TÜRK LOYDU RULE CHANGE SUMMARY

TL NUMBER: 04/2019 DECEMBER 2019

Latest editions of TL Rules incorporate all rule changes. The latest rule revisions of a published rule are shown with a vertical line. Changes after the publication of the rule are written in red colour.

Please note that within this document added items are written in red and for deleted items strikethrough is applied. After the publication of relevant rule, those revisions are to be indicated with a vertical line. Following Rule Changes presented in English are also implemented into Turkish Version of Rules.

RULE CHANGE SUMMARY

CLASSIFICATION AND SURVEYS

No	Item
01	Section 2
02	Section 3
03	Annex A

CHAPTER 1 - HULL

No	Item
01	Section 1
02	Section 3
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04	**Section 7**
05	**Section 11**
06	**Section 12**
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CHAPTER 2 - MATERIAL

No	**Item**
01	**Section 02**

CHAPTER 4 - MACHINERY

No	**Item**
01	**Section 01**
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05	**Section 14**
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CHAPTER 4-1 - AUTOMATION

No	**Item**
01	**Section 08**

CHAPTER 5 – ELECTRICAL INSTALLATION

No	Item
01	Section 4
02	Section 5
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CHAPTER 7 – HIGH SPEED CRAFTS

No	Item
01	Section 8

CHAPTER 9 – Rules for Construction and Classification of Yachts

No	Item
01	Section 2

CHAPTER 10 - LIQUEFIED GAS TANKERS

No	Item
01	Section 03
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CHAPTER 36 – OFFSHORE SERVICE VESSELS

No	Item
01	Section 3

CHAPTER 78 - RULES FOR CLASSIFICATION OF SHIPS USING GASES OR OTHER LOW-FLASHPOINT FUEL

No	Item
01	Section 06
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03	Section 15

ADDITIONAL RULE – SURVEY and CERTIFICATION RULES ON ENERGY EFFICIENCY OF SHIPS (MARPOL 73/78 ANNEX VI, CHAPTER 4)

No	Item
01	General

ADDITIONAL RULE – REGULATIONS FOR THE PERFORMANCE OF THE TYPE TESTS PART 1 – TEST SPECIFICATION FOR TYPE APPROVAL

No	Item
01	General

CLASSIFICATION AND SURVEYS

01. Section 2 – Classification

Revision Date: October 2019

Entry into Force Date: 6 November 2019

Item A, 2.4.2.3 was revised as below:

……

TL requires the applicable Convention Certificates to be issued by a flag state or **TL** or an organization which is authorized by the flag state. Safety Management Certificates in accordance with the provisions of the International Safety Management Code (ISM Code) may be issued by an organisation complying ~~with IMO Resolution A.739(18) amended by Resolution MSC.208(81)~~ the Code for Recognized Organizations (RO Code) adopted by IMO Resolution MSC.349(92) and authorised by the flag state with which the ship is registered. ……

Revision Date: December 2019

Entry into Force Date: 1 January 2020

Item D, 2.4.1.4 was revised as below:

L2 This range of service is limited to trade in harbours not exceeding 10 nautical miles from the nearest coastline and not exceeding 100 nautical miles from the port of departure.

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Item D.2.4.2.1 was revised as below:

2.4.2.1 Inland Waterway Service - I

This notation applies to inland vessels, i.e. vessels intended for navigation in inland waters only and complying with the **TL** Rules, Chapter 19 – Inland Vessels. For details of notations, see Chapter 19, Section 2.

Table 2.1 was revised as below:

Class Notation	Description	Application	Rule Requirement, Design (1)	Rule Requirement, Survey
PASSENGER CRAFT / RO-RO PASSENGER CRAFT	For passenger crafts / Ro-Ro passenger crafts intended to operate in harbour service (**L1/L2**)	Passenger Crafts / Ro-Ro Passenger Crafts	Part C, Chapter 37- Tentative Rules for the Classification of Passenger Crafts	Classification and Surveys Section 3

	within the domestic waters of Turkey			

Revision Date: December 2019

Entry into Force Date: 1 January 2020

Item D.2.10 was added as below:

2.10 Compliance with IACS resolutions

For existing ships which are not in full compliance with all applicable and relevant IACS Resolutions, including those with retrospective application, class notation **NCS** will be assigned.

Notes: *For definition of IACS resolution see item A.2.2.5.*

List of non compliant IACS resolutions will be identified as memorendum.

For the purpose of this paragraph, an existing ship is a ship which the date of contract for construction as defined in TL- PR 29 is prior to 1st of January 2020.

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Table 2.12 was revised as below:

Class Notation	Description	Application	Rule Requirement, Design (1)	Rule Requirement, Survey
AUV	For autonomous operating submersibles	Auvs		

Revision Date: October 2019

Entry into Force Date: 6 November 2019

Table 2.12 was revised as below:

Class Notation	Description	Application	Rule Requirement, Design (1)	Rule Requirement, Survey
TRAINING VESSEL	This notation is assigned to vessels engaged in training and practical marine experience to develop seafaring skills suitable for a professional career at sea	Training Vessels	- Relevant sections of Part A Chapter 1 Hull - Structural fire protection and stability are to comply with 2008 IMO SPS Code - Code of Safety for Special Purpose Ships, as amended	Classification and Surveys Section 3

02. Section 3 – Surveys

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Item A.11.2.1.1 was revised as below:

……

- Firms engaged in ~~the servicing and~~ maintenance, thorough examination, operational testing, overhaul and repair of lifeboats and rescue boats, launching appliances and ~~on-load~~ release gear ~~and david launched liferaft automatic release hooks~~

……

Item A.15 was added according to MSC 461(101) as below:

15. Documentation on Board

15.1 Documentation on Board for ESP Vessels

15.1.1 For enhanced programme of inspections (ESP) during surveys for bulk carriers and oil tankers, the owner shall obtain, supply and maintain on board the ship documentation as specified in 15.1.1, 15.1.2 and 15.1.3, which shall be readily available for the surveyor. The executive hull summary report referred to in 15.1.1 shall include a translation into English.

The documentation shall be kept on board for the lifetime of the ship.

A Survey Report File is to be part of the documentation on board:

- Reports on structural surveys
- Executive Hull Summary
- Thickness measurements reports

The Survey Report File is to be available also in the Owners management office.

15.1.2 Main structural plans of cargo and ballast holds or tanks (for CSR ships these plans are to include for each structural element both the as-built and renewal thickness. Any thickness for voluntary addition is also to be clearly indicated on the plans. The midship section plan to be supplied on board the ship is to include the minimum allowable hull girder sectional properties for hold transverse section in all cargo holds), previous repair history, cargo and ballast history, extent of use of inert gas plant and tank cleaning procedures, records of inspections and actions by ship's personnel for structural deterioration, leakage in bulkheads and piping, condition of coating or corrosion prevention and any other information identifying critical structural areas and/or suspect areas requiring inspection.

Note: *Cargo and ballast history, extent of use of inert gas plant and tank cleaning procedures and records of inspections and actions by ship's personnel for structural deterioration, leakage in bulkheads and piping, condition of coating or corrosion prevention are applicable in conjunction with Class Notation ESP.*

15.1.3 Effective from 01 July 2016, for tankers and bulk carriers subject to SOLAS Chapter II-1 Part A-1 Regulation 3-10, the Ship Construction File (SCF), limited to the items to be retained on board, is to be available on board.

15.1.3.1 For the SCF stored on board ship, the surveyor is to examine the information on board ship.

In cases where any major event, including, but not limited to, substantial repair and conversion, or any modification to the ship structures, the surveyor is to also verify that the updated information is kept on board the ship. If the updating of the SCF onboard is not completed at the time of survey, the Surveyor records it and requires confirmation at the next periodical survey.

15.1.3.2 For the SCF stored on shore archive, the surveyor is to examine the list of information included on shore archive.

In cases where any major event, including, but not limited to, substantial repair and conversion, or any modification to the ship structures, the surveyor is to also verify that the updated information is stored on shore archive by examining the list of information included on shore archive or kept on board the ship.

In addition, the surveyor is to confirm that the service contract with of the Archive Center is valid.

If the updating of the SCF Supplement ashore is not completed at the time of survey, the Surveyor records it and requires confirmation at the next periodical survey.

15.1.4 For bulk carriers and oil tankers with coatings of dedicated seawater ballast tanks subject to PSPC standards (MSC.215(82), as amended), the owner shall arrange the updating of the Coating Technical File (CTF) throughout the ship's life whenever a maintenance, repair, or recoating activity to these coatings has taken place. Documented procedures for updating the CTF shall be included within the Safety Management System.

15.2 Documentation on Board for All Ships Other than ESP Vessels

The Owner is to supply and maintain onboard survey and thickness measurement reports, which are to be readily available for the Surveyor. Prior to commencing Structural Hull surveys, the Surveyor is to examine the documentation onboard as a basis for the survey.

The documentation is to be kept onboard for the lifetime of the vessel.

Item B.3.4.1 was revised as below:

.....

- Cover panels, including side plates, and stiffener attachments that ~~may be~~ **are** accessible in the open position by close-up survey (for corrosion, cracks, deformation);

.....

Where considered necessary, the effectiveness of sealing arrangements shall be confirmed and may be proved by hose or chalk testing supplemented by dimensional measurements of seal compressing components.

Item B.3.6.2 and 3.6.3 were revised according to MSC 461(101) as below:

3.6.2 Examination of weather decks

3.6.2.1 Examination of cargo tank openings including gaskets, covers, coaming and flame screens as far as practicable.

3.6.2.2 Examination of cargo tanks pressure / vacuum valves and flame screens as far as practicable.

3.6.2.3 Examination of flame screens on vents to all bunker tanks as far as practicable.

3.6.2.4 Examination of cargo, crude oil washing, bunker and vent piping systems, including vent masts and headers as far as practicable.

3.6.3 Examination of cargo pump rooms and pipe tunnels if fitted

3.6.3.1 Examination of all pump room bulkheads for signs of oil/chemical leakage or fractures and, in particular, the sealing arrangements of all penetrations of pump room bulkheads as far as practicable.

3.6.3.2 Examination of the condition of all piping systems as far as practicable.

Item B.4.1.1 was revised ccording to UR E24 Rev.1 as below:

……

- For ships, contracted for construction before 1 July 2017, where harmonic filters are installed on main busbars of electrical distribution system, other than those installed for single application frequency drives such as pump motors; As a minimum, harmonic distortion levels of main busbar on board ~~existing~~ a ships ~~including harmonic filters and contracted for construction before 1 July 2017,~~ are to be measured annually under seagoing conditions as close to the periodical machinery survey as possible so as to give a clear representation of the condition of the entire plant to the surveyor.

……

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Table 3.3 was revised according to UR Z7 Rev.27 as below:

Class renewal survey No.1 Age ≤ 5	**Class renewal survey No.2 5 < Age ≤ 10**	**Class renewal survey No.3 10 < Age ≤ 15**	**Class renewal survey No.4 and subsequent 15 < Age**
		4) Internals in forepeak and after peak ballast tanks.	4) Internals in forepeak and after peak ballast tanks.

Item C.2 was revised as below:

2. Documentation on Board Ships

See item A.15 for requirements of documentation on board.

~~**2.1 Documentation on Board for ESP Vessels**~~

~~**2.1.1** For enhanced programme of inspections (ESP) during surveys for bulk carriers and oil tankers, the owner shall obtain, supply and maintain on board the ship documentation as specified in 2.1.1, 2.1.2 and 2.1.3, which shall be readily available for the surveyor. The executive hull summary report referred to in 2.1.1 shall include a translation into English.~~

The documentation shall be kept on board for the lifetime of the ship.

A Survey Report File is to be part of the documentation on board:

- Reports on structural surveys
- Executive Hull Summary
- Thickness measurements reports

The Survey Report File is to be available also in the Owners management office.

2.1.2 Main structural plans of cargo and ballast holds or tanks (for CSR ships these plans are to include for each structural element both the as-built and renewal thickness. Any thickness for voluntary addition is also to be clearly indicated on the plans. The midship section plan to be supplied on board the ship is to include the minimum allowable hull girder sectional properties for hold transverse section in all cargo holds), previous repair history, cargo and ballast history, extent of use of inert gas plant and tank cleaning procedures, records of inspections and actions by ship's personnel for structural deterioration, leakage in bulkheads and piping, condition of coating or corrosion prevention and any other information identifying critical structural areas and/or suspect areas requiring inspection.

Note: *Cargo and ballast history, extent of use of inert gas plant and tank cleaning procedures and records of inspections and actions by ship's personnel for structural deterioration, leakage in bulkheads and piping, condition of coating or corrosion prevention are applicable in conjunction with Class Notation ESP.*

2.1.3 Effective from 01 July 2016, for tankers and bulk carriers subject to SOLAS Chapter II-1 Part A-1 Regulation 3-10, the Ship Construction File (SCF), limited to the items to be retained on board, is to be available on board.

2.1.3.1 For the SCF stored on board ship, the surveyor is to examine the information on board ship.

In cases where any major event, including, but not limited to, substantial repair and conversion, or any modification to the ship structures, the surveyor is to also verify that the updated information is kept on board the ship. If the updating of the SCF onboard is not completed at the time of survey, the Surveyor records it and requires confirmation at the next periodical survey.

2.1.3.2 For the SCF stored on shore archive, the surveyor is to examine the list of information included on shore archive.

In cases where any major event, including, but not limited to, substantial repair and conversion, or any modification to the ship structures, the surveyor is to also verify that the updated information is stored on shore archive by examining the list of information included on shore archive or kept on board the ship.

In addition, the surveyor is to confirm that the service contract with of the Archive Center is valid.

If the updating of the SCF Supplement ashore is not completed at the time of survey, the Surveyor records it and requires confirmation at the next periodical survey.

2.2 Documentation on Board for All Ships Other than ESP Vessels

The Owner is to supply and maintain onboard survey and thickness measurement reports, which are to be readily available for the Surveyor. Prior to commencing Structural Hull surveys, the Surveyor is to examine the documentation onboard as a basis for the survey.

The documentation is to be kept onboard for the lifetime of the vessel.

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Table 3.10 and 3.13 were revised according to MSC 461(101) as below:

Class renewal survey No.1 Age ≤ 5	**Class renewal survey No.2 5 < Age ≤ 10**	**Class renewal survey No.3 10 < Age ≤ 15**	**Class renewal survey No.4 and subsequent 15 < Age**
Suspect areas.	Suspect areas.	Suspect areas.	Suspect areas.
	Within the cargo length: Two transverse sections of deck plating outside line of cargo hatch openings.	Within the cargo length: - Each deck plate outside line of cargo hatch opening - Two transverse sections, one in the amidship area, outside line of cargo hatch opening. - All wind and water strakes within the cargo length area.	Within the cargo length: - Each deck plate outside line of cargo hatch opening - Three transverse sections, one in the amidship area, outside line of cargo hatch opening. - Each bottom plate.

Class renewal survey No.1 Age ≤ 5	**Class renewal survey No.2 5 < Age ≤ 10**	**Class renewal survey No.3 10 < Age ≤ 15**	**Class renewal survey No.4 and subsequent 15 < Age**
Suspect areas.	Suspect areas.	Suspect areas.	Suspect areas.
	Within the cargo length: Two transverse sections of deck plating outside line of cargo hatch openings.	Within the cargo length: - Each deck plate outside line of cargo hatch opening - Two transverse sections, one in the amidship area, outside line of cargo hatch opening. - All wind and water strakes within the cargo length area.	Within the cargo length: - Each deck plate outside line of cargo hatch opening - Three transverse sections, one in the amidship area, outside line of cargo hatch opening. - Each bottom plate.

Table 3.15 was revised according to MSC 461(101) as below:

Class renewal survey No.1 Age ≤ 5	**Class renewal survey No.2 5 < Age ≤ 10**	**Class renewal survey No.3 10 < Age ≤ 15**	**Class renewal survey No.4 and subsequent 15 < Age**
(A) One web frame ring in a ballast wing tank, if any, or a cargo wing tank used primarily for water ballast. **(B)** One deck transverse in a cargo oil tank. **(D)** One transverse bulkhead in a ballast tank **(D)** One transverse bulkhead in a cargo oil wing tank. **(D)** One transverse bulkhead in a cargo oil centre tank.	**A)** All web frame rings in a ballast wing tank, if any, or a cargo wing tank used primarily for water ballast. **(B)** One deck transverse in each of the remaining ballast tanks, if any. **(B)** One deck transverse in a cargo wing tank. **(B)** One deck transverse in two cargo centre tanks. **(C)** Both transverse bulkheads in a wing ballast tank, if any, or a cargo wing tank used primarily for water ballast. **(D)** One transverse bulkhead in each remaining ballast tank. **(D)** One transverse bulkhead in a cargo oil wing tank. **(D)** One transverse bulkhead in two cargo oil centre tanks.	**A)** All web frame rings in all ballast tanks **(A)** All web frame ring in a cargo wing tank. **(A)** A minimum of 30% of all web frame rings in each remaining cargo wing tank (see note). **(C)** All transverse bulkheads in all cargo and ballast tanks. **(E)** A minimum of 30% of deck and bottom transverses including adjacent structural members in each cargo centre tank. **(F)** As considered necessary by the surveyor.	As class renewal survey No. 3. Additional transverses included as deemed necessary by **TL**.

(A), (B), (C), (D), (E) *and* **(F)** *are areas to be subjected to close-up surveys and thickness measurements.*

- **(A)** *Complete transverse web frame ring including adjacent structural members.*
- **(B)** *Deck transverse including adjacent deck structural members.*
- **(C)** *Transverse bulkhead complete – including girder system and adjacent structural members*
- **(D)** *Transverse bulkhead lower part – including girder system and adjacent structural members*
- **(E)** *Deck and bottom transverse including adjacent structural members.*
- **(F)** *Additional complete transverse web frame ring.*

Note :

The 30% is to be rounded up to the next whole integer.

Table 3.16 was revised according to MSC 461(101) as below:

Class renewal survey No.1 Age ≤ 5	**Class renewal survey No.2 5 < Age ≤ 10**	**Class renewal survey No.3 10 < Age ≤ 15**	**Class renewal survey No.4 and subsequent 15 < Age**
One web frame **(1)**, in a ballast tank (see note 1).	All web frames **(1)**, in a ballast tank, (see note 1). The knuckle area and the upper part (5 metres approximately) of one web frame in each remaining ballast tank **(6).**	All web frames **(1)**, in all ballast tanks.	As for class renewal survey for age from 10 to 15 years. Additional transverse areas as deemed necessary by TL.
One deck transverse in a cargo oil tank **(2)**.	One deck transverse in two cargo oil tanks **(2)**.	All web frames **(7),** including deck transverse and cross ties, if fitted, in a cargo oil tank. One web frame **(7),** including deck transverse and cross ties, if fitted, in each remaining cargo oil tank.	
One transverse bulkhead **(4)**, in a ballast tank (see note 1)	One transverse bulkhead **(4)**, in each ballast tank (see note 1)	All transverse bulkheads, in all cargo oil **(3)** and ballast **(4)** tanks.	
One transverse bulkhead **(5)**, in a cargo oil centre tank. One transverse bulkhead **(5)**, in a cargo oil wing tank (see note 2).	One transverse bulkhead **(5)**, in two cargo oil centre tanks. One transverse bulkhead **(5)**, in a cargo oil wing tank (see note 2).		

(1), (2), (3), (4), (5), (6) *and* **(7)** *are areas to be subjected to close-up surveys and thickness measurements.*

(1) *Web frame in a ballast tank means vertical web in side tank, hopper web in hopper tank, floor in double bottom tank and deck transverse in double deck tank (where fitted), including adjacent structural members. In fore and aft peak tanks web frame means a complete transverse web frame ring including adjacent structural members.*

(2) *Deck transverse, including adjacent deck structural members (or external structure on deck in way of the tank, where applicable)*

(3) *Transverse bulkhead complete in cargo tanks, including girder system, adjacent structural members (such as longitudinal bulkheads) and internal structure of lower and upper stools, where fitted.*

(4) *Transverse bulkhead complete in ballast tanks, including girder system and adjacent structural members, such as longitudinal bulkheads, girders in double bottom tanks, inner bottom plating, hopper side, connecting brackets.*

(5) *Transverse bulkhead lower part in cargo tank, including girder system, adjacent structural members (such as longitudinal bulkheads) and internal structure of lower stool, where fitted.*

(6) *The knuckle area and the upper part (5 metres approximately), including adjacent structural members. Knuckle area is the area of the web frame around the connections of the slope hopper plating to the inner hull bulkhead and the inner bottom plating, up to 2 metres from the corners both on the bulkhead and the double bottom.*

(7) *Web frame in a cargo oil tank means deck transverse, longitudinal bulkhead structural elements and cross ties, where fitted, including adjacent structural members.*

Note:

1. *Apart from the fore and aft peak tanks, the term "complete ballast tank" has the following meaning:*

.1 all ballast compartments (hopper tank, side tank and double-deck tank, if separate from double-bottom tank) located on one side, i.e. portside or starboard side, and additionally double-bottom tank on portside plus starboard side, when the longitudinal central girder is not watertight and, therefore, the double-bottom tank is a unique compartment from portside to starboard side; or

.2 all ballast compartments (double-bottom tank, hopper tank, side tank and double-deck tank) located on one side, i.e. portside or starboard side, when the longitudinal central girder is watertight and, therefore, the portside double-bottom tank separate from the starboard-side double-bottom tank..

2. *Where no centre cargo tanks are fitted (as in case of centre longitudinal bulkhead), transverse bulkheads in wing tanks are to be surveyed.*

03. Annex A – Applicable Sections for Bulk Carriers and Double Hull Oil Tankers with CSR Notation

Revision Date: October 2019

Entry into Force Date: 1 January 2020

New item, A.15 was inserted into Annex A.

A. GENERAL REQUIREMENTS	1. Definitions			Y	
	…. Omitted ….				
	15. Documentation on board			Y	Only Item 15.1

PART A – CHAPTER 1 - HULL

01. Section 1 – General, Definitions

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Item E.2. 1.3 was revised as below:

2.1.3 Ships with assigned reduced freeboards intended to carry deck cargo shall be provided with a limiting GM or KG curve required by SOLAS Chapter II-1, Regulation ~~25-8~~ 5-1, based on compliance with the probabilistic damage stability analysis of Part B-1 (see TL Interpretation LL 65).

Item H.2.4 was revised as below:

2.4 Subdivision length Ls : Reference is made to the definition in SOLAS 74, Chapter II-1, Reg. ~~25-2~~.2.1 and in Section 26, A.2.27.

02. Section 3 – Design Principles

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Table 3.22 was revised as below:

For plating with longitudinal stiffeners

(parallel to compressive stress)

$$\sigma_E = \frac{0.9mE}{10^6}\left[\frac{t}{s}\right]^2 \qquad m = \frac{8.4}{\psi + 1.1} \qquad for\ 0 \le \psi \le 1$$

For plating with transverse stiffeners

(perpendicular to compressive stress)

$$\sigma_E = \frac{0.9mE}{10^6}\left[\frac{t}{s}\right]^2 \qquad m = c\left[1+\left(\frac{s}{l}\right)^2\right]^2 \frac{2.1}{\psi+1.1} \qquad for\ 0 \le \psi \le 1$$

where,

c =1.30 when the plating is supported by floors or deep girders

c = 1.21 when stiffeners are angles or T-sections

c = 1.10 when stiffeners are bulb bars

c = 1.05 when stiffeners are flat bars

Ψ = ratio between smallest and largest compressive σ_a stress when linear variation across panel

03. Section 5 – Design Loads

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Item D.4.1 was revised as below:

.....

