



財團法人驗船中心

CR CLASSIFICATION SOCIETY

# **RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF STEEL SHIPS 2026**

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**AMENDMENT**

*June 2026*





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# **RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF STEEL SHIPS 2026**

## **AMENDMENT**

| The following Parts have been amended and the effective dates are: |                       |
|--------------------------------------------------------------------|-----------------------|
| <b>Part</b>                                                        | <b>Effective date</b> |
| I                                                                  | 1 January, 2027       |
| II                                                                 | 1 January, 2027       |
| III                                                                | 1 January, 2027       |
| IV                                                                 | 1 January, 2027       |
| VI                                                                 | 1 January, 2027       |
| VII                                                                | 1 January, 2027       |
| VIII                                                               | 1 January, 2027       |
| IX                                                                 | 1 January, 2027       |
| XI                                                                 | 1 January, 2027       |
| XII                                                                | 1 January, 2027       |
| XIII                                                               | 1 January, 2027       |
| XV                                                                 | 1 January, 2027       |

This Amendment and *the Rules for the Construction and Classification of Steel Ships 2026* are to be consolidated and published as *January 2027 Edition*.

AMENDMENT TO "THE RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF  
STEEL SHIPS 2026"

## **PART I          CLASSIFICATION AND SURVEY**

## List of major changes in Part I from 2026 edition

|               |         |
|---------------|---------|
| Table I 1-2   | Revised |
| Table I 1-3   | Revised |
| Table I 1-6   | Revised |
| 1.10.1~1.10.2 | Revised |
| 2.6.5(a)      | Revised |
| 2.7.2         | Revised |
| 3.10          | New     |
| 3.11          | New     |

Rules for the Construction and Classification of Steel Ships 2026 have been partly amended as follows:

## Chapter 1 Classification of Steel Ship

### 1.4 Class Notations

*Table I 1-2 has been amended as follows:*

**Table I 1-2  
List of Ship Type Notation**

| Notation             | Description                                                                                                                                                                                                                                                                                                                     | Reference                                          |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| <b>Barge</b>         | Non-self-propelled barges intended to be towed or pushed                                                                                                                                                                                                                                                                        | Part II and Part III<br>Chapter 9                  |
| ....                 |                                                                                                                                                                                                                                                                                                                                 |                                                    |
| <del><b>IP</b></del> | <del>This notation will be assigned to cargo ships and highspeed cargo craft of 500 GT and upwards which carry more than 12 industrial personnel that comply with the IMO Resolution MSC.521(106) containing the new SOLAS Chapter XV and International Code of Safety for Ships Carrying Industrial Personnel (IP Code).</del> | <del>IMO Resolution MSC.521(106) and IP Code</del> |

Note:

- (1) For ships deemed necessary by the Society, an appropriate notation except specified above may be affixed to classification characters.

Table I 1-3 has been amended as follows:

**Table I 1-3**  
**List of Additional Service Notation**

| Notation                          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                               | Reference                                                              |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| CSR                               | This notation will be assigned to bulk carriers or oil tankers which fully comply with the IACS's Common Structural Rules.                                                                                                                                                                                                                                                                                                                                | IACS's Common Structural Rules                                         |
| ....                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                        |
| NR-N                              | This notation (the comfort Rating of Noise), with N being I or II, will be assigned to ships where the applicable requirements in Chapter 34 of Part II are complied with.                                                                                                                                                                                                                                                                                | Part II Chapter 34                                                     |
| ....                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                        |
| IP                                | This notation will be assigned to cargo ships and high-speed cargo craft of 500 GT and upwards which carry more than 12 industrial personnel and that comply with the IMO Resolution MSC.521(106) containing the new SOLAS Chapter XV and International Code of Safety for Ships Carrying Industrial Personnel (IP Code).                                                                                                                                 | IMO Resolution MSC.521(106) and IP Code                                |
| VR                                | This notation will be assigned to ships which comply with the limits for vibration of ISO 20283-5:2016, as given in Table II 34-2.                                                                                                                                                                                                                                                                                                                        | Part II Chapter 34                                                     |
| Smartship{Hx; Mx; Ex; Nx; Cx; Ix} | This notation will be assigned to ships which comply with the requirements of the Guidelines in terms of smart hull, smart machinery, smart energy efficiency management, smart navigation, smart cargo management, smart integration platform. If the ship complies with the additional requirements for specific operations or design condition, the corresponding qualifiers specified in Guidelines for Smart Ships will be affixed to this notation. | Guidelines for Smart Ships                                             |
| HLA                               | This notation (Heavy Lift Appliance) will be assigned to ships equipped with heavy lift appliance.                                                                                                                                                                                                                                                                                                                                                        | Rules for the Construction and Survey of Cargo Gear Lifting Appliances |

*Table I 1-6 has been amended as follows:*

**Table I 1-6**  
**List of Special Equipment Notation**

| Notation               | Description                                                                                                                                                                                                                                                                           | Reference                                                                                            |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| <b>CCB</b>             | This notation (Centralized System for Cargo and Ballast Water Handling) will be assigned to ships provided with centralized system for cargo and ballast water handling.                                                                                                              | Part VIII/7.10                                                                                       |
| ....                   |                                                                                                                                                                                                                                                                                       |                                                                                                      |
| <b>Cyber-S</b>         | The notation ( <b>Cyber-S</b> ) will be assigned to ships which comply with the requirements in <b>Part I</b> of the Guidelines for Cyber Security Onboard Ships.                                                                                                                     | Guidelines for Cyber Security Onboard Ships<br><b>Part I</b>                                         |
| <b>Cyber-R</b>         | This notation ( <b>Cyber-R</b> ) will be assigned to ships where the applicable requirements in <del>3.2.12(e)(i)</del> <b>Part II</b> of <del>Part VIII</del> the Guidelines for Cyber Security Onboard Ships are complied with.                                                     | <del>Part VIII/3.2.12(e)(i)</del><br>Guidelines for Cyber Security Onboard Ships<br><b>Part II</b>   |
| <b>Cyber-SnE</b>       | This notation ( <b>Cyber-SnE</b> ) will be assigned to ships where the applicable requirements in <del>3.2.12(e)(ii)</del> <b>Part III</b> of <del>Part VIII</del> the Guidelines for Cyber Security Onboard Ships are complied with.                                                 | <del>Part VIII/3.2.12(e)(ii)</del><br>Guidelines for Cyber Security Onboard Ships<br><b>Part III</b> |
| ....                   |                                                                                                                                                                                                                                                                                       |                                                                                                      |
| <b>OCCS</b>            | This notation will be assigned to ships where the applicable requirements in the Guidelines for Onboard Carbon Capture and Storage are complied with.                                                                                                                                 | Guidelines for Onboard Carbon Capture and Storage                                                    |
| <b>OCCS Ready-N(X)</b> | The notation with N ( <b>I</b> , <b>II</b> , or <b>III</b> ) and X (applicable only to <b>OCCS Ready-III</b> , representing one or more suffixes S, E, L, or T) will be assigned to ships that comply with the requirements of the Guidelines for Onboard Carbon Capture and Storage. | Guidelines for Onboard Carbon Capture and Storage                                                    |
| <b>MASS</b>            | The notation ( <b>MASS</b> ) will be assigned to ships which comply with the requirements of the Guidelines for Maritime Autonomous Surface Ship.                                                                                                                                     | Guidelines for Maritime Autonomous Surface Ship                                                      |

## 1.10 Suspension and Withdrawal of Class

*Paragraph 1.10.1~1.10.2 have been amended as follows:*

1.10.1 In any of the following cases, the class of a ship is liable to be withheld or if already granted, may be withdrawn or expunged from the Register:

- (a) The wording, symbols or marks on the certificate ~~is~~ **are** altered, defaced or obliterated.
- (b) Any damage or casualty is done to the hull or machinery to such an extent as affecting her class in the Register and the damage so sustained has been un-repaired or not been repaired to the satisfaction of the Society.
- (c) The structure or arrangement of the hull, equipment and machinery have been altered without approval of the Society.
- (d) The loading of the ship exceeds the load line assigned by the Society or the freeboard marks have been placed higher on the ship's sides than the positions assigned by the Society.
- (e) The applicant fails to pay any survey fees or expenses.
- (f) The applicant fails to fulfill the Society's requirements.
- (g) The Owner so request~~s~~.
- ~~(h) If the Annual Survey or Intermediate Survey is not complete within 3 months of the due date of the survey.~~

1.10.2 Class suspension and cancellation

- (a) Class will be suspended automatically ~~in~~ **under** the following conditions **unless the vessel is under attendance for completion of the required survey.**
  - (i) If ~~the~~ **a** class periodical survey **is overdue (Special Survey is to be completed prior to resuming trading).**
  - ~~(ii) If MCS survey or HCS survey~~ **Continuous Survey items which are due or overdue at the time of annual survey are not completed and no extension has been granted is over due.**
  - (iii) If **any** other required survey in the Rules is over-due **and no extension has been granted.** However, over-due of required survey of environmental protection notation as listed in Table I 1-10 will not cause the suspension of class. ~~Class will be reinstated automatically from the date of satisfactory completion of the over-due surveys or the over-due recommendations.~~
  - ~~(iv) (iii)~~ **If any outstanding recommendation is over-due and no extension has been granted. Class will be reinstated automatically from the date of satisfactory completion of the overdue surveys or the overdue recommendations.**
- (b) If the Owners failed to apply for a survey on any casualty, damage, operational failure or any repair upon the first opportunity, class may be suspended until ~~the date before~~ the repair survey **has been** ~~is~~ completed satisfactorily.

- (c) Class Maintenance Certificate is not to be issued during the period of class suspension and before the required survey is completed satisfactorily.
- (d) Class suspended for over 3 months may result in cancellation of class.

## Chapter 2

### Survey Requirements of Steel Ship

#### 2.6 Intermediate Surveys

*Paragraph 2.6.5(a) has been amended as follows:*

##### 2.6.5 Intermediate Survey – machinery

- (a) At each Intermediate Survey, all ~~the~~ applicable requirements for Annual Survey are to be complied with.
- (b) For tankers, in addition to the above, insulation resistance of electrical circuits in dangerous spaces is to be measured. Consideration may be given to accept the recent readings by the crew.

#### 2.7 Special Surveys

*Paragraph 2.7.2 has been amended as follows:*

##### 2.7.2 Special Survey–machinery

All applicable requirements for Intermediate Survey are also to be complied with.

## Chapter 3

### Survey Requirements for Additional Systems and Services

*Section 3.10 has been added as follows:*

#### 3.10 Survey for Cyber Resilience of Ships

This section outlines the survey requirements for ships assigned the class notation **Cyber-R**.

##### 3.10.1 General

- (a) The shipowner shall prepare and implement operational procedures, provide periodic training and carry out drills for the onboard personnel and other concerned personnel ashore to familiarize them with the Computer Based Systems (CBSs) onboard the ship and the networks connecting such systems to each other and to other CBSs not onboard (e.g. ashore), and to properly manage the measures adopted for the fulfilment of requirements.
- (b) Ship Cyber Resilience Test Procedure
  - (i) The shipowner, with the support of suppliers, shall keep the Ship Cyber Resilience Test Procedure up to date and aligned with the CBSs onboard the ship and the networks connecting such systems to each other and to other CBSs not onboard (e.g. ashore). The shipowner shall update the Ship Cyber Resilience Test Procedure considering the changes occurred on CBSs and networks onboard, possible emerging risks related to such changes, new threats, new vulnerabilities and other possible changes in the ship's operational environment.
  - (ii) The shipowner shall retain onboard a copy of results of execution of tests and an updated Ship Cyber Resilience Test Procedure and make them available to the Classification Society.
- (c) Ship Cyber Security and Resilience Program
  - (i) Ship Cyber Security and Resilience Program is to be submitted to the Society before the first Annual Survey for approval.
  - (ii) Change of vessel management company will require a new verification of the Ship Cyber Security and Resilience Program.
  - (iii) At the completion of Periodical Surveys, the Surveyor is to confirm that the Ship Cyber Security and Resilience Program is kept on board.

##### 3.10.2 Annual Survey

In the first annual survey of the ship, after the Society has approved the Ship Cyber Security and Resilience Program, compliance shall be demonstrated by presenting records or other documented evidence of implementation of the following (a) to (j) described in the approved Ship Cyber Security and Resilience Program.

- (a) Vessel asset inventory:
  - (i) The approved management of change process has been adhered to.
  - (ii) Known vulnerabilities and functional dependencies have been considered for the software in the CBSs.
  - (iii) The vessel asset inventory has been kept updated.

[ PART I ]

(b) Security zones and network segmentation

Security zone boundaries are managed in accordance with the latest Zones and conduit diagram.

(c) Antivirus, antimalware, antispam and other protections from malicious code.

- (i) Any anti-malware software has been maintained and updated.
- (ii) Procedures for use of portable, mobile or removable devices have been followed.
- (iii) Policies and procedures for access control have been followed.
- (iv) Physical safeguards are maintained.

(d) Access control:

- (i) Personnel are authorized to access the CBSs in accordance with their responsibilities.
- (ii) Only authorized devices are connected to the CBSs.
- (iii) Visitors are given access to the CBSs according to relevant policies and procedures.
- (iv) Physical access controls are maintained and applied.
- (v) Credentials, keys, secrets, certificates, relevant CBS documentation, and other sensitive information is managed and kept confidential according to relevant policies and procedures.

(e) Remote access control and communication with untrusted networks:

- (i) Remote access sessions have been recorded or logged and carried out as per relevant policies and user manuals.
- (ii) Installation of security patches and other software updates have been carried out in accordance with Management of Change procedures and in cooperation with the supplier.

(f) Use of mobile and portable devices:

- (i) The use of mobile, portable or removable media is restricted to authorised personnel and follows relevant policies and procedures.
- (ii) Only authorized devices are connected to the CBSs.
- (iii) Means to restrict use of physical interface ports are implemented as per approved design documentation.

(g) Network operation monitoring:

The CBSs are routinely monitored for anomalies by inspection of security audit records and investigation of alerts in the CBSs.

(h) Verification and diagnostic functions of CBS and networks

The security functions in the CBSs are periodically tested or verified.

(i) Incident response plan

- (i) The incident response plans are available for the responsible personnel onboard.
- (ii) Procedures or instructions for local/manual controls are available for responsible personnel onboard.
- (iii) Procedures or instructions for disconnection/isolation of security zones are available for responsible personnel onboard.
- (iv) Any cyber incidents have been responded to in accordance with the incident response plans.

(j) Recovery plan

- (i) Instructions and/or procedures for incident recovery are available for the responsible personnel onboard.

- (ii) Equipment, tools, documentation, and/or necessary software and data needed for recovery is available for the responsible personnel onboard.
- (iii) Backup of the CBSs have been taken in accordance with the policies and procedures.
- (iv) Manuals and procedures for shutdown, reset, restore and restart are available for the responsible personnel onboard.

In the subsequent annual surveys of the ship, implementation of the Ship Cyber Security and Resilience Program shall be demonstrated upon request by the Surveyor.

### 3.10.3 Special Survey

At Special Surveys, the following examinations and tests are to be carried out and/or witnessed in accordance with the approved Ship Cyber Resilience Test Procedures, to the satisfaction of the Surveyor.

#### (a) Vessel asset inventory

- (i) Vessel asset inventory is updated.
- (ii) CBSs are correctly represented by the vessel asset inventory.
- (iii) Software of the CBSs has been kept updated, e.g. by vulnerability scanning or by checking the software versions of CBSs while switched on.

#### (b) Security zones and network segmentation

- (i) The security zones on board are implemented in accordance with the approved documents (i.e. zones and conduit diagram, cyber security design description, asset inventory, and relevant documents provided by the supplier). This may be done by e.g., inspection of the physical installation, network scanning and/or other methods providing the Surveyor assurance that the installed equipment is grouped in security zones according to the approved design.
- (ii) Security zone boundaries allow only the traffic that has been documented in the approved cyber security description. This may be done by e.g., evaluation of firewall rules or port scanning

#### (c) Network protection safeguards

Subject to modifications of the CBSs, the following activities shall be demonstrated:

- (i) Test denial of service attacks targeting zone boundary protection devices, as applicable.
- (ii) Test denial of service to ensure protection against excessive data flow rate, originating from inside each network segment. Such denial of service tests are to cover flooding of network (i.e., attempt to consume the available capacity on the network segment), and application layer attack (i.e., attempt to consume the processing capacity of selected endpoints in the network)
- (iii) Test e.g. by analytic evaluation and port scanning that unnecessary functions, ports, protocols and services in the computer-based systems have been removed or prohibited in accordance with hardening guidelines provided by the suppliers.

#### (d) Antivirus, antimalware, antispam and other protections from malicious code

Approved anti-malware software or other compensating countermeasures is effective (test e.g., with a trustworthy anti-malware test file).

#### (e) Wireless communication

Subject to modifications of the wireless networks, the following activities shall be demonstrated:

- (i) Only authorised devices can access the wireless network.
- (ii) Secure wireless communication protocol is used as per approved documentation by the respective supplier (demonstrate e.g. by use of a network protocol analyser tool).

#### (f) Remote access control and communication with untrusted networks

- (i) Communication with untrusted networks is secured in accordance with IACS UR E27 section 4.2 and that the communication protocols cannot be negotiated to a less secure version (demonstrate e.g., by use of a network protocol analyzer tool).
  - (ii) Remote access requires multifactor authentication of the remote user.
  - (iii) A limit of unsuccessful login attempts is implemented, and that a notification message is provided for the remote user before session is established.
  - (iv) Remote connections must be explicitly accepted by responsible personnel on board.
  - (v) Remote sessions can be manually terminated by personnel on board or that the session will automatically terminate after a period of inactivity.
  - (vi) Remote sessions are logged (see IACS UR E27 section 4.1 item 13).
  - (vii) Instructions or procedures are provided by the respective product suppliers (see IACS UR E27 section 3.1.3).
- (g) Use of mobile and portable devices
- The following countermeasures shall be demonstrated as relevant:
- (i) Use of mobile and portable devices is restricted to authorised users.
  - (ii) Interface ports can only be used by specific device types.
  - (iii) Files cannot be transferred to the system from such devices.
  - (iv) Files on such devices will not be automatically executed (by disabling autorun).
  - (v) Network access is limited to specific MAC or IP addresses.
  - (vi) Unused interface ports are disabled.
  - (vii) Unused interface ports are physically blocked.
- (h) Network operation monitoring
- Subject to modifications of the CBSs, the following activities shall be demonstrated:
- (i) Test that disconnected network connections will activate alarm and that the event is recorded.
  - (ii) Test that abnormally high network traffic is detected, and that alarm and audit record is generated. This test may be carried on together with the test specified in 3.10.3(k) of this Chapter.
  - (iii) Demonstrate that the computer-based system will respond in a safe manner to network storm scenarios, considering both unicast and broadcast messages (see also 3.10.3(c) of this Chapter).
  - (iv) Demonstrate generation of audit records (logging of security-related events).
  - (v) If Intrusion detection systems are implemented, demonstrate that this is passive and will not activate protection functions that may affect intended operation of the computer-based systems.
- (i) Local, independent and/or manual operation
- Subject to modifications of the CBSs, the following activities shall be demonstrated:
- The required local controls needed for safety of the ship can be operated independently of any remote or automatic control systems. The tests are to be carried out by disconnecting all networks from the local control system to other systems/devices.
- (j) Network isolation
- Subject to modifications of the CBSs, the following activities shall be demonstrated:
- The systems integrator shall demonstrate, by disconnecting all networks traversing security zone boundaries, that the CBSs in the security zone will maintain adequate operational functionality without network communication with other security zones or networks.
- (k) Fallback to a minimal risk condition
- Subject to modifications of the CBSs, the following activities shall be demonstrated:

The systems integrator shall demonstrate that the CBSs respond to cyber incidents in a safe manner, e.g. by maintaining its outputs to essential services and allowing operators to carry out control and monitoring functions by alternative means. The tests are to at least include denial of service attacks and may be done together with related test specified in 3.10.3(h) of this Chapter.

(l) Backup and restore capability

Subject to modifications of the CBSs, the following activities shall be demonstrated:

The procedures and instructions for backup and restore provided by the suppliers for CBSs are to be verified.

(m) Controlled shutdown, reset, roll-back and restart

Subject to modifications of the CBSs, the following activities shall be demonstrated:

Manuals or procedures are established for shutdown, reset and restore of the CBSs.

*Section 3.11 has been added as follows:*

### **3.11 Survey for Anchor Handling Winches**

#### **3.11.1 Annual and Special Survey**

(a) Thorough Examination

(i) Anchor Handling Winches

The following items are to be visually examined and confirmed to be in satisfactory condition.

(1) Structural members

(2) Connections between structural members and hull structures

(3) Installations of driving system

(4) Safety devices and protective devices

(5) Markings for maximum brake holding capacity, maximum line pull, etc., and the validity of relevant certificates

(6) Provision of operation and maintenance manuals on board the ship

Where deemed necessary by Surveyors, the following additional items are also to be examined.

(7) Checking of plate thickness of structural members, NDT and open-up examinations of bearings

(8) Open-up examinations of driving gears

(9) Operation tests of safety devices and protective devices

(ii) Loose Gear

The following items are to be visually examined and confirmed to be in satisfactory condition.

(1) Wires throughout their full length

(2) Chains, rings, hooks, shackles, swivels, cramps, etc.

(3) Safe working load and identification symbol markings, and the validity of the relevant certificates

Where deemed necessary by the Surveyor, the items listed in (2) above are to be opened up and examined.

(b) Testing

(i) Anchor handling winches and associated equipment are to be operationally and functionally tested according to the manufacturer recommendations.

[ PART I ]

- (ii) Operation tests of safety devices and protective devices (including braking tests and electric power source cut-off tests).

However, at annual survey, where appropriate operation test records are maintained and found acceptable by the Surveyor, the testing may be the confirmation of the test records at the times of such surveys.

(c) Records of inspection, maintenance, testing and thorough examination

(i) Records of thorough examination and testing

- (1) For anchor handling winches, records of thorough examinations and tests are to be maintained and kept in the survey record and are to be available on board.
- (2) For loose gear, records of thorough examinations and proof tests are to be maintained and kept in the survey record and are to be available on board.

(ii) Records of inspection and maintenance

- (1) For anchor handling winches or their components or parts, records of the routine inspection and maintenance are to be maintained and kept in the survey record and are to be available on board.
- (2) For loose gear, records of the routine inspection and maintenance are to be maintained and kept in the survey record and are to be available on board.
- (3) Any recommendations of the manufacturer for such inspection and maintenance records are to be followed.

AMENDMENT TO "THE RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF  
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## **PART II      HULL CONSTRUCTION AND EQUIPMENT**

## List of major changes in Part II from 2026 edition

|                |            |
|----------------|------------|
| 25.1.1         | Revised    |
| 25.1.3         | Revised    |
| 25.5           | Revised    |
| 25.5.1(a)      | Revised    |
| 25.5.2         | Revised    |
| 25.5.4~25.5.6  | Revised    |
| 25.5.7~25.5.12 | New        |
| Fig. II 25-4   | New        |
| 25.9.2(b)      | Revised    |
| Fig. II 25-4   | Renumbered |
| 25.9.3(b)      | Revised    |
| Table II 25-1  | Revised    |
| 30.6.1(b)      | Revised    |
| 32.2.2(d)(i)   | Revised    |
| 32.2.2(d)(ii)  | Revised    |
| 32.2.2(d)(iii) | New        |

Rules for the Construction and Classification of Steel Ships 2026 have been partly amended as follows:

## Chapter 25 Equipment

### 25.1 General

*Paragraph 25.1.1 has been amended as follows:*

25.1.1 All ships are to be provided with a complete equipment of including the anchors, the chain cables, the towlines and the mooring ropelines in accordance with the following requirements. The letter E will be placed after the symbol of classification of hull in the Register Book as **CR100 ✕ E**.

*Paragraph 25.1.3 has been amended as follows:*

25.1.3 The number and mass of anchors and the length and the size of the chain, and the towline, and the mooring rope for a classed ship are to be determined from Table II 25-1. The number and length of the mooring line for a classed ship with an equipment number of less than or equal to 2000 ( $EN \leq 2000$ ) are to be determined from Table II 25-1, and the number and length of the mooring line for a classed ship with an equipment number greater than 2000 ( $EN > 2000$ ) are to be determined from 25.5.2 and 25.5.10 to 25.5.12. For ships having equipment numbers not more than 50 or more than 16,000, the number and mass of anchors, and chain cables and mooring lines are to be determined by the Society. The total length of chain given in Table II 25-1 is to be divided in approximately equal parts between the two bower anchors.

*Section 25.5 has been amended as follows:*

### 25.5 Towlines and Mooring RopesLines

#### 25.5.1 Material

*Paragraph 25.5.1(a) has been amended as follows:*

- (a) Towlines and mooring ropelines may be of steel wires, natural fibre or synthetic fibre ropes. The breaking strength of the towline and the mooring rope is given in Table II 25-1. The ship design minimum breaking load and number of the mooring lines for ships with an equipment number of less than or equal to 2000 ( $EN \leq 2000$ ) are given in Table II 25-1. The ship design minimum breaking load and number of the mooring lines for ships with an equipment number greater than 2000 ( $EN > 2000$ ) are defined in 25.5.7 to 25.5.12.
- (b) Irrespective of the breaking strength, the diameter of the fibre rope is not to be less than 20 mm.
- (c) Where it is proposed to use the synthetic fibre rope, the size and construction are to be specially considered.

*Paragraph 25.5.2 has been amended as follows:*

25.5.2 The lengths of mooring lines for ships with an equipment number of less than or equal to 2000 ( $EN \leq 2000$ ) are to be in accordance with Table II 25-1. For ships with an equipment number greater than 2000 ( $EN > 2000$ ), the length of mooring lines may be taken as 200 m. The length of the individual mooring ropeline may be reduced by 7% of the Table length above given lengths, provided that the actual total length of the stipulated number of the mooring ropeline is not less than that obtained from the Table the required total length.

[ PART II ]

25.5.3 Towlines are not ~~be~~ required as a condition of classification. The towlines listed in Table II 25-1 are intended as a guide.

*Paragraph 25.5.4~25.5.6 have been amended as follows:*

25.5.4 Steel wire ropes used for the towline or mooring ~~rope~~**line** are to be of a flexible construction. Where wire ropes in construction of  $6 \times 12$  and  $6 \times 24$  are used, the diameter of the rope is not to be more than 25 mm and 33 mm respectively, however, the construction of  $6 \times 30$  and  $6 \times 37$ , any diameter is permitted.

25.5.5 For ships **with an equipment number of less than or equal to 2000 ( $EN \leq 2000$ )** having an A/EN ratio greater than 0.9, the number of mooring ~~ropes~~**lines** given in Table II 25-1 is to be increased by the number given below:

| A/EN Ratio            | Increase No. of Mooring<br><del>Ro</del> <b>pe</b> <b>Line</b> |
|-----------------------|----------------------------------------------------------------|
| $1.1 \geq A/EN > 0.9$ | 1                                                              |
| $1.2 \geq A/EN > 1.1$ | 2                                                              |
| $A/EN > 1.2$          | 3                                                              |

where:

- A = The profile area defined in 25.2 of this Chapter.  
EN = Equipment number determined by 25.2 of this Chapter.

25.5.6 It is the responsibility of the owner to replace or make good towlines and mooring ~~ropes~~**lines** as opportunity occurs.

*Paragraph 25.5.7~25.5.12 have been added as follows:*

25.5.7 The ship design minimum breaking load of mooring lines and the number of head, stern and breast lines (see Fig. II 25-4) for ships with an equipment number greater than 2000 ( $EN > 2000$ ) are based on the side-projected area  $A_1$ . Side-projected area  $A_1$  is to be calculated similar to the side-projected area A according to 25.2.1 but considering the following conditions:

- The lightest ballast draft is to be considered for the calculation of the side-projected area  $A_1$ . For ship types having small variation in the draft (e.g., passenger ships and RO-RO ships), the side-projected area  $A_1$  may be calculated using the summer load waterline.
- Wind shielding of the pier can be considered for the calculation of the side-projected area  $A_1$  unless the ship is intended to be regularly moored to jetty-type piers. A height of the pier surface of 3 m above the waterline may be assumed, i.e. the lower part of the side-projected area with a height of 3 m above the waterline for the considered loading condition may be disregarded for the calculation of the side-projected area  $A_1$ .
- Deck cargoes as given by the nominal capacity condition (see note) are to be included for the determination of side-projected area  $A_1$ . For the condition with cargo on deck, the summer load waterline may be considered. Deck cargoes may not need to be considered if ballast draft condition generates a larger side-projected area  $A_1$  than the full load condition with cargoes on deck. The larger of both side-projected areas is to be chosen as side-projected area  $A_1$ .

**Note:**

The nominal capacity condition is defined as the theoretical condition where the maximum possible deck cargoes are included in the ship arrangement in their respective positions. For container ships, the nominal capacity condition represents the theoretical condition where the maximum possible number of containers is included in the ship arrangement in their respective positions.

25.5.8 The mooring lines for ships with an equipment number greater than 2000 ( $EN > 2000$ ) as given hereunder are based on a maximum current speed of 1.0 m/s and the following maximum wind speed  $v_w$ , in m/s:

$$\begin{aligned} v_w &= 25 - 0.002 (A_1 - 2000) \quad \text{for passenger ships, ferries and car carriers with } 2000 \text{ m}^2 < A_1 \leq 4000 \text{ m}^2 \\ &= 21 \quad \text{for passenger ships, ferries and car carriers with } A_1 > 4000 \text{ m}^2 \\ &= 25 \quad \text{for other ships} \end{aligned}$$

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

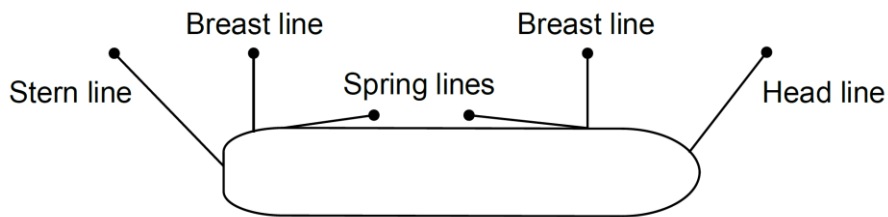
Additional loads caused by, for example, higher wind or current speeds, cross currents, additional wave loads, or reduced shielding from non-solid piers may need to be particularly considered. Furthermore, it is to be observed that unbeneficial mooring layouts can considerably increase the loads on single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

Notes:

The following is defined with respect to the purpose of mooring lines, see also Fig. II 25-4:

1. Breast line: A mooring line that is deployed perpendicular to the ship, restraining the ship in the off-berth direction.
2. Spring line: A mooring line that is deployed almost parallel to the ship, restraining the ship in fore or aft direction.
3. Head/Stern line: A mooring line that is oriented between longitudinal and transverse direction, restraining the ship in the off-berth and in fore or aft direction. The amount of restraint in fore or aft and off-berth direction depends on the line angle relative to these directions.

