EH		
		ships of $150 < L_1 \leq 250$ , having double bottom structures and ships having single bottom structures	AH		DH		EH		
		<del>ships of <math>L_1 \leq 150</math>, having double bottom structures</del>	<del>AH</del>		<del>DH</del>		<del>EH</del>		
	within 0.6L amidship excluding the above		AH			DH		EH	
other than those mentioned above		AH					DH		
Bottom plating including keel plate	within 0.4L amidship		AH			DH		EH	
Deck plating									
Stringer plate in strength deck	within 0.4L amidship	$L_1 \leq 250$	AH		DH		EH		
		$L_1 > 250$	EH						
	within 0.6L amidship excluding the above		AH			DH		EH	
other than those mentioned above		AH					DH		
Strength deck strake adjoining to longitudinal bulkhead	within 0.4L amidship		AH		DH		EH		
	within 0.6L amidship excluding the above		AH			DH		EH	
	other than those mentioned above		AH					DH	
Strength deck other than mentioned above	within 0.4L amidship		AH			DH		EH	
Strength deck at cargo hatch corner	container carriers and other ships with similar hatch openings configuration		AH		DH		EH		
	bulk carriers, ore carriers, combination carriers and other ships with similar hatch openings configuration	within 0.6L amidship	AH		DH		EH		
		cargo region excluding the above	AH			DH		EH	
	other than those mentioned above within 0.4L amidship		AH			DH		EH	

Structural member	Application	Thickness of plate : $t$ (mm)					
		$t \leq 15$	$15 < t \leq 20$	$20 < t \leq 25$	$25 < t \leq 30$	$30 < t \leq 40$	$40 < t \leq 50$
Deck plating exposed to weather, in general	within 0.4L amidship	AH					DH
Longitudinal bulkhead plate							
Upper strake in longitudinal bulkhead adjoining to strength deck	within 0.4L amidship	AH			DH		EH
Other than those mentioned above	within 0.4L amidship	AH					DH
Longitudinals							
Upper strake in sloping plate of topside tank adjoining to strength deck	within 0.4L amidship	AH			DH		EH
Longitudinal members above strength deck including bracket and face plate of longitudinals	within 0.4L amidship	AH			DH		EH
Cargo Hatch							
Face plate and web of cargo hatch coaming longitudinally extended on the strength deck	longitudinal members over 0.15L	within 0.4L amidship	DH			EH	
	and	within 0.6L amidship excluding the above	DH				EH
	end brackets and deck house transition	other than those mentioned above	DH				
Stern							
Stern frame, rudderhorn, shaft bracket	—	AH			DH		EH
Rudder							
Rudder plate	—	AH			DH		EH
Other							
Other members than those mentioned above		AH					

Notes:

1. ~~A, B, D, E in Table C1.1 and~~ AH, DH, EH in Table C1.2 refer to the following grades of steel.  
 (1) ~~A: KA, B: KB, D: KD, E: KE~~  
 (2) AH: KA32, KA36 and KA40; DH: KD32, KD36 and KD40; EH: KE32, KE36 and KE40
2.  ~~$L_1$  in Table C1.1 and Table C1.2~~ is the length (m) of ship specified in 2.1.2 Part A or 0.97 times the length (m) of the ship on the load line, whichever is smaller.
3. Where the strength deck strake adjoined to the inner skin bulkhead of double hull ships is not a deck stringer plate, the deck strake may be treated as an ordinary strength deck strake.
4. ~~In Table C1.1 and Table C1.2,~~ applicable areas of bilge strakes is as follows.  
 (1) If the point where the bottom flat line stops being parallel to the centre line of the ship is within 0.6 L amidships, the applicable part is to be taken as 0.6 L amidships.

- (2) If the point where the bottom flat line stops being parallel to the centre line of the ship is outside 0.6 *L* amidships, the applicable part is to be taken as is.
5. The type of steel used in way of lower pintle for type D and type E rudders specified in **Chapter 3** and in way of upper part of type C rudder specified in **Chapter 3** is to be approved by the Society.

## EFFECTIVE DATE AND APPLICATION (Amendment 2-1)

1. The effective date of the amendments is 1 July 2008.
2. Notwithstanding the amendments to the Rules, the current requirements may apply to ships for which the date of contract for construction\* is before the effective date.  
\*“contract for construction” is defined in IACS Procedural Requirement(PR) No.29 (Rev.4).