For ships engaged in sheltered water service (assigned with **K6, L1** and **L2** notations), the deck load on weather decks is to be taken as P_{WD} = 10 kN/m^2 unless a greater load is required by the Owner.

Item D.5.1 was revised as below:

.....

For ships engaged in sheltered water service (assigned with **K6, L1** and **L2** notations) n=0,5 is to be taken.

04. Section 7 – Plating

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Item A.2.2.1 was revised as below:

2.2.1 The thickness $t_{B,SW}$ of bottom plating is not to be less than determined by the following formula:

$$t_{B,SW\,trans} = 1{,}6 \cdot s \cdot \sqrt{k \cdot p} + 1{,}5 \ [mm]$$

$$t_{B,SW\,long} = 1{,}2 \cdot s \cdot \sqrt{k \cdot p} + 1{,}5 \ [mm]$$

$t_{B,SW}$ is not to be less than minimum thickness $t_{min,SW}$ determined in the item B.3.3 and need not to be greater than greater of t_B and t_{min} determined according to 2.1 and 3.1 or 3.2 respectively.

If tanks are not use as ballast, a discount of 0,5 mm can be made.

Item A.3.3 was revised as below:

3.3 For ships engaged in sheltered water service (assigned with the notations **K6, L1** and **L2**), the minimum thickness $t_{min,SW}$ is defined as:

$$t_{min,trans} = 1{,}85 + 0{,}03 \cdot L \cdot \sqrt{k} + 3{,}6 \cdot s \quad [mm]$$

$$t_{min,long} = 1{,}1 + 0{,}03 \cdot L \cdot \sqrt{k} + 3{,}6 \cdot s \ [mm]$$

Item C.2.2 was revised as below:

2.2 Side Shell Plating and Sides of Superstructures for Ships Engaged In Sheltered Water Service (Assigned With the Notations K6, L1 and L2)

Thickness for side shell plating and sides of superstructures $t_{S,SW}$ shall be;

$t_{S,SW} = t_{B,SW} \cdot 0{,}9$

.....

Item C.3.3 was revised as below:

3.3 For ships engaged in sheltered water service (assigned with the notations **K6, L1** and **L2**); the minimum thickness $t_{min,SW}$ is defined as:

$$t_{min} = 1{,}68 + 0{,}025 \cdot L \cdot \sqrt{k} + 3{,}6 \cdot s \ [mm]$$

Item D.4.2 was added an subsequent items were renumbered as below:

4.2 For ships engaged in sheltered water service (assigned with the notations **K6, L1** and **L2**); the minimum deck plating thickness is defined as:

$$t_{min} = 4 + 0{,}01 \cdot L \cdot \sqrt{k} \qquad [mm]$$

05. Section 11 – Watertight Bulkheads

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Item A.4.1.3 was revised according to MSC 421(98)as below:

4.1.3 The collision bulkhead shall extend watertight up to the bulkhead deck of passenger ships and the freebord deck of cargo ships. The bulkhead may have steps or recesses provided they are within the limits prescribed in 4.1.1 or 4.1.2.

4.1.4 No doors, manholes, access openings, or ventilation ducts are permitted in the collision bulkhead below the bulkhead deck of passenger ships and the freeboard deck of cargo ships.

4.1.5 Except as provided in 4.1.6 the collision bulkhead may be pierced below the bulkhead deck of passenger ships and the freeboard deck of cargo ships by not more than one pipe for dealing with fluid in the forepeak tank, provided that the pipe is fitted with a screw down valve capable of being operated from above the bulkhead deck of passenger ships and the freeboard deck of cargo ships, the valve ~~chest~~ being ~~secured~~ located inside the forepeak at the collision bulkhead. TL may, however, authorize the fitting of this valve on the after side of the collision bulkhead provided that the valve is readily accessible under all service conditions and the space in which it is located is not a cargo space. Alternatively, for cargo ships, the pipe may be fitted with a butterfly valve suitably supported by a seat or flanges and capable of being operated from above the freeboard deck. All valves shall be of steel, bronze or other approved ductile material. Valves of ordinary cast iron or similar material are not acceptable.

4.1.6 If the forepeak is divided to hold two different kinds of liquids TL may allow the collision bulkhead to be pierced below the bulkhead deck of passenger ships and the freeboard deck of cargo ships by two pipes, each of which is fitted as required by 4.1.5, provided **TL** is satisfied that there is no practical alternative to the fitting of such a second pipe and that, having regard to the additional subdivision provided in the forepeak, the safety of the ship is maintained.

4.1.7 Where a long forward superstructure is fitted the collision bulkhead shall be extended weather tight to the deck next above the bulkhead deck of passenger ships and the freeboard deck of cargo ships. The extension need not be fitted directly above the bulkhead below provided that all parts of the extension, including any part of the ramp attached to it is located within the limits prescribed in 4.1.1 or 4.1.2 with the exception permitted by 4.1.8 and that the part of the deck which forms the step is made effectively weather tight. The extension shall be so arranged as to preclude the possibility of the bow door or ramp, where fitted, causing damage to it in the case of damage to, or detachment of, a bow door or any part of the ramp.

4.1.8 Where bow doors are fitted and a sloping loading ramp forms part of the extension of the collision bulkhead above the bulkhead deck of passenger ships and the freeboard deck of cargo ships, the ramp shall be weather tight over its complete length. In cargo ships the part of the ramp which is more than 2.3 m. above the ~~bulkhead~~ freeboard deck may extend forward of the limits specified in 4.1.1 or 4.1.2. Ramps not meeting the above requirements shall be disregarded as an extension of the collision bulkhead.

4.1.9 The number of openings in the extension of the collision bulkhead above the ~~bulkhead~~ freeboard deck shall be restricted to the minimum compatible with the design and normal operation of the ship. All such openings shall be capable of being closed weather tight.

4.2.1 Bulkheads shall be fitted separating the machinery space from cargo and accommodation spaces forward and aft and made watertight up to the bulkhead deck of passenger ships and the freeboard deck of cargo ships. ~~In passenger ships~~ An after peak bulkhead shall also be fitted and made watertight up to the bulkhead deck or the freeboard deck. The

after peak bulkhead may, however, be stepped below the bulkhead deck or the freeboard deck, provided the degree of safety of the ship as regards subdivision is not thereby diminished.

06. Section 12 – Tank Structures

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Item A.5 was revised as below:

Oil is not to be carried in a forepeak tank. See also SOLAS 74, Chapter II-2, Reg. ~~15.6~~ 4.2 and MARPOL 73/78 Annex I, Reg. ~~14.4~~ 16.3.

07. Section 13 – Superstructures and Deckhouses

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Item B.1.1 was revised as below:

.....

For ships engaged in sheltered water service (assigned with **K6**, **L1** and **L2**),**t** is not to be less than the following:

$$t_{min} = 1{,}68 + 0{,}025 \cdot L \cdot \sqrt{k} + 3{,}6 \cdot s \ [mm]$$

.....

Item B.2.1 was revised as below:

.....

For L1, L2, K6:

$$t = 4 + 0{,}01 \cdot L \cdot \sqrt{k} \qquad [mm]$$

.....

Item C.2 was revised as below:

.....

For ships engaged in sheltered water service (assigned with **K6**, **L1** and **L2**), P_{Amin} values for front and aft bulkheads and deckhouse walls are to be taken from the following table.

Type of wall	Location		P_{Amin}
Unprotected front wall	Lower tier	x/L >0.7	13
		x/L <0.7	10

	Upper tiers	6
Protected front wall	Lower tier	6
	Upper tiers	5
Side walls	anywhere	6
Aft wall	anywhere	6

Item C.3.2 was revised as below:

.....

For notations L1, L2 and K 6,

The thickness of aft bulkhead is not to be less than the greater of the following values:

$$t_1 = 3{,}5 + 0{,}01 \cdot L \cdot \sqrt{k}$$

$$t_2 = 1{,}6 \cdot s \cdot \cdot \sqrt{p \cdot k} + 1$$

The thickness of front bulkhead is not to be less than the greater of the following values:

$$t_1 = 4 + 0{,}01 \cdot L \cdot \sqrt{k}$$

$$t_2 = 1{,}6 \cdot s \cdot \cdot \sqrt{p \cdot k} + 1$$

08. Section 16 – Hull Outfitting

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Footnote (2) was revised as below:

(2) *For the definition of the enclosed superstructures see ICLL, ~~Rule~~ Reg. 3 (10) (b).*

Footnote (*) on Table 16.5 was revised as below:

(*) *Oil Tankers, Chemical Tankers and Gas Carriers as defined in SOLAS regulations II-1/2.22, VII/8.2 and VII/11.2, respectively.*

09. Section 21 – Structural Fire Protection

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Item A.1.4 was revised according to MSC 404(96) as below:

.....

- Evacuation analysis (only ~~ro-ro~~ passenger ships).

Item B.11.3 was revised as below:

Windows facing life-saving appliances, embarkation and muster stations, external stairs and open decks used for escape routes, and windows situated below liferaft and escape slide embarkation areas are to have the fire integrity as required in the Tables 21.1 ~~and 21.2~~. Where automatic dedicated sprinkler heads are provided for windows (see also TL Rules Chapter 4 Machinery Section 18), "A-0" windows may be accepted as equivalent. To be considered under this paragraph, the sprinkler heads are to either be :

.....

Footnote (1) was revised as below:

(1) *Refer to the Revised Guidelines for approval of sprinkler systems equivalent to that referred to in SOLAS regulation II-2/12 (resolution A. 800 (19), as amended).*

Item B.11.4 and 11.5 was added according to MSC 421(98) as below:

11.4 For ships carrying more than 36 passengers

For ships carrying more than 36 passengers, windows facing survival craft, embarkation and assembly stations, external stairs and open decks used for escape routes, and windows situated below liferaft and escape slide embarkation areas shall have fire integrity as required in table 21.1. Where automatic dedicated sprinkler heads are provided for windows, "A-0" windows may be accepted as equivalent. To be considered under this paragraph, the sprinkler heads must either be:

- dedicated heads located above the windows, and installed in addition to the conventional ceiling sprinklers; or
- conventional ceiling sprinkler heads arranged such that the window is protected by an average application rate of at least 5 l/min per square metre and the additional window area is included in the calculation of the area of coverage; or
- water-mist nozzles that have been tested and approved in accordance with the Guidelines **(1)**; and Windows located in the ship's side below the lifeboat embarkation area shall have fire integrity at least equal to "A-0" class.

11.5 For ships carrying not more than 36 passengers

For ships carrying not more than 36 passengers, windows facing survival craft and escape slide, embarkation areas and windows situated below such areas shall have fire integrity at least equal to "A-0" class.

Item B.13.2.1 was revised as below:

.....

A division consisting of a non-combustible core and combustible veneers may be accepted as a B or C class division, provided that the non-combustible core is tested in accordance with the FTP Code 2010, Annex 1, part 1, that the B class division is tested in accordance with the FTP Code 2010, Annex 1, part 3, and that the veneers are tested in accordance with the FTP Code 2010, Annex 1, part 5 and part 2, if applicable.

Footnote (13) on item B.17.6.1.1 was revised according to A.1116(30) as below:

(13) *Refer to ~~symbols related to life-saving appliances and arrangements~~ Escape route signs and equipment location markings adopted by IMO by resolution A.1116 (30).*

Item B.17.6.4 was renumbered as 17.7 and revised according to MSC 404(96) as below:

17.7 Evacuation analysis for passenger ships (14)

Escape routes are to be evaluated by an evacuation analysis early in the design process. This analysis are to be applied to ro-ro passenger ships and passenger ships carrying more than 36 passengers.

.....

Item B.19 was revised according to MSC 421(98) as below:

19. Protection of Vehicle,Special Category and Ro-Ro Spaces

Vehicle, special category and ro-ro spaces is to be comply with the requirements of following items.

Vehicles with fuel in their tanks for their own propulsion may be carried in cargo spaces other than vehicle, special category or ro-ro spaces, provided that all the following conditions are met:

- the vehicles do not use their own propulsion within the cargo spaces;
- the cargo spaces are in compliance with the appropriate requirements of SOLAS Reg. II-2/19; and
- the vehicles are carried in accordance with the IMDG Code, as defined in SOLAS Reg. VII/1.1.

Item C.9.1.1 was revised as below:

A division consisting of a non-combustible core and combustible veneers may be accepted as a B or C class division, provided that the non-combustible core is tested in accordance with the FTP Code 2010, Annex 1, part 1, that the B class division is tested in accordance with the FTP Code 2010, Annex 1, part 3, and that the veneers are tested in accordance with the FTP Code 2010, Annex 1, part 5 and part 2, if applicable.

Item C.14.2 was revised and C.14.4 was added according to MSC 421(98) as below:

14.2 Ventilation system

~~**14.2.1 Capacity of ventilation systems**~~

~~Closed vehicle and ro-ro spaces are to be provided with an effective power ventilation system sufficient to give at least 6 air changes per hour.~~

~~**14.2.2 Performance of ventilation systems**~~

~~**14.2.2.1** The ventilation fans shall normally be run continuously and give at least the number of air changes required in paragraph 14.2.1 whenever vehicles are on board, except where an air quality control system in accordance with paragraph 14.2.2.4 is provided. Where this is impracticable, they shall be operated for a limited period daily as weather permits and in any case for a reasonable period prior to discharge, after which period the ro-ro or vehicle space shall be proved gas free. One or more portable combustible gas detecting instruments shall be carried for this purpose. The system shall be entirely separate from other ventilation systems.~~

~~**14.2.2.2** Ventilation ducts serving ro-ro or vehicle spaces are to be capable of being effectively sealed for each such space. The system is to be capable of being controlled from a position outside such spaces.~~

~~**14.2.2.3** The ventilation system is to be such as to prevent air stratification and the formation of air pockets.~~

~~**14.2.2.4** Where an air quality control system is provided based on the guidelines **(15)**, the ventilation system may be operated at a decreased number of air changes and/or a decreased amount of ventilation. This relaxation does not apply to spaces to which at least ten air changes per hour is required by Chapter 5 Electrical Installation Section 16 B.2.1 and spaces subject to item 15.1 and Chapter 4 Machinery Section 18 B.12.~~

~~**14.2.3 Indication of ventilation systems**~~

~~Means are to be provided on the navigation bridge to indicate any lost of the required ventilating capacity.~~

~~**14.2.4 Closing appliances and ducts**~~

~~Arrangements are to be provided to permit a rapid shutdown and effective closure of the ventilation system from outside of the space in case of fire, taking into account the weather and sea conditions.~~

~~Ventilation ducts, including dampers are to be made of steel.~~

~~**14.2.5 Permanent openings**~~

~~Permanent openings in side plating, the ends or deckhead of the space are to be so situated that a fire in the cargo space does not endanger stowage areas and embarkation stations for survival craft and accommodation spaces, service spaces and control stations in superstructures and deckhouses above the cargo spaces.~~

Ventilation requirements in Chapter 28 - Ventilation, Section 1, H and Chapter 4 – Machinery Section 18, B.11 are to be provided.

14.4 Requirements for vehicles with fuel in their tanks for their own propulsion in cargo spaces

Vehicles with fuel in their tanks for their own propulsion may be carried in cargo spaces other than vehicle, special category or ro-ro spaces, provided that all the following conditions are met:

- the vehicles do not use their own propulsion within the cargo spaces;
- the cargo spaces are in compliance with the appropriate requirements of SOLAS Reg. II-2/19; and
- the vehicles are carried in accordance with the IMDG Code, as defined in SOLAS Reg. VII/1.1.

10. Section 26 – Stability

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Items A.2 was revised as below:

2. Definitions

For terms and definitions which are not given here, the definitions as given in the SOLAS ~~2009~~ Convention shall apply.

Items A.2.17 and 2.28 were revised according to MSC 421(98) as below:

2.17 Draught

Is the vertical distance from the ~~moulded baseline~~keel line at amidships to the waterline in question.

2.28 Deepest Subdivision Draught

The deepest subdivision draught is ~~the waterline which corresponds to~~ the Summer Load Line draught of the ship.

Items A.2.29 to A.2.33 were added according to MSC 413(97) as below:

2.29 Ship engaged in anchor handling operations

Ships engaged in anchor handling operations means a ship engaged in operations with deployment, recovering and repositioning of anchors and the associated mooring lines of rigs or other vessels. Forces associated with anchor handling are generally associated with the winch line pull and may include vertical, transverse, and longitudinal forces applied at the towing point and over the stern roller.

2.30 Ship engaged in harbour towing

Ship engaged in harbor towing means a ship engaged in an operation intended for assisting ships or other floating structures within sheltered waters, normally while entering or leaving port and during berthing or unberthing operations.

2.31 Ship engaged in coastal or ocean-going towing

Ship engaged in coastal or ocean-going towing means a ship engaged in an operation intended for assisting ships or other floating structures outside sheltered waters in which the forces associated with towing are often a function of the ship's bollard pull.*

** Refer to the Guidelines for safe ocean towing (MSC/Circ.884).*

2.32 Ship engaged in lifting operation

Ship engaged in lifting operation means a ship engaged in an operation involving the raising or lowering of objects using vertical force by means of winches, cranes, a-frames or other lifting devices.

Note: *Fishing vessels should not be included in the definition of lifting operations. Reference is made to IS Code paragraphs 2.1.2.2 and 2.1.2.8 of chapter 2 of part B. For anchor handling operations reference is made to section 2.7 of chapter 2 of part B.*

2.33 Ship engaged in escort operation

Ship engaged in escort operation means a ship specifically engaged in steering, braking and otherwise controlling of the assisted ship during ordinary or emergency manoeuvring, whereby the steering and braking forces are generated by the hydrodynamic forces acting on the hull and appendages and the thrust forces exerted by the propulsion units (see also figure 1).

Item B.6 was revised as below:

6. Determination of Lightship Parameters

Every passenger ship regardless of size and every cargo ship having a length, as defined in the international Convention on Load Lines, 1966 or the protocol of 1988 relating thereto, as amended, as applicable, of 24 m and upwards, should be inclined upon its completion ~~and the elements of its stability determined~~. For the details of an inclining test, refer to 2008 IS Code, Chapter 8 and Annex I

Note was added to item B.6.2 as below:

Note: For passenger ships the final documentation is always to be based on the results of the inclining test

Item 6.4 was revised according to MSC 429(98) as below:

6.4 Alterations

6.4.1 Where any alterations are made to a ship so as to materially affect the stability information supplied to the master, amended stability information shall be provided. If necessary the ship shall be re-inclined. The ship shall be re-inclined if anticipated deviations exceed one of the following values:

- The deviation of lightship displacement should not exceed 2%. When deviation is evaluated, the 2% should be considered the total of added and removed masses with their positions.

- The deviation of lightship longitudinal centre of gravity should not exceed 1% of the L_s of the ship.

- In addition, if the adjusted lightship vertical centre of gravity, when compared to the approved value, exceeds 1%, the ship should be re-inclined. The lightship transverse centre of gravity is not subject to a deviation limit.

6.4.2 When a ship does not exceed the deviation limits specified in 6.4.1 above, amended stability information should be provided to the master using the new calculated lightship properties if any of the following deviations from the approved values are exceeded:

- 1% of the lightship displacement; or

- 0.5% of L for the longitudinal centre of gravity; or

- 0.5% of the vertical centre of gravity.

However, in cases when these deviation limits are not exceeded, it is not necessary to amend the stability information supplied to the master.

6.4.3 When multiple alterations are made to a ship in service over a period of time and each alternation is within the deviation limits specified above, the cumulative total changes to the lightship properties from the most recent inclining also should not exceed the deviation limits specified above or the ship should be re-inclined.

Item B.8.1 was revised as below:

8.1 Stability data and associated plans should be drawn up in the working language of the ship and any other language TL may require. Reference is also made to the International Safety Management (ISM) Code, adopted by the Organization by Resolution A.741(18), as amended. All translations of the stability booklet should be approved.

Item B.8.2 was revised as below:

.....

These Rules addresses only the stability related contents of the booklet (Refer to Regulation II-1/5-1 of the 1974 SOLAS Convention, as amended, Regulation 10 of the International Convention on Load Lines, 1966 or the Protocol of 1988 as amended, as applicable and Regulation III/10 of the 1993 Torremolinos Protocol.

.....

Item B.8.3.1 was revised as below:

.....

Comprehensive rolling period tables or diagrams have proved to be very useful aids in verifying the actual stability conditions (Refer to Regulation II-1/5-1 of the 1974 SOLAS Convention, as amended, and Regulation 10(2) of the International Convention on Load Lines, 1966 or the Protocol of 1988 as amended, as applicable.

Item B.8.4.7 was revised as below:

.....

- Curves or tables of minimum operational metacentric height (GM) and maximum permissible trim versus draught which assures compliance with the ~~relevant~~ intact and damage stability requirements (those limiting curves shall extend over the full range of operational trims), alternatively corresponding curves or tables of the maximum allowablevertical centre of gravity (KG) and maximum permissible trim versus draught, or with the equivalents of either of these curves or tables, when applicable

Content of item D was revised according to MSC 415(97)as below:

D. RECOMMENDED CRITERIA FOR SHIPS ENGAGED IN CERTAIN TYPES OF OPERATIONS AND CERTAIN TYPES OF SHIPS

1. General
2. Fishing Vessels
3. Pontoons
4. Containerships Greater than 100 m
5. Offshore Supply Vessels
6. Special Purpose Ships
7. Ships Engaged in Anchor Handling Operations
8. Ships Engaged in Towing and Escort Operations
9. Ships Engaged in Lifting Operations

Title of item D was revised according to MSC 415(97) as below:

D. Recommended Criteria for Ships Engaged in Certain Types of Operations and Certain Types of Ships

Item 1.2.2 was added and subsequent items were renumbered according to MSC 415(97) as below:

1.2.2 The recommendations contained herein may also apply to other ships subject to similar external forces, when determining the adequacy of stability.

Item 3.5.1 was revised as below:

~~**3.5.1 Application**~~

The requirements of ~~this~~ item 9 is to be applied to ships with the service notation pontoon - crane and specify the criteria these ships are to satisfy during cargo lifting in addition to those in item 3.4

Items D.3.5.2 and 3.5.3 was deleted as below:

~~**3.5.2 Intact stability criteria during cargo lifting**~~

~~The following intact stability criteria are to be complied~~

~~with:~~

- ~~$\theta_C \leq 15°$~~
- ~~$GZ_C \leq 0.6\ GZ_{MAX}$~~
- ~~$A_1 \geq 0.4\ A_{TOT}$~~

~~where:~~

~~θ_C = Heeling angle of equilibrium, corresponding to the first intersection between heeling and righting arms (see Figure 26.2)~~

~~GZ_C = Defined in Figure 26.2~~

~~GZ_{MAX} = Defined in Figure 26.2~~

~~A_1 = Area, in m.rad, contained between the righting lever and the heeling arm curves, measured from the heeling angle θ_C to the heeling angle equal to the lesser of:~~

- ~~heeling angle θ_R of loss of stability, corresponding to the second intersection between heeling and righting arms (see Figure 26.2)~~
- ~~down flooding angle θ_F, corresponding to flooding of unprotected openings (see Figure 26.2)~~

~~A_{TOT} = Total area, in m.rad, below the righting lever curve.~~

~~In the above formula, the heeling arm, corresponding to the cargo lifting, is to be obtained, in m, from the following formula:~~

$$b = \frac{Pd - Zz}{\Delta}$$

~~where:~~

~~P = Cargo lifting mass, in t~~

d = Transversal distance, in m, of lifting cargo to the longitudinal plane (see Figure 26.2)

Z = Mass, in t, of ballast used for righting the pontoon, if applicable (see Figure 26.2)

z = Transversal distance, in m, of the centre of gravity of Z to the longitudinal plane (see Figure 26.2)

Δ = Displacement, in t, at the loading condition considered.