*Fig. II 25-4 has been added as follows:*



**Fig. II 25-4**

**Breast Line, Spring Line, Head/Stern Line**

25.5.9 The ship design minimum breaking load, in kN, of the mooring lines for ships with an equipment number greater than 2000 ( $EN > 2000$ ) is to be taken as:

$$MBL_{SD} = 0.1 \cdot A_1 + 350 \quad \text{kN}$$

The ship design minimum breaking load may be limited to 1275 kN (130 t). However, in this case the moorings are to be considered as not sufficient for environmental conditions given in 25.5.8. For these ships, the acceptable wind speed  $v_w^*$ , in m/s, can be estimated as follows:

$$v_w^* = v_w \cdot \sqrt{\frac{MBL_{SD}^*}{MBL_{SD}}}$$

where:

- $v_w$  = wind speed as per 25.5.8
- $MBL_{SD}^*$  = ship design minimum breaking load of the mooring lines intended to be supplied
- $MBL_{SD}$  = ship design minimum breaking load according to the above formula

However, the ship design minimum breaking load is not to be taken less than corresponding to an acceptable wind speed of 21 m/s:

$$MBL_{SD}^* \geq \left( \frac{21}{v_w} \right)^2 \cdot MBL_{SD}$$

[ PART II ]

If lines are intended to be supplied for an acceptable wind speed  $v_w^*$  higher than  $v_w$  as per 25.5.8, the ship design minimum breaking load is to be taken as:

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

25.5.10 The total number of head, stern and breast lines for ships with an equipment number greater than 2000 (EN > 2000) is to be taken as:

$$n = 8.3 \cdot 10^{-4} \cdot A_1 + 6$$

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

$$n = 8.3 \cdot 10^{-4} \cdot A_1 + 4$$

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

25.5.11 The number of head, stern and breast lines may be increased or decreased in conjunction with an adjustment to the ship design minimum breaking load of the lines. The adjusted ship design minimum breaking load,  $MBL_{SD}^{**}$ , is to be taken as:

$$MBL_{SD}^{**} = 1.2 \cdot MBL_{SD} \cdot n/n^{**} \leq MBL_{SD} \quad \text{for increased number of lines}$$

$$MBL_{SD}^{**} = MBL_{SD} \cdot n/n^{**} \quad \text{for reduced number of lines}$$

where  $MBL_{SD}$  is  $MBL_{SD}$  or  $MBL_{SD}^*$  specified in 25.5.9, as appropriate;  $n^{**}$  is the increased or decreased total number of head, stern and breast lines, and  $n$  is the number of lines for the considered ship type as calculated according to 25.5.10 without rounding.

The ship design minimum breaking load of head, stern, and breast lines may be increased or decreased in conjunction with an adjustment to the number of lines.

25.5.12 The total number of spring lines is not to be taken less than:

two lines where the equipment number is less than 5000 (EN < 5000); and

four lines where the equipment number is 5000 or greater (EN ≥ 5000).

The ship design minimum breaking load of spring lines is to be the same as that of the head, stern and breast lines. If the number of head, stern and breast lines is increased in conjunction with an adjustment to the ship design minimum breaking load of the lines, the number of spring lines is to be taken as follows, but rounded up to the nearest even number:

$$n_s^* = MBL_{SD} / MBL_{SD}^{**} \cdot n_s$$

where  $MBL_{SD}$  is  $MBL_{SD}$  or  $MBL_{SD}^*$  specified in 25.5.9, as appropriate;  $MBL_{SD}^{**}$  is the adjusted ship design minimum breaking load of lines as specified in 25.5.11;  $n_s$  is the number of spring lines as given in 25.5.12 and  $n_s^*$  is the increased number of spring lines.

## 25.9 Towing and Mooring Fittings

### 25.9.2 Towing Fittings

*Paragraph 25.9.2(b) has been amended as follows:*

#### (b) Design Load

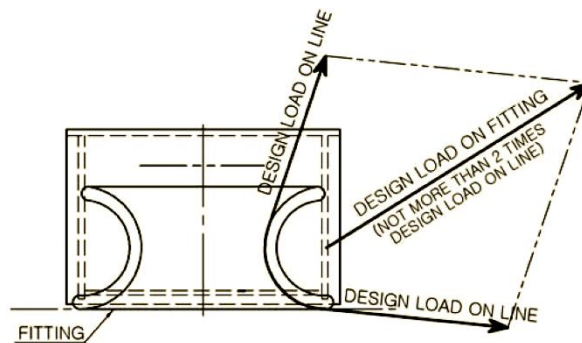
Design loads, see Fig. II 25-45, for towing fittings and their supporting structures are to be as specified in (i) to (vi) below:

- (i) For normal towing operations (e.g. harbour/manoeuvring), the design load on the line (see Fig. II 25-45) is to be 1.25 times the intended maximum towing load.

[ PART II ]

- (ii) For other types of towing (e.g. escort), the design load on the line is to be the breaking strength of the towing line specified in Table II 25-1 according to the equipment number determined in 25.2 of this Chapter.
- (iii) The design load on fittings is to take into account all acting loads.
- (iv) The point where the towing force acts on towing fittings is to be taken as the attachment point of the towing line.
- (v) The design load on fittings is to take into account the total design load on the line specified in (i) and (ii), but need not exceed twice the design load on the line.
- (vi) If the design load on fittings specified in (ii) to (v) is less than the intended towing load stipulated in the construction specifications for the towing fittings and their supporting structures used for towing operations specified in (ii), the design load on fittings is to be not less than the intended towing load.

Fig. II 25-4 has been renumbered as follows:



**Fig. II 25-45**  
**Design Load**

### 25.9.3 Mooring Fittings

Paragraph 25.9.3(b) has been amended as follows:

(b) Design Load

Design loads, see Fig. II 25-45, for mooring fittings and their supporting structures are to be as specified in (i) to (vii) below:

- (i) The minimum design load on the line (see Fig. II 25-45) is to be 1.15 times the ~~breaking strength~~ **ship design minimum breaking load** of the mooring line specified in ~~Table II 25-1~~ **25.5** according to the equipment number determined in 25.2.
- (ii) The design load on fittings is to take into account all acting loads.
- (iii) The point where the mooring force acts on mooring fittings is to be taken as the attachment point of the mooring line.
- (iv) The design load on fittings is to take into account the total design load on the line specified in (i) (see Fig. II 25-45), but need not exceed twice the design load on the line.

Table II 25-1 has been amended as follows:

**Table II 25-1**  
**Anchor, Chain Cable and Ropes**

| Equipment number |       | Equipment numeral | Bower anchor |                 | Stream anchor |                 | Stud link chain cable for bower anchors |                       |          | Wire rope or chain for stream anchor |        | Tow line<br>(1 length per ship) |        | Mooring <del>ropes</del> <sup>lines</sup> <sup>(1)</sup> |        |                                                |                                                                                                        |
|------------------|-------|-------------------|--------------|-----------------|---------------|-----------------|-----------------------------------------|-----------------------|----------|--------------------------------------|--------|---------------------------------|--------|----------------------------------------------------------|--------|------------------------------------------------|--------------------------------------------------------------------------------------------------------|
|                  |       |                   | Number       | Mass per anchor | Number        | Mass per anchor | Total length                            | Nominal diameter (mm) |          |                                      | Length | Breaking strength               | Length | Breaking Strength                                        | Number | Length of each <del>rope</del> <sup>line</sup> | Breaking strength <del>design minimum breaking load</del> <sup>Ship design minimum breaking load</sup> |
| Over             | Up to |                   |              | kg              |               | kg              | m                                       | Grade E1              | Grade E2 | Grade E3                             | m      | kN                              | m      | <del>kN</del>                                            |        | m                                              | kN                                                                                                     |
| 50               | 70    | E51               | 2            | 180             | 1             | 60              | 220                                     | 14                    | 12.5     |                                      | 80     | 65                              | 180    | 98                                                       | 3      | 80                                             | <del>24</del> 37                                                                                       |
| 70               | 90    | E52               | 2            | 240             | 1             | 80              | 220                                     | 16                    | 14       |                                      | 85     | 74                              | 180    | 98                                                       | 3      | 100                                            | <del>27</del> 40                                                                                       |
| 90               | 110   | E53               | 2            | 300             | 1             | 100             | 247.5                                   | 17.5                  | 16       |                                      | 85     | 81                              | 180    | 98                                                       | 3      | 110                                            | <del>29</del> 42                                                                                       |
| 110              | 130   | E54               | 2            | 360             | 1             | 120             | 247.5                                   | 19                    | 17.5     |                                      | 90     | 89                              | 180    | 98                                                       | 3      | 110                                            | <del>44</del> 48                                                                                       |
| 130              | 150   | E55               | 2            | 420             | 1             | 140             | 275                                     | 20.5                  | 17.5     |                                      | 90     | 98                              | 180    | 98                                                       | 3      | 120                                            | <del>49</del> 53                                                                                       |
| 150              | 175   | E56               | 2            | 480             | 1             | 165             | 275                                     | 22                    | 19       |                                      | 90     | 108                             | 180    | 98                                                       | 3      | 120                                            | <del>54</del> 59                                                                                       |
| 175              | 205   | E57               | 2            | 570             | 1             | 190             | 302.5                                   | 24                    | 20.5     |                                      | 90     | 118                             | 180    | 112                                                      | 3      | 120                                            | <del>59</del> 64                                                                                       |
| 205              | 240   | E58               | 2            | 660             |               |                 | 302.5                                   | 26                    | 22       | 20.5                                 |        |                                 | 180    | 129                                                      | 4      | 120                                            | <del>64</del> 69                                                                                       |
| 240              | 280   | E59               | 2            | 780             |               |                 | 330                                     | 28                    | 24       | 22                                   |        |                                 | 180    | 150                                                      | 4      | 120                                            | <del>69</del> 75                                                                                       |
| 280              | 320   | E60               | 2            | 900             |               |                 | 357.5                                   | 30                    | 26       | 24                                   |        |                                 | 180    | 174                                                      | 4      | 140                                            | <del>74</del> 80                                                                                       |
| 320              | 360   | E61               | 2            | 1020            |               |                 | 357.5                                   | 32                    | 28       | 24                                   |        |                                 | 180    | 207                                                      | 4      | 140                                            | <del>79</del> 85                                                                                       |
| 360              | 400   | E62               | 2            | 1140            |               |                 | 385                                     | 34                    | 30       | 26                                   |        |                                 | 180    | 224                                                      | 4      | 140                                            | <del>88</del> 96                                                                                       |
| 400              | 450   | E63               | 2            | 1290            |               |                 | 385                                     | 36                    | 32       | 28                                   |        |                                 | 180    | 250                                                      | 4      | 140                                            | <del>98</del> 107                                                                                      |
| 450              | 500   | E64               | 2            | 1440            |               |                 | 412.5                                   | 38                    | 34       | 30                                   |        |                                 | 180    | 277                                                      | 4      | 140                                            | <del>108</del> 117                                                                                     |
| 500              | 550   | E65               | 2            | 1590            |               |                 | 412.5                                   | 40                    | 34       | 30                                   |        |                                 | 190    | 306                                                      | 4      | 160                                            | <del>123</del> 134                                                                                     |
| 550              | 600   | E66               | 2            | 1740            |               |                 | 440                                     | 42                    | 36       | 32                                   |        |                                 | 190    | 338                                                      | 4      | 160                                            | <del>133</del> 143                                                                                     |
| 600              | 660   | E67               | 2            | 1920            |               |                 | 440                                     | 44                    | 38       | 34                                   |        |                                 | 190    | <del>371</del> 370                                       | 4      | 160                                            | <del>147</del> 160                                                                                     |
| 660              | 720   | E68               | 2            | 2100            |               |                 | 440                                     | 46                    | 40       | 36                                   |        |                                 | 190    | 406                                                      | 4      | 160                                            | <del>157</del> 171                                                                                     |
| 720              | 780   | E69               | 2            | 2280            |               |                 | 467.5                                   | 48                    | 42       | 36                                   |        |                                 | 190    | 441                                                      | 4      | 170                                            | <del>172</del> 187                                                                                     |
| 780              | 840   | E70               | 2            | 2460            |               |                 | 467.5                                   | 50                    | 44       | 38                                   |        |                                 | 190    | <del>480</del> 479                                       | 4      | 170                                            | <del>186</del> 202                                                                                     |
| 840              | 910   | E71               | 2            | 2640            |               |                 | 467.5                                   | 52                    | 46       | 40                                   |        |                                 | 190    | 518                                                      | 4      | 170                                            | <del>201</del> 218                                                                                     |
| 910              | 980   | E72               | 2            | 2850            |               |                 | 495                                     | 54                    | 48       | 42                                   |        |                                 | 190    | 559                                                      | 4      | 170                                            | <del>216</del> 235                                                                                     |
| 980              | 1060  | E73               | 2            | 3060            |               |                 | 495                                     | 56                    | 50       | 44                                   |        |                                 | 200    | 603                                                      | 4      | 180                                            | <del>230</del> 250                                                                                     |
| 1060             | 1140  | E74               | 2            | 3300            |               |                 | 495                                     | 58                    | 50       | 46                                   |        |                                 | 200    | 647                                                      | 4      | 180                                            | <del>250</del> 272                                                                                     |
| 1140             | 1220  | E75               | 2            | 3540            |               |                 | 522.5                                   | 60                    | 52       | 46                                   |        |                                 | 200    | 691                                                      | 4      | 180                                            | <del>270</del> 293                                                                                     |
| 1220             | 1300  | E76               | 2            | 3780            |               |                 | 522.5                                   | 62                    | 54       | 48                                   |        |                                 | 200    | 738                                                      | 4      | 180                                            | <del>284</del> 309                                                                                     |
| 1300             | 1390  | E77               | 2            | 4050            |               |                 | 522.5                                   | 64                    | 56       | 50                                   |        |                                 | 200    | 786                                                      | 4      | 180                                            | <del>309</del> 336                                                                                     |

**Table II 25-1**  
**Anchor, Chain Cable and Ropes (continued)**

| Equipment number |                     | Equipment numeral | Bower anchor |                 | Stream anchor |                 | Stud link chain cable for bower anchors |                       |          | Wire rope or chain for stream anchor |        | Tow line (1 length per ship) |        | Mooring ropes/lines <sup>(1)</sup> |                   |                     |                                   |
|------------------|---------------------|-------------------|--------------|-----------------|---------------|-----------------|-----------------------------------------|-----------------------|----------|--------------------------------------|--------|------------------------------|--------|------------------------------------|-------------------|---------------------|-----------------------------------|
|                  |                     |                   | Number       | Mass per anchor | Number        | Mass per anchor | Total length                            | Nominal diameter (mm) |          |                                      | Length | Breaking strength            | Length | Breaking strength                  | Number            | Length of each line | Breaking strength                 |
| Over             | Up to               |                   |              | kg              |               | kg              | m                                       | Grade E1              | Grade E2 | Grade E3                             | m      | kN                           | m      | kN                                 |                   | rope m              | kN                                |
| 1390             | 1480                | E78               | 2            | 4320            |               |                 | 550                                     | 66                    | 58       | 50                                   |        |                              | 200    | 836                                | 4                 | 180                 | <del>324</del> 352                |
| 1480             | 1570                | E79               | 2            | 4590            |               |                 | 550                                     | 68                    | 60       | 52                                   |        |                              | 220    | 888                                | 5                 | 190                 | <del>324</del> 352                |
| 1570             | 1670                | E80               | 2            | 4890            |               |                 | 550                                     | 70                    | 62       | 54                                   |        |                              | 220    | 941                                | 5                 | 190                 | <del>322</del> 362                |
| 1670             | 1790                | E81               | 2            | 5250            |               |                 | 577.5                                   | 73                    | 64       | 56                                   |        |                              | 220    | 1024                               | 5                 | 190                 | <del>352</del> 384                |
| 1790             | 1930                | E82               | 2            | 5610            |               |                 | 577.5                                   | 76                    | 66       | 58                                   |        |                              | 220    | 1109                               | 5                 | 190                 | <del>378</del> 411                |
| 1930             | 2080 <sup>(1)</sup> | E83               | 2            | 6000            |               |                 | 577.5                                   | 78                    | 68       | 60                                   |        |                              | 220    | 1168                               | 5 <sup>(2)</sup>  | 190 <sup>(2)</sup>  | <del>402</del> 437 <sup>(2)</sup> |
| 2080             | 2230                | E84               | 2            | 6450            |               |                 | 605                                     | 81                    | 70       | 62                                   |        |                              | 240    | 1259                               | 5 <sup>(2)</sup>  | 200 <sup>(2)</sup>  | <del>422</del> <sup>(2)</sup>     |
| 2230             | 2380                | E85               | 2            | 6900            |               |                 | 605                                     | 84                    | 73       | 64                                   |        |                              | 240    | 1356                               | 5 <sup>(2)</sup>  | 200 <sup>(2)</sup>  | <del>451</del> <sup>(2)</sup>     |
| 2380             | 2530                | E86               | 2            | 7350            |               |                 | 605                                     | 87                    | 76       | 66                                   |        |                              | 240    | 1453                               | 5 <sup>(2)</sup>  | 200 <sup>(2)</sup>  | <del>480</del> <sup>(2)</sup>     |
| 2530             | 2700                | E87               | 2            | 7800            |               |                 | 632.5                                   | 90                    | 78       | 68                                   |        |                              | 260    | 1471                               | 6 <sup>(2)</sup>  | 200 <sup>(2)</sup>  | <del>480</del> <sup>(2)</sup>     |
| 2700             | 2870                | E88               | 2            | 8300            |               |                 | 632.5                                   | 92                    | 81       | 70                                   |        |                              | 260    | 1471                               | 6 <sup>(2)</sup>  | 200 <sup>(2)</sup>  | <del>490</del> <sup>(2)</sup>     |
| 2870             | 3040                | E89               | 2            | 8700            |               |                 | 632.5                                   | 95                    | 84       | 73                                   |        |                              | 260    | 1471                               | 6 <sup>(2)</sup>  | 200 <sup>(2)</sup>  | <del>500</del> <sup>(2)</sup>     |
| 3040             | 3210                | E90               | 2            | 9300            |               |                 | 660                                     | 97                    | 84       | 76                                   |        |                              | 280    | 1471                               | 6 <sup>(2)</sup>  | 200 <sup>(2)</sup>  | <del>520</del> <sup>(2)</sup>     |
| 3210             | 3400                | E91               | 2            | 9900            |               |                 | 660                                     | 100                   | 87       | 78                                   |        |                              | 280    | 1471                               | 6 <sup>(2)</sup>  | 200 <sup>(2)</sup>  | <del>554</del> <sup>(2)</sup>     |
| 3400             | 3600                | E92               | 2            | 10500           |               |                 | 660                                     | 102                   | 90       | 78                                   |        |                              | 280    | 1471                               | 6 <sup>(2)</sup>  | 200 <sup>(2)</sup>  | <del>588</del> <sup>(2)</sup>     |
| 3600             | 3800                | E93               | 2            | 11100           |               |                 | 687.5                                   | 105                   | 92       | 81                                   |        |                              | 300    | 1471                               | 6 <sup>(2)</sup>  | 200 <sup>(2)</sup>  | <del>618</del> <sup>(2)</sup>     |
| 3800             | 4000                | E94               | 2            | 11700           |               |                 | 687.5                                   | 107                   | 95       | 84                                   |        |                              | 300    | 1471                               | 6 <sup>(2)</sup>  | 200 <sup>(2)</sup>  | <del>647</del> <sup>(2)</sup>     |
| 4000             | 4200                | E95               | 2            | 12300           |               |                 | 687.5                                   | 111                   | 97       | 87                                   |        |                              | 300    | 1471                               | 7 <sup>(2)</sup>  | 200 <sup>(2)</sup>  | <del>647</del> <sup>(2)</sup>     |
| 4200             | 4400                | E96               | 2            | 12900           |               |                 | 715                                     | 114                   | 100      | 87                                   |        |                              | 300    | 1471                               | 7 <sup>(2)</sup>  | 200 <sup>(2)</sup>  | <del>657</del> <sup>(2)</sup>     |
| 4400             | 4600                | E97               | 2            | 13500           |               |                 | 715                                     | 117                   | 102      | 90                                   |        |                              | 300    | 1471                               | 7 <sup>(2)</sup>  | 200 <sup>(2)</sup>  | <del>667</del> <sup>(2)</sup>     |
| 4600             | 4800                | E98               | 2            | 14100           |               |                 | 715                                     | 120                   | 105      | 92                                   |        |                              | 300    | 1471                               | 7 <sup>(2)</sup>  | 200 <sup>(2)</sup>  | <del>677</del> <sup>(2)</sup>     |
| 4800             | 5000                | E99               | 2            | 14700           |               |                 | 742.5                                   | 122                   | 107      | 95                                   |        |                              | 300    | 1471                               | 7 <sup>(2)</sup>  | 200 <sup>(2)</sup>  | <del>686</del> <sup>(2)</sup>     |
| 5000             | 5200                | E100              | 2            | 15400           |               |                 | 742.5                                   | 124                   | 111      | 97                                   |        |                              | 300    | 1471                               | 8 <sup>(2)</sup>  | 200 <sup>(2)</sup>  | <del>686</del> <sup>(2)</sup>     |
| 5200             | 5500                | E101              | 2            | 16100           |               |                 | 742.5                                   | 127                   | 111      | 97                                   |        |                              | 300    | 1471                               | 8 <sup>(2)</sup>  | 200 <sup>(2)</sup>  | <del>696</del> <sup>(2)</sup>     |
| 5500             | 5800                | E102              | 2            | 16900           |               |                 | 742.5                                   | 130                   | 114      | 100                                  |        |                              | 300    | 1471                               | 8 <sup>(2)</sup>  | 200 <sup>(2)</sup>  | <del>706</del> <sup>(2)</sup>     |
| 5800             | 6100                | E103              | 2            | 17800           |               |                 | 742.5                                   | 132                   | 117      | 102                                  |        |                              | 300    | 1471                               | 9 <sup>(2)</sup>  | 200 <sup>(2)</sup>  | <del>706</del> <sup>(2)</sup>     |
| 6100             | 6500                | E104              | 2            | 18800           |               |                 | 742.5                                   |                       | 120      | 107                                  |        |                              |        |                                    | 9 <sup>(2)</sup>  | 200 <sup>(2)</sup>  | <del>716</del> <sup>(2)</sup>     |
| 6500             | 6900                | E105              | 2            | 20000           |               |                 | 770                                     |                       | 124      | 111                                  |        |                              |        |                                    | 9 <sup>(2)</sup>  | 200 <sup>(2)</sup>  | <del>726</del> <sup>(2)</sup>     |
| 6900             | 7400                | E106              | 2            | 21500           |               |                 | 770                                     |                       | 127      | 114                                  |        |                              |        |                                    | 10 <sup>(2)</sup> | 200 <sup>(2)</sup>  | <del>726</del> <sup>(2)</sup>     |
| 7400             | 7900                | E107              | 2            | 23000           |               |                 | 770                                     |                       | 132      | 117                                  |        |                              |        |                                    | 11 <sup>(2)</sup> | 200 <sup>(2)</sup>  | <del>726</del> <sup>(2)</sup>     |

**Table II 25-1**  
**Anchor, Chain Cable and Ropes (continued)**

| Equipment number |       | Equipment numeral | Bower anchor |                 | Stream anchor |                 | Stud link chain cable for bower anchors |                       |          | Wire rope or chain for stream anchor |        | Tow line<br>(1 length per ship) |        | Mooring <del>ropes</del> lines <sup>(1)</sup> |                              |                               |                                      |
|------------------|-------|-------------------|--------------|-----------------|---------------|-----------------|-----------------------------------------|-----------------------|----------|--------------------------------------|--------|---------------------------------|--------|-----------------------------------------------|------------------------------|-------------------------------|--------------------------------------|
|                  |       |                   | Number       | Mass per anchor | Number        | Mass per anchor | Total length                            | Nominal diameter (mm) |          |                                      | Length | Breaking strength               | Length | Breaking strength                             | Number                       | Length of each line           | Breaking strength                    |
| Over             | Up to |                   |              | kg              |               | kg              | m                                       | Grade E1              | Grade E2 | Grade E3                             | m      | kN                              | m      | kN                                            |                              | rope m                        | Ship design minimum breaking load kN |
| 7900             | 8400  | E108              | 2            | 24500           |               |                 | 770                                     |                       | 137      | 122                                  |        |                                 |        |                                               | <del>11</del> <sup>(2)</sup> | <del>200</del> <sup>(2)</sup> | <del>725</del> <sup>(2)</sup>        |
| 8400             | 8900  | E109              | 2            | 26000           |               |                 | 770                                     |                       | 142      | 127                                  |        |                                 |        |                                               | <del>12</del> <sup>(2)</sup> | <del>200</del> <sup>(2)</sup> | <del>725</del> <sup>(2)</sup>        |
| 8900             | 9400  | E110              | 2            | 27500           |               |                 | 770                                     |                       | 147      | 132                                  |        |                                 |        |                                               | <del>13</del> <sup>(2)</sup> | <del>200</del> <sup>(2)</sup> | <del>725</del> <sup>(2)</sup>        |
| 9400             | 10000 | E111              | 2            | 29000           |               |                 | 770                                     |                       | 152      | 132                                  |        |                                 |        |                                               | <del>14</del> <sup>(2)</sup> | <del>200</del> <sup>(2)</sup> | <del>725</del> <sup>(2)</sup>        |
| 10000            | 10700 | E112              | 2            | 31000           |               |                 | 770                                     |                       |          | 137                                  |        |                                 |        |                                               | <del>15</del> <sup>(2)</sup> | <del>200</del> <sup>(2)</sup> | <del>725</del> <sup>(2)</sup>        |
| 10700            | 11500 | E113              | 2            | 33000           |               |                 | 770                                     |                       |          | 142                                  |        |                                 |        |                                               | <del>16</del> <sup>(2)</sup> | <del>200</del> <sup>(2)</sup> | <del>725</del> <sup>(2)</sup>        |
| 11500            | 12400 | E114              | 2            | 35500           |               |                 | 770                                     |                       |          | 147                                  |        |                                 |        |                                               | <del>17</del> <sup>(2)</sup> | <del>200</del> <sup>(2)</sup> | <del>725</del> <sup>(2)</sup>        |
| 12400            | 13400 | E115              | 2            | 38500           |               |                 | 770                                     |                       |          | 152                                  |        |                                 |        |                                               | <del>18</del> <sup>(2)</sup> | <del>200</del> <sup>(2)</sup> | <del>725</del> <sup>(2)</sup>        |
| 13400            | 14600 | E116              | 2            | 42000           |               |                 | 770                                     |                       |          | 157                                  |        |                                 |        |                                               | <del>19</del> <sup>(2)</sup> | <del>200</del> <sup>(2)</sup> | <del>725</del> <sup>(2)</sup>        |
| 14600            | 16000 | E117              | 2            | 46000           |               |                 | 770                                     |                       |          | 162                                  |        |                                 |        |                                               | <del>21</del> <sup>(2)</sup> | <del>200</del> <sup>(2)</sup> | <del>725</del> <sup>(2)</sup>        |

**Note:**

(1) The mooring lines are to be selected only for ships with an equipment number less than or equal to 2000 ( $EN \leq 2000$ ).

(2) For ships with an equipment number greater than 2000 ( $EN > 2000$ ), see 25.5.2 and 25.5.7 to 25.5.12.

## Chapter 30 Intact Stability

### 30.6 Stability Criteria in Wind and Waves

*Paragraph 30.6.1(b) has been amended as follows:*

30.6.1 Stability curves and wind-heeling moment lever curves of ships are to comply with the following requirements in Fig. II 30-2.

- (b) Area "b" is not to be less than area "a".

where:

$$l_{w1} = \text{Heeling moment lever caused by steady wind (m) given by the following formula:}$$

$$= \frac{0.0514AZ}{W}$$

A = Projected lateral area of hull and cargoes on deck above waterline (m<sup>2</sup>).

Z = Vertical distance between the centre of "A" and the centre of underwater projected lateral area of hull (m). In general, the centre of underwater projected lateral area may be approximated to locate at half the draught.

W = Displacement (ton).

$l_{w2}$  = Heeling moment lever caused by gust (m) given by the following formula:

$$= 1.5l_{w1}$$

a = Area encircled by stability curve,  $l_{w2}$  and  $\theta_r$  (m · rad).

b = Area encircled by stability curve,  $l_{w2}$  and  $\theta_2$  (m · rad).

$\theta_r$  = Angle of rolling stop motion (degree). In general, it may be given by the formula  $(\theta_0 - \theta_1)$ .

$\theta_c$  = Heeling angle at the second intersection between heeling moment lever ( $l_{w2}$ ) and stability curve (degree).

$\theta_2$  = Heeling angle (degree) to be taken of whichever is the least, down flooding angle,  $\theta_c$  or 50°.

$\theta_0$  = Angle of heel under action of steady wind (degree).

$\theta_1$  = Angle of roll to windward due to wave action (degree) given by the following formula:

$$= 109x_1x_2k\sqrt{rs}$$

$x_1$  = Values obtained from Table II 30-1 according to the value of B/d. In case the value of B/d becomes intermediate, values are to be determined by interpolation.

$x_2$  = Values obtained from Table II 30-2 according to the value of  $C_b$ . In case the value of  $C_b$  becomes intermediate, values are to be determined by interpolation.