### IACS PR No.29 (Rev.4)

1. The date of “contract for construction” of a vessel is the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. This date and the construction numbers (i.e. hull numbers) of all the vessels included in the contract are to be declared to the classification society by the party applying for the assignment of class to a newbuilding.
2. The date of “contract for construction” of a series of vessels, including specified optional vessels for which the option is ultimately exercised, is the date on which the contract to build the series is signed between the prospective owner and the shipbuilder.  
For the purpose of this Procedural Requirement, vessels built under a single contract for construction are considered a “series of vessels” if they are built to the same approved plans for classification purposes. However, vessels within a series may have design alterations from the original design provided:
  - (1) such alterations do not affect matters related to classification, or
  - (2) If the alterations are subject to classification requirements, these alterations are to comply with the classification requirements in effect on the date on which the alterations are contracted between the prospective owner and the shipbuilder or, in the absence of the alteration contract, comply with the classification requirements in effect on the date on which the alterations are submitted to the Society for approval.The optional vessels will be considered part of the same series of vessels if the option is exercised not later than 1 year after the contract to build the series was signed.
3. If a contract for construction is later amended to include additional vessels or additional options, the date of “contract for construction” for such vessels is the date on which the amendment to the contract, is signed between the prospective owner and the shipbuilder. The amendment to the contract is to be considered as a “new contract” to which **1.** and **2.** above apply.
4. If a contract for construction is amended to change the ship type, the date of “contract for construction” of this modified vessel, or vessels, is the date on which revised contract or new contract is signed between the Owner, or Owners, and the shipbuilder.

#### Notes:

1. This Procedural Requirement applies to all IACS Members and Associates.
2. This Procedural Requirement is effective for ships “contracted for construction” on or after 1 January 2005.
3. Revision 2 of this Procedural Requirement is effective for ships “contracted for construction” on or after 1 April 2006.
4. Revision 3 of this Procedural Requirement was approved on 5 January 2007 with immediate effect.
5. Revision 4 of this Procedural Requirement was adopted on 21 June 2007 with immediate effect.

## Chapter 32 CONTAINER CARRIERS

Section 32.9 has been added as follows.

### **32.9 Welding**

#### **32.9.1 Application**

1 Fillet welding is to be applied to longitudinals with a web plate thickness above 40mm and up to 80mm, which are used for the strength deck or for side shell plating and longitudinal bulkheads that extend upwards from a position 0.25D below the strength deck.

2 Where longitudinals with a web plate thickness above 80mm are used, the kind and size of the weldings are to be at the discretion of the Society.

#### **32.9.2 Fillet Welding**

1 Fillet welding is to be continuous.

2 The size of fillet is to be not less than 8mm.

### EFFECTIVE DATE AND APPLICATION (Amendment 2-2)

1. The effective date of the amendments is 1 December 2008.
2. Notwithstanding the amendments to the Rules, the current requirements may apply to ships for which the date of contract for construction is before the effective date.
3. Notwithstanding the provision of preceding 2., the amendments to the Rules may apply to ships for which the application is submitted to the Society before the effective date upon request by the owner.

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# **GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS**

**Part C**

**Hull Construction and Equipment**

**GUIDANCE**

**2008 AMENDMENT NO.2**

Notice No.37 29th May 2008

Resolved by Technical Committee on 1st February 2008

AMENDMENT TO THE GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

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

**Part C HULL CONSTRUCTION AND EQUIPMENT**

**C1 GENERAL**

**C1.1 General**

**C1.1.7 Materials**

Sub-paragraph -5 has been added as follows.

**1** Where high tensile steel are used, the construction and scantlings are to be determined in accordance with **Annex C1.1.7 “GUIDANCE FOR HULL CONSTRUCTION CONTAINING HIGH TENSILE STEEL MEMBERS.”**

**2** Where the requirements in **1.1.7-2.(3), Part C** of the Rules are applied, data corresponding to the standard of steels used (extent of their use, location of structural members, section rigidity, fatigue strength, minimum thickness, etc.) is to be submitted to the Society and approved.

**3** The requirements of **1.1.7-3(2), Part C** of the Rules apply to members which do not come in contact with sea water, and the values in **(1)** and **(2)** may be deducted from the scantlings required by relevant requirements.

(1) For stainless steel

(a) Where the scantling is determined by the thickness of the plate: *1.0 mm*

(b) Where the scantling is determined by the section modulus: 5%

(2) For stainless clad steel

Where the scantling is determined by the thickness of plate: *0.5mm*

**4** Where aluminium alloys specified in **Chapter 8, Part K** of the Rules are used for the main hull structure, data corresponding to the standard of the materials used (extent of their use, location of structural members, section rigidity, fatigue strength, weldability, corrosion protection, etc.) is to be submitted to the Society and approved. However, aluminium alloys whose material grade is 6005AS, 6061P, or 6061S, or is an alloy that does not have suitable anti-corrosion characteristics as deemed by the Society are not to be used for parts likely to come into contact with sea water during normal operation, unless approved otherwise by the Society.

**5** In cases where it has been deemed appropriate by the Society, fiber reinforced plastic (FRP) may be used for equipment specified in this Part. In this case, such usage is subject to the requirements given in Annex C1.1.7-5 “Guidance for the Use of Fiber Reinforced Plastic (FRP)”.

Annex C1.1.7-5 has been added as follows.