The above check is to be carried out considering the most unfavourable situations of cargo lifting combined with the lesser initial metacentric height GM, corrected according to the requirements in B.3.

The residual freeboard of the unit during lifting operations in the most unfavourable stability condition is to be not less than 0.30 m. However, the heeling of the unit is not to produce in the lifting devices higher loads than those envisaged by the Manufacturer, generally expected to be 5° in the boom plane and 2° transversally in the case of a crane.

The vertical position of the centre of gravity of cargo lifting is to be assumed in correspondence of the suspension point.

3.5.3 Intact stability criteria in the event of sudden loss of cargo during lifting

This additional requirement is compulsory when counterweights or ballasting of the ship are necessary or when deemed necessary by the Society taking into account the ship dimensions and the weights lifted.

The case of a hypothetical loss of cargo during lifting due to a break of the lifting cable is to be considered.

In this case, the following intact stability criteria are to be complied with:

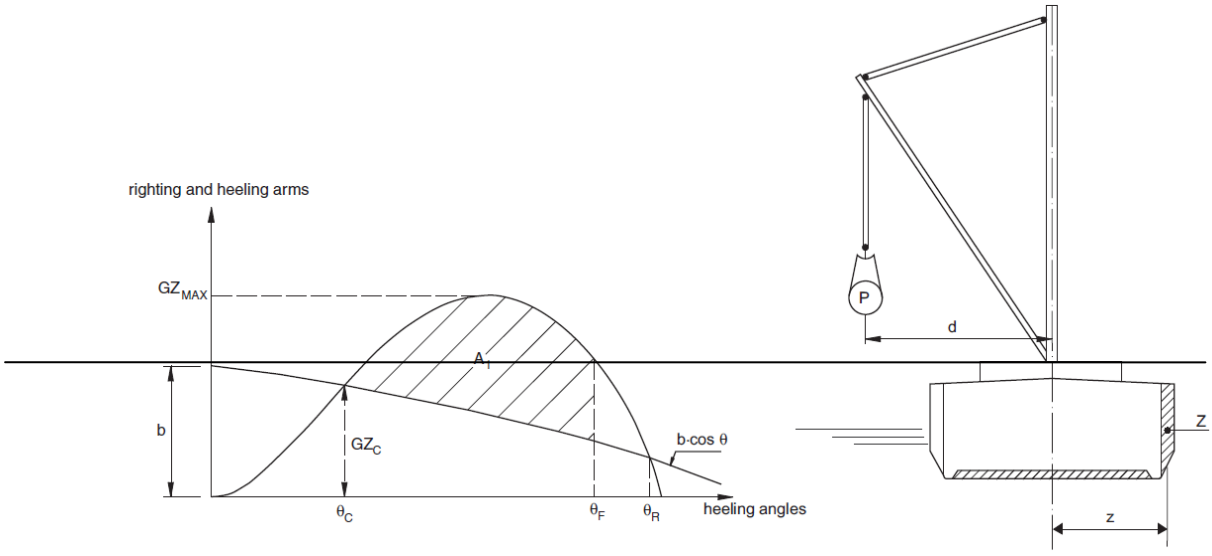
- $\frac{A_2}{A_1} \geq 1$

- $\theta_2 - \theta_3 \geq 20°$

where:

A_1 = Area, in m.rad, contained between the righting lever and the heeling arm curves, measured from the heeling angle θ_1 to the heeling angle θ_C (see Figure 26.3),

A_2 = Area, in m.rad, contained between the righting lever and the heeling arm curves, measured from the heeling angle θ_C to the heeling angle θ_2 (see Figure 26.3)



~~Figure 26.2 Cargo Lifting~~

~~A_3 = Area, in m.rad, contained between the righting lever and the heeling arm curves, measured from the heeling angle θ_C to the heeling angle θ_3 (see Figure 26.3)~~

~~θ_1 = Heeling angle of equilibrium during lifting (see Figure 26.3)~~

~~θ_2 = Heeling angle corresponding to the lesser of θ_R and θ_F~~

~~θ_C = Heeling angle of equilibrium, corresponding to the first intersection between heeling and righting arms (see Figure 26.3)~~

~~θ_3 = Maximum heeling angle due to roll, at which $A_3 = A_1$, to be taken not greater than 30° (angle in correspondence of which the loaded cargo on deck is assumed to shift (see Figure 26.3)~~

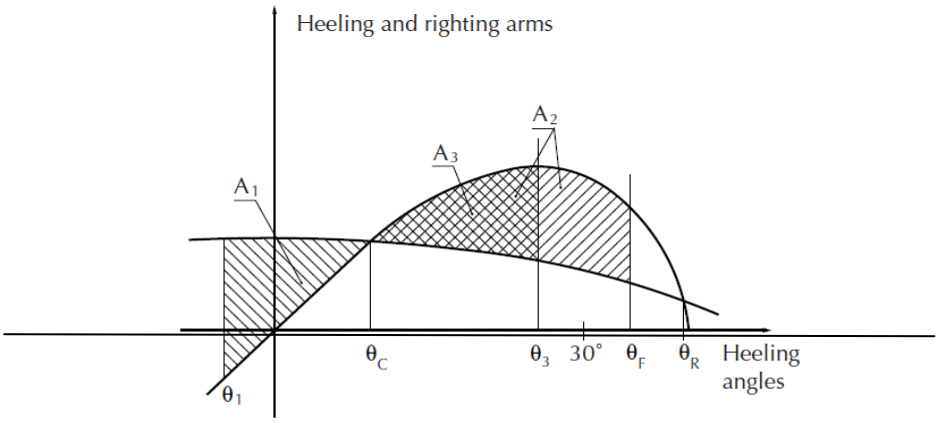
~~θ_R = Heeling angle of loss of stability, corresponding to the second intersection between heeling and righting arms (see Figure 26.3).~~

~~θ_F = Down-flooding angle at which progressive flooding may occur (see Figure 26.3)~~

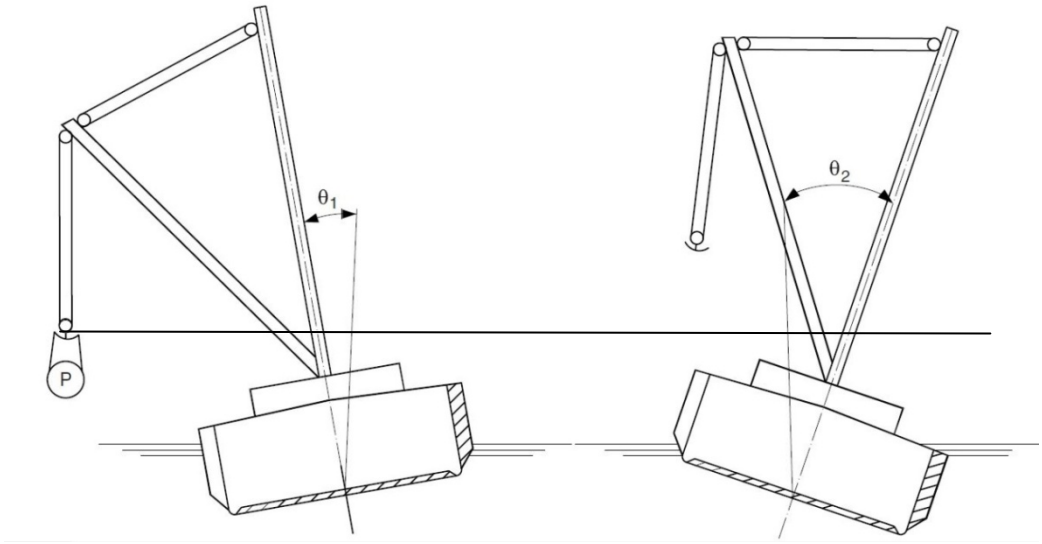
~~In the above formulae, the heeling arm, induced on the ship by the cargo loss, is to be obtained, in m, from the following formula:~~

$$b = \frac{Zz}{\Delta}\cos\theta$$

~~where Z, z and Δ are defined in item 3.5.2.~~



A_1: Area between θ_1 and θ_C
A_2: Area between θ_C and θ_2 (in the figure $\theta_2 = \theta_F$)
A_3: Area between θ_C and θ_3
$A_3 = A_1$



~~**Figure 26.3 Cargo loss**~~

Item 5.3.4 was revised according to MSC 415(97) as below:

5.3.4 A vessel engaged in towing operations should be provided with means for quick release of the ~~towing hawser~~ towline (*).

(*) *Vessels provided with towing winch systems should also be provided with means of quick release.*

Items 7, 8 and 9 were added according to MSC 415(97) as below:

7. Ships Engaged in Anchor Handling Operations

7.1 Application

7.1.1 The provisions given hereunder apply to ships engaged in anchor handling operations.

7.1.2 A *wire* means a dedicated line (wire rope, synthetic rope or chain cable) used for the handling of anchors by means of an anchor handling winch.

7.2 Heeling levers

7.2.1 A heeling lever, HL_φ, generated by the action of a heeling moment caused by the vertical and horizontal components of the tension applied to the wire should be calculated as:

$HL_\varphi = (M_{AH} / \Delta_2) \cos \varphi$

where:

$M_{AH} = F_p \times (h \sin \alpha \times \cos \beta + y \times \sin \beta)$;

Δ_2 = displacement of a loading condition, including action of the vertical loads added (Fv), at the centreline in the stern of ship;

$Fv = Fp \times \sin \beta$;

α = the horizontal angle between the centreline and the vector at which the wire tension is applied to the ship in the upright position, positive outboard;

β = the vertical angle between the waterplane and the vector at which the wire tension is applied to the ship, positive downwards, should be taken at the maximum heeling moment angle as $\tan^{-1}(y / (h \times \sin \alpha))$, but not less than $\cos^{-1}(1{,}5\ B_P / (F_P \cos \alpha))$, using consistent units;

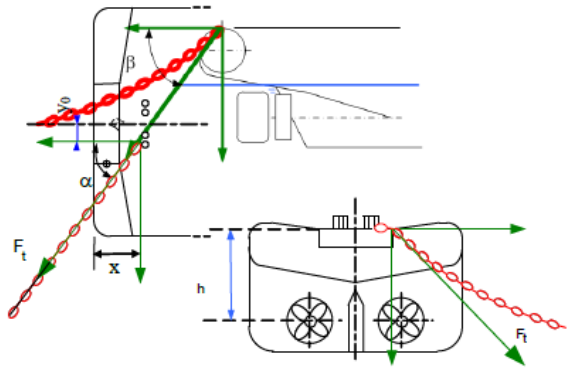


Figure 26.5 – Diagrams showing the intended meaning of parameters α, β, x, y and h. F_t shows the vector of the applied wire tension.

B_P = the Bollard pull that is the documented maximum continuous pull obtained from a static pull test on sea trial, carried out in accordance with annex A of MSC/Circ.884 or an equivalent standard acceptable to the Administration;

F_p = (Permissible tension) the wire tension which can be applied to the ship as loaded while working through a specified tow pin set, at each α, for which all stability criteria can be met. Fp should in no circumstance be taken as greater than Fd;

F_d = (Design maximum wire tension) the maximum winch wire pull or maximum static winch brake holding force, whichever is greater;

h = the vertical distance (m) from the centre the propulsive force acts on the ship to either:

- the uppermost part at the towing pin, or
- a point on a line defined between the highest point of the winch pay-out and the top of the stern or any physical restriction of the transverse wire movement;

y = the transverse distance (m) from the centreline to the outboard point at which the wire tension is applied to the ship given by:

$y_0 + x \tan \alpha$; but not greater than B/2;

B = the moulded breadth (m);

y_0 = the transverse distance (m) between the ship centreline to the inner part of the towing pin or any physical restriction of the transverse wire movement;

x = the longitudinal distance (m) between the stern and the towing pin or any physical restriction of the transverse wire movement.

7.3 Permissible tension

7.3.1 The permissible tension as function of *α*, defined in paragraph 7.2, should not be greater than the tension given by paragraph 7.3.2,

7.3.2 Permissible tension as function of *α* can be calculated by direct stability calculations, provided that the following are met:

7.3.2.1 the heeling lever should be taken as defined in paragraph 7.2 for each *α*;

7.3.2.2 the stability criteria in paragraph 7.4, should be met;

7.3.2.3 *α* should not be taken less than 5 degrees, except as permitted by paragraph 7.3.3; and

7.3.2.4 Intervals of *α* should not be more than 5 degrees, except that larger intervals may be accepted, provided that the permissible tension is limited to the higher *α* by forming working sectors.

7.3.3 For the case of a planned operation to retrieve a stuck anchor in which the ship is on station above the anchor and the ship has low or no speed, *α* may be taken as less than 5 degrees.

7.4 Stability criteria

7.4.1 For the loading conditions intended for anchor handling, but before commencing the operation, the stability criteria given in B.10.2, or where a ship's characteristics render compliance with B.10.2 impracticable, the equivalent stability criteria given in D.5, should apply. During operation, under the action of the heeling moment, the criteria under paragraphs 7.4.2 to 7.4.4 should apply.

7.4.2 The residual area between the righting lever curve and the heeling lever curve calculated in accordance with paragraph 7.2 should not be less than 0,070 metre-radians. The area is determined from the first intersection of the two curves, φ_e, to the angle of the second intersection, φ_c, or the angle of down-flooding, φ_f, whichever is less.

7.4.3 The maximum residual righting lever GZ between the righting lever curve and the heeling lever curve calculated in accordance with paragraph 7.2 should be at least 0,2 m.

7.4.4 The static angle at the first intersection, φ_e, between the righting lever curve and the heeling lever curve calculated in accordance with paragraph 7.2 should not be greater than:

7.4.4.1 the angle at which the righting lever equals 50% of the maximum righting lever;

7.4.4.2 the deck edge immersion angle; or

7.4.4.3 15^o,

whichever is less.

7.4.5 A minimum freeboard at stern, on centreline, of at least 0,005*L* should be maintained in all operating conditions, with a displacement given by Δ_2, as defined in paragraph 7.2. In the case of the anchor retrieval operation covered by paragraph 7.3.3, a lower minimum freeboard may be accepted provided that due consideration has been given to this in the operation plan.

7.5 Constructional precautions against capsizing

7.5.1 A stability instrument may be used for determining the permissible tension and checking compliance with relevant stability criteria.

Two types of stability instrument may be used on board:

- either a software checking the intended or actual tension on the basis of the permissible tension curves; or

- a software performing direct stability calculations to check compliance with the relevant criteria, for a given loading condition (before application of the tension force), a given tension and a given wire position (defined by angles α and β).

7.5.2 Access to the machinery space, excluding emergency access and removal hatches, should, if possible, be arranged within the forecastle. Any access to the machinery space from the exposed cargo deck should be provided with two weathertight closures. Access to spaces below the exposed cargo deck should preferably be from a position within or above the superstructure deck.

7.5.3 The area of freeing ports in the side bulwarks of the cargo deck should at least meet the requirements of regulation 24 of the International Convention on Load Lines, 1966 or the Protocol of 1988 relating thereto, as amended, as applicable. The disposition of the freeing ports should be carefully considered to ensure the most effective drainage of water trapped in working deck and in recesses at the after end of the forecastle. In ships operating in areas where icing is likely to occur, no shutters should be fitted in the freeing ports.

7.5.4 The winch systems should be provided with means of emergency release.

7.5.5 For ships engaged in anchor handling operations the following recommendations for the anchor handling arrangements should be considered:

7.5.5.1 stop pins or other design features meant to impede the movement of the wire further outboard should be installed; and

7.5.5.2 the working deck should be marked with contrasting colours or other identifiers such as guide pins, stop pins or similar easily identifiable points that identify operational zones for the line to aid operator observation.

7.6 Operational procedures against capsizing

7.6.1 A comprehensive operational plan should be defined for each anchor handling operation, where at least, but not only, the following procedures and emergency measures should be identified:

7.6.1.1 environmental conditions for the operation;

7.6.1.2 winch operations and movements of weights;

7.6.1.3 compliance with the stability criteria, for the different expected loading conditions;

7.6.1.4 permissible tensions on the winches as function of α;;

7.6.1.5 stop work and corrective procedures; and

7.6.1.6 confirmation of the master's duty to take corrective action when necessary.

7.6.2 The arrangement of cargo stowed on deck should be such as to avoid any obstruction of the freeing ports or sudden shift of cargo on deck.

7.6.3 Counter-ballasting to correct the list of the ship during anchor handling operations should be avoided.

8. Ships Engaged in Towing and Escort Operations

8.1 Application

The provisions given hereunder apply to ships engaged in harbour towing, coastal or ocean-going towing and escort operations and to ships converted to carry out towing operations after this date.

8.2 Heeling lever for towing operations

8.2.1 The self-tripping heeling lever is calculated as provided below:

8.2.1.1 A transverse heeling moment is generated by the maximum transverse thrust exerted by the ship's propulsion and steering systems and the corresponding opposing towline pull.

8.2.1.2 The heeling lever *HLφ*, in (m), as a function of the heeling angle *φ*, should be calculated according to the following formula:

$$HL_{\varphi} = \frac{BP \cdot C_T \cdot (h \cdot \cos\varphi - r \cdot \sin\varphi)}{g \cdot \Delta}$$

where:

BP = bollard pull, in (kN), which is the documented maximum continuous pull obtained from a static bollard pull test performed in accordance with relevant IMO guidelines (*) or a standard acceptable to TL.

(*) Refer to annex A to the *Guidelines for safe ocean towing* (MSC/Circ.884).

C_T = 0,5, for ships with conventional, non-azimuth propulsion units;

 = 0,90/(1 + l/L_{LL}), for ships with azimuth propulsion units installed at a single point along the length. However, C_T should not be less than 0,7 for ships with azimuth stern drive towing over the stern or tractor tugs towing over the bow, and not less than 0,5 for ships with azimuth stern drive towing over the bow or tractor tugs towing over the stern;

For tugs with other propulsion and/or towing arrangements, the value of C_T is to be established on a case by case basis to the satisfaction of the Administration.

Δ = displacement, in (t);

l = longitudinal distance, in (m), between the towing point and the vertical centreline of the propulsion unit(s) relevant to the towing situation considered;

h = vertical distance, in (m), between the towing point and the horizontal centreline of the propulsion unit(s) as relevant for the towing situation considered;

g = gravitational acceleration, in (m/s^2), to be taken as 9,81;

r = the transverse distance, in (m), between the centre line and the towing point, to be taken as zero when the towing point is at the centreline.

L_{LL} = length (L) as defined in the International Convention on Load Lines in force.

The towing point is the location where the towline force is applied to the ship. The towing point may be a towing hook, staple, fairlead or equivalent fitting serving that purpose.

8.2.2 The tow-tripping heeling lever HL_{φ}, in (m), is calculated according to the following formula:

$$HL_{\varphi} = \frac{C_1 \cdot C_2 \cdot \gamma \cdot V^2 \cdot A_P \cdot (h \cdot \cos\varphi - r \cdot \sin\varphi + C_3 \cdot d)}{2 \cdot g \cdot \Delta}$$

where:

C_1 = lateral traction coefficient =

$$= 2.8\left(\frac{L_S}{L_{PP}} - 0.1\right)$$

$0.10 \le C_1 \le 1.00$

C_2 = correction of C_1 for angle of heel

$$= \left(\frac{\varphi}{3 \cdot \varphi_D} + 0.5\right)$$

$C_2 \ge$ 1.00

Angle to deck edge $\varphi_D = \arctan\left(\frac{2f}{B}\right)$

C_3 = distance from the centre of A_P to the waterline as fraction of the draught related to the heeling angle

C_3 = $\left(\frac{\varphi}{\varphi_D}\right) \cdot 0.26 + 0.30$

$0.50 \le C_3 \le 0.83$

γ = specific gravity of water, in (t/m^3);

V = lateral velocity, in (m/s), to be taken as 2,57 (5 knots);

A_P = lateral projected area, in (m^2), of the underwater hull;

r = the transverse distance, in (m), between the centre line and the towing point, to be taken as zero when the towing point is at the centre line;

L_S = the longitudinal distance, in (m), from the aft perpendicular to the towing point;

L_{PP} = length between perpendiculars, in (m);

φ = angle of heel;

f = freeboard amidship, in (m);

B = moulded breadth, in (m);

h = vertical distance, in (m), from the waterline to the towing point;

d = actual mean draught, in (m).

The towing point is the location where the towline force is applied to the ship. The towing point may be a towing hook, staple, fairlead or equivalent fitting serving that purpose.

8.3 Heeling lever for escort operations

8.3.1 For the evaluation of the stability particulars during escort operations the ship is considered to be in an equilibrium position determined by the combined action of the hydrodynamic forces acting on hull and appendages, the thrust force and the towline force as shown in figure 26.6.

8.3.2 For each equilibrium position the corresponding steering force, braking force, heel angle and heeling lever are to be obtained from the results of full scale trials, model tests, or numerical simulations in accordance with a methodology acceptable to the Administration.

8.3.3 For each relevant loading condition the evaluation of the equilibrium positions is to be performed over the applicable escort speed range, whereby the speed of the assisted ship through the water is to be considered (*).

(*) The typical escort speed range is 6 to 10 knots.

8.3.4 For each relevant combination of loading condition and escort speed, the maximum heeling lever is to be used for the evaluation of the stability particulars.

8.3.5 For the purpose of stability calculations the heeling lever is to be taken as constant.

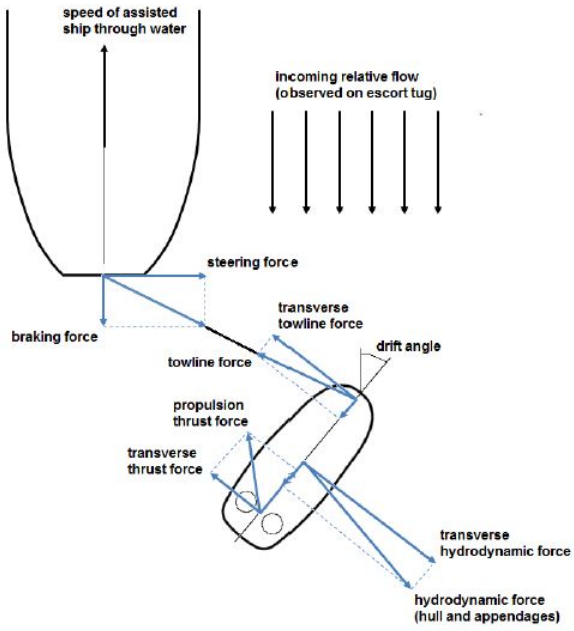


Figure 26.6 Escort tug equilibrium positions

8.4 Stability criteria

8.4.1 In addition to the stability criteria given in B.10.2, or the equivalent stability criteria given in chapter 4 of the explanatory notes to the 2008 IS Code where the ship's characteristics render compliance with B.10.2 impracticable, the following stability criteria should be complied with.