$C_b$  = Block coefficient given by the following formula:

$$= \frac{W}{1.025LBd}$$

L = Length of the ship at waterline (m)

k = Values determined as follows;

= 1.0 for round-bilged ships having neither bilge keels nor bar keels,

= 0.7 for ships with sharp bilges,

For ships with bilge keel and/or bar keels: Values obtained from Table II 30-3 according to the value of  $\frac{100A_k}{LB}$ .

In case  $\frac{100A_k}{LB}$  becomes intermediate, values are to be determined by interpolation.

$A_k$  = Total area of bilge keels, projected lateral area of bar keels or sum of those areas (m<sup>2</sup>).

[ PART II ]

- r = Values obtained from the following formula.  
~~However, the value of r need not be taken over 1.0.~~
- $$r = 0.73 + 0.6 \frac{OG}{d}$$
- OG = Distance between the centre of gravity and the waterline (m), and is taken as positive when the centre of gravity is above waterline.
- s = Values obtained from Table II 30-4 according to the value of T. In case T becomes intermediate, values are to be determined by interpolation.
- T = Rolling period (seconds) obtained from the following formula,
- $$T = \frac{2B}{\sqrt{G_0 M}} \left( 0.373 + 0.023 \frac{B}{d} - 0.043 \frac{L}{100} \right)$$
- G<sub>0</sub>M = As specified in 30.5.

## Chapter 32

### Pollution Prevention Notations For Vessels

#### 32.2 PP Notation

##### 32.2.2 Control of discharges into the Air

This section addresses requirements aimed towards the prevention of pollution ~~to~~ **of** the air environment ~~discharged~~ from vessels.

##### (d) Ozone depleting substances (ODS)

This subsection **is** aimed towards the prevention of pollution to the air environment by ozone depleting substances from vessels.

Vessels are to comply with the requirements of Regulation 12 of MARPOL Annex VI.

*Paragraph 32.2.2(d)(i) has been amended as follows:*

##### (i) Refrigerant Systems

The requirements of this subsection are applicable to refrigerant systems onboard vessels, excluding permanently sealed equipment, where there are no refrigerant charging connections or potentially removable components containing ozone depleting substances. Refrigerant systems are to be provided with environmentally friendly refrigerants in accordance with the requirements of Regulation 12 of MARPOL Annex VI. ~~Furthermore, the use of refrigerants with global warming potential (GWP) greater than 3000 are prohibited.~~ Annual refrigerant leakage is to be not more than 10% of the total refrigerant charge of each system. An appropriate leak detection system is to be provided to continuously monitor spaces into which the refrigerant could leak. Further, an alarm is to be given in a manned location when the refrigerant concentration exceeds a predetermined limit (for example, 25 ppm for ammonia or 300 ppm for halogenated fluorocarbons).

(1) In addition to complying with the requirements of 32.2.2(d)(i), vessels that meet the following requirements regarding the Global Warming Potential (GWP) of the refrigerants used may be assigned the additional notation **GWP(R2000)**, affixed after the environmental protection notation **PP**, e.g.: **PP+GWP(R2000)**.

a) The refrigerants used in the refrigerant system shall have an Ozone Depleting Potential (ODP) of zero and a Global Warming Potential (GWP) of less than 2000. At the initial review, the details and documents related to refrigerants used on board ships are to be submitted to demonstrate compliance with these requirements.

*Paragraph 32.2.2(d)(ii) has been amended as follows:*

##### (ii) Fire-fighting Systems

This subsection addresses requirements aimed at reducing the potential adverse effects on the air environment by fire-fighting systems onboard vessels. The use of Halons or perfluorocarbon mediums is not permitted in fixed fire extinguishing systems or portable fire extinguishers. ~~Alternative mediums to Halons or perfluorocarbons may be acceptable, provided they contain no ozone-depleting substances or have a GWP less than 4000.~~

(1) In addition to complying with the requirements of 32.2.2(d)(ii), vessels that meet the following requirements regarding the Global Warming Potential (GWP) of the extinguishing agents used may be assigned the additional notation **GWP(F2000)**, affixed after the environmental protection notation **PP**, e.g.: **PP+GWP(F2000)**.

- a) The extinguishing agents used in fixed fire extinguishing systems and portable fire extinguishers shall have an Ozone Depleting Potential (ODP) of zero and a Global Warming Potential (GWP) of less than 2000. At the initial review, the details and documents related to extinguishing agents used on board ships are to be submitted to demonstrate compliance with these requirements.

*Paragraph 32.2.2(d)(iii) has been added as follows:*

- (iii) Where the vessel complies with both the requirements of 32.2.2(d)(i)(1) and 32.2.2(d)(ii)(1), the additional notations **R2000** and **F2000** will be placed within parentheses and separated by a comma “,”, e.g.: **PP+GWP(R2000, F2000)**.

AMENDMENT TO "THE RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF  
STEEL SHIPS 2026"

## **PART III      SPECIAL SERVICE AND TYPE OF SHIPS**

## List of major changes in Part III from 2026 edition

|            |         |
|------------|---------|
| Chapter 14 | Revised |
| 14.1       | Revised |
| 16.3       | Revised |
| 16.3.1     | Revised |
| 16.3.2     | Revised |
| 16.3.3     | Revised |
| 16.3.4     | Revised |

Rules for the Construction and Classification of Steel Ships 2026 have been partly amended as follows:

*Chapter 14 has been amended as follows:*

## **Chapter 14**

### **Additional Requirements for ~~General Dry Cargo Ships~~ Carrying Dry Cargo in Bulk**

*Section 14.1 has been amended as follows:*

#### **14.1 Application**

~~General dry cargo ships~~ Ships, other than those defined in Chapter 1 and Chapter 1A of this Part, intended to carry dry cargo in bulk are to be in compliance with the requirements given in Chapter XII of SOLAS 1974, as amended. If complying with the relevant requirements, the additional service notation **BC-XII** will be assigned, e.g. "**General Dry Cargo Ship, BC-XII...**".

## Chapter 16

### Offshore Service Vessels

*Section 16.3 has been amended as follows:*

#### 16.3 Anchor-Handling and Towing Vessels

*Paragraph 16.3.1 has been amended as follows:*

##### 16.3.1 ~~Introduction~~ General

###### (a) Introduction

The requirements in this section apply to vessels intended for anchor handling and towing operations offshore. Anchor handling operations imply ~~ies towing of floating objects in open waters and objects on sea bed in addition to~~ subsurface deployment ~~and~~, moving, and lifting of anchoring equipment. Towing operations imply ~~ies~~ towing of floating objects in open waters.

###### (b) Scope

The following is covered by this section:

- design ~~and~~, manufacturing, and testing requirements to towing and anchor handling equipment
- hull arrangement and supporting structure
- stability and watertight integrity.

Basic requirements for anchor handling and towing vessels are given in 16.1 and 16.2 of this Chapter.

###### (c) Application

Vessels **with class notation OSV** intended for anchor handling operations, ~~and built in compliance with class notation OSV together~~ with the requirements in this section, may be given the ~~class notation~~ qualifier **Anchor Handling**.

Vessels **with class notation OSV** intended for towing operations, ~~and built in compliance with class notation OSV together~~ with the requirements in this section, may be given the ~~class notation~~ qualifier **Towing**.

###### (d) Testing requirements

- The winches and other equipment **specified** ~~made mandatory~~ in this section are to be ~~function tested on board~~ according to **an** approved procedures **before being put into service**. ~~in order to verify~~
  - ~~the ability of the arrangement and equipment to operate within the limitations, towline paths, towline sectors etc. specified by the arrangement drawing~~
  - ~~the correct function of the normal operation modes~~
  - ~~the correct function of the emergency operation modes, including emergency release and dead ship operations~~
- The winches are to be function tested. The tests are to include, as a minimum, the following:
  - **Function test of the complete winch system at low load for all operating scenarios and emergency scenarios (including dead ship operations) to demonstrate functionality of equipment and controls and the ability to operate within specified limits.**

- Testing of all safety functionalities, including test of winch emergency release functionality, with residual holding force in the wire and residual braking force after release. Wire is to be attached to an onshore strong point, anchor on seabed, or similar arrangement.
- (iii) The winches ~~is~~ **are** to be load tested during hoisting, braking, and pay-out. ~~Design loads to be applied. However, a maximum load equal to BP may be accepted if the winch is not of novel design or complex structure.~~ The tests are to include, as a minimum, the following:
  - Load test to demonstrate capacity and structural integrity of equipment, foundations, and supporting structures.  
Note: Test load equal to maximum static bollard pull may be accepted, given the capacity is demonstrated through calculations.
  - Static bollard pull test is to be performed for vessels with winches designed for towing. Testing is to be performed according to the applicable requirements given in 11.9 of this Part.
  - Brake holding capacity test.  
Note: Where not practicable to test brake holding capacity, capacity may be demonstrated through calculations.
- ~~(iii)~~ **(v)** ~~The BP testing is to comply with applicable requirements in 11.9 of this Part.~~ Chain stoppers, towing pins, stern rollers, and any other handling equipment are to be function tested. The tests are to include, as a minimum, the following:
  - Function test at low load for all operating scenarios and emergency scenarios (including dead ship operations), to demonstrate functionality of the equipment and controls and the ability to operate within specified limits.
  - Testing of all safety functionalities, including test of emergency release functionality. Emergency release is to include disengagement of any equipment that may prevent or reduce the possibility of a successful release, e.g. towing pins.
- (v) Loose gear is to be tested and examined according to the applied recognized standard or code, see 16.3.3(d)(v).
- (vi) After testing the winches and equipment are to be inspected for signs of damage or deterioration. Any identified damage or deterioration is to be rectified before being put into service.

Paragraph 16.3.2 has been amended as follows:

#### 16.3.2 Hull

##### (a) Deck structure

- (i) Scantlings of foundations and supports of towing pins are to be based on **minimum** 2 times the specified maximum static working load ~~specified by the designer.~~
- (ii) Scantlings of foundations and supports of winches intended for towing functions are to be based on minimum 2.2 times the maximum ~~BP of the vessel.~~ **static bollard pull.**
- (iii) Scantlings of foundations and supports of winches intended for anchor handling functions are to be based on **minimum** 1.5 times the specified maximum hoisting capacity or the maximum brake holding capacity of the winch, whichever is greater.
- (iv) Scantlings of foundations and supports of stern rollers are to be based on **minimum** 2 times the maximum static working load ~~as specified by the designer~~ or 2 times the specified maximum hoisting capacity of the anchor handling winch, whichever is greater.
- (v) Scantlings of foundations and supports of ~~shank jaws~~ **chain stoppers** are to be based on **minimum** 2 times the maximum static working load ~~as specified by the designer.~~
- (vi) **The strength assessment is to be based on gross scantlings.**

(vii) Stresses from the design loads specified in 16.3.2(a)(i) to (v) are not to exceed the following values:

Acceptable stresses, in N/mm<sup>2</sup>, for the scantlings of the supporting structure resulting from bending moment M, in kNm, and shear force Q, in kN, calculated for the load given above are:

$$\begin{aligned} \sigma_b &= \text{Bending stress, in N/mm}^2, \text{ taken as:} \\ &= \frac{1000 M}{Z} \\ \sigma_b &\leq 0.9 R_y \\ \tau &= \text{Average shear stress, in N/mm}^2, \text{ taken as:} \\ \tau &= \frac{100 Q}{A_{shear}} \\ \tau &\leq 0.9 R_{eff} / \sqrt{3} \end{aligned}$$

where:

$$\begin{aligned} R_y &= \text{Nominal yield stress, taken equal to 235/k, in N/mm}^2 \\ K &= \text{Material factor as specified in 1.5.2(a) of Part II} \\ \tau_y &= \text{Nominal shear yield stress, taken equal to } \frac{R_y}{\sqrt{3}}, \text{ in N/mm}^2 \\ Z &= \text{Net section modulus, in cm}^3 \\ A_{shear} &= \text{Net shear area, in cm}^2 \\ R_{eff} &= \text{Specified minimum yield stress specified in Table XI 3-9 or Table XI 3-10 of Part XI, in N/mm}^2 \end{aligned}$$

In case of For direct strength calculations, the equivalent von Mises stress for a coarse mesh (s x s),  $\sigma_{vm}$ , in N/mm<sup>2</sup>, is to satisfy:

$$\sigma_{vm} \leq 0.9 R_y R_{eff}$$

(b) Ship's sides and stern

Vessels intended for anchor Where subjected to heavy loads when handling anchors, are to have the stern and the flat part of the bottom in way of the stern are to be adequately strengthened. The Net plate thickness is not to less than twice be a minimum of 2 times the basic requirement given stated in 16.2.2(c)(ii) of this Chapter. The deck adjacent to the stern is to be strengthened accordingly. If a substantial sheathing is fitted on the deck, the requirement may be modified waived.

Paragraph 16.3.3 has been amended as follows:

### 16.3.3 Systems and equipment

(a) General

- (i) The equipment is to meet the requirements in this section. Alternatively, equipment complying with a recognized standard may be accepted upon special considerations, provided said standard gives a reasonable equivalence to the requirements of this section and fulfils the intention.
- (ii) Arrangement drawing for anchor handling and towing, with the content listed under documentation requirement in this section, is to be posted on the bridge.
- (iii) Structural elements, e.g. cargo rails, bulwarks, etc., that may support the towline during normal operation, are to have a radius of bend sufficient to avoid damage to the towline.
- (iv) The arrangement is to be such that the heeling moment arising when the towline is running in the athwartship direction, will be as small as possible.
- (v) Vessels with class notation qualifier **Anchor Handling** are to be fitted with the following items:
  - anchor handling winch
  - chain stopper (shark jaw)
  - towing pins
  - stern roller.

- (vi) Vessels with class notation qualifier **Towing** are to be fitted with the following items:
    - towing winch, or
    - towing hook.
  - (vii) If a vessel with qualifier **Towing** is fitted with towing pins and/or **chain stopper**, these are to be certified as specified in CR Guidelines for Survey of Products for Marine Use.
  - (viii) The arrangement is to be such that the towline is led to the winch drum in a controlled manner under all foreseeable conditions (directions of the towline) and provides proper spooling on the drum.
- (b) Materials for **and manufacturing equipment**
- (i) **Chain stopper** and towing pins with attachments are to be made of rolled, forged or cast steel in accordance with Part XI.
  - (ii) **Materials for anchor handling and towing, winches and towing hooks** materials are to comply with relevant specifications given the applicable requirements in Part XI.
  - (iii) ~~For forged and cast steel with minimum specified tensile strength  $R_m$  above 650 N/mm<sup>2</sup>, specifications of chemical composition and mechanical properties are to be submitted for approval for the equipment in question.~~ (iv) Plate material in welded parts is to be of the grades as given in Table III 16-6 as below.

**Table III 16-6**  
**Plate Material Grades**

| Thickness in mm                  | Normal strength structural steel | High strength structural steel |
|----------------------------------|----------------------------------|--------------------------------|
| $t \leq 20$                      | A                                | AH                             |
| $20 < t \leq 25$                 | B                                | AH                             |
| $25 < t \leq 40$                 | D                                | DH                             |
| $40 < t \leq 150$ <sup>(1)</sup> | E                                | EH                             |

Note:

(1) For plates above 40 mm joined with fillet-/partly penetration welds, grade D and DH will normally be accepted

- (iv) **Manufacturing of winches and equipment are to be in accordance with Part XII or a recognized standard or code.** When  $R_{eH}$  is greater than 80% of  $R_m$ , calculations for structural strength, as given in 16.3.2(c) as below, are to be based on the following value for  $R_{eH}$ :  $R_{eH} = \min(R_{eH}, 0.8R_m)$
  - (v) **Manufacturing of loose gear is to be in accordance with Part XII or a recognized standard or code.**
  - (vi) Fabrication of **chain stopper** ~~shark jaws~~ and towing pins is to be in accordance with Part XI and Part XII, or a standard recognised by the Society.
- (c) Anchor handling and towing winches
- (i) **Control system Anchor handling winches**
    - (1) **Anchor handling winches are to be capable of controlled operation at adjustable speeds during lowering and hoisting of anchors and associated equipment when submerged and pulled over the stern roller, to ensure that the system is not overloaded.**
    - (2) **Anchor handling winches are to be equipped with remotely operated spooling devices.**
  - (ii) **Control and monitoring**
    - (1) **Main control station for anchor handling winches are to be placed on the bridge. If multiple control stations are available, only one control station is to be in control at one time.**

Note: See Chapter 2 of Part VIII for transfer of control.

    - (2) **The control stations are to provide a safe and logical interface for the operator, with operating levers are to pay out when moving away from operator, pull in when moving towards operator, and return to stop position when released. Operating controls are to be permanently marked with signs indicating their purpose and the operating direction.**  
**Control stations are to provide the operator with a clear view to the deck area and drums,**

alternatively through use of cameras or similar. Control stations are to have a light intensity of minimum 320 lux. They are to have prevention against inadvertent operation, suitable protection of personnel, and be provided with two-way communication with the main control station.

(3) Winches are to be provided with continuous load monitors and audible and visual overload alarms. The overload alarm for anchor handling winches are to be programmable for lower load levels.

(4) Anchor handling winches are to be equipped with tension control to ensure that systems are not overloaded in the event that the anchor being handled gets stuck, entangled or is otherwise exposed to similar situations.

~~returning to stop position when released, and, in addition, providing a clear view to the drums.~~

~~The anchor handling winch is to be capable of controlled operation during lowering and hoisting of anchors, both submerged and over the stern roller.~~

~~(ii) Monitoring system~~

~~Devices for measuring tension in tow ropes should be fitted.~~

(iii) Emergency release

~~The winches are to be able to release the load in a controlled and safe manner during all operational modes and during emergency scenarios, e.g. power loss, deadship conditions. designed to allow drum release in an emergency, and in all operational modes.~~

Design and operation of emergency release are to take into consideration restrictions on pay-out speed due to inertia and any restrictions due to onboard arrangements.

It is to be possible to initiate emergency release from the main control station. Emergency release may also be available locally at the winch.

The release capabilities are to be as specified on arrangement drawing as required in 16.3.3(a)(ii) of this Chapter.

~~The action to release the drum is to be from a position at the bridge with full view and control of the operation. Identical means of equipment for the release operation are to be used on all release stations. After an emergency release, the winch brake is to be in normal function without delay.~~

~~It is to always be possible to carry out the emergency release sequence (emergency release and/or application of brake), even during a black out.~~

Control handles, buttons, etc. for emergency release are to be protected against unintentional operation.

Emergency release operating instructions are to be clearly displayed at all control stations and locations where emergency release may be initiated.

(iv) Structural strength of winch for anchor handling function

~~The Anchor handling winches for anchor handling function are~~ to be capable of withstanding the maximum forces from hoisting, rendering and braking, including dynamic effects, without exceeding the following stress levels:

- hoisting including dynamic effect at relevant layer:  $0.67R_{eH}$
- braking at relevant layer as specified in 16.3.3(c)(ix) as below:  $0.67R_{eH}$
- rendering load (i.e. line load in towline when drum starts to rotate in the opposite direction of the applied driving torque):  $0.85 R_{eH}$ .

If  $R_{eH}$  is greater than 80% of  $R_m$ ,  $0.8R_m$  is to be used instead of  $R_{eH}$  in the calculations.

where

|          |   |                                                                                                            |
|----------|---|------------------------------------------------------------------------------------------------------------|
| $R_{eH}$ | = | Specified minimum yield stress specified in Table XI 3-9 or Table XI 3-10 of Part XI, in N/mm <sup>2</sup> |
| $R_m$    | = | Specified minimum tensile strength in Table XI 3-9 or Table XI 3-10 of Part XI, in N/mm <sup>2</sup>       |

Buckling and fatigue are to be considered according to a recognized standard or code of practice.

(v) Structural strength for winch for towing function

~~The Design and scantlings are to be capable of withstanding the winch holding capacity, taken as 80% of the minimum breaking load, as given in 11.7.4 of this Part, without permanent deformations at the relevant layer.~~

Buckling and fatigue are to be considered according to a recognized standard or code of practice.

~~(vi) Winches intended for both functions are to meet the requirements of both 16.3.3(c)(iv) and 16.3.3(c)(v) above.~~

(vi) Drums

The drum design is to be carried out with due consideration **suitable for all** to the relevant operations.

The drum diameter for steel wire rope should not be less than 14 times the maximum intended diameter of the rope. ~~However, for all rope types, the rope bending specified by the rope manufacturer should not be exceeded.~~

(viii) ~~Towline~~ **Line** attachment

The end attachment of the ~~towline~~ to the winch ~~barrel~~ **drum** is to be of limited strength making a weak link in case the ~~towline~~ has to be run out.

At least ~~three~~ **3** ~~dead~~ turns of rope are ~~assumed on the~~ **to remain on the** drum ~~under~~ **during** normal operation to provide proper attachment.

~~(ix)~~ **viii** Brake on drum intended for towing

The brake is to ~~normally~~ act directly on the drum and ~~should~~ be capable of holding the ~~at least the~~ winch holding capacity, as given in 16.3.3(c)(v) ~~above~~ at the inner layer. ~~It is to be arranged for a~~ **Manual** operation or other means for activation during a failure of the power supply **is to be available**.

(ix) Brake on drum intended for anchor handling

The brake is ~~generally~~ to act directly on the drum. It is to be capable of holding at least 1.25 times the maximum torque created from ~~towline~~ pull including dynamic effect. ~~In addition, the~~ **The** brake is to be capable of stopping the rotation of the drum from its maximum speed.

The holding load of the winch is not to be affected by failure ~~of in~~ the power supply, and the brake is to be actuated at power failure if the load is not controlled by the winch motors or **otherwise controlled** ~~similar~~. Means are, ~~however~~, to be provided for overriding such systems at any time.

~~(xi) Brakes on drums intended for both functions are to meet the requirements in 16.3.3(c)(ix) and 16.3.3(c)(x) above.~~

(x) **Maintenance manual**

**The maintenance manual for anchor handling winches is to include, as a minimum, the following:**

- **description of inspection regime with schedules and checklists**
- **instructions for routine repair and maintenance**
- **technical maintenance information**
- **information on recommended lubricants, oil, and filter changes**
- **information on bearing maintenance, if applicable**
- **lists of replaceable parts and components with inspection, maintenance, and replacement procedures**
- **lists of sources of spare parts**
- **model forms for records of inspections and maintenance**
- **operational test procedures, as well as the pre/post-operational test inspection procedures**
- **list of components requiring particular attention during inspections, as well as inspection and maintenance procedures**
- **recommended intervals for replacement and overhaul of components and equipment**
- **information on the preservation of the coating and corrosion protection system**
- **information regarding special inspection and maintenance in cases where the anchor handling winch is not operated for longer periods of time.**

(xi) **Operations manual**

**The operations manual for the anchor handling winches is to include, as a minimum, the following:**

- **design, operational, and environmental limitations**
- **the dynamic capacity in way of maximum line speed for all winch operational modes**

- compatible loose gear, as applicable
- safety instructions
- operating procedures, including emergency procedures, for the specific type of winch.

Note: Due consideration is to be given to international and national regulations and best practices for occupational safety and health, in addition to any limiting operational conditions, such as the ship's motion/inclination, environmental conditions including sea state, maximum wind speeds including wind gusts, ice and snow accretion, as well as limitations of the anchor handling winch, such as maximum hoisting force, maximum brake holding capacity.

(d) Other equipment

(i) Chain stopper ~~The shark jaw and towing pins~~

Chain stoppers are to be capable of sustaining the load defined on the arrangement drawing given in 16.3.3(a)(ii) of this Chapter without exceeding a stress level of  $0.67R_{eH}$ . Dynamic effects are to be included.

Chain stoppers are to be provided with an audible alarm, sounding when the chain stopper is being engaged and when being disengaged.

Chain stoppers are to be provided with emergency release functionality for all operational modes and emergency scenarios (e.g. power loss, deadship conditions). Emergency release is to include disengagement of any equipment that may prevent or reduce the possibility of a successful release.

It is to be possible to initiate emergency release from the main control station on the bridge and locally at the emergency release control mechanism. Emergency release is to be designed for remote operation in order to minimize the risk of injury to personnel. Control handles, buttons, etc. for emergency release are to be protected against unintentional operation.

Emergency release operating instructions are to be clearly displayed at all control stations and locations where emergency release may be initiated.

Release capabilities are to be specified on the arrangement drawing, see 16.3.3(a)(ii) of this Chapter.

(ii) ~~Towing pins~~ ~~If an emergency release on shark jaw and towing pins is arranged, the capabilities are to be as specified on the arrangement drawing, given in 16.3.3(a)(ii) of this Chapter.~~

Towing pins are to withstand forces and towline sectors defined on the arrangement drawing given in 16.3.3(a)(ii) of this Chapter without exceeding a stress level of  $0.67 R_{eH}$ . Dynamic effect is to be included.

(iii) ~~If emergency release of towing pins is arranged, capabilities are to be specified on the arrangement drawing, see 16.3.3(a)(ii) and 16.3.3(d)(i) of this Chapter. When the towing hook is fitted, applicable requirements in 11.7 of this Part are to be complied with.~~

(iv) Towing hook

If a towing hook is installed, the applicable requirements in 11.7 of this Part are to be complied with.

(v) Loose gear is to comply with Rules for the Construction and Survey of Lifting Appliances or a recognized standard or code.

(e) Marking

~~Equipment is to be marked to enable them to be readily related to their specifications and manufacturer. When the Society's product certificate is required, the equipment is to be clearly marked by the Society for identification.~~

(i) Winches and equipment

Winches and equipment are to be provided with a permanent affixed name plate with the following information:

- details of the manufacturer (name, address)
- model name/number
- serial number (unique identification)
- placeholder for the classification society's stamp.

- (ii) The following information is to be on the anchor handling winch name plate, or in the operation manual, the maintenance manual or similar:
- date of manufacture and date of installation
  - details of power supply
  - details of intended line (e.g. length, diameter, type)
  - maximum brake holding capacity, in metric tonnes
  - maximum static bollard pull, in metric tonnes
  - drum size
  - winch speed.
- (iii) Loose gear
- Loose gear is to be clearly and permanently marked with its unique identification (serial no.), safe working load (SWL) and any additional marks required for safe use. If insufficient space for marking on the loose gear other than the SWL, additional information is to be included in the compliance documentation or be provided by other suitable means.

*Paragraph 16.3.4 has been amended as follows:*

#### 16.3.4 Stability

- (a) ~~General~~ Requirements for towing operations
- Vessels engaged in ~~For~~ towing operations, ~~stability~~ are to comply with applicable ~~stability~~ requirements in 11.8 and 11A.4 of this Part.
- (b) Requirements for anchor handling operations
- (i) Intact stability
- The intact stability of a vessel engaged in anchor handling operation is to be evaluated for all anchor handling conditions, demonstrating compliance with the additional criteria in Part B, 2.7 of IMO Code on Intact Stability 2008, as amended by IMO Res.MSC.415(97) for ships engaged in anchor handling operations.
- (ii) Loading conditions
- The following loading conditions intended for anchor handling are to be examined in the Trim and Stability Booklet:
- (1) Vessel at the maximum Load Line draft, with full stores and fuel and fully loaded with all liquid and dry cargo distributed below deck and with remaining deadweight distributed as above deck weight (anchors, chain, etc., specified by weight, LCG, VCG and total height above deck) corresponding to the worst service departure condition in which all the relevant stability criteria are met.
  - (2) Vessel with 10% stores and fuel and fully loaded cargoes of (1) above, arrival condition.
  - (3) Vessel at the maximum Load Line draft, with full stores, a full set of rig anchors on deck to be deployed during single trip (and rig chains, where appropriate) and fuel loaded to the maximum deadweight, corresponding to the worst service departure condition in which all the relevant stability criteria are met.
  - (4) Vessel with 10% stores and fuel and fully loaded cargoes of (3) above, arrival condition.
  - (5) Service loading condition at the maximum draft at which anchor handling operations may occur with the heeling levers for the line tension the ship is capable of with a minimum of 67% stores and fuel and in which all the relevant stability criteria are met.
  - (6) Service loading condition at the minimum draft at which anchor handling operations may occur with the heeling levers for the line tension the ship is capable of with 10% stores and fuel and in which all the relevant stability criteria are met.

(7) Vessel in worst anticipated operating condition.

These conditions are to include the following items:

- a) The loads on the deck (including the weight of anchors, chains and lines) and winch reels (loaded with heaviest possible line types).
- b) The vertical force from the tension, upon which calculations of trim and curve for righting arm are based.
- c) The weight of the anchors and lines.
- d) The righting arm curve (GZ curve) is to be plotted using the VCG corrected for the free surface of all slack tanks, including any roll reduction tanks in use.  
Consideration is to be given to fuel oil and fresh water used as well as any ballast water necessary during the operations.
- e) Where the vessel is fitted with rig chain locker(s) below the main deck, the opening(s) is to be considered as a downflooding point in all stability calculations.
- f) Where the vessel is fitted with open rig chain lockers on the main deck, effective means to drain these lockers are to be provided. Where not, the lockers are to be considered flooded and the appropriate free surface effects included in all stability calculations.

(iii) Stability guidance for the master

The trim and stability booklet is to include the following guidance:

- (1) Information stating the maximum force/tension in wire or chain, as well as corresponding lateral point of direction according to the calculations, is to be provided in the trim and stability booklet and be displayed next to the control desk or at another location where the navigator on duty easily can see the information from his command post.
- (2) The displayed information is to be in the form of simple sketches showing the vessel's righting moment/arm curves in addition to a table stating the relevant combinations of force/tension and point of direction which gives the maximum acceptable heeling moment.
- (3) Any tank restrictions (i.e. ballast tank and/or roll reduction tank usage, fuel oil burn off sequences, etc.) determined by the stability calculations.

During anchor handling operations, all weather-tight access and emergency hatches, and doors on the work deck, are to be kept closed, except when actually being used for transit under safe conditions.

Note: For additional information on stability booklets and operation manuals for ships engaged in anchor handling operations, refer to Part B, 3.6.3 and 3.8 of IMO Code on Intact Stability 2008, as amended by IMO Res.MSC.415(97).