## **Annex C1.1.7-5            GUIDANCE FOR THE USE OF FIBER REINFORCED    PLASTIC (FRP)**

### **1.1        General**

#### **1.1.1    Application**

This Annex provides standards for choosing appropriate Fiber Reinforced Plastic (hereinafter, referred to as “FRP”) products, in cases where their use has been approved by the Society, for each ship design in accordance with their purpose of use and location of use on a case by case basis.

#### **1.1.2    Documents to be submitted**

The following plans and documents are to be submitted.

- (1) Plans that indicate the location of use, service conditions, arrangement, etc..
- (2) Documents describing any special electrical characteristics and service conditions of FRP to be used.
- (3) Plans and Documents regarding the application procedures and joint procedures of the FRP to be used.
- (4) Other drawings and data considered necessary by the Society

### **1.2        General for FRP**

#### **1.2.1    General**

1 All FRP have to be approved by the Society in accordance with the requirements in **Chapter 9, Part 2 of Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use** and be adequate for the service conditions of its use.

2 All FRP used in hazardous areas are to have no electrostatic properties.

3 All FRP are to be resistant to any substances they are expected to be exposed to during service.

#### **1.2.2    Strength of Connections**

1 The connections of FRP are to be of sufficient strength.

2 All tightening of joints is to be performed in accordance with the Manufacturer’s instructions.

3 All bonding procedure specifications are to be submitted to the Society.

### **1.3        Requirements for FRP Depending on Service and/or Locations**

#### **1.3.1    Requirements for FRP Depending on Service and/or Locations**

1 The requirements for fire integrity, fire retardance, flame spread and smoke generation required for FRP are, in principle, to be in accordance with those given in **Table 1.3.1**. If a FRP corresponds to the multiple classifications of service in **Table 1.3.1**, it is to satisfy the most stringent requirements.

2 Subdivisions other than those specified in **Table 1.3.1** are to be deemed appropriate by the Society.

**3** FRP may be used for ladders, handrails, steps and small platforms, etc. because they are not considered to be part of the hull and, therefore, required to have the means of access specified in **Chapter 35, Part C of the Rules**.

**Table 1.3.1 Applicable Requirements of FRP**

Location	Service	Fire Integrity	Fire Retardance	Flame Spread	Smoke Generation
Cargo Pump Rooms	All personnel walkways, catwalk, ladder, platforms or access areas	L1	○	○	—
Cargo Holds	Walkways or areas which may be used for escape, or access for firefighting, emergency operation or rescue	L1	○	—	—
	Personnel walkways, catwalks, ladders, platforms or access areas other than those described above	—	○	—	—
Cargo Tanks	All personnel walkways, catwalks, ladders, platforms or access areas	— <sup>3)</sup>	○	—	—
Fuel Oil Tanks	All personnel walkways, catwalks, ladders, platforms or access areas	— <sup>3)</sup>	○	—	—
Ballast Water Tanks	All personnel walkways, catwalks, ladders, platforms or access areas	— <sup>4)</sup>	○	—	—
Cofferdams, void spaces, double bottoms, pipe tunnels, etc.	All personnel walkways, catwalks, ladders, platforms or access areas	— <sup>4)</sup>	○	—	—
Accommodation, service, and control spaces	All personnel walkways, catwalks, ladders, platforms or access areas	L1	○	○	○
Lifeboat embarkation or temporary safe refuse stations in open deck areas	All personnel walkways, catwalks, ladders, platforms or access areas	L2	○	—	—
Open Decks or semi-enclosed areas	Walkways or areas which may be used for escape, or access for firefighting, emergency operation or rescue <sup>6)</sup>	L3 <sup>5)</sup>	○	—	—
	Personnel walkways, catwalks, ladders, platforms or access areas other than those described above	—	○	—	—

Note:

1) SYMBOL

○: Fire retardance test specified in 9.4.2-2, flame spreading test specified in 9.4.2-3, smoke generation test specified in 9.4.2-3, Chapter 9, Part 2 of Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use are to be satisfied.

—: Not applicable

2) ABBREVIATIONS

L1: L1 is the abbreviations of fire retardance Level 1. FRP complying with L1 means it complies with the standard of fire retardance test specified in 9.4.2-1(3), Chapter 9, Part 2 of Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use.

L2: L2 is the abbreviations of fire retardance Level 2. FRP complying with L2 means it complies with the standard of fire retardance test specified in 9.4.2-1(2), Chapter 9, Part 2 of Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use.

L3: L3 is the abbreviations of fire retardance Level 3. FRP complying with L3 means it complies with the standard of fire retardance test specified in 9.4.2-1(3), Chapter 9, Part 2 of Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use.

3) If these spaces are normally entered when underway, FRP of L1 integrity is to be required.

4) If these spaces are normally entered when underway, FRP of L3 integrity is to be required.

5) Vessels fitted with fixed foam fire-extinguishing systems and fixed dry chemical powder type extinguishing systems on deck require FRP of L1 integrity for foam system operational areas and access routes.

6) Including the gangways to bow specified in 23.7.2, Part C of the Rules.

#### EFFECTIVE DATE AND APPLICATION

1. The effective date of the amendments is 29 May 2008.