8.4.2 For ships engaged in harbour, coastal or ocean-going towing operations the area A contained between the righting lever curve and the heeling lever curve calculated in accordance with paragraph 8.2.1 (self-tripping), measured from the heel angle, φ_e, to the angle of the second intersection, φ_c, or the angle of down-flooding, φ_f, whichever is less, should be greater than the area B contained between the heeling lever curve and the righting lever curve, measured from the heel angle $\varphi = 0$ to the heel angle, φ_e.

where:

φ_e = Angle of first intersection between the heeling lever and righting lever curves;

φ_f = Angle of down-flooding as defined in part A, paragraph 2.3.1.4 of 2008 IS Code. Openings required to be fitted with weathertight closing devices under the ICLL but, for operational reasons, are required to be kept open should be considered as down-flooding points in stability calculation;

φ_c = Angle of second intersection between the heeling lever and righting lever curves.

8.4.3 For ships engaged in harbour, coastal or ocean-going towing operations the first intersection between the righting lever curve and the heeling lever curve calculated in accordance with paragraph 8.2.2 (tow-tripping) should occur at an angle of heel less than the angle of down-flooding, φf.

8.4.4 For ships engaged in escort operations the maximum heeling lever determined in accordance with paragraph 8.3 should comply with the following criteria:

8.4.4.1 Area A ≥ 1.25 × Area B;

8.4.4.2 Area C ≥ 1.40 × Area D; and

8.4.4.3 $\varphi e \leq 15$ degrees.

where:

Area A = Righting lever curve area measured from the heel angle φe to a heel angle of 20 degrees (see figure 26.7);

Area B = Heeling lever curve area measured from the heeling angle φe to a heel angle of 20 degrees (see figure 26.7);

Area C = Righting lever curve area measured from the zero heel ($\varphi = 0$) to φd (see figure 26.8);

Area D = Heeling lever curve area measured from zero heel ($\varphi = 0$) to the heeling angle φd (see figure 26.8);

φ_e = Equilibrium heel angle corresponding to the first intersection between heeling lever curve and the righting lever curve;

φ_d = the heel angle corresponding to the second intersection between heeling lever curve and the righting lever curve or the angle of down-flooding or 40 degrees, whichever is less.

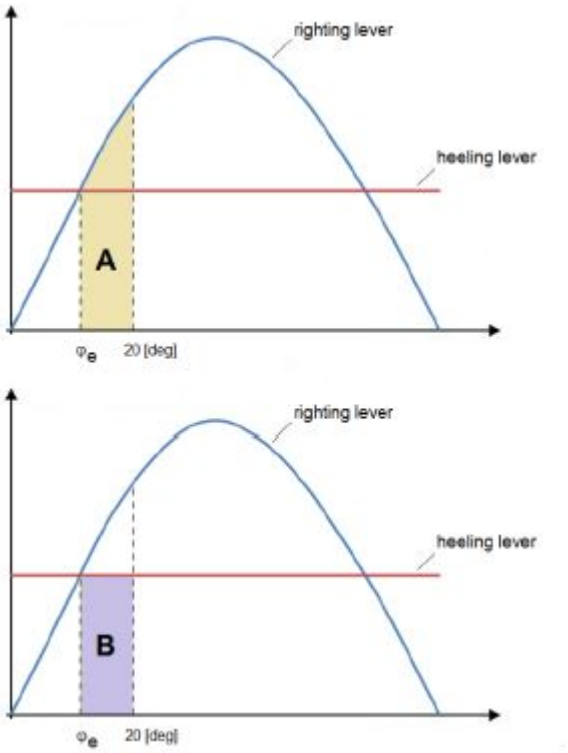


Figure 26.7 Areas A and B

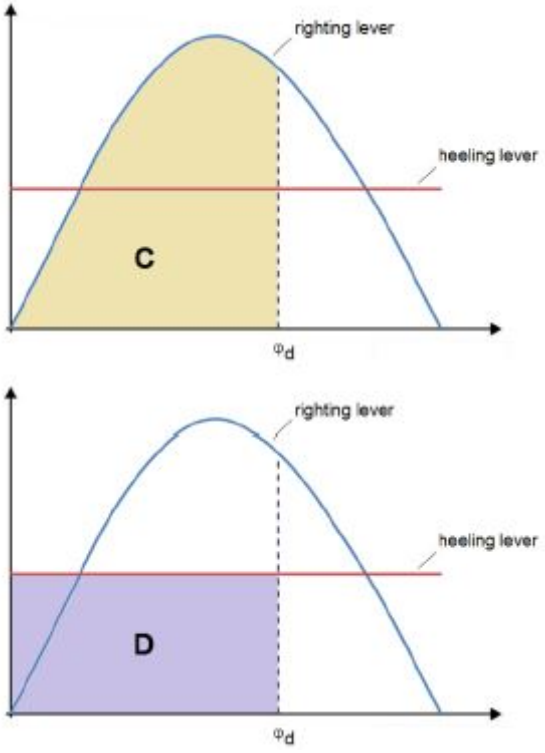


Figure 26.8 Areas C and D

8.5 Constructional precautions against capsizing

8.5.1 Access to the machinery space, excluding emergency access and removal hatches, should, if possible, be arranged within the forecastle. Any access to the machinery space from the exposed cargo deck should be provided with two weathertight closures, if practicable. Access to spaces below the exposed cargo deck should preferably be from a position within or above the superstructure deck.

8.5.2 The area of freeing ports in the side bulwarks of the cargo deck should at least meet the requirements of regulation 24 of the International Convention on Load Lines, 1966 or the Protocol of 1988 relating thereto, as amended, as applicable. The disposition of the freeing ports should be carefully considered to ensure the most effective drainage of water trapped on the working deck and in recesses at the after end of the forecastle. In ships operating in areas where icing is likely to occur, no shutters should be fitted in the freeing ports.

8.5.3 A ship engaged in towing operations should be provided with means for quick release of the towline (*).

(*) Ships provided with towing winch systems should also be provided with means of quick release.

8.6 Operational procedures against capsizing

8.6.1 The arrangement of cargo stowed on deck should be such as to avoid any obstruction of the freeing ports or sudden shift of cargo on deck. Cargo on deck, if any, should not interfere with the movement of the towline.

8.6.2 A minimum freeboard at stern of at least 0.005 . L_{LL} should be maintained in all operating conditions.

9. Ships Engaged in Lifting Operations

9.1 Application

9.1.1 The provisions given hereunder apply to ships engaged in lifting operations and to ships converted to carry out lifting operations after this date.

9.1.2 The provisions of this section should be applied to operations involving the lifting of the ship's own structures or for lifts in which the maximum heeling moment due to the lift is greater than that given in the following:

$M_L = 0{,}67 \cdot \Delta \cdot GM \cdot (f/B)$

where:

M_L = Threshold value for the heeling moment, in (t.m), induced by the (lifting equipment and) load in the lifting equipment;

GM = The initial metacentric height, in (m), with free surface correction, including the effect of the (lifting equipment and) load in the lifting equipment;

f = the minimum freeboard, in (m), measured from the upper side of the weather deck to the waterline;

B = the moulded breadth of the ship, in (m); and

Δ = the displacement of the ship, including the lift load, in (t).

The provisions of this section also apply to ships which are engaged in lifting operations where no transverse heeling moment is induced and the increase of the ship's vertical centre of gravity (VCG) due to the lifted weight is greater than 1%.

The calculations should be completed at the most unfavourable loading conditions for which the lifting equipment shall be used.

9.1.3 For the purpose of this section, waters that are not exposed are those where the environmental impact on the lifting operation is negligible. Otherwise, waters are to be considered exposed. In general, waters that are not

exposed are calm stretches of water, i.e. estuaries, roadsteads, bays, lagoons; where the wind fetch (*) is six nautical miles or less.

_____

(*) Wind fetch is an unobstructed horizontal distance over which the wind can travel over water in a straight direction.

9.2 Load and vertical centre of gravity for different types of lifting operations

9.2.1 In lifting operations involving a lifting appliance consisting of a crane, derrick, sheerlegs, a-frame or similar:

9.2.1.1 the magnitude of the vertical load (P_L) should be the maximum allowed static load at a given outreach of the lifting appliance;

9.2.1.2 the transverse distance (y) is the transverse distance between the point at which the vertical load is applied to the lifting appliance and the ship centreline in the upright position;

9.2.1.3 the vertical height of the load (KG_{load}) is taken as the vertical distance from the point at which the vertical load is applied to the lifting appliance to the baseline in the upright position; and

9.2.1.4 the change of centre of gravity of the lifting appliance(s) need to be taken into account.

9.2.2 In lifting operations not involving a lifting appliance consisting of a crane, derrick, sheerlegs, a-frame or similar, which involve lifting of fully or partially submerged objects over rollers or strong points at or near a deck-level:

9.2.2.1 the magnitude of the vertical load (P_L) should be the winch brake holding load;

9.2.2.2 the transverse distance (y) is the transverse distance between the point at which the vertical load is applied to the ship and the ship centreline in the upright position; and

9.2.2.3 the vertical height of the load (KGl_{oad}) is taken as the vertical distance from the point at which the vertical load is applied to the ship to the baseline in the upright position.

9.3 Stability criteria

9.3.1 The stability criteria included herein, or the criteria contained in paragraphs 9.4, 9.5 or 9.7, as applicable shall be satisfied for all loading conditions intended for lifting with the lifting appliance and its load at the most unfavourable positions. For the purpose of this section, the lifting appliance and its load(s) and their centre of gravity (COG) should be included in the displacement and centre of gravity of the ship, in which case no external heeling moment/heeling lever is
applied.

9.3.2 All loading conditions utilized during the lifting operations are to comply with the stability criteria given in B.10.2 B.10.3. Where the ship's characteristics render compliance with B.10.2.2 impracticable, the equivalent stability criteria given in chapter 4 of the explanatory notes to the 2008 IS Code should apply. During the lifting operation, as determined by paragraphs 9.1, the following stability criteria should also apply:

9.3.2.1 the equilibrium heel angle, φ1, shall not be greater than the maximum static heeling angle for which the lifting device is designed and which has been considered in the approval of the loading gear;

9.3.2.2 during lifting operations in non-exposed waters, the minimum distance between the water level and the highest continuous deck enclosing the watertight hull, taking into account trim and heel at any position along the length of the ship, shall not be less than 0.50 m; and

9.3.2.3 during lifting operations in exposed waters, the residual freeboard shall not be less than 1.00 m or 75% of the highest significant wave height H_S, in (m), encountered during the operation, whichever is greater.

9.4 Lifting operations conducted under environmental and operational limitations

9.4.1 For lifting conditions carried out within clearly defined limitations set forth in paragraph 9.4.1.1, the intact criteria set forth in paragraph 9.4.1.2 may be applied instead of the criteria included in paragraph 9.3.

9.4.1.1 The limits of the environmental conditions should specify at least the following:

- the maximum significant wave height, H_S; and
- the maximum wind speed (1 minute sustained at 10 m above sea level).

The limits of the operational conditions should specify at least the following:

- the maximum duration of the lift;
- limitations in ship speed; and
- limitations in traffic/traffic control.

9.4.1.2 The following stability criteria should apply with the lifted load is at the most unfavourable position:

9.4.1.2.1 the corner of the highest continuous deck enclosing the watertight hull shall not be submerged;

9.4.1.2.2 $A_{RL} \geq 1.4 \times A_{HL}$
where:

A_{RL} = The area under the net righting lever curve, corrected for crane heeling moment and for the righting moment provided by the counter ballast if applicable, extending from the equilibrium heeling angle, φ_1, to the angle of down flooding, φ_F, the angle of vanishing stability, φ_R, or the second intersection of the righting lever curve with the wind heeling lever curve, whichever is less, see figure 26.9

A_{HL} = The area below the wind heeling lever curve due to the wind force applied to the ship and the lift at the maximum wind speed specified in paragraph 9.4.1.1, see figure 26.9.

9.4.1.2.3 The area under the net righting lever curve from the equilibrium heel angle, φ_1, to the down flooding angle φF, or 20°, whichever is less, shall be at least 0.03 m rad

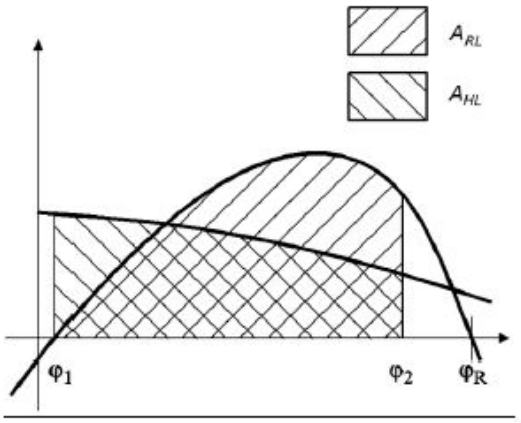


Figure 26.9 Intact criteria under Environmental and Operational limitations

9.5 Sudden loss of hook load

9.5.1 A ship engaged in a lifting operation and using counter ballasting should be able to withstand the sudden loss of the hook load, considering the most unfavourable point at which the hook load may be applied to the ship (i.e. largest heeling moment). For this purpose, the area on the side of the ship opposite to the lift (Area 2) should be greater than the residual area on the side of the lift (Area 1), as shown in figure 26.10, by an amount given by the following:

Area 2 > 1.4 . Area 1, for lifting operations in waters that are exposed.

Area 2 > 1.0 . Area 1, for lifting operations in waters that are not exposed

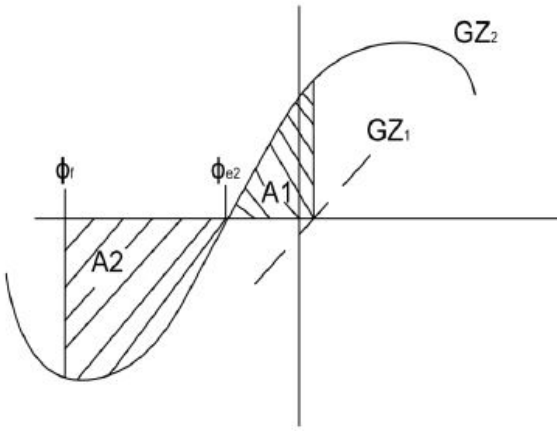


Figure 26.10

where:

GZ_1 = net righting lever (GZ) curve for the condition before loss of crane load, corrected for crane heeling moment and for the righting moment provided by the counter ballast if applicable;

GZ_2 = net righting lever (GZ) curve for the condition after loss of crane load, corrected for the transverse moment provided by the counter ballast if applicable;

φ_{e2} = the angle of static equilibrium after loss of crane load;

φ_f = the angle of down-flooding or the heel angle corresponding to the second intersection between heeling and righting arm curves, whichever is less; and

The term "net righting lever" means that the calculation of the GZ curve includes the ship's true transverse centre of gravity as function of the angle of heel.

9.6 Alternative method

9.6.1 The criteria in paragraph 2.9.6 may be applied to a ship engaged in a lifting operation, as determined by paragraph 2.9.1, as an alternative to the criteria in paragraph 2.9.3 through paragraph 2.9.5, as applicable. For the purpose of this section and the stability criteria set out in paragraph 2.9.7, the lifted load which causes the ship to heel is translated for the purpose of stability calculation to a heeling moment/heeling lever which is applied on the righting lever curve of the ship.

9.6.2 The heeling moment applied to the ship due to a lift and the associated heeling lever should be calculated using the following formulae:

$$HM_{\varphi} = P_L \cdot y \cdot \cos\varphi$$

$$HL_{\varphi} = \frac{HM_{\varphi}}{\Delta}$$

where:

$HM\varphi$ = the heeling moment, in (t.m), due to the lift at φ;

P_L = the vertical load, in (t), of the lift, as defined in 9.2.1.1;

y = the transverse distance, in (m), of the lift, metres, as defined in 9.2.1.2;

φ = the angle of heel;

HL_{φ} = the heeling lever, in (m) due to the lift at φ; and

Δ = the displacement, in (t) of the ship with the load of the lift.

9.6.3 For application of the criteria contained in paragraph 7. involving the sudden loss of load of the lift in which counter-ballast is used, the heeling levers that include the counter-ballast should be calculated using the following formulae:

$$CHL_1 = \frac{(P_L \cdot y - CBM) \cdot \cos\varphi}{\Delta}$$

$$CHL_2 = \frac{CBM \cdot \cos\varphi}{(\Delta - P_L)}$$

where:

CBM = the heeling moment, in (t.m), due to the counter-ballast;

CHL_1 = combined heeling lever, in (m), due to the load of the lift and the counter-ballast heeling moment at the displacement corresponding to the ship with the load of the lift; and

$CBHL_2$ = heeling lever, in (m), due to the counter-ballast heeling moment at the displacement corresponding to the ship without the load of the lift.

9.6.4 The equilibrium heel angle φe referred to in .9.7 means the angle of first intersection between the righting lever curve and the heeling lever curve.

9.7 Alternative stability criteria

9.7.1 For the loading conditions intended for lifting, but before commencing the operation, the stability criteria given in B.10.2 and B.10.3 should be complied with. Where a ship's characteristics render compliance with B.10.2 impracticable, the equivalent stability criteria given in chapter 4 of the explanatory notes to the 2008 IS Code should apply. During the lifting operation, as determined by paragraph 9.1, the following stability criteria should apply:

9.7.1.1 the residual righting area below the righting lever and above the heeling lever curve between ***φe*** and the lesser of 40° or the angle of the maximum residual righting lever should not be less than:

0.080 m rad, if lifting operations are performed in waters that are exposed; or

0.053 m rad, if lifting operations are performed in waters that are not exposed;

9.7.1.2 in addition, the equilibrium angle is to be limited to the lesser of the following:

9.7.1.2.1 10 degrees;

9.7.1.2.2 the angle of immersion of the highest continuous deck enclosing the watertight hull; or

9.7.1.2.3 the lifting appliance allowable value of trim/heel (data to be derived from sidelead and offlead allowable values obtained from manufacturer).

9.7.2 A ship engaged in a lifting operation and using counter ballasting should be able to withstand the sudden loss of the hook load, considering the most unfavourable point at which the hook load may be applied to the ship (i.e. largest heeling moment). For this purpose, the area on the side of the ship opposite from the lift (Area 2) in figure

26.11 should be greater than the residual area on the side of the lift (Area 1) in figure 26.11 by an amount given by the following:
Area 2 – Area 1 > K,

where:

K = 0.037 m rad, for a lifting operation in waters that are exposed; and

K = 0.0 m rad, for a lifting operation in waters that are not exposed.

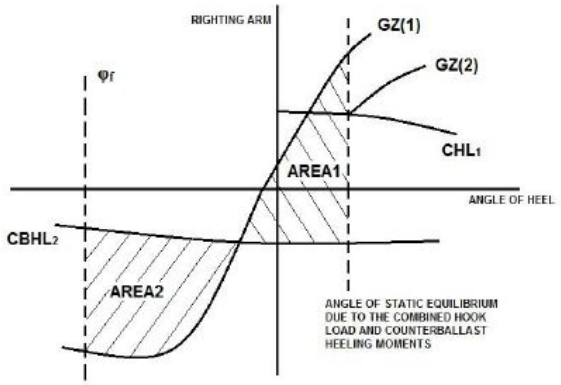


Figure 26.11

GZ(1) = The righting arm curve at the displacement corresponding to the ship without hook load;

GZ(2) = The righting arm curve at the displacement corresponding to the ship with hook load;

Area2 = residual area between GZ(1) and $CBHL_2$ up to the lesser of the down-flooding angle or the second intersection of GZ(2) and $CBHL_2$;

Area1 = residual area below GZ(1) and above $CBHL_2$ up to φ_e.

9.8 Model tests or direct calculations

9.8.1 Model tests or direct calculations, performed in accordance with a methodology acceptable to TL, that demonstrate the survivability of the ship after sudden loss of hook load, may be allowed as an alternative to complying with the requirements of paragraph 9.5 or 9.7.2, provided that:

9.8.1.1 the effects of wind and waves are taken into account; and

9.8.1.2 the maximum dynamic roll amplitude of the ship after loss of load will not cause immersion of unprotected openings.

9.9 Operational procedures against capsizing

9.9.1 Ships should avoid resonant roll conditions when engaged in lifting operations.

Item E.1.1.1 was revised as below:

1.1.1 All passenger vessels and all cargo vessels with Ls ≥ 80 m excluding those ships covered by other damage stability regulations in conventions and codes have to fulfill the stability requirements of part B-1 of SOLAS as amended in conjunction with Resolution MSC.~~281(85)~~429(98) Revised Explanatory Notes to the SOLAS Chapter II-1 Subdivision and Damage Stability Regulations.

Item E.2.4 was revised according to MSC 421(98) as below:

2.4 Small wells constructed in the double bottom in connection with drainage arrangements of holds, etc., shall not extend downward more than necessary. ~~In no case shall~~ The vertical distance from the bottom of such a well to a plane coinciding with the keel line shall not to be less than h/2 or 500 mm, whichever is greater, or compliance with SOLAS Reg. II-1/9.8 of this requirement shall be shown for that part of the ship.

11. Section 29 – Tugs

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Item F was revised according to MSC 414(97) and MSC 415(97) as below:

F. Intact Stability

The intact stability is to be comply with the provisions of Section 26, item D.8.

~~The vessel is accepted as having adequate stability, if at least the following sets of criteria are met:~~

~~- The intact stability requirement of IMO Res. MSC.267 (85), Part A Chapter 2.2,~~

~~- Alternatively, if applicable, the intact stability requirement of IMO Res. MSC.267 (85), Part B~~

~~Chapter 2.4~~

~~- Additionally, the vessel should be met one of the following sets of criteria:~~

~~Criteria Set A~~

~~- The residual area between a righting lever curve and a heeling lever curve developed from 70 % of the maximum bollard pull force acting in 90° to the ship length direction should not be less than 0.09 mrad. The area has to be determined between the first interception of the two curves and the second interception or the angle of down~~

~~flooding whichever is less.~~

~~- Alternatively, the area under a righting lever curve should not be less than 1,4 times the area under a heeling lever curve developed from 70 % of the maximum bollard pull force acting in 90° to ship-length direction. The areas are to be determined between 0° and the 2nd interception or the angle of down flooding whichever is less.~~

~~The heeling lever curve should be derived by using the following formula:~~

$$b_{h1} = \frac{0,7 \cdot T \cdot H \cdot \cos\theta}{9,81 \cdot \Delta}$$

~~b_{h1} = Heeling arm [m],~~

~~T = Maximum bollard pull [kN],~~

H = Vertical distance [m] between the towing hook

and the centre of the propeller,

Δ = Loading condition displacement [t],

θ = Heeling angle [°].

Criteria Set B

The residual area between a righting curve and heeling curve developed from the maximum bollard pull force acting in 90° to ship-length direction is not to be less than 0.011 mrad. The area is to be determined between the first interception of the two curves and θ_D.

where θ_D is the heeling angle, to be taken as the lowest of:

• the angle of where the maximum GZ occurs

• the angle of downflooding

• 40°

The heeling lever curve should be derived by using the following formula:

$$b_{h2} = \frac{T \cdot H \cdot c \cdot \cos\theta}{9.81 \cdot \Delta}$$

b_{h2} = Heeling arm [m],

T = Maximum bollard pull [kN],

where this force is unknown, it can be assumed equal to:

T = 0.179 P for propellers not fitted with nozzles

= 0.228 P for propellers fitted with nozzles

P = Maximum continuous power of the propulsion engine [kW]

H = Vertical distance [m] between the towing hook, or equivalent fitting, and half draught corresponding to Δ [m]

c = coefficient to be taken equal to:

= 1.0 for ships with azimuth propulsion

= 0.65 for ships with non-azimuth propulsion

Δ = Loading condition displacement [t],

θ = Heeling angle [°].