AMENDMENT TO "THE RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF  
STEEL SHIPS 2026"

## **PART IV      MACHINERY INSTALLATIONS— CONSTRUCTION AND SHAFTING**

## List of major changes in Part IV from 2026 edition

|              |         |
|--------------|---------|
| Table IV 3-4 | Revised |
| 4.1.6        | New     |
| 4.6.3(b)     | Revised |
| 6.6.4        | Revised |
| 6.6.4(b)(i)  | Revised |
| 6.6.4(b)(iv) | New     |
| 6.6.4(d)(i)  | Revised |
| 6.6.4(d)(iv) | New     |

Rules for the Construction and Classification of Steel Ships 2026 have been partly amended as follows:

### Chapter 3 Diesel Engines

*Table IV 3-4 has been amended as follows:*

**Table IV 3-4**  
**Summary of Inspection, Test and Certification<sup>(8)</sup> of Diesel Engine Parts**

| <b>Parts</b>                                   | <b>Material properties<sup>(1)</sup></b> | <b>Non-destructive Examination<sup>(2)</sup></b> | <b>Hydraulic Testing<sup>(3)(6)</sup></b> | <b>Dimensional Inspection<sup>(6)</sup><br/>(including surface condition)</b> | <b>Visual Inspection<sup>(6)</sup><br/>(Surveyor)</b> | <b>Application to Engine</b> | <b>Component Certificate</b> |
|------------------------------------------------|------------------------------------------|--------------------------------------------------|-------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------------------|------------------------------|------------------------------|
| Welded bedplate                                | W (CC+M)                                 | W (UT+MT/PT)                                     |                                           |                                                                               | fit-up + post-welding                                 | All                          | €                            |
| Bearing transverse girders (cast steel)        | W (CC+M)                                 | W (UT+MT/PT)                                     |                                           |                                                                               | X                                                     | All                          | €                            |
| Welded frame box                               | W (CC+M)                                 | W (UT+MT/PT)                                     |                                           |                                                                               | fit-up + post-welding                                 | All                          | €                            |
| Cylinder block (grey cast iron)                |                                          |                                                  | W <sup>(5)</sup>                          |                                                                               |                                                       | CH                           |                              |
| Cylinder block (spheroidal graphite cast iron) |                                          |                                                  | W <sup>(5)</sup>                          |                                                                               |                                                       | CH                           |                              |
| Welded cylinder frames                         | W (CC+M)                                 | W (UT+MT/PT)                                     |                                           |                                                                               | fit-up + post-welding                                 | CH                           | €                            |
| Engine block (grey cast iron)                  |                                          |                                                  | W <sup>(5)</sup>                          |                                                                               |                                                       | > 400 kW/cyl                 |                              |
| Engine block (spheroidal graphite cast iron)   | W (M)                                    |                                                  | W <sup>(5)</sup>                          |                                                                               |                                                       | > 400 kW/cyl                 |                              |
| Cylinder liner                                 | W (CC+M)                                 |                                                  | W <sup>(5)</sup>                          |                                                                               |                                                       | D > 300 mm                   |                              |
| Cylinder head (grey cast iron)                 |                                          |                                                  | W                                         |                                                                               |                                                       | D > 300 mm                   |                              |
| Cylinder head (spheroidal graphite cast iron)  |                                          |                                                  | W                                         |                                                                               |                                                       | D > 300 mm                   |                              |

| Parts                                        | Material properties <sup>(1)</sup> | Non-destructive Examination <sup>(2)</sup>                     | Hydraulic Testing <sup>(3)(6)</sup> | Dimensional Inspection <sup>(6)</sup><br>(including surface condition) | Visual Inspection <sup>(6)</sup><br>(Surveyor)           | Application to Engine | <del>Component</del><br>Certificate |
|----------------------------------------------|------------------------------------|----------------------------------------------------------------|-------------------------------------|------------------------------------------------------------------------|----------------------------------------------------------|-----------------------|-------------------------------------|
| Cylinder head<br>(cast steel)                | W (CC+M)                           | W (UT+MT/PT)                                                   | W                                   |                                                                        | X                                                        | D > 300 mm            | €                                   |
| Forged cylinder head                         | W (CC+M)                           | W (UT+MT/PT)                                                   | W                                   |                                                                        | X                                                        | D > 300 mm            | €                                   |
| Piston crown<br>(cast steel)                 | W (CC+M)                           | W (UT+MT/PT)                                                   |                                     |                                                                        | X                                                        | D > 400 mm            | €                                   |
| Forged piston crown                          | W (CC+M)                           | W (UT+MT/PT)                                                   |                                     |                                                                        | X                                                        | D > 400 mm            | €                                   |
| Crankshaft: made in one piece                | C (CC+M)                           | W (UT+MT/PT)                                                   |                                     | X                                                                      | Random, of fillets and oil bores                         | All                   | €                                   |
| Semi-built crankshaft                        | See below                          | See below                                                      |                                     | See below                                                              | See below                                                | All                   | €                                   |
| Crank throw                                  | C (CC+M)                           | W (UT+MT/PT)                                                   |                                     | X                                                                      | Random, of fillets and shrink fittings                   | All                   |                                     |
| Forged main journal and journals with flange | C (CC+M)                           | W (UT+MT/PT)                                                   |                                     | X                                                                      | Random, of shrink fittings                               | All                   |                                     |
| Exhaust gas valve cage                       |                                    |                                                                | W                                   |                                                                        |                                                          | CH                    |                                     |
| Piston rod, if applicable                    | C (CC+M)                           | W (UT+MT/PT)<br>(MT/PT again after final machining (grinding)) |                                     |                                                                        | Random                                                   | D > 400 mm            | €                                   |
| Cross head                                   | C (CC+M)                           | W (UT+MT/PT)<br>(MT/PT again after final machining (grinding)) |                                     |                                                                        | Random                                                   | CH                    | €                                   |
| Connecting rod with cap                      | C (CC+M)                           | W (UT+MT/PT)                                                   |                                     | X                                                                      | Random, of all surfaces, in particular those shot peened | All                   | €                                   |
| Coupling bolts for crankshaft                | C (CC+M)                           | W (UT+MT/PT)                                                   |                                     | X                                                                      | Random, of interference fit                              | All                   | €                                   |
| Bolts and studs for main bearings            | W (CC+M)                           | W (UT+MT/PT)                                                   |                                     |                                                                        |                                                          | D > 300 mm            |                                     |

| Parts                                                                       | Material properties <sup>(1)</sup> | Non-destructive Examination <sup>(2)</sup> | Hydraulic Testing <sup>(3)(6)</sup>   | Dimensional Inspection <sup>(6)</sup><br>(including surface condition) | Visual Inspection <sup>(6)</sup><br>(Surveyor) | Application to Engine                                    | Component Certificate |
|-----------------------------------------------------------------------------|------------------------------------|--------------------------------------------|---------------------------------------|------------------------------------------------------------------------|------------------------------------------------|----------------------------------------------------------|-----------------------|
| Bolts and studs for cylinder heads                                          | W (CC+M)                           | W (UT+MT/PT)                               |                                       |                                                                        |                                                | D > 300 mm                                               |                       |
| Bolts and studs for connecting rods                                         | W (CC+M)                           | W (UT+MT/PT)                               |                                       | TR <sup>(7)</sup><br>(thread marking)                                  |                                                | D > 300 mm                                               |                       |
| Tie rod                                                                     | W (CC+M)                           | W (UT+MT/PT)                               |                                       | TR <sup>(7)</sup><br>(thread marking)                                  | Random                                         | CH                                                       | €                     |
| High pressure fuel injection pump body                                      |                                    |                                            | W                                     |                                                                        |                                                | D > 300 mm                                               |                       |
|                                                                             |                                    |                                            | TR <sup>(7)</sup>                     |                                                                        |                                                | D ≤ 300 mm                                               |                       |
| High pressure fuel injection valves (only for those not autofretted)        |                                    |                                            | W                                     |                                                                        |                                                | D > 300 mm                                               |                       |
|                                                                             |                                    |                                            | TR <sup>(7)</sup>                     |                                                                        |                                                | D ≤ 300 mm                                               |                       |
| High pressure fuel injection pipes including common fuel rail               | W (CC+M)                           |                                            | W for those that are not autofretted  |                                                                        |                                                | D > 300 mm                                               |                       |
|                                                                             |                                    |                                            | TR for those that are not autofretted |                                                                        |                                                | D ≤ 300 mm                                               |                       |
| High pressure common servo oil system                                       | W (CC+M)                           |                                            | W                                     |                                                                        |                                                | D > 300 mm                                               |                       |
|                                                                             |                                    |                                            | TR <sup>(7)</sup>                     |                                                                        |                                                | D ≤ 300 mm                                               |                       |
| Cooler, both sides <sup>(4)</sup>                                           | W (CC+M)                           |                                            | W                                     |                                                                        |                                                | D > 300 mm                                               |                       |
| Accumulator of common rail fuel or servo oil system                         | W (CC+M)                           |                                            | W                                     |                                                                        |                                                | All engines with accumulators with a capacity of > 0.5 l |                       |
| Piping, pumps, actuators, etc. for hydraulic drive of valves, if applicable |                                    |                                            | W                                     |                                                                        |                                                | > 800 kW/cyl                                             |                       |
| Engine driven pumps (oil, water, fuel, bilge)                               |                                    |                                            | W                                     |                                                                        |                                                | > 800 kW/cyl                                             |                       |

| Parts                                      | Material properties <sup>(1)</sup> | Non-destructive Examination <sup>(2)</sup>                                          | Hydraulic Testing <sup>(3)(6)</sup> | Dimensional Inspection <sup>(6)</sup><br>(including surface condition) | Visual Inspection <sup>(6)</sup><br>(Surveyor) | Application to Engine | <del>Component</del><br><del>Certificate</del> |
|--------------------------------------------|------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------|------------------------------------------------------------------------|------------------------------------------------|-----------------------|------------------------------------------------|
| Bearings for main, crosshead, and crankpin | TR <sup>(7)</sup> (CC)             | TR <sup>(7)</sup><br>(UT for full contact between basic material and bearing metal) |                                     | W                                                                      |                                                | > 800 kW/cyl          |                                                |

Notes:

- (1) Material properties include chemical composition and mechanical properties, and also surface treatment such as surface hardening (hardness, depth and extent), peening and rolling (extent and applied force).
- (2) Non-destructive examination means e.g. ultrasonic testing, crack detection by magnetic particle testing or dye penetration testing.
- (3) Hydraulic testing is applied on the water/oil side of the component. Items are to be tested by hydraulic pressure at the pressure equal to 1.5 times the maximum working pressure. High pressure parts of the fuel injection system are to be tested by hydraulic pressure at the pressure equal to 1.5 maximum working pressure or maximum working pressure plus 300 bar, whichever is the less. Where design or testing features may require modification of these test requirements, special consideration may be given.
- (4) Charge air coolers need only be tested on the water side.
- (5) Hydraulic testing is also required for those parts filled with cooling water and having the function of containing the water which is in contact with the cylinder or cylinder liner.
- (6) Testing or inspection required for parts is marked with an "X".
- (7) "TR" is a document signed by the manufacturer stating:
  - conformity with requirements.
  - that the tests and inspections have been carried out on samples from the current production.

(8) The certification requirements of marine diesel engines are to comply with the requirements of the Guidelines for Survey of Products for Marine Use.

## 4.1 General

*Paragraph 4.1.6 has been added as follows:*

4.1.6 Anchor handling winches and associated equipment are to be designed, constructed, installed and function tested in accordance with 16.3 of Part III of the Rules.

## 4.6 Thrusters

*Paragraph 4.6.3(b) has been amended as follows:*

### 4.6.3 Design

#### (a) Prime movers

##### (i) Diesel engines

Diesel engines used for driving thrusters are to comply with the design, construction, testing and certification requirements of Chapter 3 of this Part. Engine support systems are to be in accordance with Chapter 3 of this Part, except that standby pumps and similar redundancy specified for propulsion engines are not required for thruster engines.

##### (ii) Electric motors

Electric motors driving thrusters are to comply with the design, construction, testing and certification requirements of Chapter 4 of Part VII of the Rules. Power for thruster motors may be derived from ship service generators; except that precautions, such as interlock arrangements, are to be fitted to prevent starting except when there are enough generators on-line to support the starting and running of the thruster motor. All ship service generators may be put on line for this purpose, see 11.2 of Part VII of the Rules.

##### (iii) Hydraulic motors

Hydraulic motors delivering propulsion torque to thrusters are to be certified by the Surveyor at manufacturers' plants in accordance with the applicable requirements in 4.1, 4.5 and 4.8~~7~~ of this Chapter. When applicable to notation **DPS**, in addition to the required test, hydraulic motors are to be designed based on applicable pressure vessel and piping standards for pressure retaining components, allowable stress for torque components, and recognized standard for seals. As an alternative to design review, mass produced motors may be accepted on the basis of specification review and a prototype test to 150% of the rated load, subject to agreement on design standards and manufacturing process.

#### (b) Propellers

The thruster propellers are to comply with the requirements of 7.2 of this Part. However, thrusters not intended for main propulsion, such as maneuvering thrusters, may be accepted based on design calculations in accordance with applicable standards and subject to approval by the Society.

## Chapter 6

### Shafting

#### 6.6 Shafting Accessories

*Paragraph 6.6.4 has been amended as follows:*

##### 6.6.4 Bearings

The stern tube gland for propeller shaft and the shaft tunnel bearings for intermediate shafts are to be accessible at all times without shifting of cargo and to be provided with efficient means of lubrication. The length of the **aftmost propeller shaft** bearing in the stern ~~tube or in the strut bush~~ next to and supporting the propeller is to be as follows.

(a) Oil lubricated bearings of white metal

- (i) The length of white metal lined bearings is to be not less than 2.0 times the rule diameter of the shaft in way of the bearing.
- (ii) The length of the bearing may be less provided the normal bearing pressure is not more than 8 bar as determined by static bearing reaction calculation taking into account shaft and propeller weight which is deemed to be exerted solely on the aft bearing divided by the projected area of the shaft. However, the minimum length is to be not less than 1.5 times the actual diameter.
- (iii) Where the stern bearing is white metal lined and lubricated by oil or grease, the following are to be complied with:
  - (1) The oil sealing gland is to be of an approved type and capable of operating under the various sea water temperatures it may be subject to in service.
  - (2) The space between propeller shaft and stern tube is to be kept filled with oil or grease of good quality. The stern bearing is to be provided with proper grooves for oil, air and possible accumulation of dirt. Pipes and cocks for supplying and drawing off oil as well as for air are to be fitted.
  - (3) Where lubrication is made by means of gravity, the lubricating oil tank is to be located above the load water line and provided with a low level alarm.
  - (4) Means are to be provided, where necessary, for cooling the lubricating oil of the stern bearing.

(b) Oil lubricated bearings of synthetic rubber, reinforced resin or plastic materials

*Paragraph 6.6.4(b)(i) has been amended as follows:*

- (i) For bearings of synthetic rubber, reinforced resin or plastics materials which are approved for use as oil lubricated ~~stern bush~~ **aftmost propeller shaft** bearings, the length of the bearing is to be not less than 2.0 times the rule diameter of the shaft in way of the bearing.
- (ii) The length of bearing may be less provided the nominal bearing pressure is not more than 6 bar as determined by static bearing reaction calculation taking into account shaft and propeller weight which is deemed to be exerted solely on the aft bearing divided by the projected area of the shaft. However, the minimum length is to be not less than 1.5 times the actual diameter. Where the material has **been** proven satisfactory **by** testing and operating experience, consideration may be given to an increased bearing pressure.

- (iii) Means of lubrication are to be submitted for special consideration by the Society.

*Paragraph 6.6.4(b)(iv) has been added as follows:*

(iv) Synthetic materials used for oil lubricated aftmost propeller shaft bearings are to be type approved.

- (c) Water lubricated bearings of lignum vitae

- (i) Where the bearing comprises staves of wood (known as lignum vitae), the length of the bearing is to be not less than 4.0 times the rule diameter of the shaft in way of the bearing.
- (ii) Adequate means are to be provided to supply an ample amount of clean water for lubrication and cooling. Forced water lubrication by a suitable independent pump or from other pressure source is recommended to be provided when the required shaft diameter exceeds 350 mm.

- (d) Water lubricated bearings of synthetic material

*Paragraph 6.6.4(d)(i) has been amended as follows:*

- (i) Where the bearing is constructed of synthetic materials which are approved for use as water lubricated ~~stem bush~~ aftmost propeller shaft bearings such as rubber or plastics, the length of the bearing is to be not less than 4.0 times the rule diameter of the shaft in way of the bearing.
- (ii) For a bearing design substantiated by experiments to the satisfaction of the Society consideration may be given to a bearing length not less than 2.0 times the rule diameter of the shaft in way of the bearing.
- (iii) Means of lubrication are to be submitted for special consideration by the Society.

*Paragraph 6.6.4(d)(iv) has been added as follows:*

(iv) Synthetic materials used for water lubricated aftmost propeller shaft bearings are to be type approved.

A reduction of the bearing length may be approved if the bearing is shown by means of bench tests to have sufficient load bearing capacity.



AMENDMENT TO "THE RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF  
STEEL SHIPS 2026"

## **PART VI      PIPING AND PUMPING SYSTEMS**

List of major changes in Part VI from 2026 edition

|               |         |
|---------------|---------|
| Table VI 1-1  | Revised |
| 2.8.1         | Revised |
| 2.8.2         | Revised |
| 2.8.3         | Revised |
| 2.8.4         | Revised |
| Table VI 2-11 | Revised |
| 2.8.5         | Revised |
| 2.8.6         | Revised |
| 2.8.7         | Revised |
| 2.8.8         | Revised |
| 2.8.9         | Revised |
| 7.2.3         | Revised |

Rules for the Construction and Classification of Steel Ships 2026 have been partly amended as follows:

## Chapter 1 General

*Table VI 1-1 has been amended as follows:*

**Table VI 1-1  
Classes of Pipes**

| Piping System for                                                                                      | Class I                     | Class II                                                          | Class III                                                  |
|--------------------------------------------------------------------------------------------------------|-----------------------------|-------------------------------------------------------------------|------------------------------------------------------------|
|                                                                                                        | P > P2 (MPa) or T > T2 (°C) | Bounded by Class I and III as Fig. VI 1-1                         | P ≤ P1 (MPa) & T ≤ T1 (°C)                                 |
| <del>Toxic or Corrosive media</del>                                                                    | Without special safeguards  | With special safeguards <sup>(1)(2)</sup>                         | Not applicable                                             |
| <del>Toxic media</del>                                                                                 | <del>All</del>              | <del>Not applicable<sup>(2)</sup></del>                           | <del>Not applicable<sup>(2)</sup></del>                    |
| Flammable media heated to above flash point or with flash point below 60°C<br><del>Liquefied Gas</del> | Without special safeguards  | With special safeguards <sup>(1)</sup>                            | <del>Not applicable</del> Open-ended piping <sup>(3)</sup> |
| <del>Cargo oil</del>                                                                                   | <del>Not applicable</del>   | <del>Not applicable</del>                                         | <del>All<sup>(4)</sup></del>                               |
| Steam                                                                                                  | 1.6 300                     | Any pressure-temperature combination not belong to Class I or III | 0.7 170                                                    |
| Thermal oil                                                                                            | 1.6 300                     |                                                                   | 0.7 150                                                    |
| Fuel oil<br>Lubricating oil<br>Flammable hydraulic oil                                                 | 1.6 150                     |                                                                   | 0.7 60                                                     |
| Other media <sup>(3)(5)</sup>                                                                          | 4.0 300                     |                                                                   | 1.6 200                                                    |

Notes:

- (1) Safeguards for reducing leakage possibility and limiting its consequences e.g., pipes led in positions where leakage of internal fluids will not cause a potential hazard or damage to surrounding areas which may include the use of pipe ducts, shielding, screening etc.
- (2) Class II, III pipes are not to be used for toxic media.
- (3) Open ended pipes (drains, overflows, vents, exhaust gas lines, boiler escape pipes) irrespective of T, belong to Class III.
- (4) Cargo oil pipes belong to Class III.
- (5) Other media including water, air, gases, non-flammable hydraulic oil, urea for SCR systems\*.  
\*Note: When piping materials selected according to ISO 18611-3:2014 for Urea in SCR systems.
- (6) P = Design pressure, as defined in 1.2 of this Part.  
T = Design temperature, as defined in 1.3 of this Part.

## Chapter 2

### Piping Design and Arrangements

#### 2.8 Plastic Pipes

*Paragraph 2.8.1 has been amended as follows:*

##### 2.8.1 General

- (a) These requirements are applicable to piping systems on ships, including pipe joints and fittings, made predominately of other material than metal. ~~plastic pipes/piping systems on ships.~~
- (b) The use of mechanical joints approved for the use in metallic piping systems only are not permitted. ~~The requirements are not applicable to mechanical joints and flexible couplings used in metallic piping systems.~~
- (c) Piping systems ~~made of thermoplastic materials, such as polyethylene(PE), polypropylene(PP), polybutylene(PB) and~~ intended for non-essential services are to meet **only** the requirements of recognized standards and provisions stipulated in 2.8.3(a)(iii)(2), 2.8.4(b), 2.8.5 and 2.8.6.

*Paragraph 2.8.2 has been amended as follows:*

##### 2.8.2 Terms and Definition

- (a) "Plastic(s)" means both thermoplastic and thermosetting plastic materials with or without reinforcement, such as PVC and fibre reinforced plastics - FRP. Plastic includes synthetic rubber and materials of similar thermo/mechanical properties.
- (b) "Pipes/piping systems" means those made of plastic(s) and include the pipes, fittings, system joints, method of joining and any internal or external liners, coverings and coatings required to comply with the performance criteria.
- (c) "Joint" means the location at which two pieces of pipe or a pipe and a fitting are connected together. The joint may be made by adhesive bonding, laminating, welding, flanges and mechanical joints. ~~means joining pipes by adhesive bonding, laminating, welding, etc.~~
- (d) "Fittings" means bends, elbows, fabricated branch pieces etc. of plastic materials.
- (e) "Nominal pressure" means the maximum permissible working pressure which should be determined in accordance with the requirements in 2.8.3(a).
- (f) "Design pressure" means the maximum working pressure which is expected under operation conditions or the highest set pressure of any safety valve or pressure relief device on the system, if fitted.
- (g) "Fire endurance" means the capability of piping to maintain its strength and integrity (i.e. capable of performing its intended function) for some predetermined period of time while exposed to fire.

(h) "Essential to the safety of ship" means all piping systems that in event of failure will pose a threat to personnel and the ship\*.

\*Note: Examples for piping systems essential to the safety are provided by Table VI 2-11.

(i) "Essential services" are those services essential for propulsion and steering and safety of the ship as specified in 1.3.1 of Part IV of the Rules.

(j) "FTP Code" means the International Code for Application of Fire Test Procedures as adopted by IMO resolution.

*Paragraph 2.8.3 has been amended as follows:*

### 2.8.3 Design requirements

The specification of piping is to be in accordance with a recognised national or international standard acceptable to the Society. In addition, the following requirements apply:

#### (a) Strength

(i) The strength of the pipes is to be determined by a hydrostatic test failure pressure of a pipe specimen under the standard conditions:

(1) Atmospheric pressure 100kPa

(2) Relative humidity 30%

(3) Environmental and carried fluid temperature 25°C

(ii) The strength of fittings and joints is to be not less than that of the pipes.

(iii) The nominal pressure is to be determined from the following conditions:

##### (1) Internal Pressure

For an internal pressure the following is to be taken whichever is smaller:

$$P_{int} \leq \frac{P_{sth}}{4} \quad \text{or} \quad P_{int} \leq \frac{P_{lth}}{2.5}$$

where

$P_{sth}$  = Short-term hydrostatic test pipe failure pressure

$P_{lth}$  = Long-term hydrostatic test pipe failure pressure ( > 100,000 h)

(2) External Pressure (for any installation which may be subject to vacuum conditions inside the pipe or a head of liquid acting on the outside of the pipe; and for any pipe installation required to remain operational in case of flooding damage, as per SOLAS II-1/8-1 or for any pipes that would allow progressive flooding to other compartments through damaged piping or through open ended pipes in the compartments).

For an external pressure:

$$P_{ext} \leq \frac{P_{col}}{3}$$

where

$P_{col}$  = Pipe collapse pressure

(iv) In no case is the collapse pressure to be less than 3 bar.

~~(v)~~ The maximum working external pressure is a sum of the vacuum inside the pipe and a head of liquid acting on the outside of the pipe.

(iv) Notwithstanding the requirements of 2.8.3(a)(iii)(1) or (2) above as applicable, the pipe or pipe layer minimum wall thickness is to follow recognized standards. In the absence of standards for pipes not subject to external pressure, the requirements of 2.8.3(a)(iii)(2) above are to be met.

(v\*) The maximum permissible working pressure is to be specified with due regard for maximum possible working temperatures in accordance with manufacturer's recommendations.

(b) Axial Strength

(i) The sum of the longitudinal stresses due to pressure, weight and other loads is not to exceed the allowable stress in the longitudinal direction.

(ii) In the case of FRP pipes, the sum of the longitudinal stresses is not to exceed half of the nominal circumferential stress derived from the nominal internal pressure condition (refer to 2.8.3(a)).

(c) Impact Resistance

(i) Plastic pipes and joints are to have a minimum resistance to impact in accordance with recognized national or international standards ~~such as ASTM D2444 or equivalent.~~

(ii) After the test the specimen is to be subjected to hydrostatic pressure equal to 2.5 times the design pressure for at least 1 hour.

(d) Temperature

(i) The permissible working temperature depending on the working pressure is to be in accordance with manufacturer's recommendations, but in each case it is to be at least 20°C lower than the minimum heat distortion/~~deflection~~ temperature of the pipe material, determined according to ISO 75-2:2013 method A, or equivalent e.g. ASTM D648-18.

(ii) The minimum heat distortion/~~deflection~~ temperature is to be not less than 80°C.

Paragraph 2.8.4 has been amended as follows:

2.8.4 Requirements for pipes/piping systems depending on service and/or locations

(a) Fire endurance

(i) Pipes and their associated joints and fittings whose integrity is essential to the safety of ships, including plastic piping required by SOLAS II-2/21.4 to remain operational after a fire casualty, are required to meet the minimum fire endurance requirements of Appendix 1 or 2, as applicable, of IMO resolution A.753(18), as amended.

(ii) Unless instructed otherwise by the Flag Administration, fire endurance tests are to be carried out with specimen representative for pipes, joints and fittings\*:

\*Note:

A test specimen incorporating several components of a piping system may be tested in a single test.

(1) Pipes:

a) for sizes with outer diameter < 200 mm the minimum outer diameter and wall thickness\*

\*Note:

Test conditions are most demanding for minimum wall thickness and thus larger wall thickness is covered. A key factor determining the fire performance of a pipe component variant is the thickness-to-diameter (t/D) ratio and whether it is larger or smaller than that of the variant which has been fire-tested.

If fire-protective coatings or layers are included in the variant used in the fire test, only variants with the same or greater thickness of protection, regardless of the (t/D) ratio, shall be qualified by the fire test.

- b) for sizes with outer diameter  $\geq 200$  mm one test specimen for each category of t/d (D = outer diameter, t = structural wall thickness). A scattering of  $\pm 10\%$  for t/D is regarded as the same group. Minimum size approved is equal to the diameter of specimen successfully tested.

(2) Joints:

Each type of joint applicable for applied fire endurance level tested on pipe to pipe specimen.

- (iii) Means are to be provided to ensure a constant media pressure inside the test specimen during the fire test as specified in Appendix 1 or 2 of the IMO Res.A.753(18), as amended. During the test it is not permitted to replace media drained by fresh water or nitrogen.

- (iv) Depending on the capability of a piping system to maintain its strength and integrity, there exist ~~three~~ **five** different levels of fire endurance for piping systems.

- (1) Level 1: Piping having passed the fire endurance test specified in Appendix 1 of IMO resolution A.753(18), as amended, for a duration of a minimum of one hour without loss of integrity in the dry condition is considered to meet level 1 fire endurance standard (L1).

- (2) Level 1W: Piping systems similar to Level 1 systems except these systems do not carry flammable fluid or any gas and a maximum 5% flow loss in the system after exposure is acceptable\*, which is considered to meet level 1W fire endurance standard (L1W).

- ~~(3)~~ Level 2: Piping having passed the fire endurance test specified in Appendix 1 of IMO resolution A.753(18), as amended, for a duration of a minimum of 30 minutes in the dry condition is considered to meet level 2 fire endurance standard (L2).

- (4) Level 2W: Piping systems similar to Level 2 systems except a maximum 5% flow loss in the system after exposure is acceptable\*, which is considered to meet level 2W fire endurance standard (L2W).

- ~~(3)~~ Level 3: Piping having passed the fire endurance test specified in Appendix 2 of IMO Res. A.753 (18), as amended, for a duration of a minimum of 30 minutes in the wet condition is considered to meet level 3 fire endurance standard (L3).

\*Note:

The flow loss must be taken into account when dimensioning the system.

- ~~(viii)~~ Permitted use of piping depending on fire endurance, location and piping system is given in Table VI 2-11.

- (vi) For Safe Return to Port purposes (SOLAS II-2/21.4), plastic piping can be considered to remain operational after a fire casualty if the plastic pipes and fittings have been tested to L1 standard.