12. Section 30 – Passenger Ships

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Item B.3.2 was added and subsequent items were renumbered and references to renumbered items were revised according to MSC 421(98) as below:

3.2 The ship is to be so designed that s_i calculated in accordance with SOLAS regulation II-1/7-2 will not be less than 1 at the deepest subdivision draught loading condition, level trim or any forward trim loading conditions, if any part of the ship forward of the collision bulkhead is flooded without vertical limits.

Renumbered item B.3.6.1 was revised according to MSC 421(98) as below:

3.6.1 Except as provided in item 3.6.2, the collision bulkhead may be pierced below the bulkhead deck by not more than one pipe for dealing with fluid in the forepeak tank, provided that the pipe is fitted with a screwdown valve capable of being operated from above the bulkhead deck, the valve ~~chest~~ being ~~secured~~ located inside the forepeak ~~to~~ at the collision bulkhead. **TL** may, however, authorize the fitting of this valve on the after side of the collision bulkhead provided that the valve is readily accessible under all service conditions and the space in which it is located is not a cargo space. All valves are to be of steel, bronze or other approved ductile material. Valves of ordinary cast iron or similar material are not acceptable.

Renumbered item B.3.7 was revised according to MSC 421(98) as below:

3.7 Where a long forward superstructure is fitted, the collision bulkhead is to be extended weathertight to the deck next above the bulkhead deck. The extension need not be fitted directly above the bulkhead below, provided that all parts of the extension, including any part of the ramp attached to it is located within the limits prescribed in item 3.1 or 3.3 with the exception permitted by item 3.8 and that the part of the deck which forms the step is made effectively weathertight. The extension is to be so arranged as to preclude the possibility of the bow door or ramp, where fitted, causing damage to it in the case of damage to, or detachment of, a bow door or any part of the ramp.

Item C.3.1 was revised according to MSC 421(98) as below:

3.1 Where trunkways or tunnels for access from crew accommodation to the ~~stokehold~~ machinery spaces, for piping or for other purpose are carried through ~~main transverse~~ watertight bulkheads, they are to be watertight and in accordance with the requirements of SOLAS regulation II-1/16-1. The access to at least one end of each such tunnel or trunkway, if used as a passage at sea, are to be through a trunk extending watertight to a height sufficient to permit access above the bulkhead deck. The access to the other end of the trunkway or tunnel may be through a watertight door of the type required by its location in the ship. Such trunkways or tunnels are not to extend through the first subdivision bulkhead abaft the collision bulkhead.

Item D.3 was revised according to MSC 421(98) as below:

3. Small Wells in Double Bottom

Small wells constructed in the double bottom in connection with drainage arrangements of holds, are not to extend downwards more than necessary. ~~A well extending to the outer bottom is, however, permitted at the after end of the shaft tunnel. Other wells may be permitted by the Society if satisfied that the arrangements give protection equivalent to that afforded by a double bottom complying with this rule. In no case is~~ The vertical distance from the

bottom of such a well to a plane coinciding with the keel line is not to be less than 500 mm, whichever is greater, or compliance with item 4.5 shall be shown for that part of the ship.

Other wells (e.g. for lubricating oil under main engines) may be permitted by **TL** if satisfied that the arrangements give protection equivalent to that afforded by a double bottom complying with this regulation.

Proof of equivalent protection is to be shown by demonstrating that the ship is capable of withstanding bottom damages as specified in item 4.5. Alternatively, wells for lubricating oil below main engines may protrude into the double bottom below the boundary line defined by the distance h provided that the vertical distance between the well bottom and a plane coinciding with the keel line is not less than h/2 or 500 mm, whichever is greater.

Item D.4.5 was revised according to MSC 421(98) as below:

4.5 Compliance with items 3, 4.3 or 4.4 is to be achieved by demonstrating that s_i when calculated in accordance with SOLAS regulation II-1/7-2, is not less than 1 for all service conditions when subject to a bottom damage ~~assumed at any position along the ship's bottom and~~ with an extent specified in subparagraph 4.5.2 for any position in the affected part of the ship:

Item D.4.5.2 was revised according to MSC 421(98) as below:

4.5.2 Assumed extent of damage is to be as follows:

	For 0,3L from the forward perpendicular of the ship	**Any other part of the ship**
Longitudinal extent	1/3 $L^{2(3}$ or 14.5 m, whichever is less	1/3 $L^{2(3}$ or 14.5 m, whichever is less
Transverse extent	B/6 or 10 m, whichever is less	B/6 or 5 m, whichever is less
Vertical extent, measured from the keel line	B/20 ~~or~~ to be taken not less than 0.76 m and not more than 2 m~~, whichever is less~~	B/20 ~~or~~ to be taken not less than 0.76 m and not more than 2 m~~, whichever is less~~

Item E.2.3 and E.3.2.1 were revised according to MSC 421(98) as below:

2.3 Efficient hinged inside deadlights so arranged that they can be easily and effectively closed and secured watertight, are to be fitted to all sidescuttles except that abaft one eighth of the ship's length from the forward perpendicular and above a line drawn parallel to the bulkhead deck at side and having its lowest point at a height of

3.7 m + 2.5 % of the breadth of the ship above the deepest subdivision ~~load line~~ draught, the deadlights may be portable in passenger accommodation unless the deadlights are required by ICLL in force to be permanently attached to their positions.

3.2.1 Subject to the requirements of the ICLL in force, and except as provided in item 3.3, each separate discharge led through the shell plating from spaces below the ~~margin line~~ bulkhead deck are to be provided with either one automatic non-return valve fitted with positive means of closing it from above the bulkhead deck or with two automatic non-return valves without positive means of closing, provided that the inboard valve is situated above the deepest subdivision ~~load line~~ draught and is always accessible for examination under service conditions. Where a valve with positive means of closing is fitted, the operating position above the bulkhead deck are always to be readily accessible and means are to be provided for indicating whether the valve is open or closed.

Item F.3 was revised according to MSC 421(98) as below:

3. Air Pipes

The open end of air pipes terminating within a superstructure ~~is to be at least 1 m above the waterline when the ship heels to an angle of 15º, or the maximum angle of heel during intermediate stage of flooding, as determined by direct calculation, whichever is the greater. Alternatively, air pipes from tanks other than oil tanks may discharge through the side of the superstructure~~ which are not fitted with watertight means of closure is to be considered as unprotected openings when applying SOLAS regulation II-1/7-2.6.1.1.

Item Hwas revised according to MSC 421(98) as below:

H. Equalization Devices

Unsymmetrical flooding is to be kept to a minimum consistent with efficient arrangements. Where it is necessary to correct large angles of heel, the means adopted is, where practicable, to be self-acting, but in any case where controls to equalization devices are provided they are to be operable from above the bulkhead deck. These fittings together with their controls are to be acceptable to **TL (1)**. Suitable information concerning the use of equalization devices is to be supplied to the master of the ship.

(1) *Refer to the Revised recommendation on a standard method for evaluating cross-flooding arrangements, adopted by resolution MSC.362(92), as may be amended.*

Item I.2 , 2.1, 2.2 and 2.4 was revised according to MSC 421(98) as below:

2. Construction and Initial Testing of Watertight ~~Doors~~ Closures

2.1 The design, materials and construction of all watertight closures such as doors, hatches, sidescuttles, gangway and cargo ports, valves, pipes, ash-chutes and rubbish-chutes are to be to the satisfaction to **TL**.

2.2 Such valves, doors and mechanisms are to be suitably marked to ensure that they may be properly used to provide maximum safety~~; and~~.

2.4 Each watertight door and hatch is to be tested by water pressure to ~~a~~ the maximum head of water they might sustain in a final or intermediate stage of flooding. Where testing of individual doors and hatches is not carried out because of possible damage to insulation or outfitting items, testing of individual doors and hatches may be replaced by a prototype pressure test of each type and size of door or hatch with a test pressure corresponding at least to the head required for the ~~intended~~ individual location. The prototype test is to be carried out before the door or hatch is fitted. The insulation method and procedure for fitting the door or hatch on board is to correspond to that of the prototype test. When fitted on board, each door or hatch is to be checked for proper seating between the bulkhead, the frame and the door or between deck, the coaming and the hatch.

Item I.3.2 was revised according to MSC 421(98) as below:

3.2 Where a ventilation trunk passing through a structure penetrates a watertight area of the bulkhead deck, the trunk is to be capable of withstanding the water pressure that may be present within the trunk, after having taken into account the maximum heel angle allowable during ~~intermediate stages of~~ flooding.

Note was added under item J.1.3 according to MSC 429(98) as below:

Note: *When the lightweight survey results do not exceed the specified deviation limits, the lightship displacement and the longitudinal and transverse centres of gravity obtained from the lightweight survey should be used in conjunction with the vertical centre of gravity derived from the most recent inclining in all subsequent stability information supplied to the master.*

Item K was revised and items 3 and 4 merged and subsequent items were renumbered and references to renumbered items were revised according to MSC 421(98) as below:

1. All watertight doors are to be kept closed during navigation except that they may be opened during navigation as specified in item~~s~~ 3~~1.3 and 1.4~~. Watertight doors of width of more than 1.2 m. in machinery spaces as permitted by item C,2.2 may only be opened in the circumstances detailed in that item. Any door which is opened in accordance with this item is to be ready to be immediately closed.

2. Watertight doors located below the bulkhead deck having a maximum clear opening width of more than 1.2 m are to be kept closed during navigation ~~when the ship at sea~~, except for limited period when absolutely necessary.

3. A watertight door may be opened during navigation to permit the passage of passengers or crew, or when work in the immediate vicinity of the door necessitates it being opened. The door must be immediately closed when transit through the door is complete or when the task which necessitated it being open is finished. **TL** is to authorize that such a watertight door may be opened during navigation

~~**4.** Certain watertight doors may be permitted to remain open during navigation only if considered absolutely necessary; that is, being open is determined essential to the safe and effective operation of the ship's machinery or to permit passengers normally unrestricted access throughout the passenger area. Such determination is to be made by the Society~~ only after careful consideration of the impact on ship operations and survivability **(2)**. A watertight door permitted to ~~remain thus open~~ be opened during navigation is to be clearly indicated in the ship's stability information and is always to be ready for immediately closed.

(2) *Refer to the Revised guidance for watertight doors on passenger ships which may be opened during navigation (MSC.1/Circ.1564).*

4. Portable plates on bulkheads are always to be in place before the ~~ship leaves port~~ voyage commences, and are not to be removed during navigation except in case of urgent necessity at the discretion of master. The necessary precautions are to be taken in replacing them to ensure that the joints are watertight. Power operated sliding watertight doors permitted in machinery spaces in accordance with item C,2.2 are to be closed before the ~~ship leaves port~~ voyage commences and are to remain closed during navigation except in case of urgent necessity at the discretion of master.

5. Watertight doors fitted in watertight bulkheads dividing cargo between deck spaces in accordance with item C,4.1 are to be closed before the voyage commences and are to be kept closed during navigation.

6. Gangway, cargo and fuelling ports fitted below the bulkhead deck are to be effectively closed and secured watertight before the ~~ship leaves port~~ voyage commences, and are to be kept closed during navigation.

7. The following doors, located above the bulkhead deck, are to be closed and locked before the ~~ship proceeds on any~~ voyage commences and are to remain closed and locked until the ship is at its next berth:

11. Hinged doors, portable plates, sidescuttles, gangway, cargo and bunkering ports and other openings, which are required by these regulations to be kept closed during navigation, are to closed before the ~~ship leaves port~~ voyage commences.

12. Where, in a between-deck, the sills of any of the sidescuttles referred to in item E,2.2 are below a line drawn parallel to the bulkhead deck at side and having its lowest point 1.4 m. + 2,5 % of the breadth of the ship above the water when the ~~ship departs from any port~~ voyage commences, all the sidescuttles in that between-deck are to be closed watertight and locked before the ~~ship leaves port~~ voyage commences, and they are not to be opened before the ship arrives at the next port.

13. Sidescuttles and their deadlights which will not be accessible during navigation are to be closed and secured before the ~~ship leaves port~~ voyage commences.

Item M.2 was revised according to MSC 436(99) as below:

A passenger ship ~~constructed on or after 1 July 2010~~ shall be designed so that the systems specified in SOLAS Regulation II-2/21.4 remain operational when the ship is subject to flooding of any single watertight compartment.

Item M.3 and existing footnote (2) on this were revised according to MSC 436(99) as below:

For the purpose of providing operational information to the Master for safe return to port after a flooding casualty, passenger ships ~~constructed on or after 1 January 2014~~ shall have:

.....

(2) *Refer to the Revised Guidelines on operational information for Masters of passenger ships for safe return to port by own power or under tow (MSC.1/Circ. 1532/Rev.1).*

13. Section 31 – Special Purpose Ships

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Item A.3 was revised as below:

.....

- Damage stability calculation in accordance with Code of Safety for Special Purpose Ships (IMO Res. MSC.266 (84), as amended.

.....

- Stability information booklet in accordance with Code of Safety for Special Purpose Ships (IMO Res. MSC.266 (84), as amended.

Item C was revised as below:

1. Intact Stability

The intact stability of special purpose ships ~~should~~ is to be comply with the provisions of Section ~~2.5 of Part B of the 2007 Intact Stability Code~~ 26 item D.6.

2. Subdivision and Damage Stability

2.1 The subdivision and damage stability of special purpose ships is to be comply with Section 26, item E.1.1.4. ~~should in general be in accordance with SOLAS Chapter II-1 where the ship is considered a passenger ship, and special personnel are considered passengers, with an R- value calculated in accordance with SOLAS regulation II-1/6.2.3 as follows:~~

~~**2.1.1** Where the ship is certified to carry 240 persons or more, the R-value is assigned as R;~~

~~**2.1.2** Where the ship is certified to carry not more than 60 persons, the R-value is assigned as 0,8R;and~~

~~**2.1.3** For more than 60 (but not more than 240) persons, the R-value should be determined by lineer interpolation between the R-values given in 2.1.1 and 2.1.2. above.~~

~~**2.2** For special purpose ships to which 2.1.1 applies, the requirements of SOLAS regulation II-1/8 and II-1/8-1 and SOLAS chapter II-1, parts B-2, B-3 and B-4 should be applied as though the ship is a passenger ship and the special personnel are passengers. However, SOLAS regulations II-1/14 and II-1/18 are not applicable.~~

~~**2.3** For special purpose ships to which 2.1.2 or 2.1.3 applies, except as provided in 2.4, the requirements of SOLAS chapter II-1, parts B-2, B-3 and B-4 should be applied as though the ship is a cargo ship and the special personnel are crew. However, SOLAS regulations II-1/8 and II-1/8-1 need not be applied and SOLAS regulations 1/14 and II-1/18 are not applicable.~~

~~**2.4** All special purpose ships should comply with SOLAS regulation II-1/9, II-1/13, II-1/19, II-1/20, II-1/21 and II-1/35-1, as though the ship is a passenger ship.~~

14. Section 32 – Supply Vessels

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Item A.1.2 was revised as below:

Guidance :

For supply vessels which shall transport ~~limited amounts of~~ hazardous and/~~or~~ noxious liquid substances in bulk, the IMO-Resolution A.1122(30) (OSV Chemical Code), shall be observed.

Item H was revised as below:

H. Carriage of ~~Limited Amounts of~~ Hazardous and Noxious Liquid Substances

Where it is intended to carry limited amounts of hazardous and noxious liquid substances in bulk on offshore supply vessels, the requirements of IMO Resolutin A.~~673(16) "Guidelines for the Transport Handing of Limited Amounts of Hazardous and Noxious Liquid Sunstances in Bulk in Offshore Support Vessels" as amended by IMO Resolution MSC.236(82) and MEPC.158(55)~~1122(30) (OSV Chemical Code) are to be applied.

.....

15. Section 34 – Dredgers

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Item B.1.4 was revised as below:

The dredger is to comply with the weather criterion of the ~~IMO Code on Intact Stability A.749(18)~~ 2008 IS Code (Chapter ~~3.2~~ 2.3) at the summer load line taking into account the following loading condition:

- State of the cargo: liquid,
- Stores and fuel : 10%,
- Hopper(s) loaded with a homogeneous cargo up to the spill-out edge of the hopper where the density of such cargo equals or exceeds 1000 kg/m^3 ; where this condition implies a lighter cargo than 1000 kg/m^3 the hopper is considered to be partially filled with a cargo of density equal to 1000 kg/m^3.

In addition to the weather criterion requirement at the summer load line, the dredger is to comply with the weather criterion of the ~~IMO Code on Intact Stability A.749(18)~~ 2008 IS Code (Chapter ~~3.2~~ 2.3) at the dredging load line, assuming a reduced wind pressure of P=270 N/mm^2.

PART A – CHAPTER 2 - MATERIAL

01. Section 2 – Mechanical and Technological Testing Procedures

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Table 2.7 was revised as below:

Manufacturer/film type	ASTM (1)	DIN (3)	EN (3)	ISO (2)	RCC-M (4)
AGFA (5)					
Structurix D2	Special	G1	C1	GI	1
Structurix D3	1	G1	C2	GI	1
Structurix D3 s.c.	1	G1	C2	GI	2
Structurix D4	1	G2	C3	GI	3
Structurix D5	1	G2	C4	GII	3-4
Structurix D7	2	G3	C5	GIII	4
Structurix D8	2	G4	C6	GIII	5
Fuji (5)					
IX 25	1	G2	C3	GI	3
IX 50	Special	G1	C1	GI	1
IX 80	1	G2	C3	GI	3
IX 100	1	G2	C4	GII	3-4
IX 150	2	G4	C6	GIII	4-5
Kodak (5)					
DR	Special	G1	C1	GI	
M	1	G1	C2	GI	
MX 125	1	G2	C3	GI	
T 200	1	G2	C4	GII	
AA 400	2	G3	C5	GIII	
CX	3	G4	C6	GIII	
B	W-B			GIII	

(1) ***ASTM E 94/E94M***

(2) ***ISO 5579***

(3) ***Classification according to EN ISO 11699-1***

(4) ***French standard***

(5) ***Equivalent film types from other manufacturers may also be considered, provided that appropriate proof has been furnished.***

PART B – CHAPTER 4 MACHINERY

01. Section 01 – General Rules and Instructıons

Revision Date: September 2019

Entry into Force Date: 1 January 2020

Table 1.1 was revised according to IACS UR M46 Rev.2 as below:

Table 1.1 Ambient conditions about inclinations

Installations, components	Angle of inclination [degrees] (2)			
	Athwartships		For-and-aft	
	Static	Dynamic (rolling)	Static	Dynamic (pitching)
Main and auxiliary machinery	15	22.5	5 **(4)**	7.5
Safety equipment, e.g. emergency power installations, emergency fire pumps and their devices Switch gear, electrical and electronic appliances **(1)** and remote control systems	22.5 **(3)**	22.5 **(3)**	10	10

Notes :

(1) *~~Up to an angle of inclination of 45° n~~No undesired switching operations or operational changes ~~may~~ are to occur.*
(2) *Athwartships and fore-end-aft inclinations may occur simultaneously.*
(3) *In ships for the carriage of liquefied gases and of chemicals the emergency power supply must also remain operable with the ship flooded to a final athwartships inclination up to maximum of 30°.*
(4) *Where the length of the ship exceeds 100m, the fore-and-aft static angle of inclination may be taken as 500/L degrees where L = length of the ship, in metres.*

02. Section 02 – Internal Combustion Engines And Air Compressors

Revision Date: September 2019

Entry into Force Date: 1 January 2020

Item E.2.1.2, E.2.1.3, E.2.1.4, E.2.1.7 and Table 2.6.B was revised according to IACS UR M72 Rev.2 as below:

2. Certification of Engine Components

……

2.1.2 TL Certificate (SC)

This is a document issued by **TL** stating:

- Conformity with Rule requirements.

- That the tests and inspections have been carried out on:
  - the finished certified ~~product~~ component itself, or
  - on samples taken from ~~the certified product itself~~ earlier stages in the production of the component, when applicable.

- That the inspection and tests were performed in the presence of the Surveyor or in accordance with special agreements, i.e. Alternative Certification Scheme (ACS).

2.1.3 Work's Certificate (W)

……

- That the tests and inspections have been carried out on:
  - the finished certified ~~product~~ component itself,
  - or on samples taken from ~~the raw material, used for the product to be certified~~ earlier stages in the production of the component, when applicable

……

A Work's Certificate may be considered equivalent to a **TL** Certificate and endorsed by **TL** ~~under the following cases~~ if:

……

2.1.4 Test Report (TR)

……

- That the tests and inspections have been carried out on samples from the current production batch.

……

2.1.7

……

The ~~M~~manufacturing ~~works~~ process and equipment is to be ~~equipped~~ set up and maintained in such a way that all materials and components can be consistently produced to the required standard.