[ PART VI ]

Table VI 2-11 has been amended as follows:

**Table VI 2-11**  
**Fire Endurance Requirements Matrix**

| PIPING SYSTEM                                     |                                                 | LOCATION <sup>(13)</sup> |                      |                      |                      |                      |                   |                  |                   |                  |                           |                   |
|---------------------------------------------------|-------------------------------------------------|--------------------------|----------------------|----------------------|----------------------|----------------------|-------------------|------------------|-------------------|------------------|---------------------------|-------------------|
|                                                   |                                                 | A                        | B                    | C                    | D                    | E                    | F                 | G                | H                 | I                | J                         | K                 |
| CARGO (Flammable cargoes with flash point ≤ 60°C) |                                                 |                          |                      |                      |                      |                      |                   |                  |                   |                  |                           |                   |
| 1                                                 | Cargo lines                                     | NA                       | NA                   | L1                   | NA                   | NA                   | 0                 | NA               | 0 <sup>(10)</sup> | 0                | NA                        | L1 <sup>(2)</sup> |
| 2                                                 | Crude oil washing lines                         | NA                       | NA                   | L1                   | NA                   | NA                   | 0                 | NA               | 0 <sup>(10)</sup> | 0                | NA                        | L1 <sup>(2)</sup> |
| 3                                                 | Vent lines                                      | NA                       | NA                   | NA                   | NA                   | NA                   | 0                 | NA               | 0 <sup>(10)</sup> | 0                | NA                        | X                 |
| INERT GAS                                         |                                                 |                          |                      |                      |                      |                      |                   |                  |                   |                  |                           |                   |
| 4                                                 | Water seal effluent lines                       | NA                       | NA                   | 0 <sup>(1)</sup>     | NA                   | NA                   | 0 <sup>(1)</sup>  | 0 <sup>(1)</sup> | 0 <sup>(1)</sup>  | 0 <sup>(1)</sup> | NA                        | 0                 |
| 5                                                 | Scrubber effluent lines                         | 0 <sup>(1)</sup>         | 0 <sup>(1)</sup>     | NA                   | NA                   | NA                   | NA                | NA               | 0 <sup>(1)</sup>  | 0 <sup>(1)</sup> | NA                        | 0                 |
| 6                                                 | Main lines                                      | 0                        | 0                    | L1                   | NA                   | NA                   | NA                | NA               | NA                | 0                | NA                        | L1 <sup>(6)</sup> |
| 7                                                 | Distribution lines                              | NA                       | NA                   | L1                   | NA                   | NA                   | 0                 | NA               | NA                | 0                | NA                        | L1 <sup>(2)</sup> |
| FLAMMABLE LIQUIDS (flash point > 60°C)            |                                                 |                          |                      |                      |                      |                      |                   |                  |                   |                  |                           |                   |
| 8                                                 | Cargo lines                                     | X                        | X                    | L1                   | X                    | X                    | NA <sup>(3)</sup> | 0                | 0 <sup>(10)</sup> | 0                | NA                        | L1                |
| 9                                                 | Fuel oil                                        | X                        | X                    | L1                   | X                    | X                    | NA <sup>(3)</sup> | 0                | 0                 | 0                | L1                        | L1                |
| 10                                                | Lubricating oil                                 | X                        | X                    | L1                   | X                    | X                    | NA                | NA               | NA                | 0                | L1                        | L1                |
| 11                                                | Hydraulic oil                                   | X                        | X                    | L1                   | X                    | X                    | 0                 | 0                | 0                 | 0                | L1                        | L1                |
| SEA WATER <sup>(1)</sup>                          |                                                 |                          |                      |                      |                      |                      |                   |                  |                   |                  |                           |                   |
| 12                                                | Bilge main & branches                           | L1 <sup>(7)</sup>        | L1 <sup>(7)</sup>    | L1                   | X                    | X                    | NA                | 0                | 0                 | 0                | NA                        | L1                |
| 13                                                | Fire main and water spray                       | L1                       | L1                   | L1                   | X                    | NA                   | NA                | NA               | 0                 | 0                | X                         | L1                |
| 14                                                | Foam system                                     | L1W                      | L1W                  | L1W                  | NA                   | NA                   | NA                | NA               | NA                | 0                | L1W                       | L1W               |
| 15                                                | Sprinkler system                                | L1W                      | L1W                  | L3                   | X                    | NA                   | NA                | NA               | 0                 | 0                | L3                        | L3                |
| 16                                                | Ballast                                         | L3                       | L3                   | L3                   | L3                   | X                    | 0 <sup>(10)</sup> | 0                | 0                 | 0                | L2W                       | L2W               |
| 17                                                | Cooling water, essential services               | L3                       | L3                   | NA                   | NA                   | NA                   | NA                | NA               | 0                 | 0                | NA                        | L2W               |
| 18                                                | Tank cleaning services fixed machines           | NA                       | NA                   | L3                   | NA                   | NA                   | 0                 | NA               | 0                 | 0                | NA                        | L3 <sup>(2)</sup> |
| 19                                                | Non-essential systems                           | 0                        | 0                    | 0                    | 0                    | 0                    | NA                | 0                | 0                 | 0                | 0                         | 0                 |
| FRESH WATER                                       |                                                 |                          |                      |                      |                      |                      |                   |                  |                   |                  |                           |                   |
| 20                                                | Cooling water, essential services               | L3                       | L3                   | NA                   | NA                   | NA                   | NA                | 0                | 0                 | 0                | L3                        | L3                |
| 21                                                | Condensate return                               | L3                       | L3                   | L3                   | 0                    | 0                    | NA                | NA               | NA                | 0                | 0                         | 0                 |
| 22                                                | Non-essential systems                           | 0                        | 0                    | 0                    | 0                    | 0                    | NA                | 0                | 0                 | 0                | 0                         | 0                 |
| SANITARY/ DRAINS/ SCUPPERS                        |                                                 |                          |                      |                      |                      |                      |                   |                  |                   |                  |                           |                   |
| 23                                                | Deck drains (internal)                          | L1W <sup>(4)</sup>       | L1W <sup>(4)</sup>   | NA                   | L1W <sup>(4)</sup>   | 0                    | NA                | 0                | 0                 | 0                | 0                         | 0                 |
| 24                                                | Sanitary drains (internal)                      | 0                        | 0                    | NA                   | 0                    | 0                    | NA                | 0                | 0                 | 0                | 0                         | 0                 |
| 25                                                | Scuppers and discharges (overboard)             | 0 <sup>(1),(8)</sup>     | 0 <sup>(1),(8)</sup> | 0 <sup>(1),(8)</sup> | 0 <sup>(1),(8)</sup> | 0 <sup>(1),(8)</sup> | 0                 | 0                | 0                 | 0                | 0 <sup>(1),(8)</sup>      | 0                 |
| SOUNDING/AIR                                      |                                                 |                          |                      |                      |                      |                      |                   |                  |                   |                  |                           |                   |
| 26                                                | Water tanks/ dry spaces                         | 0                        | 0                    | 0                    | 0                    | 0                    | 0 <sup>(10)</sup> | 0                | 0                 | 0                | 0                         | 0                 |
| 27                                                | Oil Tanks (flash point > 60°C)                  | X                        | X                    | X                    | X                    | X                    | X <sup>(3)</sup>  | 0                | 0 <sup>(10)</sup> | 0                | X                         | X                 |
| MISCELLANEOUS                                     |                                                 |                          |                      |                      |                      |                      |                   |                  |                   |                  |                           |                   |
| 28                                                | Control air                                     | L1 <sup>(5)</sup>        | L1 <sup>(5)</sup>    | L1 <sup>(5)</sup>    | L1 <sup>(5)</sup>    | L1 <sup>(5)</sup>    | NA                | 0                | 0                 | 0                | L1 <sup>(5)</sup>         | L1 <sup>(5)</sup> |
| 29                                                | Service air (non-essential)                     | 0                        | 0                    | 0                    | 0                    | 0                    | NA                | 0                | 0                 | 0                | 0                         | 0                 |
| 30                                                | Brine                                           | 0                        | 0                    | NA                   | 0                    | 0                    | NA                | NA               | NA                | 0                | 0                         | 0                 |
| 31                                                | Auxiliary low pressure steam (pressure ≤ 7 bar) | L2W                      | L2W                  | 0 <sup>(9)</sup>     | 0 <sup>(9)</sup>     | 0 <sup>(9)</sup>     | 0                 | 0                | 0                 | 0                | 0 <sup>(9)</sup>          | 0 <sup>(9)</sup>  |
| 32                                                | Central vacuum cleaners                         | NA                       | NA                   | NA                   | 0                    | NA                   | NA                | NA               | NA                | 0                | 0                         | 0                 |
| 33                                                | Exhaust gas cleaning system effluent line       | L3 <sup>(1)</sup>        | L3 <sup>(1)</sup>    | NA                   | NA                   | NA                   | NA                | NA               | NA                | 0                | L3 <sup>(1),(11)</sup> NA | 0                 |
| 34                                                | Urea transfer/supply system                     | L1 <sup>(12)</sup>       | L1 <sup>(12)</sup>   | NA                   | NA                   | NA                   | NA                | NA               | NA                | 0                | L3 <sup>(11)</sup>        | 0                 |

|  |                     |  |  |  |  |  |  |  |  |  |  |    |  |
|--|---------------------|--|--|--|--|--|--|--|--|--|--|----|--|
|  | (SCR installations) |  |  |  |  |  |  |  |  |  |  | NA |  |
|--|---------------------|--|--|--|--|--|--|--|--|--|--|----|--|

#### Abbreviations:

|     |                                                                                                    |
|-----|----------------------------------------------------------------------------------------------------|
| L1  | Fire endurance test (appendix 1 of IMO Resolution A.753(18), as amended, in dry conditions, 60 min |
| L1W | Fire endurance test (2.8.4(a)(iv)(2))                                                              |
| L2  | Fire endurance test (appendix 1 of IMO Resolution A.753(18), as amended, in dry conditions, 30 min |
| L2W | Fire endurance test (2.8.4(a)(iv)(4))                                                              |
| L3  | Fire endurance test (appendix 2 of IMO Resolution A.753(18), as amended, in wet conditions, 30 min |
| 0   | No fire endurance test required                                                                    |
| NA  | Not applicable                                                                                     |
| X   | Metallic materials having a melting point greater than 925°C                                       |

#### Notes:

- (1) Where non-metallic piping is used, remotely controlled valves to be provided at ship's side (valve is to be controlled from outside space).
- (2) Remote closing valves to be provided at the cargo tanks.
- (3) When cargo tanks contain flammable liquids with flash point > 60°C, "0" may replace "NA" or "X".
- (4) For drains serving only the space concerned, "0" may replace "L1W".
- (5) When controlling functions are not required by statutory requirements or guidelines, "0" may replace "L1".
- (6) For pipe between machinery space and deck water seal, "0" may replace "L1".
- (7) For passenger vessels, "X" is to replace "L1".
- (8) Scuppers serving open decks in positions 1 and 2, as defined in regulation 13 of the International Convention on Load Lines, 1966, are to be "X" throughout unless fitted at the upper end with the means of closing capable of being operated from a position above the freeboard deck in order to prevent downflooding.
- (9) For essential services, such as fuel oil tank heating and ship's whistle, "X" is to replace "0".
- (10) For tankers where compliance with regulation 19.3.6 of Annex I of MARPOL is required, "NA" is to replace "0".
- (11) L3 in service spaces, NA in accommodation and control spaces.
- (12) Type approved plastic piping without fire endurance test (0) is acceptable downstream of the tank valve, provided this valve is metal seated and arranged as fail-to-closed or with quick closing from a safe position outside the space in the event of fire.
- (13) For Passenger Ships subject to SOLAS II-2/21.4 (Safe return to Port), plastic pipes for services required to remain operative in the part of the ship not affected by the casualty thresholds, such as systems intended to support safe areas, are to be considered essential services. In accordance with MSC.1/Circ.1369, interpretation 12, for Safe Return to Port purposes, plastic piping can be considered to remain operational after a fire casualty if the plastic pipes and fittings have been tested to L1 standard.

#### Location:

- |   |                                     |
|---|-------------------------------------|
| A | Machinery spaces of category A      |
| B | Other machinery spaces & pump rooms |
| C | Cargo pump rooms                    |
| D | Ro/Ro cargo holds                   |
| E | Other dry cargo holds               |

#### DefinitionAbbreviations:

- Machinery spaces of category A as defined in SOLAS II-2/3.31.**
- ~~L1 Fire endurance test in dry conditions, 60 min~~
- Spaces, other than category A machinery spaces and cargo pump rooms, containing propulsion machinery, boilers, fuel oil units, steam and internal combustion engines, generators and major electrical machinery, oil filling stations, refrigerating, stabilizing, ventilation and air-conditioning machinery, and similar spaces and trunks to such spaces.
- ~~L2 Fire endurance test in dry conditions, 30 min~~
- Spaces containing cargo pumps and entrances and trunks to such spaces.
- ~~L3 Fire endurance test in wet conditions, 30 min~~
- Ro-ro cargo holds are ro-ro cargo spaces and special category spaces as defined in SOLAS II-2/3.41 and SOLAS II-2/3.46.
- ~~0 No fire endurance test required~~
- All spaces other than ro-ro cargo holds used for nonliquid cargo and trunks to such spaces.

[ PART VI ]

|   |                                              |                                                                                                                                                              |
|---|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |                                              | <del>NA Not applicable</del>                                                                                                                                 |
| F | Cargo tanks                                  | All spaces used for liquid cargo and trunks to such spaces.                                                                                                  |
| G | Fuel oil tanks                               | <del>X Metallic materials having a melting point greater than 925°C</del><br>All spaces used for fuel oil (excluding cargo tanks) and trunks to such spaces. |
| H | Ballast water tanks                          | All spaces used for ballast water and trunks to such spaces.                                                                                                 |
| I | Cofferdams, void spaces, pipe tunnel & ducts | Cofferdams and voids are those empty spaces between two bulkheads separating two adjacent compartments.                                                      |
| J | Accommodation service & control spaces       | Accommodation spaces, service spaces and control stations as defined in SOLAS II-2/3.1, SOLAS II-2/3.45 and SOLAS II-2/3.18.                                 |
| K | Open decks                                   | Open deck spaces as defined in SOLAS II-2/9.2.2.3.2(5).                                                                                                      |

(b) Flame spread

- (i) All pipes, except those fitted on open decks and within tanks, cofferdams, pipe tunnels, and ducts if separated from accommodation, permanent manned areas and escape ways by means of an A class bulkhead are to have low surface flame spread characteristics not exceeding average values listed in Appendix 3 of IMO Resolution A.753(18), as amended. ~~the FTP Code, Annex 1, Part 5.~~
- (ii) Surface flame spread characteristics are to be determined using the procedure given in the 2010 FTP Code, Annex 1, Part 5 with regard to the modifications due to the curvilinear pipe surfaces as also listed in Appendix 3 of IMO Resolution A.753(18), as amended.
- (iii) Surface flame spread characteristics may also be determined using the test procedures given in ASTM D635-18, or in other national equivalent standards. Under the procedure of ASTM D635-18 a maximum burning rate of 60 mm/min applies. In case of adoption of other national equivalent standards, the relevant acceptance criteria are to be defined.

(c) Fire protection coatings

Where a fire protective coating of pipes and fittings is necessary for achieving the fire endurance level required, it is to meet the following requirements:

- (i) The pipes are generally to be delivered from the manufacturer with the protective coating on.
- (ii) The fire protection properties of the coating are not to be diminished when exposed to salt water, oil or bilge slops. It is to be demonstrated that the coating is resistant to products likely to come into contact with the piping.
- (iii) In considering fire protection coatings, such characteristics as thermal expansion, resistance against vibrations, and elasticity are to be taken into account.
- (iv) The fire protection coatings are to have sufficient resistance to impact to retain their integrity.

(d) Electrical conductivity

- ~~(i) Piping conveying fluids with a conductivity of less than 1000 pico siemens per meter is to be electrically conductive.~~
- ~~(ii) Regardless of the fluid being conveyed, plastic piping is to be electrically conductive if the piping passes through a hazardous area.~~
- ~~(iii) Pipes and fittings with layers having different conductivity are to be protected against the possibility of spark damage to the pipe wall.~~
- ~~(iv) Where electrical conductivity is to be ensured, the resistance of the pipes and fittings is not to exceed 0.1 MΩ/m.~~

(e) Durability against chemicals

The pipes are to be resistant to any chemical substances they might possibly contact with during service.

Paragraph 2.8.5 has been amended as follows:

#### 2.8.5 Installation

##### (a) Supports

- (i) Selection and spacing of pipe supports in shipboard systems are to be determined as a function of allowable stresses and maximum deflection criteria. Support spacing is not to be greater than the pipe manufacturer's recommended spacing. The selection and spacing of pipe supports are to take into account pipe dimensions, **length of the piping**, mechanical and physical properties of the pipe material, mass of pipe and contained fluid, external pressure, operating temperature, thermal expansion effects, loads due to external forces, thrust forces, water hammer, vibrations, maximum accelerations to which the system may be subjected. Combination of loads is to be considered.
- (ii) Each support is to evenly distribute the load of the pipe and its contents over the full width of the support. Measures are to be taken to minimize wear of the pipes where they contact the supports.
- (iii) Heavy components in the piping system such as valves and expansion joints are to be independently supported.

##### (b) Expansion

- (i) Suitable provision is to be made in each pipeline to allow for relative movement between pipes made of plastic and the steel structure, having due regard to:
  - (1) the difference in the coefficients of thermal expansion;
  - (2) deformations of the ship's hull and its structure.
- (ii) When calculating the thermal expansions, account is to be taken of the system working temperature and the temperature at which assembly is performed.

##### (c) External loads

- (i) When installing the piping, allowance is to be made for temporary point loads, where applicable. Such allowances are to include at least the force exerted by a load (person) of 100 kg at mid-span on any pipe of more than 100 mm nominal outside diameter.
- (ii) **Besides providing adequate robustness for all piping including open-ended piping a minimum wall thickness, complying with 2.8.3(a), may be increased taking into account the conditions encountered during service on board ships.**
- (iii) Pipes are to be protected from mechanical damage where necessary.

##### (d) Strength of connections

- (i) The strength of connections is to be not less than that of the piping system in which they are installed.
- (ii) Pipes may be assembled using adhesive-bonded, welded, flanged or other joints.
- (iii) Adhesives, when used for joint assembly, are to be suitable for providing a permanent seal between the pipes and fittings throughout the temperature and pressure range of the intended application.
- (iv) Tightening of joints is to be performed in accordance with manufacturer's instructions.

##### (e) Installation of conductive pipes

- (i) **In piping systems for fluids with conductivity less than 1000 pico siemens per metre (pS/m) such as refined products and distillates use is to be made of conductive pipes.**
- (ii) **Regardless of the fluid being conveyed, plastic piping is to be electrically conductive if the piping passes through a hazardous area. The resistance to earth from any point in the piping system is not to exceed 1 MΩ. It is preferred that pipes and fittings be homogeneously conductive. Pipes and fittings having conductive layers are to be protected against a possibility of spark damage to the pipe wall. Satisfactory earthing is to be provided.**

~~In case where pipes are required to be electrically conductive as specified in 2.8.4(d), installations of the pipes are to be in accordance with the following provisions:~~

[ PART VI ]

- ~~(i) The resistance to earth from any point in the piping system is not to exceed 1.0 MΩ/m.~~
  - (iii) After completion of the installation, the resistance to earth is to be verified. Earthing wires are to be accessible for inspection.
- (f) Application of fire protection coatings
- (i) Fire protection coatings are to be applied on the joints, where necessary for meeting the required fire endurance as for 2.8.4(c), after performing hydrostatic pressure tests of the piping system.
  - (ii) The fire protection coatings are to be applied in accordance with manufacturer's recommendations, using a procedure approved in each particular case.
- (g) Penetration of divisions
- (i) Where plastic pipes pass through "A" or "B" class divisions, arrangements are to be made to ensure that the fire endurance is not impaired. These arrangements are to be tested in accordance with **Recommendations for fire test procedures for "A", "B" and "F" bulkheads specified in Part 3 of Annex 1 to the 2010 FTP Code.** ~~IMO resolution A.754(18) Recommendation on Fire Resistance Tests for "A", "B" and "F" Class Divisions, as amended.~~
  - (ii) When plastic pipes pass through watertight bulkheads or decks, the watertight integrity of the bulkhead or deck is to be maintained. **For pipes not able to satisfy the requirements in 2.8.3(a)(iii)(2), a metallic shut-off valve operable from above the freeboard deck should be fitted at the bulkhead or deck.**
  - (iii) If the bulkhead or deck is also a fire division and destruction by fire of plastic pipes may cause the inflow of liquid from tanks, a metallic shut-off valve operable from above the freeboard deck should be fitted at the bulkhead or deck.
  - (iv) **For passenger ships, the penetrations used for the passage of plastic piping systems through a watertight bulkhead or deck under SOLAS II-1/13.2.3 shall be successfully prototype tested for watertight integrity, as per paragraphs 3, 4 and 5 of the explanatory notes to regulation II-1/13.2.3 contained in the annex of resolution MSC.429(98)/Rev.2, as applicable, after the fire test. SOLAS II-1/13.2.3 shall be applicable to heat-sensitive piping systems like plastic piping and shall not be applied to cable penetrations in watertight bulkheads and decks.**
- (h) Control during installation
- (i) Installation is to be in accordance with the manufacturer's guidelines.
  - (ii) Prior to commencing the work, joining techniques are to be approved by the Society.
  - (iii) The personnel performing this work are to be properly qualified and certified to the satisfaction of the Society.
  - (iv) The tests and explanations specified in section 2.8 **of this Chapter** are to be completed before shipboard piping installation commences.
  - (v) **The procedure of making bonds is to include:**
    - (1) materials used,**
    - (2) tools and fixtures,**
    - (3) joint preparation requirements,**
    - (4) cure temperature,**
    - (5) dimensional requirements and tolerances, and**
    - (6) tests acceptance criteria upon completion of the assembly.**
  - (vi) **Any change in the bonding procedure which will affect the physical and mechanical properties of the joint is to require the procedure to be requalified.**
- (i) Bonding procedure quality testing
- ~~(i) The procedure of making bonds is to include:~~
    - ~~(1) materials used,~~

- ~~(2) tools and fixtures,~~
- ~~(3) joint preparation requirements,~~
- ~~(4) cure temperature,~~
- ~~(5) dimensional requirements and tolerances, and~~
- ~~(6) tests acceptance criteria upon completion of the assembly.~~
- (ii) The test assembly is to be fabricated in accordance with the procedure to be qualified and it is to consist of at least one pipe-to-pipe joint and one pipe-to-fitting joint.
- (iii) When the test assembly has been cured, it is to be subjected to a hydrostatic test pressure at a safety factor 2.5 times the design pressure of the test assembly, for not less than one hour. No leakage or separation of joints is allowed. The test is to be conducted so that the joint is loaded in both longitudinal and circumferential directions.
- (iii\*) Selection of the pipes used for test assembly, is to be in accordance with the following:
  - (1) When the largest size to be joined is 200 mm nominal outside diameter, or smaller, the test assembly is to be the largest piping size to be joined.
  - (2) When the largest size to be joined is greater than 200 mm nominal outside diameter, the size of the test assembly is to be either 200 mm or 25% of the largest piping size to be joined, whichever is greater.
- (iv) When conducting performance qualifications, each bonder and each bonding operator are to make up test assemblies, the size and number of which are to be as required above.
- ~~(vi) Any change in the bonding procedure which will affect the physical and mechanical properties of the joint is to require the procedure to be re-qualified.~~

Paragraph 2.8.6 has been amended as follows:

#### 2.8.6 Shop tests

- (a) Plastic pipes, **except for those piping systems specified in 2.8.1(c),** are to be subjected to the following tests and measurements of dimension after they have been manufactured. The number of test specimens, testing procedures, results, procedures of measurement of dimension and tolerance are to comply with the internal standards of manufacturers that have been approved by the Society.
  - (i) Tensile tests
  - (ii) Hydrostatic tests **(Hydrostatic pressures are not to be less than 1.5 times nominal pressure. Alternatively, for pipes and fittings not employing hand lay-up techniques, the hydrostatic pressure test may be carried out in accordance with the hydrostatic testing requirements stipulated in the recognized national or international standard to which the pipe or fittings are manufactured, provided that there is an effective quality system in place.)** ~~at a pressure not less than 1.5 times the maximum allowable internal pressure of the pipe in 2.8.3 or hydrostatic tests stipulated in standards considered equivalent by the Society.~~
  - (iii) Outside diameter and wall thickness measurements
  - (iv) Ascertainment of uniform quality and the presence of no harmful defects
  - (v) Electric conductivity test (only for those pipes which require electric conductivity in accordance with 2.8.4(d))
- (b) For tests and measurements specified in (a), in cases where the manufacturer has been approved by the Society, the requirements that items be tested in the presence of the Surveyor may be ~~reduced~~ **omitted**. In such cases, the Society's Surveyor may require submission of all relevant test results instead.

- (c) The plastic pipes specified in 2.8.1(c) are to be subject to the tests in 2.8.6(a)(ii) and 2.8.4(b) above for every batch of pipes. Those tests are to be conducted in the presence of the Surveyor. In cases where the manufacturer has been approved by the Society or the manufacturer has a quality system that meets ISO 9001:2015 standards or their equivalent, the tests are to be conducted by the manufacturer at the frequency specified in the quality system. In such cases, the Society may require submission of all relevant test results instead. The quality system is to consist of elements necessary to ensure that pipes and fittings are produced with consistent and uniform mechanical and physical properties.
- (e) Plastic pipes which have been connected by adhesive bonding, laminating, welding, etc. are to be subjected to hydrostatic tests after completion of all fabrication processes at pressures of 1.5 times design pressures. These tests may be carried out after installation on board.
- (e) Notwithstanding the requirements specified in (a) above, the Society may request hydrostatic tests for all plastic pipes at a higher pressure taking into consideration the pipe service conditions.

*Paragraph 2.8.7 has been amended as follows:*

2.8.7 Testing after installation on board

For testing after installation on board of plastic piping systems, reference is made to 7.2.3 Chapter 7 of this Part.

*Paragraph 2.8.8 has been amended as follows:*

2.8.8 Test specification for plastic pipes Plans and data to be submitted

~~The following information for the plastic pipes, fittings and joints is to be submitted for consideration and approval before the work concerned is proceeded:~~

This paragraph contains requirements for the type approval of plastic pipes. It is applicable to piping systems, including pipe joints and fittings, made predominately of other material than metal.

(a) Documentation

The following information for the plastic pipes, fittings and joints is to be submitted for consideration and approval:

(i) General information

- (1) Pipe and fitting dimensions
- (2) Maximum internal and external working pressure
- (3) Working temperature range
- (4) Intended services and installation locations
- (5) The level of fire endurance
- (6) Electrically conductive
- (7) Intended fluids
- (8) Limits on flow rates
- (9) Serviceable life
- (10) Installation instructions
- (11) Details of marking

(ii) Drawings and supporting documentation:

- (1) Certificates and reports for relevant tests previously carried out.
- (2) Details of relevant standards.

- ~~(3iii)~~ All relevant design drawings, catalogues, data sheets, calculations and functional descriptions.
- ~~(4iv)~~ Fully detailed sectional assembly drawings showing pipe, fittings and pipe connections.
- ~~(v) Documentation verifying the certification of the manufacturer's quality system and that the system address the testing requirements in section 2.8.3 and 2.8.4 of this Chapter.~~
- (iii)e) Materials**
  - ~~(1i)~~ The resin type.
  - ~~(2ii)~~ Catalyst and accelerator types, and concentration employed in the case of reinforced polyester resin pipes or hardeners where epoxide resins are employed.
  - ~~(3iii)~~ A statement of all reinforcements employed where the reference number does not identify the mass per unit area or the strand count (Tex System or Yardage System) of a roving used in a filament winding process, these are to be detailed.
  - ~~(4iv)~~ Full information regarding the type of gel-coat or thermoplastic liner employed during construction, as appropriate.
  - ~~(5v)~~ Cure/post-cure conditions. The cure and post cure temperatures and times employed for given resin/reinforcement ratio.
  - ~~(6vi)~~ Winding angle and orientation.
  - ~~(7vii)~~ Joint bonding procedures and qualification tests results, refer to **2.8.5(h)(v)**.

**(b) Testing**

Testing is to demonstrate compliance of the pipes, fittings and joints for which type approval is sought with 2.8 of this Chapter.

Pipes, joints and fittings are to be tested for compliance with the requirements of standards\* acceptable to the Society.

\*Note: For the lists of standards refer to IACS Recommendation 86.

*Paragraph 2.8.9 has been amended as follows:*

**2.8.9 Miscellaneous**

- (a) Sufficient consideration is to be given to any wearing down caused by materials such as sand and sludge.**
- ~~(b)~~ In cases where GRP pipes are used as drain pipes from scrubbers and blower casings of inert gas systems, the requirements in Guidelines for Inert Gas Systems of IMO are to be complied with.
- ~~(c)~~ In cases where plastic pipes are to be installed in external areas, such pipes shall either be specifically approved for external use or be protected against ultraviolet radiation.
- (d)e) After installation on board, plastic pipes are to be easily distinguishable from pipes made of other materials.**

## Chapter 7

### Tests and Inspections

|                                                          |
|----------------------------------------------------------|
| <b>7.2 Tests and Inspections after Assembly on Board</b> |
|----------------------------------------------------------|

...

Paragraph 7.2.3 has been amended as follows:

#### 7.2.3 Plastic piping systems

- (a) Plastic piping systems for essential services are to be subjected to a test pressure not less than 1.5P or 0.4 MPa whichever is greater. **Notwithstanding the requirement above, the requirement in 7.2.3(b) may be applied to open ended pipes (drains, effluent, etc.).**
- (b) Plastic piping systems for non-essential services are to be checked for leakage under operational conditions.
- (c) For piping required to be electrically conductive, earthing is to be checked, and random resistance testing is to be conducted.

AMENDMENT TO "THE RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF  
STEEL SHIPS 2026"

## **PART VII    ELECTRICAL INSTALLATIONS**

## List of major changes in Part VII from 2026 edition

|        |         |
|--------|---------|
| 1.10.6 | Revised |
| 1.10.7 | Revised |
| 2.5.4  | Revised |
| 2.5.14 | deleted |
| 5.8.1  | Revised |

Rules for the Construction and Classification of Steel Ships 2026 have been partly amended as follows:

## Chapter 1 General

### 1.10 Electrical Equipment for Use in Explosive Gas Atmospheres

*Paragraph 1.10.6 has been amended as follows:*

#### 1.10.6 Battery room

In principle, within the battery room; open deck area within 1 m from **inlet and** natural ventilation outlet, and open area within 3 m from power ventilation outlet are to be regarded as hazardous areas.

- (a) Electric ventilator motors are to be outside ventilation ducts and, if within 3 m of the exhaust end of the duct, they are to be of an explosion-proof safe type. The impeller of the fan is to be of the non-sparking type.
- (b) Overcurrent protective devices are to be installed as close as possible to, but outside of, battery rooms.
- (c) Electrical cables other than those pertaining to the equipment arranged in battery rooms are not permitted.
- (d) Electrical equipment for use in battery rooms is to have minimum explosion group IIC and temperature class T1.

*Paragraph 1.10.7 has been amended as follows:*

#### 1.10.7 Welding gas (Oxygen-acetylene) storage room

In principle, within the storage room; open deck area within 1 m from **inlet and** natural ventilation outlet, open area within 3 m from power ventilation outlet; and the area within 3 m of the gas cylinders pressure relief device discharge outlet are to be regarded as hazardous areas.

- (a) Electric ventilator motors are to be outside ventilation ducts and, if within 3 m of the exhaust end of the duct, they are to be of an explosion-proof safe type. The impeller of the fan is to be of the non-sparking type.
- (b) Electrical equipment for use in oxygen-acetylene room is to have minimum explosion group IIC and temperature class T2.

## Chapter 2

### System Design of Distribution and Circuit Protection

#### 2.5 Internal Communication

*Paragraph 2.5.4 has been amended as follows:*

2.5.4 ~~The voltage of supply for internal communication circuits is to be between 20V and 120V of D.C. or A.C. For simple circuits, voltages of not less than 6V may be used.~~ **Elevator's Alarm**

**Each elevator car is to be fitted with means to activate an alarm in a normally manned control station or with means of voice communication with that station.**

.....

*Paragraph 2.5.14 has been deleted as follows:*

~~2.5.14 Elevator's Alarm~~

~~Each elevator car is to be fitted with means to activate an alarm in a normally manned control station or with means of voice communication with that station.~~

## Chapter 5

### Switchboards and Mounted Equipment

#### 5.8 Testing and Inspection

*Paragraph 5.8.1 has been amended as follows:*

5.8.1 The temperature rise of the switchboard equipment and bus bars under applicable rated current, and/or rated voltage and rated duty operation is to be ascertained that they are not to exceed the values as specified in Table VII 5-1 and 5.3.2 of this Part. However, the temperature rise test for switchboards which are produced in series and identical to their type tested prototype unit may be omitted from the second unit onwards subject to the Society's permission. The propulsion machines will be specially considered.



AMENDMENT TO "THE RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF  
STEEL SHIPS 2026"

## **PART VIII    AUTOMATIC OR REMOTE CONTROL AND MONITORING SYSTEMS**

## List of major changes in Part VIII from 2026 edition

|        |         |
|--------|---------|
| 1.2    | Revised |
| 2.12   | Revised |
| 3.2.12 | Revised |
| 4.1.2  | deleted |
| 5.12   | Revised |

Rules for the Construction and Classification of Steel Ships 2026 have been partly amended as follows:

## **Chapter 1**

### **General Requirements**

|                           |
|---------------------------|
| <b>1.2 Plans and Data</b> |
|---------------------------|

Section 1.2 has been amended as follows:

The following plans and data are to be submitted ~~for review~~, as applicable.

## Chapter 2 Systems Design and Arrangements

### 2.12 Equipment/Components Qualifications and Trials

*Section 2.12 has been amended as follows:*

#### 2.12.1 Equipment/Components Qualifications

The manufacturers and assemblers of automatic or remote control and monitoring equipment/components associated with propulsion related machinery/systems are to provide documented evidence showing that the equipment /components have been tested individually or by acceptable sampling to establish their suitability for the intended service. The **following** requirements ~~in 4.1.2~~ are applicable to equipment/components associated with propulsion related machinery/systems intended for installation onboard **CAS**, **CAU** or **CAB** classed vessels.

##### (a) Testing of equipment

- (i) Testing is to be carried out in accordance with Table VIII 2-2 and VIII 4-1. Where environmental operating parameters exceed those specified herein, special arrangements will be considered. With the exception of field sensors, all required system's components are to be subjected to these tests. For computer-based systems, the equipment to be tested includes microprocessors, storage devices, power supply units, signal conditioners, analog/digital converters, computer monitors (video display units), keyboards, etc but it excludes printers, data recording or logging devices not required in this part.
- (ii) Performance testing in accordance with Table VIII 4-1 is to be carried out in the presence of the Surveyor at the testing plant or after installation of the equipment onboard the vessel. Where deemed necessary by the Surveyor, insulation resistance and high voltage tests in accordance with Table VIII 2-2 may be required to be carried out.

##### (b) Failure Mode and Effect Analysis (FMEA)

The integrity of the associated automatic or remote control and monitoring systems is to be verified by means of a Failure Mode and Effect Analysis (FMEA) or equivalent method on the basis of a single failure mode criterion. The analysis is to show that no single failure will lead to such a condition that endangers human safety and/or the vessel. A Failure Mode and Effect Analysis (FMEA) or equivalent is to be submitted for review. For computer-based systems, see 3.2.11 of this Part.

#### 2.12.2 Type Approval of Automatic or Remote Control and Monitoring Equipment

Equipment that meets the requirements contained in ~~this Part or 4.1.2~~ **2.12.1(a)(i)** is eligible to be certified by the Society upon formal request by the equipment manufacturer.

#### ~~2.12.3 Testing and inspection~~

~~Automatic or remote control and monitoring equipment/component which is intended for installation on ships assigned classification symbols **CAS**, **CAU** or **CAB** is to be tested in accordance with 4.1.2(a).~~

**2.12.4** Automatic or remote control and monitoring equipment/component which is intended for installation on ships not assigned classification symbols **CAS**, **CAU** or **CAB** is to be performance tested in accordance with **2.12.1(a)(ii)**.  
~~4.1.2(a)(iv).~~

#### ~~2.12.5~~ **4** Trials

....

## Chapter 3 Computer-based Systems

### 3.2 Systems Requirements

*Paragraph 3.2.12 has been amended as follows:*

#### 3.2.12 Cyber Resilience

- (a) All stakeholders are advised to refer to IACS Recommendation 166 "Recommendation on Cyber Resilience"
- (a.i) The purpose of the IACS Recommendation 166 is to provide technical guidance to stakeholders which would lead to delivery of cyber resilient ships, whose resilience can be maintained throughout their service life.
- (a.ii) It is intended that the recommendation provides guidance for mitigating the risk related to events affecting onboard computer-based systems, recognizing that, if no measures are implemented, such events could potentially affect the human safety, safety of vessel and/or the threat to the marine environment.
- (b) For new construction ships that have a contract signing on or after 1 January 2025, the following requirements have to be complied with.
- (b.i) ~~Guidelines for Cyber Security Onboard Ships Part II – Cyber Resilience of Ships (IACS UR E26 – Cyber Resilience of Ships)~~
- (b.ii) ~~Guidelines for Cyber Security Onboard Ships Part III – Cyber Resilience of On-Board Systems and Equipment (IACS UR E27 – Cyber Resilience of On Board Systems and Equipment)~~

## Chapter 4

### Machinery Operated from a Centralized Control Station – CAS Symbol

#### 4.1 General

4.1.1 Ships having the means to control and monitor the propulsion machinery and propulsion-machinery space from a continuously manned centralized control and monitoring station installed within or adjacent to, the propulsion-machinery space are to comply with the requirements contained in this chapter. Except as noted herein, the requirements in Chapter 1 through Chapter 3 of this Part as applicable, are to be complied with. Additionally, the requirements in this chapter cover the operation required for propulsion machinery start-up, safe sailing during open sea and maneuvering conditions, and do not cover operations after anchoring or mooring.

*Paragraph 4.1.2 has been deleted as follows:*

~~4.1.2 Equipment associated with the remote or automatic control and monitoring of the propulsion machinery installed in CAS, CAU and CAB ships are to comply with the following requirements.~~

~~(a) Testing of equipment~~

- ~~(i) Testing is to be carried out in accordance with Table VIII 2-2 and VIII 4-1. Where environmental operating parameters exceed those specified herein, special arrangements will be considered. With the exception of field sensors, all required system's components are to be subjected to these tests. For computer-based systems, the equipment to be tested includes microprocessors, storage devices, power supply units, signal conditioners, analog/digital converters, computer monitors (video display units), keyboards, etc but it excludes printers, data recording or logging devices not required in this part.~~
- ~~(ii) The manufacturer or assembler of the associated equipment is to provide documented evidence indicating that the equipment meets the criteria specified in Table VIII 2-2 and VIII 4-1. Additionally, for computer-based systems, evidence is to be included to indicate that semiconductor devices such as CPU, non-volatile memories, etc., have been subjected to a burn-in test for a period not less than 72 hours, at an operating temperature of 70°C, with power connected to the device.~~
- ~~(iii) Environmental testing on the associated equipment is to be carried out in accordance with the criteria outlined in Table VIII 2-2. With the exception of the inclination and vibration tests, all environmental tests are to be carried out and satisfactorily reported upon by the manufacturer and/or assembler; such test report is to be submitted for review. Inclination and vibration tests are to be carried out in the presence of the Surveyor at the manufacturer's or assembler's plant, or at an independent testing laboratory in accordance with Table VIII 2-2.~~
- ~~(iv) Performance testing in accordance with Table VIII 4-1 are to be carried out in the presence of the Surveyor at the testing plant or after installation of the equipment onboard the vessel. Where deemed necessary by the Surveyor, insulation resistance and high voltage tests in accordance with Table VIII 2-2 may be required to be carried out.~~

~~(b) Failure Mode and Effect Analysis (FMEA)~~

~~The integrity of the associated automatic or remote control and monitoring systems is to be verified by means of a Failure Mode and Effect Analysis (FMEA) or equivalent method on the basis of a single failure mode criteria. The analysis is to show that no single failure will lead to such a condition that endangers human safety and/or the vessel. A Failure Mode and Effect Analysis (FMEA) or equivalent is to be submitted for review. For computer-based systems, see 3.2.11 of this Part.~~

## Chapter 5

### Unattended Machinery Spaces – CAU Symbol

#### 5.12 Fire-fighting ~~Station~~ **Systems** and Arrangements for Propulsion Machinery-Space Fires

*Section 5.12 has been amended as follows:*

~~5.12.1 The fire fighting station is to be located outside the propulsion machinery space. However, consideration may be given to the installation of the fire fighting control station within the room housing the centralized control and monitoring station, as referenced in 4.3 provided that the room's fire protection boundaries including glazing and doors is in compliance with Regulations II 2/9.2.2, II 2/9.2.3, and II 2/9.2.4 of SOLAS, as applicable, and the room's doors facing the propulsion machinery space are self closing. Additionally, the ventilation system to such room is to be separate from other systems serving the propulsion machinery space and its ventilation inlet is to be taken from a safe space outside the propulsion machinery space. There is to be a protected access from the fire fighting station to the open deck.~~

##### ~~5.12.2 Fire fighting controls~~

~~The fire fighting station is to be provided with remote manual controls for the operations detailed in the following list. These controls are to be capable of being tested to the satisfaction of the Surveyor.~~

- ~~(a) Stopping the machinery space ventilation fans and closing of openings.~~
- ~~(b) Stopping all fuel oil pumps and forced draft fans.~~
- ~~(c) Closing machinery space skylights.~~
- ~~(d) Closing machinery space watertight and fire resistant doors.~~
- ~~(e) Closing propulsion machinery space fuel oil tanks suction valves.~~
- ~~(f) Starting the emergency generator or connecting a source of emergency power, unless automatic operation is provided.~~
- ~~(g) Operation of a fire pump located outside the propulsion machinery space, including associated valves necessary to deliver required capacity to the fire main.~~
- ~~(h) Releasing of the fire fighting media for the propulsion machinery space. This release is to be manual and not initiated automatically by signals from the fire detecting system.~~
- ~~(i) Stopping circulating pumps for thermal oil heating systems. (See 4.7.2(b) of Part VI)~~

##### 5.12.3<sup>1</sup> Fire Detection and Alarm Systems

The propulsion-machinery space is to be provided with a fixed fire detection and alarm system complying with Regulation II-2/7.4 of SOLAS 1974, as amended. This fixed fire detection and alarm system may be combined with other fire detection and alarm system required on board the vessel. Additionally, for fired boilers, fire in the air supply casings and exhausts (uptakes) is to be alarmed.

##### 5.12.4<sup>2</sup> Fire Alarm Call Points

Manually operated fire alarm call points are to be provided in, and in the passageways leading to, the propulsion-machinery spaces.

##### 5.12.5<sup>3</sup> Portable Fire Extinguishers

In addition to the portable fire extinguishers located in the machinery space as required by 8.4 of Part IX, there is to be an equal number of hand portable extinguishers located in the fire-fighting station or other suitable locations for extinguishing small fires, thus preserving the capability of the fire-fighting system of the ship.



AMENDMENT TO "THE RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF  
STEEL SHIPS 2026"

## **PART IX      FIRE PROTECTION, DETECTION AND EXTINCTION**

## List of major changes in Part IX from 2026 edition

Chapter 14-1

Revised

Rules for the Construction and Classification of Steel Ships 2026 have been partly amended as follows:

## Chapter 14-1

### Ships not Engaged on International Voyages: Passenger Ships

*Chapter 14-1 has been amended as follows:*

#### 14-1.1 General

##### 14-1.1.1 Application

- (a) The requirements of this Chapter apply to the following passenger ships **not engaged on international voyages**:
- (i) Ships of Grade I  
**Passenger ships that meet any of the following criteria:**
- (1) ~~passenger ships for greater coastal service, of 100 gross tonnage and upwards, or carrying more than 150 passengers; and~~
  - (2) **Of 100 gross tonnage and upwards;**
  - (3) **Carrying more than 150 passengers.**
- (ii) Ships of Grade II  
~~passenger ships for coastal water service or protected water service, of less than 100 gross tonnage, and carrying not more than 150 passengers.~~  
**Ships of Grade II are passenger ships other than ships of Grade I.**



AMENDMENT TO "THE RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF  
STEEL SHIPS 2026"

## **PART XI      MATERIALS**

## List of major changes in Part XI from 2026 edition

|                       |            |
|-----------------------|------------|
| 3.1.1(b)(ii)          | Revised    |
| Table XI 3-4          | Revised    |
| Table XI 3-9          | Revised    |
| Table XI 3-11         | Revised    |
| 6.5.2(b)              | Revised    |
| 6.5.2(c)              | Deleted    |
| 6.5.2(d)~(e)          | Renumbered |
| Fig. XI 6-1           | Deleted    |
| Fig. XI 6-2           | Deleted    |
| 6.5.3(a)              | Revised    |
| 6.5.3(b)              | Revised    |
| 6.5.3(d)              | Revised    |
| Table XI 9-2          | Revised    |
| 9.2.13(b)             | Revised    |
| 9.2.13(g)             | Revised    |
| Fig. XI 10-1          | Revised    |
| 10.3.7(a)             | Revised    |
| 10.3.8(a)(iii) & (iv) | Revised    |
| Fig. XI 10-7          | Revised    |
| 10.3.9(c)             | Revised    |
| 10.3.9(d)             | Revised    |

Rules for the Construction and Classification of Steel Ships 2026 have been partly amended as follows:

## **Chapter 3**

### **Rolled Steels for Hull Construction**

|                    |
|--------------------|
| <b>3.1 General</b> |
|--------------------|

Paragraph 3.1.1(b)(ii) has been amended as follows:

3.1.1 Application

(b) Thickness

- (i) The requirements of this Chapter are primarily intended to apply to rolled steel products not exceeding the thickness limits given in Table XI 3-1 of this Chapter.
- (ii) YP47 steels (minimum yield point of 460 N/mm<sup>2</sup>)  
This chapter gives the requirements for steel plates in thickness ~~greater than 50 mm and~~ not greater than 100 mm intended for hatch coamings and upper decks of container ships. For YP47 steels outside scope of the said thickness range, special consideration is to be given by the Society.
- (iii) Brittle crack arrest steels  
The thickness range of brittle crack arrest steels is over 50 mm and not greater than 100 mm as specified in Table XI 3-5.

Table XI 3-4 has been amended as follows:

**Table XI 3-4**  
**Chemical Composition for Higher Strength Steels and Brittle Crack Arrest Steels**

| Material Grade                                           | Chemical Composition <sup>(4),(6)</sup> (%) |              |                                   |             |             |                                |                                  |                                  |                     |              |              |              |              |                      |                                          |                                          |
|----------------------------------------------------------|---------------------------------------------|--------------|-----------------------------------|-------------|-------------|--------------------------------|----------------------------------|----------------------------------|---------------------|--------------|--------------|--------------|--------------|----------------------|------------------------------------------|------------------------------------------|
|                                                          | C<br>(max.)                                 | Si<br>(max.) | Mn                                | P<br>(max.) | S<br>(max.) | Al (acid<br>soluble)<br>(min.) | Nb                               | V                                | Ti<br>(max.)        | Cu<br>(max.) | Cr<br>(max.) | Ni<br>(max.) | Mo<br>(max.) | N<br>(max.)          | C <sub>eq</sub> <sup>(5)</sup><br>(max.) | P <sub>cm</sub> <sup>(8)</sup><br>(max.) |
|                                                          |                                             |              |                                   |             |             |                                |                                  |                                  |                     |              |              |              |              |                      |                                          |                                          |
| AH32, DH32, EH32<br>AH36, DH36, EH36<br>AH40, DH40, EH40 | 0.18                                        | 0.50         | 0.90 ~<br>1.60 <sup>(1)</sup>     | 0.035       | 0.035       | 0.015 <sup>(2),(3)</sup>       | 0.02~<br>0.05 <sup>(3)</sup>     | 0.05~<br>0.10 <sup>(3)</sup>     | 0.02                | 0.35         | 0.2          | 0.40         | 0.08         | -                    | -                                        | -                                        |
| FH32, FH36, FH40                                         | 0.16                                        |              | 0.90 ~<br>1.60                    | 0.025       | 0.025       |                                |                                  |                                  |                     |              |              | 0.80         |              | 0.009 <sup>(7)</sup> |                                          |                                          |
| EH47 <sup>(9)</sup>                                      | 0.18                                        | 0.55         | 0.90~<br>2.00                     | 0.020       | 0.020       |                                |                                  |                                  | 0.02 <sup>(4)</sup> |              | 0.25         | 1.0          |              | -                    | 0.49 <sup>(10)</sup>                     | 0.22                                     |
| EH36-BCA <sup>(9)</sup><br>EH40-BCA <sup>(9)</sup>       | 0.18                                        | 0.50         | 0.90~<br>2.00                     | 0.020       | 0.020       | 0.015 <sup>(2),(3)</sup>       | 0.02~<br>0.05 <sup>(3),(4)</sup> | 0.05~<br>0.10 <sup>(3),(4)</sup> | 0.02 <sup>(4)</sup> | 0.50         | 0.25         | 2.0          | 0.08         | <del>2.0</del>       | 0.47                                     | -                                        |
| EH47-BCA <sup>(9)</sup>                                  | 0.18                                        | 0.55         | 0.90 ~<br><del>1.60</del><br>2.00 | 0.020       | 0.020       | 0.015 <sup>(2),(3)</sup>       | 0.02~<br>0.05 <sup>(3)</sup>     | 0.05~<br>0.10 <sup>(3)</sup>     | 0.02 <sup>(4)</sup> | 0.50         | 0.25         | 2.0          | 0.08         | <del>2.0</del>       | 0.55                                     | 0.24                                     |

Notes:

- (1) Up to a thickness of 12.5 mm, the minimum Manganese content may be reduced to 0.70%.
- (2) The total Aluminium content may be determined instead of the acid soluble content. In such cases, the total ~~Aluminium~~ **Aluminium** content is to be not less than 0.020%.
- (3) The steel is to contain Aluminium, Niobium, Vanadium or other suitable grain refining elements, either singly or in any combination. When used singly the steel is to contain the specified minimum content of the grain refining element. When used in combination, the specified minimum content of each grain refining element is not applicable.
- (4) When any grade of higher strength steel is supplied in thermo-mechanically controlled processed condition, variations in the specified chemical composition may be allowed or required by the Society.
- (5) When required, the carbon equivalent value (C<sub>eq</sub>) is to be calculated from the ladle analysis using the following formula:

$$C_{eq} = C + \frac{Mn}{6} + \frac{Cr+Mo+V}{5} + \frac{Ni+Cu}{15} \quad (\%)$$

This formula is applicable only to steels which are basically of the carbon-manganese type and gives a general indication of the weldability of the steel.

- (6) Where additions of any other element have been made as part of the steelmaking practice, the content is to be indicated.
- (7) ~~0.0012~~ **0.012** if Al is present.
- (8) Cold cracking susceptibility P<sub>cm</sub> value is to be calculated using the following formula:

$$P_{cm} = C + \frac{Si}{30} + \frac{Mn}{20} + \frac{Cu}{20} + \frac{Ni}{60} + \frac{Cr}{20} + \frac{Mo}{15} + \frac{V}{10} + 5B(\%)$$

- (9) Variations in the specified chemical composition may be allowed subject to approval of the Society.

**(10) For EH47 grade steel up to 50 mm in thickness, the maximum carbon equivalent value (C<sub>eq</sub>) is to be 0.46%.**

*Table XI 3-9 has been amended as follows:*

**Table XI 3-9**  
**Conditions of Supply & Impact Test Requirements for Higher Strength Steels**

| Grade        | Deoxidation Practice          | Grain Refining Elements | Products | Thickness (mm)     | Condition of Supply <sup>(1)</sup> | Batch for Impact Test (ton) <sup>(2)</sup> |
|--------------|-------------------------------|-------------------------|----------|--------------------|------------------------------------|--------------------------------------------|
| AH32<br>AH36 | Killed and fine grain treated | Nb and/or V             | Sections | $t \leq 12.5$      | Any                                | 50                                         |
|              |                               |                         |          | $12.5 < t \leq 50$ | N, CR, TMCP                        | 25                                         |
|              |                               |                         |          |                    | AR*                                |                                            |
|              |                               |                         | Plates   | $t \leq 12.5$      | Any                                | 50                                         |
|              |                               |                         |          | $12.5 < t \leq 50$ | N, CR, TMCP                        |                                            |
|              |                               |                         |          | $50 < t \leq 100$  | N, TMCP                            |                                            |
|              |                               |                         |          |                    | CR                                 | 25                                         |
|              |                               | Al alone or with Ti     | Sections | $t \leq 20$        | Any                                | 50                                         |
|              |                               |                         |          | $20 < t \leq 50$   | N, CR, TMCP                        |                                            |
|              |                               |                         |          |                    | AR*                                | 25                                         |
|              |                               |                         | Plates   | $t \leq 20$        | Any                                | 50                                         |
|              |                               |                         |          | $20 < t \leq 35$   | AR*                                | 25                                         |
|              |                               |                         |          | $20 < t \leq 50$   | N, CR, TMCP                        | 50                                         |
|              |                               |                         |          | $50 < t \leq 100$  | N, TMCP                            |                                            |
|              |                               |                         |          |                    | CR                                 | 25                                         |
| AH40         | Killed and fine grain treated | Any                     | Sections | $t \leq 12.5$      | Any                                | 50                                         |
|              |                               |                         |          | $12.5 < t \leq 50$ | N, CR, TMCP                        |                                            |
|              |                               |                         | Plates   | $t \leq 12.5$      | Any                                |                                            |
|              |                               |                         |          | $12.5 < t \leq 50$ | N, CR, TMCP                        |                                            |
|              |                               |                         |          | $50 < t \leq 100$  | N, TMCP                            |                                            |
| DH32<br>DH36 | Killed and fine grain treated | Nb and/or V             | Sections | $t \leq 12.5$      | Any                                | 50                                         |
|              |                               |                         |          | $12.5 < t \leq 50$ | N, CR, TMCP                        |                                            |
|              |                               |                         |          |                    | AR*                                | 25                                         |
|              |                               |                         | Plates   | $t \leq 12.5$      | Any                                | 50                                         |
|              |                               |                         |          | $12.5 < t \leq 50$ | N, CR, TMCP                        |                                            |
|              |                               |                         |          | $50 < t \leq 100$  | N, TMCP                            |                                            |
|              |                               |                         |          |                    | CR                                 | 25                                         |
|              |                               | Al alone or with Ti     | Sections | $t \leq 20$        | Any                                | 50                                         |
|              |                               |                         |          | $20 < t \leq 50$   | N, CR, TMCP                        |                                            |
|              |                               |                         |          |                    | AR*                                | 25                                         |
|              |                               |                         | Plates   | $t \leq 20$        | Any                                | 50                                         |
|              |                               |                         |          | $20 < t \leq 25$   | AR*                                | 25                                         |
|              |                               |                         |          | $20 < t \leq 50$   | N, CR, TMCP                        | 50                                         |
|              |                               |                         |          | $50 < t \leq 100$  | N, TMCP                            |                                            |
|              |                               |                         |          |                    | CR                                 | 25                                         |
| DH40         | Killed and fine grain treated | Any                     | Sections | $t \leq 50$        | N, CR, TMCP                        | 50                                         |
|              |                               |                         | Plates   | $t \leq 50$        | N, CR, TMCP                        |                                            |
|              |                               |                         |          |                    | N, TMCP                            |                                            |

[ PART XI ]

| Grade        | Deoxidation Practice          | Grain Refining Elements | Products | Thickness (mm)             | Condition of Supply <sup>(1)</sup> | Batch for Impact Test (ton) <sup>(2)</sup> |
|--------------|-------------------------------|-------------------------|----------|----------------------------|------------------------------------|--------------------------------------------|
|              |                               |                         |          | $50 < t \leq 100$          | QT                                 | Each length as heat-treated                |
| EH32<br>EH36 | Killed and fine grain treated | Any                     | Sections | $t \leq 50$                | N, TMCP                            | 25                                         |
|              |                               |                         |          |                            | AR*, CR*                           | 15                                         |
|              |                               |                         | Plates   | $t \leq 100$               | N, TMCP                            | Each piece                                 |
| EH40         | Killed and fine grain treated | Any                     | Sections | $t \leq 50$                | N, TMCP, QT                        | 25                                         |
|              |                               |                         | Plates   | $t \leq 100$               | N, TMCP                            | Each piece                                 |
|              |                               |                         |          |                            | QT                                 | Each length as heat-treated                |
| FH32<br>FH36 | Killed and fine grain treated | Any                     | Sections | $t \leq 50$                | N, QT, TMCP                        | 25                                         |
|              |                               |                         |          |                            | CR*                                | 15                                         |
|              |                               |                         | Plates   | $t \leq 100$               | N, TMCP                            | Each piece                                 |
|              |                               |                         |          |                            | QT                                 | Each length as heat-treated                |
| FH40         | Killed and fine grain treated | Any                     | Sections | $t \leq 50$                | N, TMCP, QT                        | 25                                         |
|              |                               |                         | Plates   | $t \leq 100$               | N, TMCP                            | Each piece                                 |
|              |                               |                         |          |                            | QT                                 | Each length as heat-treated                |
| EH47         | Killed and fine grain treated | Any                     | Plates   | <del>50</del> $t \leq 100$ | TMCP <sup>(3)</sup>                | Each piece                                 |

Notes:

- (1) Symbols used in "Condition of supply" are as follows:  
Any : Any conditions, including as rolled, controlled rolled, TMCP rolled and any other heat treatments.  
N : Normalized condition.  
TMCP: Thermo-mechanically controlled processed rolling as approved by the Society.  
CR : Controlled rolled condition as an alternative to normalizing.  
AR\* : As rolled condition subject to the special approval of the Society.  
CR\* : Controlled rolled condition subject to the special approval of the Society.  
QT : Quenched and tempered condition.
- (2) One set of 3 impact specimens is to be taken from each batch of the specified mass in tons or fraction thereof. For grades A32 and A36 steels a relaxation in the number of impact tests may be permitted. (See Note (3) of Table XI 3-11 of this Chapter.)
- (3) Other conditions of supply are to be specially considered by the Society.

*Table XI 3-11 has been amended as follows:*

**Table XI 3-11**  
**Mechanical Properties Requirements for Higher Strength Steels**

| Material Grade | Tensile Test                                              |                                                         |                                      | Impact Test        |                                                                                         |             |              |
|----------------|-----------------------------------------------------------|---------------------------------------------------------|--------------------------------------|--------------------|-----------------------------------------------------------------------------------------|-------------|--------------|
|                | Min. Yield Stress R <sub>eH</sub><br>(N/mm <sup>2</sup> ) | Tensile Strength R <sub>m</sub><br>(N/mm <sup>2</sup> ) | Min. Elongation on L = 5.65√A<br>(%) | Test Temp.<br>(°C) | Minimum Average Impact Energy <sup>(2)</sup> (J)<br>Long. (trans.), t = thickness in mm |             |              |
|                |                                                           |                                                         |                                      |                    | t ≤ 50                                                                                  | 50 < t ≤ 70 | 70 < t ≤ 100 |
| AH32           | 315                                                       | 440~570                                                 | 22 <sup>(1)</sup>                    | 0                  | 31 <sup>(3)</sup> (22 <sup>(3)</sup> )                                                  | 38 (26)     | 46 (31)      |
| DH32           |                                                           |                                                         |                                      | -20                | 31 (22)                                                                                 |             |              |
| EH32           |                                                           |                                                         |                                      | -40                |                                                                                         |             |              |
| FH32           |                                                           |                                                         |                                      | -60                |                                                                                         |             |              |
| AH36           | 355                                                       | 490~630                                                 | 21 <sup>(1)</sup>                    | 0                  | 34 <sup>(3)</sup> (24 <sup>(3)</sup> )                                                  | 41 (27)     | 50 (34)      |
| DH36           |                                                           |                                                         |                                      | -20                | 34 (24)                                                                                 |             |              |
| EH36           |                                                           |                                                         |                                      | -40                |                                                                                         |             |              |
| FH36           |                                                           |                                                         |                                      | -60                |                                                                                         |             |              |
| AH40           | 390                                                       | 510~660                                                 | 20 <sup>(1)</sup>                    | 0                  | 39 (26)                                                                                 | 46 (31)     | 55 (37)      |
| DH40           |                                                           |                                                         |                                      | -20                |                                                                                         |             |              |
| EH40           |                                                           |                                                         |                                      | -40                |                                                                                         |             |              |
| FH40           |                                                           |                                                         |                                      | -60                |                                                                                         |             |              |
| EH47           | 460                                                       | 570~720                                                 | 17 <sup>(1)</sup>                    | -40                | Not applicable <sup>(4)</sup>                                                           | (4)         |              |

Notes:

- (1) For full thickness flat tensile test specimens with a width of 25 mm and a gauge length of 200 mm, the elongation is to comply with the following minimum values (%):

| Thickness(mm) \ Material Grade | $\leq 5$ | $> 5$<br>$\leq 10$ | $> 10$<br>$\leq 15$ | $> 15$<br>$\leq 20$ | $> 20$<br>$\leq 25$ | $> 25$<br>$\leq 30$ | $> 30$<br>$\leq 40$ | $> 40$<br>$\leq 50$ |
|--------------------------------|----------|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| H32                            | 14       | 16                 | 17                  | 18                  | 19                  | 20                  | 21                  | 22                  |
| H36                            | 13       | 15                 | 16                  | 17                  | 18                  | 19                  | 20                  | 21                  |
| H40                            | 12       | 14                 | 15                  | 16                  | 17                  | 18                  | 19                  | 20                  |
| EH47                           | 11       |                    | 12                  | 13                  | 14                  | 15                  |                     | 16                  |

- (2) See 3.5.1(a)(ii) & (iii).
- (3) For Grades AH32 and AH36 steels, a relaxation in the number of impact tests for acceptance purposes may be permitted by special agreement with the Society provided that satisfactory results obtained from occasional check tests.
- (4) Minimum average impact energy (J) for specimen taken in longitudinal direction is to be in accordance with the following:

| Thickness                         | <del>50</del> $\leq t \leq 70$ | $70 < t \leq 85$ | $85 < t \leq 100$ |
|-----------------------------------|--------------------------------|------------------|-------------------|
| Minimum average impact energy (J) | 53                             | 64               | 75                |

Note: Minimum average impact energy for specimen taken in transverse direction is to be at the discretion of the Society.