……

Table 2.6.B Summary of required documentation for engine components

Part (4), (5), (6), (7), (8)	Material properties (1)	Non-destructive Examination (2)	Hydraulic testing (3)	Dimensional inspection, including surface condition	Visual inspection (Surveyor)	Applicable to engines	Component certificate
Welded bedplate	W (C+M)	W (UT+CD)			Fit-up+ post welding	All	SC
Bearing transverse girders GS	W (C+M)	W (UT+CD)			X	All	SC
Welded frame box	W (C+M)	W (UT+CD)			Fit-up+ post welding	All	SC
Cylinder block GJL			W (10) ~~(9)~~			~~CH~~ > 400 kW/cyl	
Cylinder block GJS			W (10) ~~(9)~~			~~CH~~	

						> 400 kW/cyl	
Welded cylinder frames	W (C+M)	W (UT+CD)			Fit-up+ post welding	CH	SC
Engine block GJL			W (10) ~~(9)~~			> 400 kW/cyl	
Engine block GJS	W (M)		W (10) ~~(9)~~			> 400 kW/cyl	
Cylinder liner	W (C+M)		W (10) ~~(9)~~			D> 300 mm	
Cylinder head GJL			W			D> 300 mm	
Cylinder head GJS			W			D> 300 mm	
Cylinder head GS	W (C+M)	W (UT+CD)	W		X	D> 300 mm	SC
Forged cylinder head	W (C+M)	W (UT+CD)	W		X	D> 300 mm	SC
Piston crown GS	W (C+M)	W (UT+CD)			X	D> 400 mm	SC
Forged piston crown	W (C+M)	W (UT+CD)			X	D> 400 mm	SC
Crankshaft: made in one piece	SC (C+M)	W (UT+CD)		W	Random, of fillets and oil bores	All	SC
Semi-built crankshaft (Crankthrow, forged main journal and journals with flange)	~~See below~~ SC(C+M)	~~See below~~ W(UT+CD)		~~See below~~ W	~~See below~~ Random, of fillets and shrink fittings	All	SC
~~Crank throw~~	~~SC (C+M)~~	~~W (UT+CD)~~		~~W~~	~~Random, of fillets and shrink fittings~~	~~All~~	
~~Forged main journal and journals with flange~~	~~SC (C+M)~~	~~W (UT+CD)~~		~~W~~	~~Random, of shrink fittings~~	~~All~~	

Table 2.6.B Summary of required documentation for engine components (continued)

Part (4), (5), (6), (7), (8)	**Material properties (1)**	**Non-destructive Examination (2)**	**Hydraulic testing (3)**	**Dimensional inspection, including surface condition**	**Visual inspection (Surveyor)**	**Applicable to engines**	**Component certificate**
Exhaust gas valve cage			W			CH	
Piston rod~~, if applicable~~	SC (C+M)	W (UT+CD) ~~CD again after final machining (grinding)~~			Random	D > 400 mm CH	SC
Cross head	SC (C+M)	W (UT+CD) ~~CD again after final machining (grinding and polishing)~~			Random	CH	SC
Connecting rod with cap	SC (C+M)	W (UT+CD)		W	Random, of all surfaces, in particular those shot peened	All	SC
Coupling bolts for crankshaft	SC (C+M)	W (UT+CD)		W	Random, of interference fit	All	SC
Bolts and studs for main bearings	W (C+M)	W (UT+CD)				D> 300 mm	

Bolts and studs for cylinder heads	W (C+M)	W (UT+CD)				D> 300 mm	
Bolts and studs for connecting rods	W (C+M)	W (UT+CD)		TR of thread making		D> 300 mm	
Tie rod	W (C+M)	W (UT+CD)		TR of thread making	Random	CH	SC
High pressure fuel injection pump body	W (C+M)		W			D> 300 mm	
	W (C+M)		TR			D≤ 300 mm	
High pressure fuel injection valves (only for those not autofretted)			W			D> 300 mm	
			TR			D≤ 300 mm	
High pressure fuel injection pipes including common fuel rail	W (C+M)		W for those that are not autofretted			D> 300 mm	
	W (C+M)		TR for those that are not autofretted			D≤ 300 mm	
High pressure common servo oil system	W (C+M)		W			D> 300 mm	
	W (C+M)		TR			D≤ 300 mm	

Table 2.6.B Summary of required documentation for engine components (continued)

Part (4), (5), (6), (7), (8)	**Material properties (1)**	**Non-destructive Examination (2)**	**Hydraulic testing (3)**	**Dimensional inspection, including surface condition**	**Visual inspection (Surveyor)**	**Applicable to engines**	**Component certificate**
Cooler, both sides (9) ~~(8)~~	W (C+M)		W			D> 300 mm	
Accumulator ~~of common rail fuel or servo oil system~~	W (C+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 (C+M)		W			> 800 kW/cyl	
Engine driven pumps (oil, water, fuel, bilge) other than pumps referred to in item 27 and 33			W			> 800 kW/cyl	
Bearing for main, crosshead and crankpin	TR (C)	TR (UT for full contact between ~~basic~~		W		> 800 kW/cyl	

		base material and bearing metal					

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 MPI or DP.*
(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) *Material certification requirements for pumps and piping components are dependent on the operating pressure and temperature. Requirements given in this Table apply except where alternative requirements are explicitly given in Sections 14 and 16.*
(5~~4~~) *For turbochargers, see Section 3.*
(6~~5~~) *Crankcase ~~safety~~ explosion relief valves are to be type tested..*
(7~~6~~) *Oil mist detection systems are to be type tested.*
(8~~7~~) *For speed governor and overspeed protective devices, see F.*
(9~~8~~) *Charge air coolers need only be tested on the water side.*
(10~~9~~) *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.*

Revision Date: September 2019

Entry into Force Date: 1 January 2020

Item F.1.1.2, F.1.2.1, F.1.2.3 and Fig.2.9 were revised and F.1.1.3 was added according to IACS UR M3 Rev.6 as below:

F. Safety Devices

1.1.2

……

Equivalent equipment may be approved by **TL**. The overspeed protective device, including its driving mechanism, has to be independent from the required governor.

1.1.3 When electronic speed governors of main internal combustion engines form part of a remote control system, they are to comply with **TL** Rules, Chapter 4-1, Section 5, A.1 or 5, A.2 and namely with the following conditions:

- if lack of power to the governor may cause major and sudden changes in the present speed and direction of thrust of the propeller, back up power supply is to be provided
- local control of the engines is always to be possible, as required by Chapter 4-1, Section 5, A.1, and, to this purpose, from the local control position it is to be possible to disconnect the remote signal, bearing in mind that the speed control according to subparagraph 1.1.1, is not available unless an additional separate governor is provided for such local mode of control.
- In addition, electronic speed governors and their actuators are to be type tested according to **TL** Add. Rules Regulations for the Performance of Type Tests, Part 1

Note:

The rated power and corresponding rated speed are those for which classification of the installation has been requested.

1.2 Engines driving electric generators

1.2.1

……

In the case when a step load equivalent to the rated output of the generator is switched off, a transient speed variation in excess of 10% of the rated speed may be acceptable, provided this does not cause the intervention of the overspeed device as required by ~~1.1.1~~ 1.2.2.

……

1.2.3

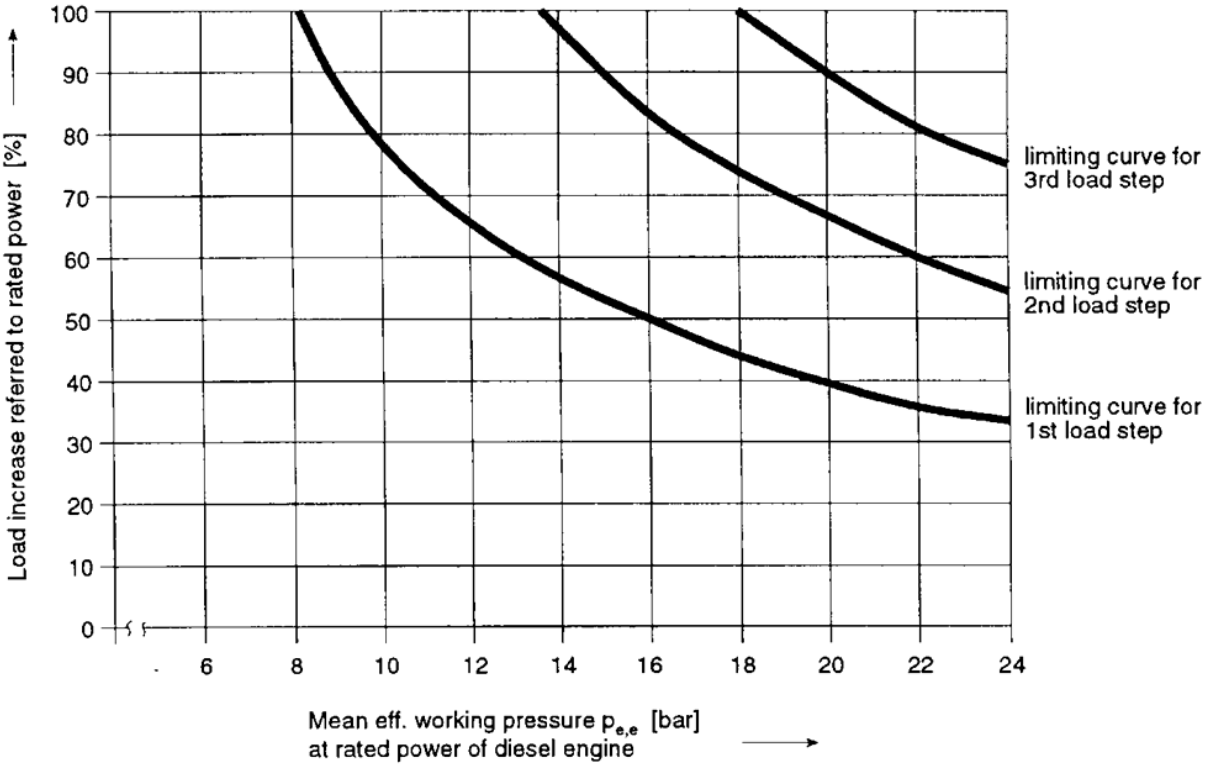
……

Application of the load in more than two steps (see Fig.2.9 for guidance on 4-stroke diesel engines expected maximum possible sudden power increase) is acceptable on condition that:

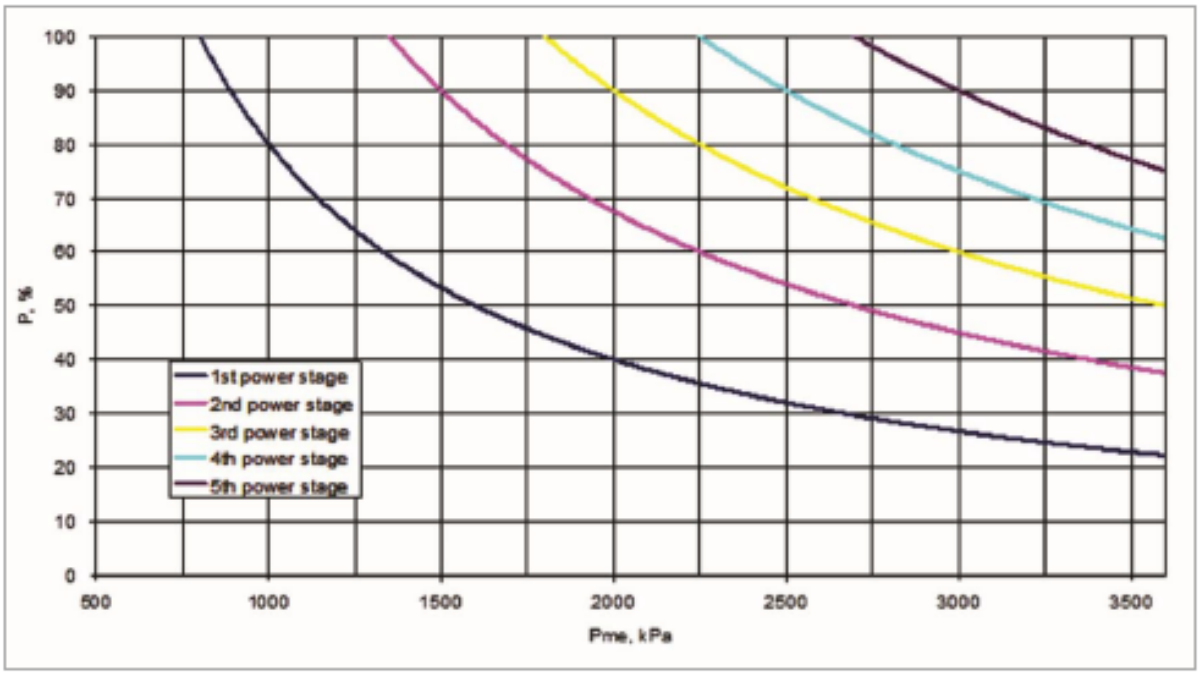
……

1.2.7

……



~~Fig. 2.9 Limiting curves for loading 4-stroke diesel engine step by step from no load to rated power as function of the brake mean effective pressure~~



Legend:

P_{me} : declared power mean effective pressure

P : power increase referred to declared power at site conditions 1 : first power stage

2 : second power stage

3 : third power stage

4 : fourth power stage

5 : fifth power stage

Fig. 2.9 Reference values for maximum possible sudden power increases as a function of brake mean effective pressure, P_{me}, at declared power (four-stroke diesel engines)

03. Section 05 – Main Shafting

Revision Date: September 2019

Entry into Force Date: 1 January 2020

Item C.6.2.3 was revised according to IACS UR M52 Rev.1 as below:

6.2.3 Water lubricated bearings

Where the propeller shafts inside the stern tube runs in bearings ~~made of lignum vitae, rubber or plastic~~ approved for use in water-lubricated stern tube bearings, the length of the after bearing ~~should equal approximately~~ is to be not less than $4 \cdot d_a$ and at that of the forward bearing ~~should equal approximately~~ is to be not less than $1.5.d_a$.

For a bearing of synthetic material, 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, provided the bearing design and material is substantiated by experiments to the satisfaction of **TL.**

Synthetic materials for application as water lubricated stern tube 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 adequate load bearing capacity.~~

04. Section 11 – Windlass And Winches

Revision Date: September 2019

Entry into Force Date: 1 January 2020

Item B.5 was added according to IACS UR M79 New as below:

5. Towing Winch Emergency Release Systems

5.1 Scope

5.1.1 This item defines minimum safety standards for winch emergency release systems provided on towing winches that are used on towing ships within close quarters, ports or terminals.

5.1.2 This item is not intended to cover towing winches on board ships used solely for long distance ocean towage, anchor handling or similar offshore activities.

Definitions

'Emergency release system' refers to the mechanism and associated control arrangements that are used to release the load on the towline in a controlled manner under both normal and dead-ship conditions.

'Maximum design load' is the maximum load that can be held by the winch as defined by the manufacturer (the manufacturer's rating).

'Girting' means the capsize of a tug when in the act of towage as a result of the towline force acting transversely to the tug (in beam direction) as a consequence of an unexpected event (could be loss of propulsion/steering or otherwise), whereby the resulting couple generated by offset and opposing transverse forces (towline force is opposed by thrust or hull resistance force) causes the tug to heel and, ultimately, to capsize. This may also be referred to as 'girthing, 'girding' or 'tripping'. See Figure 11.3 which shows the forces acting during towage operations.

'Fleet angle' is the angle between the applied load (towline force) and the towline as it is wound onto the winch drum, see Figure 11.4.

5.2 General requirements

5.2.1 The in-board end of the towline is to be attached to the winch drum with a weak link or similar arrangement that is designed to release the towline at low load.

5.2.2 All towing winches are to be fitted with an emergency release system.

5.3 Emergency release system requirements

5.3.1 Performance requirements

5.3.1.1 The emergency release system is to operate across the full range of towline load, fleet angle and ship heel angle under all normal and reasonably foreseeable abnormal conditions (these may include, but are not limited to, the following: vessel electrical failure, variable towline load (for example due to heavy weather), etc.).

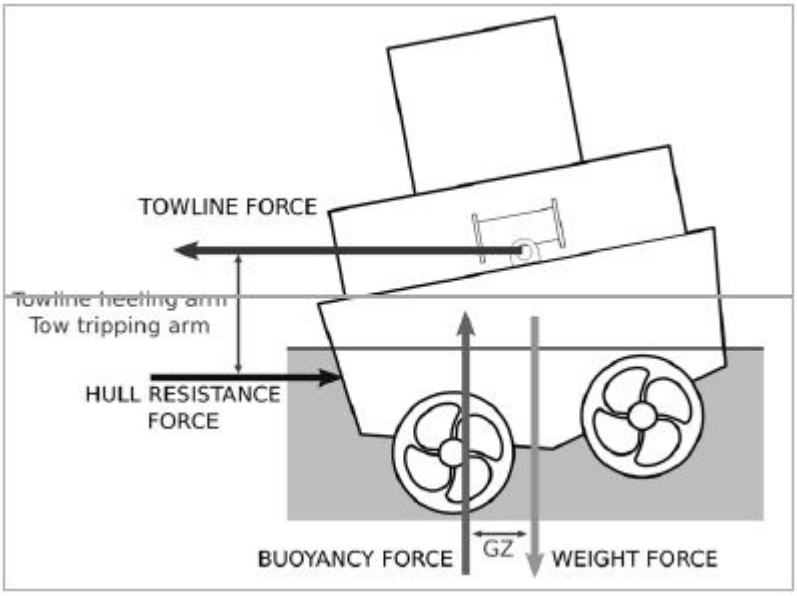


Figure 11.3 Forces during towing

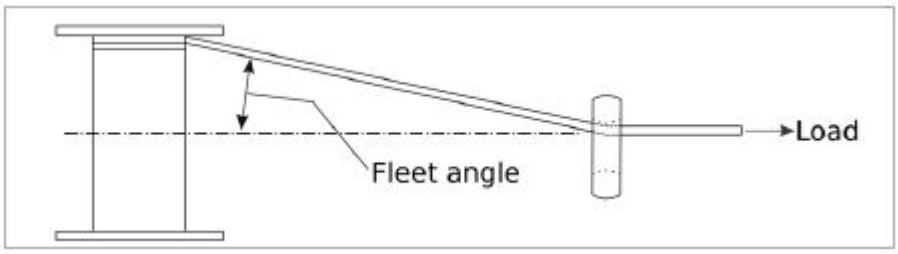


Figure 11.4 Towline 'fleet angle'

5.3.1.2 The emergency release system shall be capable of operating with towline loads up to at least 100 per cent of the maximum design load.

5.3.1.3 The emergency release system is to function as quickly as is reasonably practicable and within a maximum of three seconds after activation.

5.3.1.4 The emergency release system is to allow the winch drum to rotate and the towline to pay out in a controlled manner such that, when the emergency release system is activated, there is sufficient resistance to rotation to avoid uncontrolled unwinding of the towline from the drum. Spinning (free, uncontrolled rotation) of the winch drum is to be avoided, as this could cause the towline to get stuck and disable the release function of the winch.

5.3.1.5 Once the emergency release is activated, the towline load required to rotate the winch drum is to be no greater than:

a) the lesser of five tonnes or five per cent of the maximum design load when two layers of towline are on the drum, or

b) 15 per cent of the maximum design load where it is demonstrated that this resistance to rotation does not exceed 25 per cent of the force that will result in listing sufficient for the immersion of the lowest unprotected opening.

5.3.1.6 An alternative source of energy is to be provided such that normal operation of the emergency release system can be sustained under dead-ship conditions.

5.3.1.7 The alternative source of energy required by 5.3.1.6 is to be sufficient to achieve the most onerous of the following conditions (as applicable):

a) sufficient for at least three attempts to release the towline (i.e. three activations of the emergency release system). Where the system provides energy for more than one winch it is to be sufficient for three activations of the most demanding winch connected to it.

(b) Where the winch design is such that the drum release mechanism requires continuous application of power (e.g. where the brake is applied by spring tension and released using hydraulic or pneumatic power) sufficient power is to be provided to operate the emergency release system (e.g. hold the brake open and allow release of the towline) in a dead-ship situation for a minimum of five minutes. This may be reduced to the time required for the full length of the towline to feed off the winch drum at the load specified in 5.3.1.5 if this is less than five minutes.

5.3.2 Operational requirements

5.3.2.1 Emergency release operation must be possible from the bridge and from the winch control station on deck. The winch control station on deck is to be in a safe location.

5.3.2.2 The emergency release control is to be located in close proximity to the emergency stop button for winch operation and both should be clearly identifiable, clearly visible, easily accessible and positioned to allow safe operability.

5.3.2.3 The emergency release function is to take priority over any emergency stop function. Activation of the winch emergency stop from any location is not to inhibit operation of the emergency release system from any location.

5.3.2.4 Emergency release system control buttons are to require positive action to cancel, the positive action may be made at a different control position from the one where the emergency release was activated. It must always be possible to cancel the emergency release from the bridge regardless of the activation location and without manual intervention on the working deck.

5.3.2.5 Controls for emergency use are to be protected against accidental use.

5.3.2.6 Indications are to be provided on the bridge for all power supply and/or pressure levels related to the normal operation of the emergency release system. Alarms are to activate automatically if any level falls outside of the limits within which the emergency release system is fully operational.

5.3.2.7 Wherever practicable, control of the emergency release system is to be provided by a hard-wired system, fully independent of programmable electronic systems.

5.3.2.8 Computer based systems that operate or may affect the control of emergency release systems are to meet the requirements for Category III systems of TL- R E22.

5.3.2.9 Components critical for the safe operation of the emergency release system are to be identified by the manufacturer.

5.3.2.10 The method for annual survey of the winch is to be documented.

5.3.2.11 Where necessary for conducting the annual survey of the winch, adequately sized strong points are to be provided on deck.

5.4 Test requirements

5.4.1 General

5.4.1.1 All testing defined within item 5.4 is to be witnessed by a **TL** surveyor.

5.4.1.2 For each emergency release system or type thereof, the performance requirements of item 5.3.1 are to be verified either at the manufacturer's works or as part of the commissioning of the towing winch when it is installed on board. Where verification solely through testing is impracticable (e.g. due to health and safety), testing may be combined with inspection, analysis or demonstration in agreement with **TL.**

5.4.1.3 The performance capabilities and operating instructions of the emergency release system are to be documented and made available on board the ship on which the winch has been installed.

5.4.2 Installation trials

5.4.2.1 The full functionality of the emergency release system is to be tested as part of the shipboard commissioning trials to the satisfaction of the surveyor. Testing may be conducted either during a bollard pull test or by applying the towline load against a strong point on the deck of the tug that is certified to the appropriate load.

5.4.2.2 Where the performance of the winch in accordance with item 5.3.1 has previously been verified, the load applied for the installation trials is to be at least the lesser of 30% of the maximum design load or 80% of vessel bollard pull.

05. Section 14 – Pressure Vessels

Revision Date: September 2019

Entry into Force Date: 1 January 2020

Table 14.1 was updated as below:

Table 14.1 Pressure vessels classes

Operating medium	**Design pressure p_c [N/mm^2]** **Design temperature t [°C]**		
Pressure vessel class	**I**	**II**	**III**
Liquefied gases (propane, butane etc.), toxic and corrosive media	all	-	-

Refrigerants	Group 2	Group 1	-
Steam, compressed air, gases,	$p_c > 1,6$ or $t > 300$	$0,7 < p_c \leq 1,6$ $170 < t \leq 300$	$p_c \leq 0,7$ $t \leq 170$
Thermal oils	$p_c > 1,6$ or $t > 300$	$0,7 < p_c \leq 1,6$ $150 < t \leq 300$	$p_c \leq 0,7$ $t \leq 150$
Liquid fuels, lubricating oils, flammable hydraulic fluids	$p_c > 1,6$ or $t > 150$	$0,7 < p_c \leq 1,6$ $60 < t \leq 150$	$p_c \leq 0,7$ $t \leq 60$
Water, non-flammable hydraulic fluids	$p_c > 4$ or $t > 300$	$1,6 < p_c \leq 4$ $200 < t \leq 300$	$p_c \leq 1,6$ $t \leq 200$
Testing of Materials / Test certificates	See 4.1	See 4.2	See 4.3

06. Section 16 – Pipe Lines, Valves, Fittings And Pumps

Revision Date: September 2019

Entry into Force Date: 1 January 2020

Item B.2.6 was revised according to IACS UR P4 Rev.5 as below:

2.6 ~~Plastic pipes~~Production and application of plastic piping systems on ships

For terms and conditions, TL-R P4 apply.

……

2.6.5.2 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 Regulation II-1/8-1 of SOLAS 1974 Convention, as amended, or for any pipes that would allow progressive flooding to other compartments through damaged piping or through open ended pipes in the compartments).

~~External pressure should be taken into account in the design of piping 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.~~

……

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.

Notwithstanding the requirements of 2.6.5.1 or 2.6.5.2 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 2.6.5.2 above are to be met.

The maximum permissible working pressure is to be specified with due regard for maximum possible working temperatures in accordance with Manufacturer's recommendations.

……

2.6.7 Temperature

……

The minimum heat distortion/deflection temperature should not be less than 80°C.

……

The maximum working temperature should be at least 20°C lower than the minimum heat distortion/deflection temperature (determined according to ISO 75 method A, or equivalent, e.g ASTM D648) of the resin or plastic material.

……

2.6.8 Fire endurance

~~Fire protection of plastic pipes requires special care and the requirements wanted in different pipe systems are given in Table 16.2. In order to determine the fire endurance, plastic pipes are tested according to FTP CODE and IMO Resolution A.753(18) Guidelines for the application of plastic pipes on ships as amended by MSC.313(88).~~

~~The fire endurance varies into 5 different groups according to test results:~~

~~- L1 plastic pipes having the highest fire endurance (for a duration of a minimum of 60 min without loss of integrity in the dry condition.),~~

~~- 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~~

~~- L2 plastic pipes having middle level fire endurance (for a duration of a minimum of 30 min without loss of integrity in the dry condition,~~

~~- Level 2W Piping systems similar to level 2 systems except a maximum 5% flow loss in the system after exposure is acceptable~~

~~- L3 plastic pipes having low level fire endurance (for a duration of a minimum of 30 min without loss of integrity in the wet condition~~

2.6.8.1 Pipes and their associated fittings whose integrity is essential to the safety of ships, including plastic piping required by SOLAS II-2, Reg. 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 Res A.753(18), as amended by IMO Res. MSC. 313(88) and IMO Res. MSC. 399(95).

2.6.8.2 Depending on the capability of a piping system to maintain its strength and integrity, there exist three different levels of fire endurance for piping systems.

2.6.8.2.1 Level 1. Piping having passed the fire endurance test specified in Appendix 1 of IMO Res. A.753(18), as amended by IMO Res. MSC. 313(88) and IMO Res. MSC. 399(95) 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). 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 (L1W).

2.6.8.2.2 Level 2. Piping having passed the fire endurance test specified in Appendix 1 of IMO Res. A.753(18), as amended by IMO Res. MSC. 313(88) and IMO Res. MSC. 399(95) for a duration of a minimum of 30 minutes in the dry condition is considered to meet level 2 fire endurance standard (L2). Level 2W – Piping systems similar to Level 2 systems except a maximum 5% flow loss in the system after exposure is acceptable (L2W).

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

2.6.8.3 Permitted use of piping depending on fire endurance, location and piping system is given in Table 16.2 “Fire Endurance Requirement Matrix”.

2.6.8.4 For Safe Return to Port purposes (SOLAS II-2, Reg.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.

……

Table 16.2 Fire endurance requirement matrix for different piping systems

Piping Systems		**Location (13)**										
		A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**
Cargo (Flammable cargoes f.p. < 60°C)												
1	Cargo lines	NA	NA	L1	NA	NA	0	NA	0(10)	0	NA	L1(2)
……												
Miscellaneous												
28	Control air	L1(5)	L1(5)	L1(5)	L1(5)	L1(5)	NA	0	0	0	L1(5)	L1(5)
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 < 7 bar)	L2W	L2W	0(9)	0(9)	0(9)	0	0	0	0	0(9)	0(9)

32	Central vacuum cleaners	NA	NA	NA	0	NA	NA	NA	NA	0	0	0
33	Exhaust gas cleaning system effluent line	L3(1)	L3(1)	NA	NA	NA	NA	NA	NA	NA	L3 (1,11) NA	NA
34	Urea transfer/supply system (SCR installations)	L1(12)	L1(12)	NA	NA	NA	NA	NA	NA	0	L3 (11) NA	0

Abbreviation

L1 Fire endurance test (appendix 1) of IMO Resolution A.753(18), as amended by IMO Res. MSC. 313(88) and IMO Res. MSC. 399(95)) in dry conditions, 60 min.

~~**W1** Fire endurance test in dry conditions, 60 min. (These systems do not carry flammable fluid or any gas and a maximum 5% flow loss in the system after exposure is acceptable)~~

L1W Fire endurance test

L2 Fire endurance test (appendix 1) of IMO Resolution A.753(18), as amended by IMO Res. MSC. 313(88) and IMO Res. MSC. 399(95)) in dry conditions, 30 min.

~~**W2** Fire endurance test in dry conditions, 30 min. (These systems do not carry flammable fluid or any gas and a maximum 5% flow loss in the system after exposure is acceptable)~~

L2W Fire endurance test

L3 Fire endurance test (appendix 2) of IMO Resolution A.753(18), as amended by IMO Res. MSC. 313(88) and IMO Res. MSC. 399(95)) 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.

Location

A Machinery spaces of Category A
B Other machinery spaces and pump rooms
C Cargo pump rooms
D Ro-ro cargo holds
E Other dry cargo holds
F Cargo tanks
G Fuel oil tanks
H Ballast water tanks
I Cofferdams void spaces pipe tunnel and ducts

J	Accommodation service and control spaces
K	Open decks

Footnotes:

(1) *Where non-metallic piping is used, remotely controlled valves to be provided at ship's side. These valves are to be controlled from outside the space.*

(2) *Remote closing valves to be provided at the cargo tanks.*

(3) *When cargo tanks contain flammable liquids with a flash point >60ºC. "O" may replace "NA" or "X".*

(4) *For drains serving only the space concerned, "O" may replace" L1W".*

(5) *When controlling functions are not required by statutory requirements or guidelines, "O" may replace "L1".*

(6) *For pipe between machinery space and deck water seal, "O" 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, should 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 "O".*

(10) *For tankers where compliance with paragraph 3.6 of regulation 19 of Annex I of MARPOL 73/78 as amended, is required, "NA" is to replace "~~O~~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, Reg.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 Circular 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.*

……

2.6.17 Flame spread

2.6.17.1 All pipes, except those fitted on open decks and within tanks, cofferdams, void spaces, pipe tunnels and ducts if separated from accommodation, permanent manned areas and escape ways by means of an A class bulkhead ~~should~~ are to have low flame spread characteristics ~~as determined by the test procedures given in FTP Code and IMO resolution A.653 (16) as modified for pipes.~~ not exceeding average values listed in Appendix 3 of IMO Resolution.753(18), as amended by IMO Res. MSC. 313(88) and IMO Res. MSC. 399(95).

2.6.17.2 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 by IMO Res. MSC. 313(88) and IMO Res. MSC. 399(95).

2.6.17.3 ~~In IMO resolution A.653 (16) the test sample configuration only considers flat surfaces. Procedure modifications to A.653 (16) are necessary due to the curvilinear pipe surfaces. These procedure modifications are stated in IMO Resolution A.753 (18), Appendix 3 as amended MSC.313(88).~~

~~Piping materials giving average values for all of the surface flammability criteria not exceeding the values listed in IMO resolution A.653(16), (Surface flammability criteria, bulkhead, wall and ceiling linings) are considered to meet~~

~~the requirements for low flame spread in accommodation, service and control spaces. In other areas or where the quantity of pipes is small, TL may allow equivalent acceptance criteria.~~

Surface flame spread characteristics may also be determined using the ~~text~~ test procedures given in ASTM D635, or in other national equivalent standards. Under the procedure of ASTM D635 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.

……

2.6.21.1 Supports

Selection and spacing of pipe supports in shipboard systems are to ~~should~~ be determined as a function of allowable stresses and maximum deflection criteria. Support spacing is not to ~~should~~ be ~~not~~ greater than the pipe M~~m~~anufacturer's recommended spacing. The selection and spacing of pipe supports are to ~~should~~ take into account pipe dimensions, lenghth of piping, mechanical and physical properties of the pipe material, mass of pipe and contained fluid, external pressure, operating temperature, thermal expansion effects, ~~and~~ loads due to external forces, thrust forces, water hammer, vibrations, maximum accelerations to which the system may be subjected, and the type of support. The support spans are ~~should~~ also to be checked for combination of loads.

Each support is to ~~should~~ evenly distribute the load of the pipe and its contents over the full width of the support and be designed to minimize wear and abrasion.

Heavy components in the piping system such as valves and expansion joints are to ~~should~~ be independently supported.

2.6.21.2 Expansion

Suitable provision is to ~~should~~ be made in each pipeline to allow for relative movement between pipes made of plastics and the steel structure, having due regard to:

……

When calculating the thermal expansions, account is to ~~should~~ be taken of the system working temperature and the temperature at which assembling is performed.

2.6.21.3 External loads

Where applicable, allowance is to ~~should~~ be made for temporary point loads. Such allowances are to ~~should~~ include at least the force exerted by a load (person) of 100 kg at midspan on any pipe of more than 100 mm nominal outside diameter.

Pipes are to ~~should~~ be protected from mechanical damages where necessary.

2.6.21.4 Strength of connections

……

Adhesives, when used for joint assembly, are to ~~should~~ be suitable for providing a permanent seal between the pipes and fittings throughout the temperature and pressure range of the intended application.

Tightening of flanged or mechanically coupled joints is to ~~should~~ be performed in accordance with the manufacturer's instructions.

2.6.22 Penetrations of fire divisions

Where "A" or "B" class divisions are penetrated for the passage of plastic pipes, arrangements are to ~~should~~ be made to ensure that the fire resistance is not impaired. These arrangements are to ~~should~~ be tested in accordance with Recommendations for fire test procedures for "A" "B" and "F" bulkheads ~~(IMO resolution A.754(18), as amended).~~ 2010 FTP Code, annex 1, part 3.

2.6.23 Penetrations of watertight bulkheads and decks

Where plastic pipes pass through watertight bulkheads or decks, the watertight integrity and strength integrity of the bulkhead or deck is to ~~should~~ be maintained. For pipes not able to satisfy the requirements in 2.6.5.2, a metallic shut-off valve operable from above the freeboard deck should be fitted at the bulkhead or deck.

……

2.6.25 Installation of conductive pipes

2.6.25.1 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.

2.6.25.2 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 1×10^6 Ohm. 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.

2.6.25.3 After completion of the installation, the resistance to earth is to be verified. Earthing wires are to be accessible for inspection.

2.6.26 Application of fire protection coatings

2.6.26.1 Fire protection coatings are to be applied on the joints, where necessary for meeting the required fire endurance as for 2.6.20, after performing hydrostatic pressure tests of the piping system.

2.6.26.2 The fire protection coatings are to be applied in accordance with Manufacturer's recommendations, using a procedure approved in each particular case.

2.6.27 Control during installation

2.6.27.1 Installation is to be in accordance with the Manufacturer's guidelines.

2.6.27.2 Prior to commencing the work, joining techniques are to be approved by TL.

2.6.27.3 The tests and explanations specified in this subitem are to be completed before shipboard piping installation commences.

2.6.27.4 The personnel performing this work are to be properly qualified and certified to the satisfaction of TL.

2.6.27.5 The procedure of making bonds is to include:

- materials used,
- tools and fixtures
- joint preparation requirements,
- cure temperature,
- dimensional requirements and tolerances, and
- tests acceptance criteria upon completion of the assembly

2.6.27.6 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.

2.6.28 Bonding procedure quality testing

2.6.28.1 A 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.

2.6.28.2 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.

2.6.28.3 Selection of the pipes used for test assembly, is to be in accordance with the following:

- 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.
- 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.

2.6.28.4 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.

2.6.~~25~~29 Testing after installation on board

Plastic piping systems for essential services are to ~~should~~ be subjected to a test pressure not less than 1.5 times the design pressure of the system. The test pressure shall not be less than 4 bar.

Piping systems for non-essential services are to ~~should~~ be checked for leakage under operational conditions.

For piping required to be electrically conductive, the resistance to earth is to ~~should~~ be checked. Earthing wires should be accessible for inspection.

2.6.30 Test specification for plastic pipes

2.6.30.1 Scope

This item contains requirements for the Type Approval of plastic pipes. It is applicable to rigid pipes, piping systems, including pipe joints and fittings, made predominately of other material than metal.

2.6.30.2 Documentation

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

2.6.30.2.1 General information

- Pipe and fitting dimensions
- Maximum internal and external working pressure
- Working temperature range
- Intended services and installation locations
- The level of fire endurance
- Electrically conductive
- Intended fluids
- Limits on flow rates
- Serviceable life
- Installation instructions
- Details of marking

2.6.30.2.2 Drawings and supporting documentation

- Certificates and reports for relevant tests previously carried out.
- Details of relevant standards
- All relevant design drawings, catalogues, data sheets, calculations and functional descriptions.
- Fully detailed sectional assembly drawings showing pipe, fittings and pipe connections.

2.6.30.2.3 Materials (as applicable)

- The resin type
- Catalyst and accelerator types, and concentration employed in the case of reinforced polyester resin pipes or hardeners where epoxide resins are employed
- A statement of all reinforcements employed where the reference number does not identify the mass per unit area or the tex number of a roving used in a filament winding process, these are to be detailed.
- Full information regarding the type of gel-coat or thermoplastic liner employed during construction, as appropriate
- Cure/post-cure conditions. The cure and post cure temperatures and times employ resin/reinforcement ratio
- Winding angle and orientation
- Joint bonding procedures and qualification tests results, see 2.6.27.5.

2.6.30.3 Testing

Testing is to demonstrate compliance of the pipes, fittings and joints for which Type Approval is sought with item 2.6.

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

Revision Date: November 2019

Entry into Force Date: 1 January 2020

Item B.2.6, B.2.6.18 and B.2.6.19 were revised according to IACS REC 86 Rev.2 as below:

2.6

……

For testing and applications 2010 FTP CODE requirements and IMO Resolution A.753(18), as amended by IMO Res. MSC. 313(88) and IMO Res. MSC. 399(95), is to ~~will~~ be fulfilled ~~provided~~.

……

2.6.18 Smoke generation

2010 FTP CODE annex 1, part 2 requirements with the modifications listed in Appendix 3 of IMO Resolution A.753(18), as amended by as amended by IMO Res. MSC. 313(88) and IMO Res. MSC. 399(95), is to ~~will~~ be fulfilled ~~provided~~.

……

2.6.19 Toxicity

2010 FTP CODE annex 1, part 2 requirements with the modifications listed in Appendix 3 of IMO Resolution A.753(18), as amended by as amended by IMO Res. MSC. 313(88) and IMO Res. MSC. 399(95), is to ~~will~~ be fulfilled ~~provided~~.

Revision Date: September 2019

Entry into Force Date: 1 January 2020

Table 16.19, Table 16.20 (Footnotes), Table 16.21 was revised according to IACS UR P2.7.4 Rev.9 and item D.1.6 was added according to IACS UR P2.13 New as below:

1.6 Protection from mechanical damage

Seawater pipes located in cargo holds and in other spaces where pipes may be subject to impacts (e.g. fish holds, chain lockers) are to be protected from mechanical damage.

Table 16.19 Examples of mechanical joints

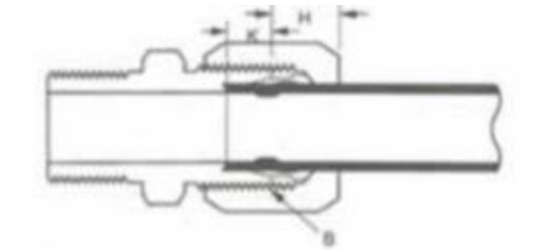
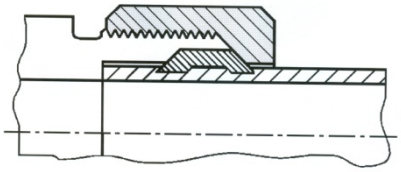
.....	
Compression Couplings	
.....	
Typical Compression Type	
Bite Type	
.....	

Table 16.20 Application of mechanical joints

Systems	**Pipe Unions**	**Compression couplings (6)**	**Slip-on joints**
.....			

Footnotes Table 16.20 – Fire resistance capability

If mechanical joints include any components which readily deteriorate in case of fire, ~~they are to be of an approved fire resistant type under consideration of~~ the following footnotes are to be observed:

1. *Inside machinery spaces of category A ~~only~~ approved of flame resistant types.*
2. *~~Not~~ Slip on joints are not accepted inside machinery spaces of category A or accommodation spaces. May be accepted in other machinery spaces provided the joint are located in easily visible and accessible positions.*
3. *Approved fire resistant types except in cases where such mechanical joints are installed on ~~exposed~~ open decks, as defined in SOLAS II-2/Reg. 9.2.3.3.2.2(10) and not used for fuel oil lines*
4. *~~Only in~~ In pump rooms and open decks- ~~only~~ approved fire resistant types.*

Footnotes Table 16.20 – General

5. *Slip type slip-on joints as shown in Table 16.19. May be used for pipes on deck with a design pressure of 10 bar or less.*
6. *Only above bulkhead deck of passenger ships and freeboard deck of cargo ships.*

\+ *Application is allowed* - *Application is not allowed*

Table 16.21 Application of mechanical joints depending upon the class of piping

Types of joints	Class I	Class II	Class III
.....			
Typical compression type	+ **(1)**	+ **(1)**	+
.....			

Revision Date: September 2019

Entry into Force Date: 1 January 2020

Item O.2.2 was revised according to Rec. 121 as below:

Note: TL Technical Circular S.P 35/13 covers interpretations of item 2.2 and also refer to TL-G 121 for uniform application of MARPOL Annex I, revised regulation 12 as a guidance.

Item N.5.3.1 was revised according to MSC 421(98) as below:

Ships with a length of 91.5 meters and upwards or having a ~~criterion of service~~ bilge pump numeral, calculated in accordance with SOLAS Regulation II-1/35-1.3.2, of 30 ~~(5)~~ or more, the arrangements are to be such that ~~have~~ at least one power bilge pump is to be available ~~in emergency cases. This requirement is satisfied if~~ for use in all flooding conditions which the ship is required to withstand and in all flooding conditions derived from consideration of minor damages as follows:

- One of the required pumps is to be an ~~submersible~~ emergency bilge pump ~~connected to its own bilge system and powered from~~ of a reliable submersible type having a source located above the bulkhead deck, or

- The pumps and their sources of power are to be distributed ~~over the entire~~ throughout the length of the ship the buoyancy of which in damaged condition is ascertained by calculation for each individual compartment or group of compartments, at least one pump being available in an undamaged compartment.

07. Section 18 – Fire Protection And Fire Extinguishing Equipment

Revision Date: September 2019

Entry into Force Date: 1 January 2020

Item B.12.2.1 was revised according to MSC 421(98) as below:

12.2.1 In addition to complying with the requirements of item 11, as appropriate, vehicle spaces of vehicle carriers ~~constructed on or after 1 January 2016~~ intended for the carriage of motor vehicles with compressed hydrogen or compressed natural gas in their tanks for their own propulsion as cargo shall comply with the requirements in items 12.3 to 12.5.

Item B.12.2.2 was deleted according to MSC 421(98) as below:

~~**12.2.2** In addition to complying with the requirements of item 11, as appropriate, vehicle carriers constructed before 1 January 2016, including those constructed before 1 July 2012 (refer to MSC.1/Circ.1471), shall comply with the requirements of item 12.5.~~

Item F.2.3.2 was revised according to MSC 409(97) as below:

Two portable foam extinguishers or equivalent in each firing space in each boiler room and in each space in which a part of the oil fuel installation is situated. There shall be not less than one approved foam-type extinguisher of at least 135 lcapacity or equivalent in each boiler room. These extinguishers shall be provided with hoses on reels suitable for reaching any part of the boiler room. In case of domestic boilers of less than 175 kW, or boilers protected by fixed water-based local application fire-extinguishing systems as required SOLAS II-2/10.5.6 an approved foam-type extinguisher of at least 135 l capacity is not required.

Item L.1.1 was added according to MSC 403(96) and subsequent items were renumbered, also references on items C.2.3, L.1.5.1 and 1.9.2 were corrected as below:

1.1 General

1.1.1 Any parts of the system which may be subjected to freezing temperatures in service shall be suitably protected against freezing.

1.1.2 Special attention shall be paid to the specification of water quality provided by the system manufacturer to prevent internal corrosion of sprinklers and clogging or blockage arising from products of corrosion or scale-forming minerals.

C.2.3 Where in passenger ships a public space comprises three or more decks (atrium) containing combustible furnishings, shops, offices or restaurants, the entire vertical fire zone is to be equipped with fire protection arrangements in accordance with 2.4.

In this case however, deviating from Chapter 5 - Electrical Installations, Section 9, D.3.1.11 and L.1.8.2 of this Section, all decks within this public space may be monitored or protected by a common fire detection - or spraying section.

1.5.1 The system shall be completely charged with fresh water when not in operation.

In addition to the water supply as per 1.3 the system is also to be connected to the fire main via a screw-down non-return valve.

1.9.2 A gauge indicating the pressure in the system shall be provided at each section valve according to 1.7.3 as well as at the centralized indication panel(s) on the navigating bridge.

Item O.1.3 was revised according to MSC 403(96) as below:

~~1.3 A fixed low expansion foam system with monitors or foam making branch pipes capable of delivering foam to all parts of the helideck in all weather conditions in which helicopters can operate. The system shall be capable of delivering a discharge rate as required in Table 18.9 for at least five minutes.~~

~~The foam agent shall meet the performance standards of ICAO (34) and be suitable for use with salt water.~~

1.3 Foam firefighting appliances

1.3.1 Application

This item details the specifications for foam firefighting appliances for the protection of helidecks and helicopter landing areas as required by chapter II-2 of the SOLAS.

1.3.2 Definitions

1.3.2.1 *D-value* means the largest dimension of the helicopter used for assessment of the helideck when its rotors are turning. It establishes the required area of foam application.

1.3.2.2 *Deck integrated foam nozzles* are foam nozzles recessed into or edge mounted on the helideck.

1.3.2.3 *Foam-making branch pipes* are air-aspirating nozzles in tube shape for producing and discharging foam, usually in straight stream only.

1.3.2.4 *Helicopter landing area* is as defined in SOLAS regulation II-2/3.57.

1.3.2.5 *Helideck* is as defined in SOLAS II-2/3.26.

1.3.2.6 *Hose reel foam station* is a hose reel fitted with a foam-making branch pipe and non-collapsible hose, together with fixed foam proportioner and fixed foam concentrate tank, mounted on a common frame.

1.3.2.7 *Monitor foam station* is a foam monitor, either self-inducing or together with separate fixed foam proportioner, and fixed foam concentrate tank, mounted on a common frame.

1.3.2.8 *Obstacle free sector* is the take-off and approach sector which totally encompasses the safe landing area and extends over a sector of at least 210º, within which only specified obstacles are permitted.

1.3.2.9 *Limited obstacle sector* is a 150º sector outside the take-off and approach sector that extends outward from a helideck where objects of limited height are permitted.

1.3.3 Engineering specifications for helidecks and helicopter landing areas

1.3.3.1 The system shall be capable of manual release, and may be arranged for automatic release.

1.3.3.2 For helidecks the foam system shall contain at least two fixed foam monitors or deck integrated foam nozzles. In addition, at least two hose reels fitted with a foam-making branch pipe and non-collapsible hose sufficient to reach any part of the helideck shall be provided. The minimum foam system discharge rate shall be determined by multiplying the D-value area by 6 l/min/m^2. The minimum foam system discharge rate for deck integrated foam nozzle systems shall be determined by multiplying the overall helideck area by 6 l/min/m^2. Each monitor shall be capable of supplying at least 50% of the minimum foam system discharge rate, but not less than

500 l/min. The minimum discharge rate of each hose reel shall be at least 400 l/min. The quantity of foam concentrate shall be adequate to allow operation of all connected discharge devices for at least 5 min.

1.3.3.3 Where foam monitors are installed, the distance from the monitor to the farthest extremity of the protected area shall be not more than 75% of the monitor throw in still air conditions.

1.3.3.4 For helicopter landing areas, at least two portable foam applicators or two hose reel foam stations shall be provided, each capable of discharging a minimum foam solution discharge rate, in accordance with the Table 18.9.