## Chapter 6 Steel Castings

### 6.5 Mechanical Properties

#### 6.5.2 Mechanical tests

- (a) Test material, sufficient for the required tests and for possible retest purposes is to be provided for each casting or batch of castings.

*Paragraph 6.5.2(b) has been amended as follows:*

- (b) The preferred test block arrangement, where practical, is for the manufacturer to provide at least one 30 mm test block by either attaching it to the castings or casting it integrally on the castings.<sup>1</sup>

**Note 1:**

The test results represent the material from which the castings have been poured and the subsequent heat treatment process and may not necessarily represent the properties of the castings. These properties can be affected by solidification conditions and the rate of cooling during heat treatment, which are in turn influenced by casting thickness, size, complexity and shape. The purpose of the test block is to provide a qualitative check to demonstrate the effective control of existing heat treatment processes and procedures.

For castings where it is required that the mechanical properties need to be demonstrated for specific section thicknesses and when agreed upon between the manufacturer and the purchaser, then proposals<sup>2</sup> for alternative test block arrangements (in terms of size and type) are to be submitted for approval by the Society.

**Note 2:**

The size of the test blocks for mechanical testing may be determined by the ruling section of the casting so that they are representative of the casting's heat treatment and microstructure. Also see ISO 4885:2018; ISO 683-1:2016 and ISO 683-2: 2016.

Alternatively, determination of test block size and type may be supported by historical and statistical test data, production of a representative test block or a component, simulation software, or a combination of all these items. The size of the test blocks for mechanical testing is to be such that the heat treatment and microstructure is representative for the section of the casting with the ruling section, i.e. the section for which the specified mechanical properties apply, see also ISO 683-1:2018 and ISO 683-2:2018, respectively.

For C, C-Mn steel castings this is in general to be achieved as follows:

The test block shall have a thickness ( $t_s$ ) of not less than the ruling section of the casting, or 30 mm, whichever is larger.

For large thickness castings other than stern tube, stern frame, anchor and rudder horn,  $t_s$  normally need not to exceed 150 mm. Length and width of the test block is normally to be at least three times  $t_s$ , unless otherwise agreed with the Society, as shown in Fig. XI 6-1. (Note that longer or wider test blocks may be necessary in order to accommodate the required test specimens.)

For castings for stern tube, stern frame, anchor and rudder horn the test block thickness  $t_s$  shall represent the ruling section.

**Notes:**

Shorter width or length may be accepted for test blocks where actual casting width or length ( $t_A$ ) is in the range between  $t_s$  and  $3t_s$ .

**Example 1:** For a general casting with dimensions 140 x 160 x 1250 mm the required test block size would typically be 140 x 160 x 420 mm (that is:  $t_s \times t_A \times 3t_s$ ).

**Example 2:** For a stern tube casting with ruling section  $t_s = 170$  mm and width/height/length  $t_{A1}/t_{A2}/t_{A3} = 1000/600/1800$  mm, the required test block size would typically be 170 x 510 x 510 mm (that is:  $t_s \times 3t_s \times 3t_s$ ) see Fig. XI 6-2.

For alloy steel castings the manufacturer shall propose dimensions for the test block and demonstrate the representative nature of it.

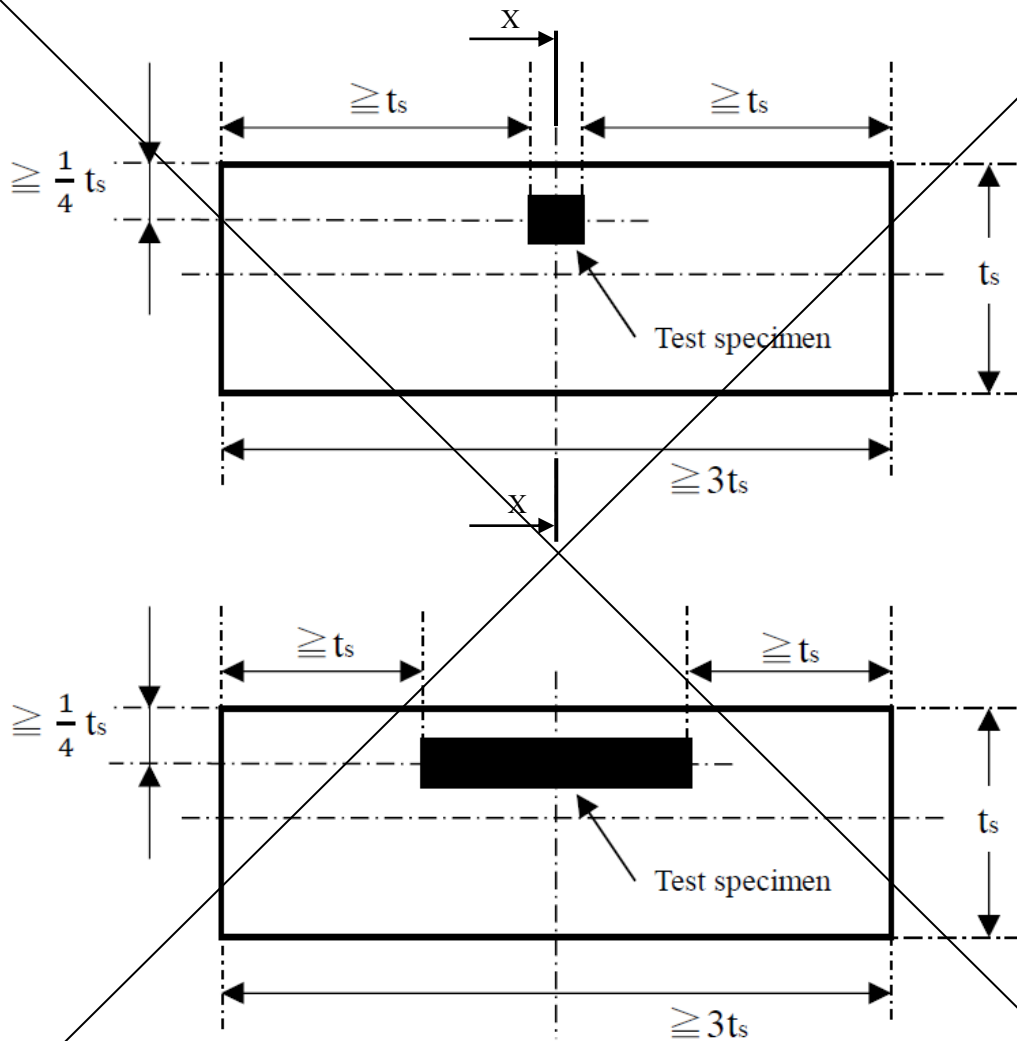
Paragraph 6.5.2(c) has been deleted as follows:

- ~~(c) For test blocks with thickness  $\leq 56$  mm, the longitudinal axis of the test specimens is to be located at  $\geq 14$  mm from the surface in the thickness direction. For test blocks with thickness  $> 56$  mm, the longitudinal axis of the test specimens is to be located at  $\geq t_s/4$  from the surface. Test specimens shall be taken in such a way that no part of the gauge length is machined from material closer than  $t_s$  to any of the other surfaces. For impact testing, this requirement shall apply to the complete test specimen — refer to Fig. XI 6-1 for location of test specimens in relation to the test block.~~

Paragraph 6.5.2(d)~(e) have been renumbered as follows:

- (c) For certain components including steel castings subjected to surface hardening process, the proposed method of manufacture may require special approval by the Society. The number and position of test blocks is to be agreed with the Society having regard to the method of manufacture employed.
- (d) The preparation of test specimens and the procedures used for mechanical testing are to comply with the relevant requirements of Chapter 2 of this Part. Unless otherwise agreed all tests are to be carried out in the presence of the Surveyors.

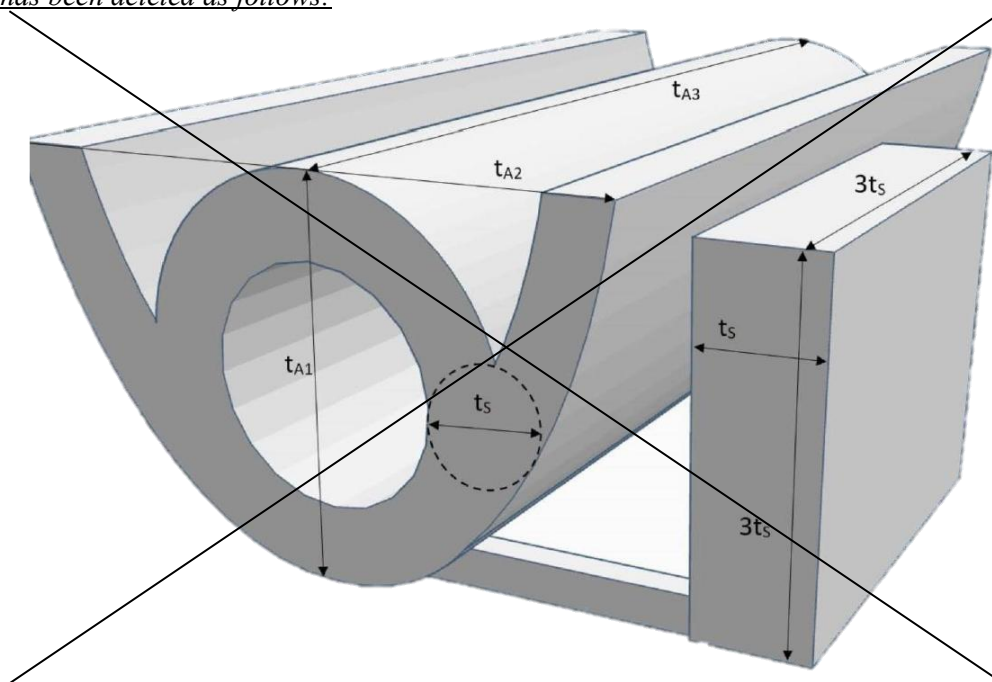
*Fig. XI 6-1 has been deleted as follows:*



~~Fig. XI 6-1~~

~~Specimen Positions Relative to The Test Block in accordance with ISO 4990:2015~~

*Fig. XI 6-2 has been deleted as follows:*



**Fig. XI 6-2**  
**Test Block Gated to Stern Tube Casting**

6.5.3 Selection of test specimens for steel castings is to comply with the requirements given in Table XI 6-6.

*Paragraph 6.5.3(a) has been amended as follows:*

- (a) Test specimens for steel castings are, after final heat treatment, to be taken from the test block **either attached to the castings, cast integrally on the castings or cast separately** ~~cast integral with the body of casting.~~ However, test blocks may be separated from the body of the casting before final heat treatment in cases where deemed appropriate by the Society. At least one test block is to be provided for each casting **or batch of castings**, and one set of test specimens **s** is to be taken from each test block.

*Paragraph 6.5.3(b) has been amended as follows:*

- (b) Except where specified otherwise by the Society, one test block is to be taken from each steel casting. In cases where the mass of one steel casting (as heat treated, hereinafter referred to as the “mass”) is more than ten tons, two test blocks are to be taken from each steel casting ~~from the heaviest section~~, located as far as practicable from each other.
- (c) In cases where a number of small castings of about the same size, each of which is under 1000 kg in mass, are made from 1 cast and heat treated in the same furnace charge, a batch testing procedure may be adopted using separately cast test blocks of suitable dimensions. At least 1 test block is to be provided for each batch of castings.

[ PART XI ]

Paragraph 6.5.3(d) has been amended as follows:

- (d) In cases where one steel casting is made from two or more casts, which are not mixed in a ladle prior to pouring, one test block is to be taken from each charge regardless of the requirements in (b) or (c) above. These are to be attached to the casting or cast integrally on the castings at locations as widely separated as possible.

## Chapter 9 Stainless Steels and Clad Steels

*Table XI 9-2 has been amended as follows:*

**Table XI 9-2  
Mechanical Properties and Test Requirements of Stainless Steels**

| Material Grade          |         | Tensile Test                               |                                                             |                                         | Hardness Test                     |                                           |                                  | Other Tests <sup>(1)</sup> | No. of Test Specimens                                                                |
|-------------------------|---------|--------------------------------------------|-------------------------------------------------------------|-----------------------------------------|-----------------------------------|-------------------------------------------|----------------------------------|----------------------------|--------------------------------------------------------------------------------------|
|                         |         | Tensile Strength min. (N/mm <sup>2</sup> ) | Yield Stress or 0.2% Proof Stress min. (N/mm <sup>2</sup> ) | Elongation on $L=5.65\sqrt{A}$ min. (%) | Brinell max. (HBN) <sup>(6)</sup> | Rockwell B max. (HRB) <sup>(7), (8)</sup> | Vickers max. (HV) <sup>(9)</sup> |                            |                                                                                      |
| Rolled Stainless Steels | S304    | 520                                        | 205                                                         | 40                                      | 187                               | 90                                        | 200                              | —                          | 1 set from each steel which is of the same charge and is heat treated simultaneously |
|                         | S304L   | 480                                        | 175                                                         | 40                                      | 187                               | 90                                        | 200                              |                            |                                                                                      |
|                         | S304N1  | 550                                        | 275                                                         | 35                                      | 217                               | 95                                        | 220                              |                            |                                                                                      |
|                         | S304N2  | 690                                        | 345                                                         | 35                                      | 248                               | 100                                       | 260                              |                            |                                                                                      |
|                         | S304LN  | 550                                        | 245                                                         | 40                                      | 217                               | 95                                        | 220                              |                            |                                                                                      |
|                         | S309S   | 520                                        | 205                                                         | 40                                      | 187                               | 90                                        | 200                              |                            |                                                                                      |
|                         | S310S   | 520                                        | 205                                                         | 40                                      | 187                               | 90                                        | 200                              |                            |                                                                                      |
|                         | S316    | 520                                        | 205                                                         | 40                                      | 187                               | 90                                        | 200                              |                            |                                                                                      |
|                         | S316L   | 480                                        | 175                                                         | 40                                      | 187                               | 90                                        | 200                              |                            |                                                                                      |
|                         | S316N   | 550                                        | 275                                                         | 35                                      | 217                               | 95                                        | 220                              |                            |                                                                                      |
|                         | S316LN  | 550                                        | 245                                                         | 40                                      | 217                               | 95                                        | 220                              |                            |                                                                                      |
|                         | S317    | 520                                        | 205                                                         | 40                                      | 187                               | 90                                        | 200                              |                            |                                                                                      |
|                         | S317L   | 480                                        | 175                                                         | 40                                      | 187                               | 90                                        | 200                              |                            |                                                                                      |
|                         | S317LN  | 550                                        | 245                                                         | 40                                      | 217                               | 95                                        | 220                              |                            |                                                                                      |
|                         | S321    | 520                                        | 205                                                         | 40                                      | 187                               | 90                                        | 200                              |                            |                                                                                      |
|                         | S329J1  | 590                                        | 390                                                         | 18                                      | 277                               | 29 <sup>(1)</sup>                         | 292                              |                            |                                                                                      |
|                         | S329J3L | 620                                        | 450                                                         | 18                                      | 302                               | 32 <sup>(1)</sup>                         | 320                              |                            |                                                                                      |
|                         | S329J4L | 620                                        | 450                                                         | 18                                      | 302                               | 32 <sup>(1)</sup>                         | 320                              |                            |                                                                                      |
|                         | S347    | 520                                        | 205                                                         | 40                                      | 187                               | 90                                        | 200                              |                            |                                                                                      |
|                         | S304    | 520                                        | 205                                                         | 40                                      | 187                               | 90                                        | 200                              |                            |                                                                                      |

**Table XI 9-2(continued)**  
**Mechanical Properties and Test Requirements of Stainless Steels**

| Material Grade           |        | Tensile Test                               |                                                             |                                 | Hardness Test                     |                                           |                                 | Other Tests <sup>(1)</sup> | No. of Test Specimens                                                    |
|--------------------------|--------|--------------------------------------------|-------------------------------------------------------------|---------------------------------|-----------------------------------|-------------------------------------------|---------------------------------|----------------------------|--------------------------------------------------------------------------|
|                          |        | Tensile Strength min. (N/mm <sup>2</sup> ) | Yield Stress or 0.2% Proof Stress min. (N/mm <sup>2</sup> ) | Elongation on L=5.65√A min. (%) | Brinell max. (HBN) <sup>(6)</sup> | Rockwell B max. (HRB) <sup>(7), (8)</sup> | Vicker max. (HV) <sup>(9)</sup> |                            |                                                                          |
| Stainless Steel Castings | S304C  | 440                                        | 185                                                         | 26                              | 183                               | —                                         | —                               | —                          | As per the applicable requirements in Table XI 6-6                       |
|                          | S304LC | 440                                        | 205                                                         | 26                              |                                   |                                           |                                 |                            |                                                                          |
|                          | S316C  | 440                                        | 185                                                         | 26                              |                                   |                                           |                                 |                            |                                                                          |
|                          | S316LC | 390                                        | 175                                                         | 31                              |                                   |                                           |                                 |                            |                                                                          |
|                          | S321C  | 390                                        | 185                                                         | 31                              |                                   |                                           |                                 |                            |                                                                          |
|                          | S347C  | 440                                        | 205                                                         | 26                              |                                   |                                           |                                 |                            |                                                                          |
| Stainless Steel Forgings | S304F  | 520                                        | 205                                                         | 37                              | —                                 | —                                         | —                               | —                          | As per the applicable requirements in <del>Table XI 8-5</del> <b>5.6</b> |
|                          | S304LF | 450                                        | 175                                                         |                                 |                                   |                                           |                                 |                            |                                                                          |
|                          | S316F  | 520                                        | 205                                                         |                                 |                                   |                                           |                                 |                            |                                                                          |
|                          | S316LF | 450                                        | 175                                                         |                                 |                                   |                                           |                                 |                            |                                                                          |
|                          | S321F  | 520                                        | 205                                                         |                                 |                                   |                                           |                                 |                            |                                                                          |
|                          | S347F  | 520                                        | 205                                                         |                                 |                                   |                                           |                                 |                            |                                                                          |
| Stainless Steel Pipes    | S304P  | 520                                        | 205                                                         | 26 (22) <sup>(2)</sup>          | —                                 | —                                         | —                               | (3), (4)                   | (5)                                                                      |
|                          | S304LP | 480                                        | 175                                                         |                                 |                                   |                                           |                                 |                            |                                                                          |
|                          | S316P  | 520                                        | 205                                                         |                                 |                                   |                                           |                                 |                            |                                                                          |
|                          | S316LP | 480                                        | 175                                                         |                                 |                                   |                                           |                                 |                            |                                                                          |
|                          | S321P  | 520                                        | 205                                                         |                                 |                                   |                                           |                                 |                            |                                                                          |
|                          | S347P  | 520                                        | 205                                                         |                                 |                                   |                                           |                                 |                            |                                                                          |

Notes:

- (1) Where the stainless steels are intended for low temperature service with design temperature lower than -105°C, additional impact test in compliance with 9.1.12 of this Part is required.
- (2) Where the nominal diameter of stainless steel pipes is 200 mm and over, tensile test specimens may be taken transversely and the value of elongation in parentheses is applicable.
- (3) Flattening tests of stainless steel pipes are to be required and e = 0.09 is to be applied to formula in 2.5.2 of this Part.
- (4) All stainless steel pipes are to be subjected to hydraulic test in accordance with the applicable requirements in 5.5 of this Part.
- (5) One sampling pipe is to be selected from each lot of 50 lengths or fraction thereof in same charge, same size and same heat. Each one of the tensile and flattening test specimens is to be taken from each of the sampling tubes.
- (6) HBN, Brinell Hardness Number
- (7) HRB, Rockwell Hardness measured on the B scale.  
Hardness Rockwell total has nine kinds of staff gauge from A to G.
- (8) Rockwell hardness of S329J1、S329J3L and S329J4L is to C scale value (HRC).
- (9) HV, Vickers-Hardness

## 9.2 Stainless Steel Castings for Propellers

### 9.2.13 Welding repair procedure

*Paragraph 9.2.13(b) has been amended as follows:*

- (b) All weld repairs are to be carried out in accordance with qualified procedures, and by welders who are qualified to a recognized standard. Welding Procedure Qualification Tests are to be carried out in accordance with IACS UR W27 Appendix A and witnessed by the Surveyor. Defects to be repaired by welding are to be ground to sound material according to ~~9.2.9~~ 9.2.12 of this Part. The welding grooves are to be prepared in such a manner which will allow a good fusion of the groove bottom. The resulting ground areas are to be examined in the presence of the Surveyor by liquid penetrant testing in order to verify the complete elimination of defective material.

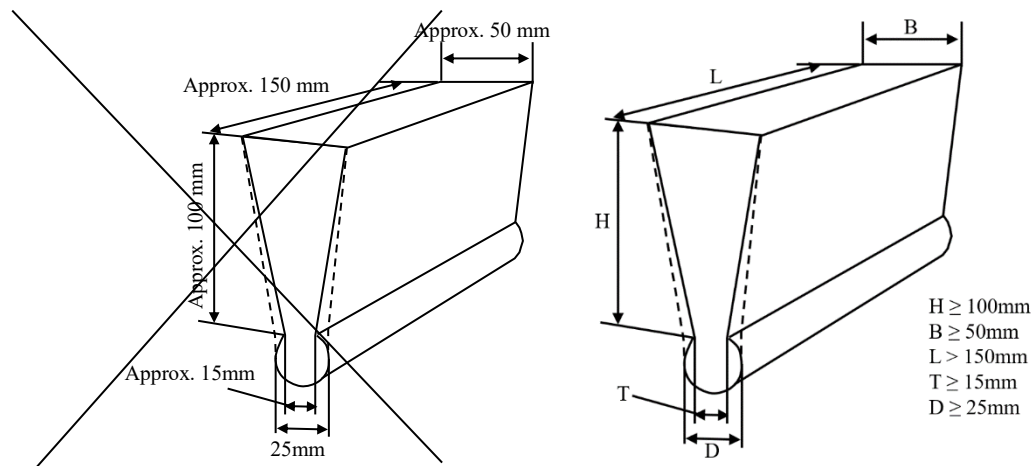
*Paragraph 9.2.13(g) has been amended as follows:*

- (g) On completion of heat treatment of martensitic steels the weld repairs and adjacent material are to be ground smooth. All weld repairs are to be liquid penetrant tested.

## Chapter 10 Copper and Copper Alloys

### 10.3 Copper Alloy Castings for Propellers

*Fig. XI 10-1 has been amended as follows:*



**Fig. XI 10-1  
Keel Block Type Test Sample**

#### 10.3.7 Non-destructive testing

*Paragraph 10.3.7(a) has been amended as follows:*

- (a) Qualification of personnel involved in NDT

~~Refer to UR W35 Requirements for NDT Suppliers, sections 2.3, 2.4 and 2.5.~~ For the qualification of personnel refer to UR W35.

#### 10.3.8 Acceptance criteria for liquid penetrant testing

*Paragraph 10.3.8(a)(iii) & (iv) have been amended as follows:*

- (a) Definitions of liquid penetrant indications

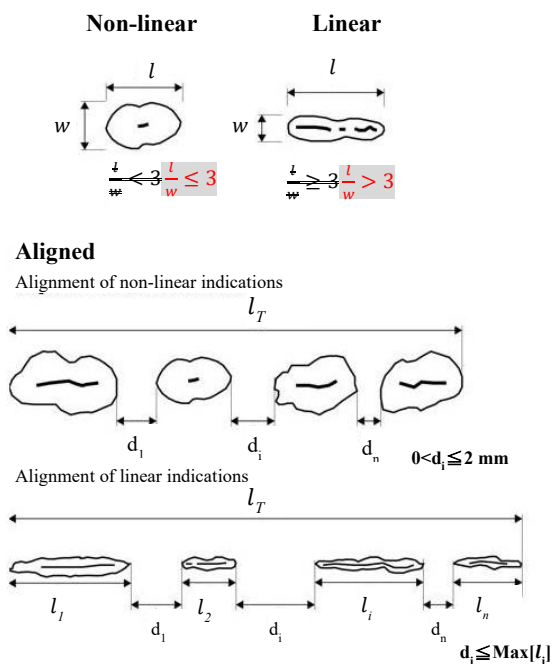
- (iii) Non-linear indication

~~An indication with a largest dimension less than three times its smallest dimension (i.e.  $l < 3 w$ ).~~  
Indication having a length less than or equal to three times its width (i.e.  $l \leq 3 w$ ).

- (iv) Linear indication

~~An indication with a largest dimension three or more times its smallest dimension (i.e.  $l \geq 3 w$ ).~~  
Indication having a length greater than three times its width (i.e.  $l > 3 w$ ).

Fig. XI 10-7 has been amended as follows:



**Fig. XI 10-7**  
**Shape of Indications**

### 10.3.9 Repair of defects

Paragraph 10.3.9(c) has been amended as follows:

#### (c) Repair of defects in Zone A

In Zone A, repair welding will generally not be allowed unless specially approved by the Society.

~~In some cases the propeller designer may submit technical documentation to propose a modified Zone A based on detailed hydrodynamic load and stress analysis for consideration by the Society.~~

Grinding may be carried out to an extent which maintains the blade thickness of the approved drawing.

The possible repair of defects which are deeper than those referred to above is to be considered by the Society.

Paragraph 10.3.9(d) has been amended as follows:

#### (d) Repair of defects in Zone B

Defects that are not deeper than dB (depth in zone B) =  $(t/40) \text{ mm}$  ( $t = \text{min. local thickness in mm according to the Rules}$ ) or 2 mm (whichever is greatest) ~~below min. local thickness according to the Rules of the Society~~ should be removed by grinding. **Note:  $t = \text{min. local thickness in mm according to the Rules of the Society}$ .**

Those defects that are deeper than allowable for removal by grinding may be repaired by welding.



AMENDMENT TO "THE RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF  
STEEL SHIPS 2026"

## **PART XII    WELDING**

## List of major changes in Part XII from 2026 edition

|               |         |
|---------------|---------|
| Table XII 2-7 | Revised |
| 2.7.2(a)(iv)  | Revised |
| Table XII 3-3 | Revised |
| Table XII 3-8 | Revised |
| Fig. XII 5-1  | Revised |

Rules for the Construction and Classification of Steel Ships 2026 have been partly amended as follows:

## Chapter 2 Welding Procedures

### 2.7 Welding Procedure Qualification, Copper Alloy

2.7.1 Pipes, plates, castings and other product forms, not including propeller castings  
WPS for pipes and plates shall be qualified in accordance with ISO 15614-6 unless otherwise agreed by the Society.

2.7.2 Copper alloy castings for propellers

(b) Welding procedure

- (i) Metal arc welding is recommended for all types of repair on bronze propellers. For CU1 and CU2 material thickness less than 30 mm, gas welding may give a satisfactory weldment. Arc welding with coated electrodes and gas-shielded metal arc process (GMAW) are generally to be applied. Argon-shielded tungsten welding (GTAW) should be used with care due to the higher specific heat input of this process. Recommended filler metals, pre-heating and stress relieving temperatures are listed in Table XII 2-6.

....

- (vi) The soaking times for stress relief heat treatment of copper alloy propellers should be in accordance with Table XII 2-7. The heating and cooling is to be carried out slowly under controlled conditions. The cooling rate after any stress relieving heat treatment shall not exceed 50°C/h until the temperature of 200°C is reached.

*Table XII 2-7 has been amended as follows:*

**Table XII 2-7  
Soaking Times for Stress Relief Heat Treatment of Copper Alloy Propellers**

| Stress relief temperature in degrees                                                                                         | Alloy grade CU1 and CU2   |                                   | Alloy grade CU3 and CU4                  |                                        |
|------------------------------------------------------------------------------------------------------------------------------|---------------------------|-----------------------------------|------------------------------------------|----------------------------------------|
|                                                                                                                              | Hours per 25 mm thickness | Max. recommended total time hours | Hours per 25 mm thickness                | Max. recommended total time hours      |
| 350                                                                                                                          | 5                         | 15                                | -                                        | -                                      |
| 400                                                                                                                          | 1                         | 5                                 | -                                        | -                                      |
| 450                                                                                                                          | 1/2                       | 2                                 | 5                                        | 15                                     |
| 500                                                                                                                          | 1/4                       | 1                                 | 1                                        | 5                                      |
| 550                                                                                                                          | 1/4 <sup>(1)</sup>        | 1/2 <sup>(1)</sup>                | 1/2 <del>(see Note)</del> <sup>(2)</sup> | 2 <del>(see Note)</del> <sup>(2)</sup> |
| 600                                                                                                                          | -                         | -                                 | 1/4 <del>(see Note)</del> <sup>(2)</sup> | 1 <del>(see Note)</del> <sup>(2)</sup> |
| Note:<br>(1) 550°C only applicable for CU 2 alloys.<br>(2) 550 and 600°C <del>degrees</del> only applicable for CU 4 alloys. |                           |                                   |                                          |                                        |

[ PART XII ]

2.7.2 Copper alloy castings for propellers

Paragraph 2.7.2(a)(iv) has been amended as follows:

(a) General requirements

- (i) Companies wishing to carry out welding work on propellers must have at their disposal the necessary workshops, lifting gear, welding equipment, preheating and, where necessary, annealing facilities, testing devices as well as certified welders and expert welding supervisors to enable them to perform the work properly. Proof shall be furnished to the Surveyor that these conditions are satisfied before welding work begins.

....

- (iv) Defects to be repaired by welding are to be ground to sound material according to the requirements as given in 10.3.6 **9(b)** of Part XI. To ensure complete removal of the defects the ground areas are to be examined by dye penetrant methods in the presence of the Surveyor. The welding grooves are to be prepared in such a manner which will allow a good fusion of the groove bottom.

### Chapter 3 Welder Qualifications and Control of Welding Operations

#### 3.2 Welder and Welding Operator Qualifications

*Table XII 3-3 has been amended as follows:*

**Table XII 3-3**  
**~~Plate Thicknesses for Welder's Qualification~~**  
**Range of Qualification for Thicknesses for Plates**

| Material Type                                                                         | Thickness of test assembly<br>T (mm) | Qualified plate thickness range<br>t (mm) |
|---------------------------------------------------------------------------------------|--------------------------------------|-------------------------------------------|
| Steel and copper alloys                                                               | $T < 3$                              | $T \leq t \leq 2T$                        |
|                                                                                       | $3 \leq T < 12$                      | $3 \leq t \leq 2T$                        |
|                                                                                       | $12 \leq T$                          | $3 \leq t$                                |
| Aluminum alloys                                                                       | $T \leq 6$                           | $0.5T \leq t \leq 2T$                     |
|                                                                                       | $T > 6$                              | $6 \leq t$                                |
| Steel and copper alloys<br>and aluminum alloys<br>(Tack welding - Butt and<br>Fillet) | $T \approx 10$                       | $t \geq 3$                                |

### 3.6 Period of Validity

Table XII 3-8 has been amended as follows:

**Table XII 3-8  
Welder Qualification Tests and Renewal Tests**

| Kind                               | Range of Qualification<br>Allowable Thickness (mm) /<br>Outside diameter (mm) <sup>(2)</sup> | Test Assemblies <sup>(1)</sup><br>Plate thickness (mm) /<br>Outside diameter (mm) <sup>(2)</sup> | No. of tests for<br>qualification test                  | No. of tests<br>for renewal test                        |
|------------------------------------|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|
| Plate<br>Butt welding              | $3 \leq t \leq 2T$ or<br>$T \leq t \leq 2T$ <sup>(3)</sup>                                   | $T \leq 12$ <sup>(2)</sup>                                                                       | 2 face bending<br>and<br>2 root bending <sup>(41)</sup> | 1 face bending<br>and<br>1 root bending <sup>(41)</sup> |
|                                    | $t \geq 3$                                                                                   | $T \geq 12$                                                                                      | 4 side bending <sup>(41)</sup>                          | 2 side bending <sup>(41)</sup>                          |
| Plate<br>Fillet welding            | $3 \leq t \leq 2T$ or<br>$T \leq t \leq 2T$ <sup>(3)</sup>                                   | $T \leq 12$ <sup>(2)</sup>                                                                       | 1 fracture <sup>(52)</sup>                              | 1 fracture <sup>(52)</sup>                              |
|                                    | $t \geq 3$                                                                                   | $T \geq 12$                                                                                      | 1 fracture <sup>(52)</sup>                              | 1 fracture <sup>(52)</sup>                              |
| Pipe<br>Butt welding               | $D \leq d \leq 2D$                                                                           | $D \leq 25$                                                                                      | 2 face bending<br>and<br>2 root bending <sup>(41)</sup> | 1 face bending<br>and<br>1 root bending <sup>(41)</sup> |
|                                    | $0.5D^{(2)} \leq d$                                                                          | $25 < D$                                                                                         | 4 side bending <sup>(41)</sup>                          | 2 side bending <sup>(41)</sup>                          |
| Pipe<br>Fillet welding             | $D \leq d \leq 2D$                                                                           | $D \leq 25$                                                                                      | 1 fracture <sup>(52)</sup>                              | 1 fracture <sup>(52)</sup>                              |
|                                    | $0.5D^{(2)} \leq d$                                                                          | $25 < D$                                                                                         | 1 fracture <sup>(52)</sup>                              | 1 fracture <sup>(52)</sup>                              |
| Tack welding<br>Butt and Fillet    | $t \geq 3$                                                                                   | $T \approx 10$                                                                                   | 1 fracture <sup>(52)</sup>                              | 1 fracture <sup>(52)</sup>                              |
| <del>Tack welding<br/>Fillet</del> | $t \geq 3$                                                                                   | $T \approx 10$                                                                                   | <del>1 fracture <sup>(52)</sup></del>                   | <del>1 fracture <sup>(52)</sup></del>                   |

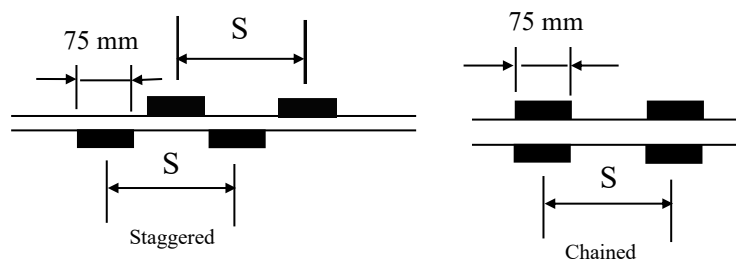
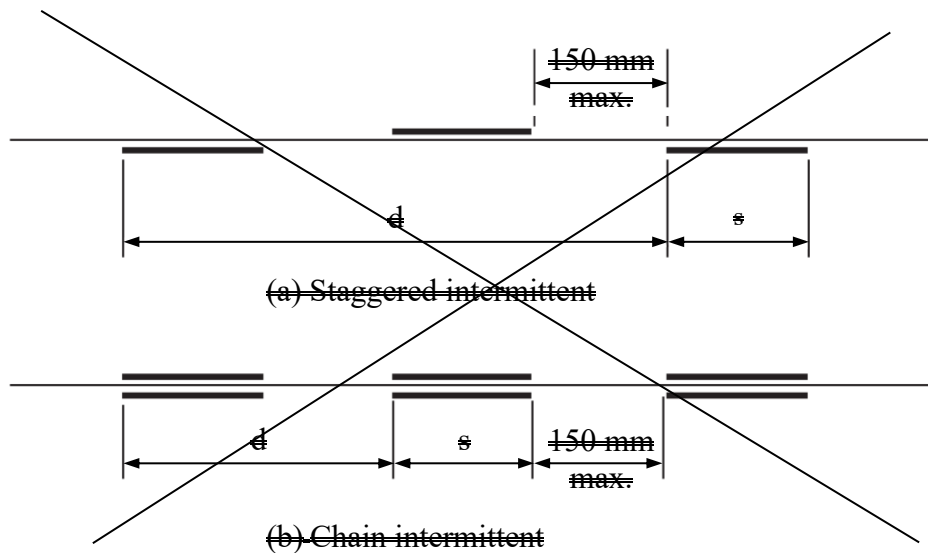
Notes:

- (1) ~~Welding position used in each test assembly is in accordance with Table XII 3-5 to Table XII 3-7 of this Chapter. Details of test assemblies are according to Fig. XII 3-3 to Fig. XII 3-12 of this Chapter.~~
- (2) ~~Symbol "T" means the thickness of the test assembly. Symbol "t" means the qualified plate thickness range. Symbol "D" means the outside diameter of test assemblies for pipe. Symbol "d" means qualified range of outside diameter of pipe.~~
- (3) ~~If the thickness of test assembly (T) is smaller than 3 mm, the qualified plate thickness range (t) assembly is from T to 2T.~~
- (41) Radiographic test or fracture test may be carried out in lieu of bend test except the gas-shielded welding processes with solid wire or metal cored wire.
- (52) 2 macro sections may be taken in lieu of the fracture test.

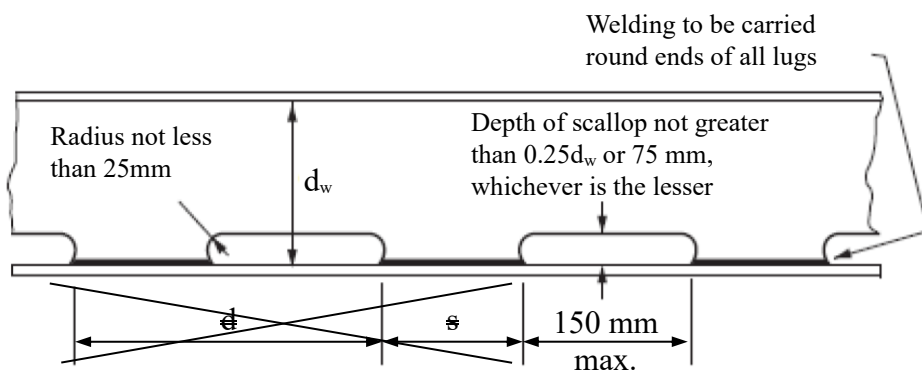
## Chapter 5 Welding Constructions

### 5.2 Specific Requirements for Ship Hull Structure and Machinery

*Fig. XII 5-1 has been amended as follows:*



(a) Types of intermittent weld



(b) Scalloped construction

Fig. XII 5-1  
Weld Dimensions and Types



AMENDMENT TO "THE RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF  
STEEL SHIPS 2026"

## **PART XIII   NAVIGATIONAL SAFETY SYSTEMS**

## List of major changes in Part XIII from 2026 edition

|              |         |
|--------------|---------|
| 1.4.1(ad)    | New     |
| 5.2.5(b)(vi) | Revised |

Rules for the Construction and Classification of Steel Ships 2026 have been partly amended as follows:

## Chapter 1 General

### 1.4 Definitions

*Paragraph 1.4.1(ad) has been added as follows:*

1.4.1 The following terms are used in this Part:

- (a) Acquisition - The selection of those target ships requiring a tracking procedure and the initiation of their tracking.

...

- (ac) Way-point - Any of the various intermediate points on a route.

(ad) Wheelhouse - Enclosed area of the bridge.

## Chapter 5

### Requirements for Notation NIBS (Navigational Integrated Bridge System)

|                                                     |
|-----------------------------------------------------|
| <b>5.2 Navigational Equipment for NIBS Notation</b> |
|-----------------------------------------------------|

5.2.1 Workstation/panel for centralized bridge

- (a) Main functions to be performed
  - (i) Main function for the Navigation and Traffic Surveillance/maneuvering workstation – See 3.2.1(a) of this Part.
  - (ii) Main function for monitoring workstation – See 3.2.2(a) of this Part.
- (b) Equipment
  - (i) Equipment required for the navigation and traffic surveillance / maneuvering workstation – See 3.2.1(b) of this Part.
  - (ii) Equipment required for monitoring workstation – See 3.2.2(b) of this Part.
  - (iii) Central alarm panel – See 5.5.
  - (iv) ECDIS (Electronic Chart Display and Information System) – See 5.8.4.

...

5.2.5 Workstation/panel for route planning

- (a) Main functions to be performed
  - (i) Determination of favorable course and optimum speed, taking into account weather conditions, current, etc. and route planning
  - (ii) Giving instructions as to the course and speed
  - ...
  - (ix) External communication for planning operation using the chart

Paragraph 5.2.5(b)(vi) has been amended as follows:

- (b) Equipment
  - (i) ECDIS including navigation planning station
  - (ii) Route planning devices
  - (iii) Chart table
  - (iv) Position-fixing receiver
  - (v) Retaining device for drawing triangles, dividers, magnifying lens, pencils, etc.
  - (vi) Weather chart plotter
    - Note: A marine computer with the ability to receive and display regular weather forecasts or a weather fax machine is an acceptable alternatives. Refer to SOLAS Regulation V/5.2.2.**
  - (vii) Main clock
  - (viii) Chronometer with receiving facility for time signals - Chronometer is not required, if official universal time is obtained by other means.
  - (ix) Radio direction finder - Radio direction finder is not required, if the ship is provided with other radionavigation equipment suitable for use throughout its intended voyages.
  - (x) Log, including distance indicator, course plotter
  - (xi) Officer of the watch check-alertness acknowledgment device
  - (xii) Barograph

- (xiii) Command printer
- (xiv) Telephone system – See 3.10 of this Part.



AMENDMENT TO "THE RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF  
STEEL SHIPS 2026"

**PART XV      HULL CONSTRUCTION AND  
EQUIPMENT FOR SHIPS LESS THAN  
90 M IN LENGTH**

## List of major changes in Part XV from 2026 edition

|               |         |
|---------------|---------|
| 1.5.1         | Revised |
| 25.1.1        | Revised |
| 25.5          | Revised |
| 25.8.3(b)(i)  | Revised |
| Table XV 25-1 | Revised |
| Table XV 25-2 | New     |

Rules for the Construction and Classification of Steel Ships 2026 have been partly amended as follows:

## Chapter 1 General

### 1.5 Definitions

The definitions of terms which appear in this Part are to be as specified in this Chapter, unless specified elsewhere.

*Paragraph 1.5.1 has been amended as follows:*

#### 1.5.1 Length of ship (L)

~~Length of ship is the distance in metres on the designed maximum load line defined in 1.5.8(b) of this Chapter, from the fore side of the stem to the aft side of the rudder post for ships with a rudder post, or to the axis of the rudder stock for ships without a rudder post. However, for ships with a cruiser stern, L is as defined above or 96% of the total length on the designed maximum load line, whichever is the greater.~~

Length of ship (L) is the distance, in meters, on the summer load waterline from the fore side of the stem to the after side of the rudder post, or to the center of the rudder stock if there is no rudder post. L is not to be less than 96%, and need not be greater than 97%, of the extreme length on the summer load waterline. The summer load waterline is the designed maximum load line corresponding to the full load condition. In ships without rudder post and stock, L is to be taken equal to 97% of the extreme length on the summer load waterline. In ships with unusual stem or stern arrangements, L is considered on a case by case basis.

## Chapter 25 Equipment

### 25.1 General

*Paragraph 25.1.1 has been amended as follows:*

25.1.1 All ships, according to their equipment numbers, are to be provided with anchors, chain cables, ropes, etc. which are not less than ~~that those~~ given in Table XV 25-1 ~~and Table XV 25-2 of this Chapter, and in 25.5.10 to 25.5.12 of Part II.~~ The letter E will be placed after the symbol of classification of hull in the Register Book.

...

25.1.6 The inboard end of the chain cable is to be secured to the hull through a strong eye plate by means of a shackle or by other equivalent means.

*Section 25.5 has been amended as follows:*

### 25.5 Towlines and Mooring RopesLines

25.5.1 ~~As for wire ropes and hemp ropes used as towlines and mooring ropes, the breaking test load specified in Chapter 14 or 15 of Part XI is not to be less than the breaking strength given in Table XV 25-1 of this Chapter, respectively.~~ Towlines and mooring lines may be of steel wires, natural fibre or synthetic fibre ropes. The breaking strength of the towline is given in Table XV 25-1. The ship design minimum breaking load and number of the mooring lines for ships with an equipment number of less than or equal to 2000 ( $EN \leq 2000$ ) are given in Table XV 25-2. The ship design minimum breaking load and number of the mooring lines for ships with an equipment number greater than 2000 ( $EN > 2000$ ) are defined in 25.5.7 to 25.5.12 of Part II.

25.5.2 For ships ~~with an equipment number of less than or equal to 2000 ( $EN \leq 2000$ )~~ having an A/EN ratio greater than 0.9, the number of mooring ~~ropes~~Lines given in Table XV 25-4~~2~~ of this Chapter is to be increased by the number given below:

| A/EN Ratio            | Increase No. of Mooring<br>RopeLine |
|-----------------------|-------------------------------------|
| $1.1 \geq A/EN > 0.9$ | 1                                   |
| $1.2 \geq A/EN > 1.1$ | 2                                   |
| $A/EN > 1.2$          | 3                                   |

where:

A = The profile area defined in 25.2 of this Chapter.  
EN = Equipment number determined by 25.2 of this Chapter.

25.5.3 Application of synthetic fibre ropes for towlines or mooring ~~ropes~~Lines is to be as deemed appropriate by the Society.

25.5.4 For mooring ~~rope~~line connected ~~with to~~ power winches where the rope is stored on the drum, steel cored wire ropes of suitable flexible construction may be used instead of fibre cored wire ropes subject to the approval by the Society.

25.5.5 ~~The lengths of mooring lines for ships with an equipment number of less than or equal to 2000 ( $EN \leq 2000$ ) are to be in accordance with Table XV 25-2. For ships with an equipment number greater than 2000 ( $EN > 2000$ ), the length of mooring lines may be taken as 200 m. The length of the individual mooring ~~rope~~line may be reduced by up to 7% of the lengths given in Table XV 25-1 of this Chapter.~~ ~~above given lengths~~, provided that the ~~actual~~ total length of

the stipulated number of the mooring rope line is not less than that obtained from multiplying the length by the number given in Table XV 25-1 of this Chapter the required total length.

## 25.8 Towing and Mooring Fittings

### 25.8.3 Mooring fittings

#### (a) Arrangement of mooring fittings

- (i) Mooring fittings are to be located on longitudinals, beams or girders, which are parts of the deck construction so as to facilitate efficient distribution of the mooring load.
- (ii) When mooring fittings cannot be located as specified in 25.8.3(a)(i) above, the mooring fittings are to be arranged on reinforced members.

*Paragraph 25.8.3(b)(i) has been amended as follows:*

#### (b) Design load

Design loads for mooring fittings and their supporting structures (hereinafter referred to as "designed load on fittings"(see Fig. XV 25-4 of this Chapter) in this paragraph) are to be as specified in 25.8.3(b)(i) to 25.8.3(b)(vii) below:

- (i) The design load on the line (see Fig. XV 25-4 of this Chapter) is to be 1.25 times the breaking strength of the mooring line specified in Table XV 25-1 of this Chapter according to the equipment number determined in 25.2 of this Chapter.
- (ii) The design load on fittings is to take into account all acting loads.
- (iii) The point where the mooring force acts on mooring fittings is to be taken as the attachment point of the mooring line.
- (iv) The design load on fittings is to take into account the total design load on the line specified in 25.8.3(b)(i) of this Chapter (see Fig. XV 25-4 of this Chapter), but need not exceed twice the design load on the line.
- (v) If the design load on fittings specified in 25.8.3(b)(i) to 25.8.3(b)(iv) of this Chapter is less than 1.25 times the intended mooring load stipulated in the construction specifications for the mooring fittings and their supporting structures used for mooring operations specified in 25.8.3(b)(i) of this Chapter, the design load on the fittings is to be at least 1.25 times the intended mooring load.
- (vi) The design load applied to supporting hull structures for mooring winches is to be 1.25 times the intended maximum brake holding load.
- (vii) The design load applied to supporting hull structures for capstans is to be 1.25 times the intended maximum hauling-in force.

#### (c) Selection of mooring fittings

Mooring fittings are generally to be specified according to standards approved by the Society.

#### (d) Allowable stresses of supporting structures

Allowable stresses of supporting structures are not to be more than below:

- (i) Normal stress: 100% of the specified yield point for the material used
- (ii) Shearing stress: 60% of the specified yield point for the material used

#### (e) Corrosion addition of supporting structures

For the corrosion addition of supporting structures, the value will be considered by the Society, but is not to be less than 2 mm.

[ **PART XV** ]

- (f) Safe working load (SWL)
  - (i) The SWL is not to exceed 80% of the design load on fittings specified in 25.8.3(b)(i) to 25.8.3(b)(v) of this Chapter or the design load specified in 25.8.3(b)(vi) or 25.8.3(b)(vii) of this Chapter.
  - (ii) The SWL of each fitting, excluding mooring winches and capstan<sup>s</sup>, is to be marked by weld beads or equivalent on the fitting.

Table XV 25-1 has been amended as follows:

**Table XV 25-1**  
**Anchors, Chain Cables and Ropes**

| Equipment number |       | Equipment numeral | Bower Anchors |                                    | Chain cable for anchor (stud anchor chain) |               |      |          | Tow line |                   |          | Mooring ropes |                     |                   |                      |
|------------------|-------|-------------------|---------------|------------------------------------|--------------------------------------------|---------------|------|----------|----------|-------------------|----------|---------------|---------------------|-------------------|----------------------|
|                  |       |                   | Number        | Mass per anchor (stockless anchor) | Total length                               | Diameter (mm) |      |          | Length   | Breaking strength |          | Number        | Length of each rope | Breaking strength |                      |
| Over             | Up to |                   |               |                                    |                                            | kg            | m    | Grade E1 |          | Grade E2          | Grade E3 |               |                     | m                 | Marks <sup>(1)</sup> |
| 50               | 70    | E51               | 2             | 180                                | 220                                        | 14            | 12.5 |          | 180      | 6×12              | 98       | 3             | 80                  | 6×12              | 34                   |
| 70               | 90    | E52               | 2             | 240                                | 220                                        | 16            | 14   |          | 180      | 6×12              | 98       | 3             | 100                 | 6×12              | 37                   |
| 90               | 110   | E53               | 2             | 300                                | 247.5                                      | 17.5          | 16   |          | 180      | 6×12              | 98       | 3             | 110                 | 6×12              | 39                   |
| 110              | 130   | E54               | 2             | 360                                | 247.5                                      | 19            | 17.5 |          | 180      | 6×12              | 98       | 3             | 110                 | 6×12              | 44                   |
| 130              | 150   | E55               | 2             | 420                                | 275                                        | 20.5          | 17.5 |          | 180      | 6×12              | 98       | 3             | 120                 | 6×12              | 49                   |
| 150              | 175   | E56               | 2             | 480                                | 275                                        | 22            | 19   |          | 180      | 6×12              | 98       | 3             | 120                 | 6×12              | 54                   |
| 175              | 205   | E57               | 2             | 570                                | 302.5                                      | 24            | 20.5 |          | 180      | 6×12              | 112      | 3             | 120                 | 6×12              | 59                   |
| 205              | 240   | E58               | 2             | 660                                | 302.5                                      | 26            | 22   | 20.5     | 180      | 6×12              | 129      | 4             | 120                 | 6×12              | 64                   |
| 240              | 280   | E59               | 2             | 780                                | 330                                        | 28            | 24   | 22       | 180      | 6×12              | 150      | 4             | 120                 | 6×12              | 69                   |
| 280              | 320   | E60               | 2             | 900                                | 357.5                                      | 30            | 26   | 24       | 180      | 6×12              | 174      | 4             | 140                 | 6×12              | 74                   |
| 320              | 360   | E61               | 2             | 1020                               | 357.5                                      | 32            | 28   | 24       | 180      | 6×12              | 207      | 4             | 140                 | 6×12              | 78                   |
| 360              | 400   | E62               | 2             | 1140                               | 385                                        | 34            | 30   | 26       | 180      | 6×24              | 224      | 4             | 140                 | 6×12              | 88                   |
| 400              | 450   | E63               | 2             | 1290                               | 385                                        | 36            | 32   | 28       | 180      | 6×24              | 230      | 4             | 140                 | 6×12              | 98                   |
| 450              | 500   | E64               | 2             | 1440                               | 412.5                                      | 38            | 34   | 30       | 180      | 6×24              | 277      | 4             | 140                 | 6×12              | 108                  |
| 500              | 550   | E65               | 2             | 1590                               | 412.5                                      | 40            | 34   | 30       | 190      | 6×24              | 306      | 4             | 160                 | 6×12              | 123                  |
| 550              | 600   | E66               | 2             | 1740                               | 440                                        | 42            | 36   | 32       | 190      | 6×24              | 338      | 4             | 160                 | 6×12              | 133                  |
| 600              | 660   | E67               | 2             | 1920                               | 440                                        | 44            | 38   | 34       | 190      | 6×24              | 371 370  | 4             | 160                 | 6×12              | 147                  |
| 660              | 720   | E68               | 2             | 2100                               | 440                                        | 46            | 40   | 36       | 190      | 6×24              | 406      | 4             | 160                 | 6×12              | 157                  |
| 720              | 780   | E69               | 2             | 2280                               | 467.5                                      | 48            | 42   | 36       | 190      | 6×24              | 441      | 4             | 170                 | 6×12              | 172                  |
| 780              | 840   | E70               | 2             | 2460                               | 467.5                                      | 50            | 44   | 38       | 190      | 6×24              | 480 479  | 4             | 170                 | 6×12              | 186                  |
| 840              | 910   | E71               | 2             | 2640                               | 467.5                                      | 52            | 46   | 40       | 190      | 6×24              | 518      | 4             | 170                 | 6×12              | 201                  |
| 910              | 980   | E72               | 2             | 2850                               | 495                                        | 54            | 48   | 42       | 190      | 6×37              | 559      | 4             | 170                 | 6×12              | 216                  |

| Equipment number |       | Equipment numeral | Bower Anchors |                                    | Chain cable for anchor (stud anchor chain) |               |          |          | Tow line |                      |     | Mooring ropes |                     |                      |     |
|------------------|-------|-------------------|---------------|------------------------------------|--------------------------------------------|---------------|----------|----------|----------|----------------------|-----|---------------|---------------------|----------------------|-----|
|                  |       |                   | Number        | Mass per anchor (stockless anchor) | Total length                               | Diameter (mm) |          |          | Length   | Breaking strength    |     | Number        | Length of each rope | Breaking strength    |     |
|                  |       |                   |               |                                    |                                            | Grade E1      | Grade E2 | Grade E3 |          | Marks <sup>(1)</sup> | kN  |               |                     | Marks <sup>(1)</sup> | kN  |
| Over             | Up to |                   |               | kg                                 | m                                          |               |          |          | m        |                      |     |               | m                   |                      |     |
| 980              | 1060  | E73               | 2             | 3060                               | 495                                        | 56            | 50       | 44       | 200      | 6×37                 | 603 | 4             | 180                 | 6×24                 | 230 |
| 1060             | 1140  | E74               | 2             | 3300                               | 495                                        | 58            | 50       | 46       | 200      | 6×37                 | 647 | 4             | 180                 | 6×24                 | 230 |
| 1140             | 1220  | E75               | 2             | 3540                               | 522.5                                      | 60            | 52       | 46       | 200      | 6×37                 | 691 | 4             | 180                 | 6×24                 | 270 |
| 1220             | 1300  | E76               | 2             | 3780                               | 522.5                                      | 62            | 54       | 48       | 200      | 6×37                 | 738 | 4             | 180                 | 6×24                 | 284 |
| 1300             | 1390  | E77               | 2             | 4050                               | 522.5                                      | 64            | 56       | 50       | 200      | 6×37                 | 786 | 4             | 180                 | 6×24                 | 309 |
| 1390             | 1480  | E78               | 2             | 4320                               | 550                                        | 66            | 58       | 50       | 200      | 6×37                 | 836 | 4             | 180                 | 6×24                 | 324 |
| 1480             | 1570  | E79               | 2             | 4590                               | 550                                        | 68            | 60       | 52       | 220      | 6×37                 | 888 | 5             | 190                 | 6×24                 | 324 |
| 1570             | 1670  | E80               | 2             | 4890                               | 550                                        | 70            | 62       | 54       | 220      | 6×37                 | 941 | 5             | 190                 | 6×24                 | 333 |

Notes:

- (1) Where steel wire ropes are used, the following wire ropes corresponding to the marks shown in the Table are to be provided.
- (2) Length of chain cables may be that including shackles for connection.

Table XV 25-2 has been added as follows:

**Table XV 25-2**

**Mooring Lines for Ships with Equipment Number  $\leq 2000$**

| Equipment number |       | Mooring lines |                          |                                         |
|------------------|-------|---------------|--------------------------|-----------------------------------------|
|                  |       | Number        | Length of each line<br>m | Ship design minimum breaking load<br>kN |
| Over             | Up to |               |                          |                                         |
| 50               | 70    | 3             | 80                       | 37                                      |
| 70               | 90    | 3             | 100                      | 40                                      |
| 90               | 110   | 3             | 110                      | 42                                      |
| 110              | 130   | 3             | 110                      | 48                                      |
| 130              | 150   | 3             | 120                      | 53                                      |
| 150              | 175   | 3             | 120                      | 59                                      |
| 175              | 205   | 3             | 120                      | 64                                      |
| 205              | 240   | 4             | 120                      | 69                                      |
| 240              | 280   | 4             | 120                      | 75                                      |
| 280              | 320   | 4             | 140                      | 80                                      |
| 320              | 360   | 4             | 140                      | 85                                      |
| 360              | 400   | 4             | 140                      | 96                                      |
| 400              | 450   | 4             | 140                      | 107                                     |
| 450              | 500   | 4             | 140                      | 117                                     |
| 500              | 550   | 4             | 160                      | 134                                     |
| 550              | 600   | 4             | 160                      | 143                                     |
| 600              | 660   | 4             | 160                      | 160                                     |
| 660              | 720   | 4             | 160                      | 171                                     |
| 720              | 780   | 4             | 170                      | 187                                     |
| 780              | 840   | 4             | 170                      | 202                                     |
| 840              | 910   | 4             | 170                      | 218                                     |
| 910              | 980   | 4             | 170                      | 235                                     |
| 980              | 1060  | 4             | 180                      | 250                                     |
| 1060             | 1140  | 4             | 180                      | 272                                     |
| 1140             | 1220  | 4             | 180                      | 293                                     |
| 1220             | 1300  | 4             | 180                      | 309                                     |
| 1300             | 1390  | 4             | 180                      | 336                                     |
| 1390             | 1480  | 4             | 180                      | 352                                     |
| 1480             | 1570  | 5             | 190                      | 352                                     |
| 1570             | 1670  | 5             | 190                      | 362                                     |
| 1670             | 1790  | 5             | 190                      | 384                                     |
| 1790             | 1930  | 5             | 190                      | 411                                     |
| 1930             | 2000  | 5             | 190                      | 437                                     |





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