Table 18.9 Required foam quantity

Category	Helicopter overall length	Discharge rate foam solution (ℓ/min)
H1	< 15 m.	250
H2	≥ 15 m... < 24 m.	500
H3	≥ 24 m... < 35 m.	800

The quantity of foam concentrate shall be adequate to allow operation of all connected discharge devices for at least 10 min. For tankers fitted with a deck foam system, TL may consider an alternative arrangement, taking into account the type of foam concentrate to be used.

1.3.3.5 Manual release stations capable of starting necessary pumps and opening required valves, including the fire main system, if used for water supply, shall be located at each monitor and hose reel. In addition, a central manual release station shall be provided at a protected location. The foam system shall be designed to discharge foam with nominal flow and at design pressure from any connected discharge devices within 30 s of activation.

1.3.3.6 Activation of any manual release station shall initiate the flow of foam solution to all connected hose reels, monitors, and deck integrated foam nozzles.

1.3.3.7 The system and its components shall be designed to withstand ambient temperature changes, vibration, humidity, shock impact and corrosion normally encountered on the open deck, and shall be manufactured and tested to the satisfaction of theTL.

1.3.3.8 A minimum nozzle throw of at least 15 m shall be provided with all hose reels and monitors discharging foam simultaneously. The discharge pressure, flow rate and discharge pattern of deck integrated foam nozzles shall be to the satisfaction of TL, based on tests that demonstrate the nozzle's capability to extinguish fires involving the largest size helicopter for which the helideck is designed.

1.3.3.9 Monitors, foam-making branch pipes, deck integrated foam nozzles and couplings shall be constructed of brass, bronze or stainless steel. Piping, fittings and related components, except gaskets, shall be designed to withstand exposure to temperatures up to 925ºC.

1.3.3.10 The foam concentrate shall be demonstrated effective for extinguishing aviation fuel spill fires and shall conform to performance standards not inferior to those acceptable to **TL (34).** Where the foam storage tank is on the exposed deck, freeze protected foam concentrates shall be used, if appropriate, for the area of operation.

(34) *Refer to the "International Civil Aviation Organization Airport Services Manual, part 1, Rescue and Fire Fighting, chapter 8, Extinguishing Agent Characteristics, paragraph 8.1.5, Foam specifications table 8-1, Performance Level B", or to the "Revised Guidelines for the performance and testing criteria, and surveys of foam concentrates for fixed fire-extinguishing systems (MSC.1/Circ.1312)".*

1.3.3.11 Any foam system equipment installed within the take-off and approach obstacle-free sector shall not exceed a height of 0,25 m. Any foam system equipment installed in the limited obstacle sector shall not exceed the height permitted for objects in this area.

1.3.3.12 All manual release stations, monitor foam stations, hose reel foam stations, hose reels and monitors shall be provided with a means of access that does not require travel across the helideck or helicopter landing area.

1.3.3.13 Oscillating monitors, if used, shall be pre-set to discharge foam in a spray pattern and have a means of disengaging the oscillating mechanism to allow rapid conversion to manual operation.

1.3.3.14 If a foam monitor with flow rate up to 1,000 l/min is installed, it shall be equipped with an air-aspirating nozzle. If a deck integrated nozzle system is installed, then the additionally installed hose reel shall be equipped with an air-aspirating handline nozzle (foam branch pipes). Use of non-air-aspirating foam nozzles (on both monitors and the additional hose reel) is permitted only where foam monitors with a flow rate above 1,000 l/min are installed. If only portable foam applicators or hose reel stations are provided, these shall be equipped with an air-aspirating handline nozzle (foam branch pipes).

Item P.6.3 was revised according to IACS UI SC288 New as below:

6.3 Mechanical ventilation (two air changes/h)

The ventilation rate according to 6.2 may be reduced to not less than two air changes per hour, provided the goods are carried in container cargo spaces in closed freight containers.

For interpretation on required air changes TL-I SC 288 apply.

PART B – CHAPTER 4-1 - AUTOMATION

01. Section 08 – Sensors, Stand-By Circuits and Remote-Control Facilities

Revision Date: September 2019

Entry into Force Date: 1 January 2020

New item Table 8.1 and 8.2 was revised according to UR M35 Rev.8 as below:

F = Fault L = Low limit H = High limit R = Reduction RI = Remote Indication S = Shut down T = Trigger Stand-by activation	Sensor for alarms	Sensor for stand-by aggregate	Sensor for safety functions	Individual alarm at the bridge
Fuel oil system				
Fuel oil pressure after filter (engine inlet)	RI, L	L, T		
Fuel oil viscosity before injection pumps or fuel oil temperature before injection pumps (1)	L, H			
Leakage from high pressure pipes	F			
Level of fuel oil in daily service tank (2)	L			
Common rail fuel oil pressure	L			
Lubricating oil system				
Lub oil to main bearing and thrust bearing, pressure	L, RI	L, T	L, S	
Lub oil pressure at engine inlet (3) (4)	L	L, T	L, S	
Lub oil filter differential pressure	H, RI			
Lub oil inlet temperature	H, RI			
Activation of oil mist ~~concentration in crankcase~~ detection arrangements (or activation of the temperature monitoring systems or equivalent devices of: - the engine main and crank bearing oil outlet; or - the engine main and crank bearing) (5)	F		H,S	
Failure in cylinder lubrication	F, R			
Level in lubrication oil sump tanks (3)	L			
Fault at lubricating oil automatic filter	F			
Temperature thrust bearing	H, R			
Flow rate cylinder lubricator. Each apparatus	L, R			
Common rail servo oil pressure	L			
Turbocharger system				
Turbocharger lub oil inlet pressure (6)	L, RI			
Turbocharger lub oil outlet temperature each bearing (6),(7)	H			
Speed of turbocharger (8)	H, RI			
Sea water cooling system				
Sea water pressure	L, RI	L, T		
Cylinder fresh water cooling system				
Cylinder water inlet pressure or flow	L, R, RI	L, T	L, S (9)	
Cylinder water outlet temperature (general) (10)	H,R, RI			
Level of cylinder cooling water in expansion tanks	L			
Oil contamination in cylinder cooling water system (11)	F			
Pressure of LT (low temperature) freshwater cooling circuit	L			
Temperature of LT (low temperature) freshwater cooling circuit	H			
Temperature of cylinder cooling water at engine inlet	L			
Starting and control air systems				
Starting air pressure before main shut-off valve (12), (13)	L, RI			

Control air pressure	**L, RI**			
Scavenge air system				
Scavenge air receiver temperature	**H**			
Exhaust gas system				
Exhaust gas temperature turbocharger inlet and outlet	**H**			
Exhaust gas temperature after each cylinder (14)	**H, R, RI**			
Exhaust gas temperature after each cylinder.Deviation from average (14)	**H**			
Engine speed	**RI**			
Engine overspeed (4)			**H, S**	
Control-safety-alarm system power supply failure	**F**			

(1) *For heavy fuel oil burning engines only.*
(2) *High-level alarm is also required if no suitable overflow arrangement is provided.*
(3) *Individual alarms are to be provided for separate circuits.*
(4) *Shut-down only for engines from 220 kW upwards*
(5) *When required by TL- R M10.8 or by SOLAS Reg. II-1/47.2.: for each engine, one oil mist detector (or engine bearing temperature monitoring system or equivalent device) having two independent outputs for initiating the alarm and shut-down would satisfy the requirement for independence between alarm and shut-down system.*
(6) *Unless provided with a self-contained lubricating oil system integrated with the turbocharger.*
(7) *Where outlet temperature from each bearing cannot be monitored due to the engine/turbocharger design alternative arrangements may be agreed with TL. Continuous monitoring of inlet pressure and inlet temperature in combination with specific intervals for bearing inspection in accordance with the turbocharger manufacturer's instructions may be accepted as an alternative.*
(8) *Only required for turbochargers of Categories B and C (see TL Machinery Rules, Chapter 4, Section 4,A.).*
(9) *If possible due to size, otherwise a shutdown for cooling temperature cylinder outlet to be provided when reaching high limit.*
(10) *Two separate sensors are required for alarm and reduction.*
(11) *Where cooling water is used for preheating or cooling fuel, lubricating oil.*
(12) *For engines with direct reversing capability and also all engines with remote start from the bridge, individual alarm.*
(13) *Where engine is started electronically the failure of the battery charger is to be alarmed.*
(14) *For engines > 500 kW/cyl.*

Note: Remote indications are required only for ships which are operated with machinery space unattended but under a continuous supervision from a position where control and monitoring devices are centralized, without the traditional watch service being done by personnel in machinery space.

F = Fault **L = Low limit** **H = High limit** **R = Reduction** **RI = Remote Indication** **S = Shut down** **T = Trigger Stand-by activation**	**Sensor alarms**	**Sensor for stand-by aggregate**	**Sensor for safety functions**	**Individual alarm at the bridge**
Fuel oil system				
Fuel oil pressure after filter (engine inlet)	**RI, L**	**L, T**		
Fuel oil viscosity before injection pumps or	**L, H**			

fuel oil temperature before injection pumps				
Leakage from high pressure pipes	**F**			
Level of fuel oil in daily service tank (1)	**L**			
Common rail fuel oil pressure	**L**			
Lubricating oil system				
Lub oil to main bearing and thrust bearing, pressure	**RI, L, R**	**L, T**	**L, S**	
Lub oil to crosshead bearing, pressure **(2)**	**RI, L, R**	**L, T**	**L, S**	
Lub oil to camshaft pressure **(2)**	**L**	**L, T**	**L, S**	
Lub oil to camshaft temperature **(2)**	**H**			
Lub oil inlet temperature	**H**			
Thrust bearing pads temp or bearing outlet temp	**H, R**		**H, S**	
~~**Main, crank, crosshead bearing, oil outlet temp or Oil mist concentration in crankcase**~~ Activation of oil mist detection arrangements (or activation of the temperature monitoring systems or equivalent devices of: - the engine main, crank and crosshead bearing oil outlet; or - the engine main, crank and crosshead bearing) **(3)**	**F**			
Flow rate cylinder lubricator. Each apparatus	**L, R**			
Level in lubricating oil tanks **(4)**	**L**			
Common rail servo oil pressure	**L**			
Turbocharger system				
Turbocharger lub oil inlet pressure (9)	**L**			
Turbocharger lub oil outlet temperature, each bearing (10)	**H**			
Speed of turbocharger (11)	**H, RI**			
Piston cooling system				
Piston coolant inlet pressure **(5)**	**L, R**	**L, T**		
Piston coolant outlet temp each cylinder	**H, R**			
Piston coolant outlet flow each cylinder **(8)**	**L, R**			
Level of piston coolant in expansion tank	**L**			
Sea water cooling system				
Sea water pressure	**L**	**L, T**		
Cylinder fresh cooling water system				
Cylinder water inlet pressure	**L, R**	**L, T**		
Cylinder water outlet temp (from each cylinder) or **Cylinder water outlet temp (general) (6)**	**H, R**			
Oily contamination of engine cooling water system (7)	**F**			
Level of cylinder cooling water in expansion tank	**L**			

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Table 8.7 was revised in Section 8 according to UR M36 Rev.5 as below:

Table 8.7 Auxiliary diesel engines

F = Fault L = Low limit H = High limit R = Reduction S = Shut down T = Trigger Stand-by activation	Sensor for alarms	Sensor for stand-by aggregate	Sensor for safety functions	Individual alarm at the bridge
Auxiliary diesel engines				
Fuel oil leakage from high pressure pipes	F			
Lubricating oil temperature	H			
Lubricating oil pressure	L		L, S	
~~Oil mist concentration in crankcase (3)~~Activation of oil mist detection arrangements (or activation of the temperature monitoring systems or equivalent devices of: - the engine main and crank bearing oil outlet; or - the engine main and crank bearing) (3)	~~H~~F		H, S	
Pressure or flow of cooling water	L			
Temperature of cooling water or cooling air	H			
Level in cooling water expansion tank, if separate circuit	L			
Level in fuel oil daily service tank	L			
Pressure of starting air	L			
Overspeed activated			H, S	
Fuel oil viscosity before injection pumps or fuel oil temperature before injection pumps (1)	L H			
Exhaust gas temperature after each cylinder (2)	H			
Common rail fuel oil pressure	L			
Common rail servo oil pressure	L			
Speed of turbocharger (4)	H			

Notes:

(1) *For heavy fuel oil burning engines only.*

(2) *For engine power above 500 kW/cyl.*

(3) *When required by TL- R M10.8 or by SOLAS Reg. II-1/47.2. for each engine, one oil mist detector ~~for each engine~~ (or engine bearing temperature monitoring system or equivalent device) having two independent outputs for initiating the alarm and shut- down would satisfy the requirement for independence between alarm and shut-down system.*

(4) *Only required for turbochargers of Categories B and C. (see **TL** Machinery Rules, Chapter 4, Section 4,A.).*

New item J was added in Section 8 as below:

J. Sensors for Electric Propulsion Plants

Table 8.11 Indicators for electric permanent excited propulsion motors (PE), as well as synchronous motors (SY) and asynchronous motors (AS)

Descriptions F = Fault L = Low limit H = High limit R = Reduction S = Shut-down T = Trigger standby activation C = Collective alarm	(R) = if applicable (S) = if applicable	Sensor for alarms	Sensor for stand-by aggregate	Sensor for safety functions	Alarm at the bridge
Electric motor					
External lubrication failure	**PE SY AS**	F		F(R) (S)	C
Bearing temperature	**PE SY AS**	H		H	C
Stator winding temperature	**PE SY AS**	H		H R	C
Sliprings condition	**SY**	Inspection			-
External cooling water and/or air failure	**PE SY AS**	F		F	C
Cooling air temperature, engine inlet at closed loop cooling system	**PE SY AS**	H		H	C
Coolant leakage	**PE SY AS**	F		F	C
Speed	**PE SY AS**	H		H S	C
Voltage regulator breakdown	**SY**	F		F S	C
Earth fault monitoring at stator with	**PE SY AS**	L		L	C
Earth fault monitoring of exciting system	**SY**	L		L	C
Transformer reactor					
Transformer winding temperature	**PE SY AS**	H		H R	C
Coolant leakage	**PE SY AS**	F		F	C
External cooling failure	**PE SY AS**	F		F	C
Converter					
Mains failure	**PE SY AS**	F		S	C
External cooling failure	**PE SY AS**	F		F R	C
Power section temperature	**PE SY AS**	H		H S	C
Cooling quality (only at direct cooling)	**PE SY AS**	L		L	C
Coolant leakage	**PE SY AS**	F		F	C
General warning	**PE SY AS**				C
Breakdown	**PE SY AS**	F		F S	C
Speed-/rotor position sensor detection failure	**PE SY AS**	F		F	C
Emergency stop (converter de-energized)	**PE SY AS**	F		F S	C

Table 8.11 Indicators for electric permanent excited propulsion motors (PE), as well as synchronous motors (continued) (SY) and asynchronous motors (AS)

Descriptions F = Fault L = Low limit H = High limit R = Reduction	(R) = if applicable	Sensor for alarms	Sensor for stand-by aggregate	Sensor for safety functions	Alarm at the bridge
Semiconductor fuse	**PE SY AS**	F		F S	C
Chopper temperature	**PE SY AS**	H		H R	C
DC-Link, voltage	**PE SY AS**	H		H S	C
DC-Link, current	**PE SY AS**	H		H S	C
Output current	**PE SY AS**	H		H S	C
Propulsion net/ship electrical system					
Harmonic filter breakdown	**PE SY AS**	F		F	C

PART B – CHAPTER 5 – ELECTRICAL INSTALLATION

01. Section 4 –Installation Protection and Power Distribution

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Item I.1.1 was added and subsequent items were renumbered and renumbered item I.1.2 and I.1.3 was revised according to UR E24 Rev.1 as below:

11.1 Scope

The requirements of this item apply to ships where harmonic filters are installed on main busbars of electrical distribution system, other than those installed for single application frequency drives such as pump motors.

11.2 General

The total harmonic distortion (THD) of electrical distribution systems is not to exceed 8 %.

This limit may be exceeded where all installed equipment and systems have been designed for a higher specified limit and this relaxation on limits is ~~to be~~ documented (harmonic distortion calculation report) and made available on board as a reference for the surveyor at each periodical survey.

11.3 Monitoring of harmonic distortion levels for a ship including harmonic filters

~~Where the electrical distribution system on board a ship includes harmonic filters, such~~The ships are to be fitted with facilities to continuously monitor the levels of harmonic distortion experienced on the main busbar as well as

alerting the crew should the level of harmonic distortion exceed the acceptable limits. Where the engine room is provided with automation systems, this reading should be logged electronically, otherwise it is to be recorded in the engine log book for future inspection by the surveyor. ~~However, harmonic filters installed for single application frequency drives such as pump motors may be excluded from these requirements.~~

02. Section 5 – Low Voltage Switchgear Assemblies

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Item A.5 and Item B.2 were revised as below:

A. General

.....

5. Regarding design, construction and testing of low-voltage switchgear assemblies attention is drawn to IEC publication 60092-302-2.

.....

B. Calculations

.....

2. Heat Losses (Heat Balance)

Switchgear assemblies shall be so designed that under operational conditions the permissible temperature rise limits in accordance with IEC publication 60092-302-2 are not exceeded.

03. Section 15 – Additional Rules for Tankers

Revision Date: November 2019

Entry into Force Date: 1 January 2020

B. Oil Tankers, Cargo Flash Point Above 60°C

1. Where the cargoes are heated ~~temperature within~~ to 15~~10~~°C below its ~~of their~~ flash point or above, the requirements of subsection C. are applicable.

2. Where the cargoes are not heated or heated to not more than 15~~10~~°C below its flash point, extended hazardous areas (zone 2) are specified inside cargo tanks, slop tanks and any pipe work for cargo and slop tanks or venting system.

PART C – CHAPTER 7 – HIGH SPEED CRAFTS

01. Section 8 – Life-Saving Appliances and Arrangements

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Items 8.10.1.5 and 8.10.1.6 were replaced each other and renumbered 8.10.1.6.1 was revised according toMSC 424(98) as below:

.6.1 the craft is arranged to allow a helpless person to be recovered from the water in horizontal or near-horizontal body position;

PART C – CHAPTER 9 – Rules for Construction and Classification of Yachts

01. Section 2 – Hull Construction – General Requirements

Revision Date: October 2019

Entry into Force Date: 1 January 2020

"m" was corrected as "rn" in item E.1 and E.2, "m" was corrected as "dg" in Table 2.4, figure numbers were given as "Figure 2.11" and "Figure 2.12" as below:

E. Loads

1. General

.....

Pressures on panels and stiffeners may be considered as uniform and equal to the value assumed in the point of reference "rn~~m~~" as defined in 2.

2. Definitions and Symbols

.....

rn~~m~~ = Point of reference, intended as the lower edge of the plating panel or the centre of the area supported by the stiffener, depending on the case under consideration,

.....

Table 2.4

Deck	Exposed weather deck		Sheltered areas(also partially by deck-houses)
	Forward 0,075 L from fore perpendicular	Aft 0,075 L from fore perpendicular	

	h_d	h_d	h_d
Deck below dg~~m~~	-	-	0,9
dg~~m~~	1,5	1,0	0,9
Deck above dg~~m~~	1,2	0,9	0,7

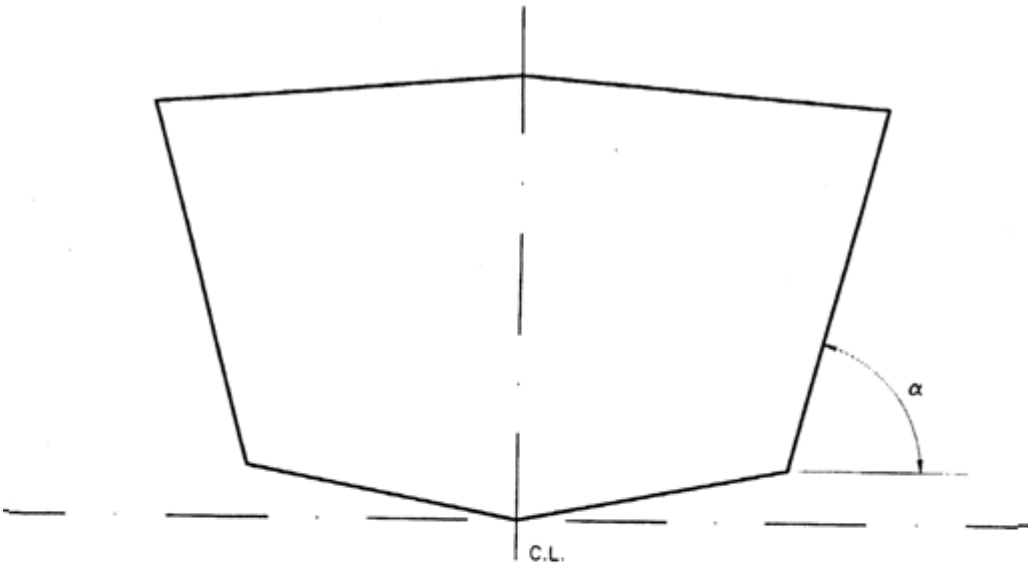


Figure 2.11

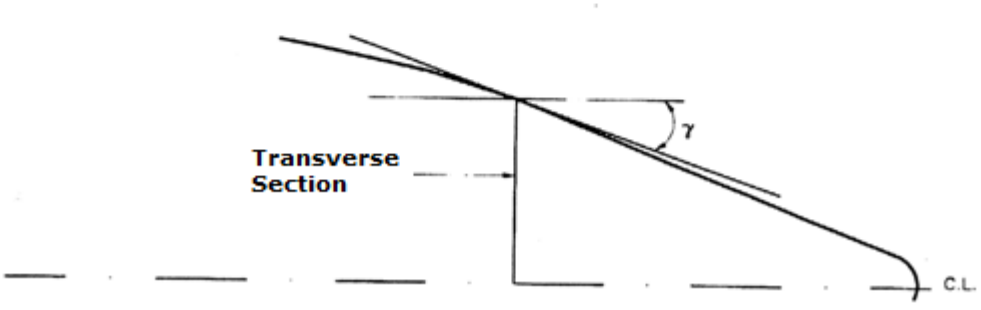


Figure 2.12

PART C – CHAPTER 10 LIQUFIED GAS TANKERS

01. Section 03 – Ship Arrangements

Revision Date: August 2019

Entry into Force Date: 1 January 2020

Item 3.2.5 was revised according to MSC 411(97) as below:

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

02. Section 04 – Cargo Containment

Revision Date: August 2019

Entry into Force Date: 1 January 2020

Item 4.16.4 was revised according to IACS UR G2 Rev.2 as below:

4.16.4 ~~*When determining the design stresses the minimum specified mechanical properties of the material, including the weld metal in the fabricated condition shall be used. For certain materials, subject to special consideration by the Society, advantage may be taken of enhanced yield strength and tensile strength at design temperatures below -105°C. However, material strength data at ambient temperature shall be applied at ambient temperature conditions, e.g. pressure testing*~~

Maximum allowable stress

The maximum allowable stresses to be used in calculation according to 4.23.2.4 shall not exceed the value defined in 4.23.3.1.

Revision Date: December 2019

Entry into Force Date: -

Item 4.19.1.6 was revised according to IACS UI GC23 New Corr.1 as below:

4.19.1.6 The means of heating referred to in 4.19.1.5 shall comply with the following requirements:

.....

Note: 1. Heating system referred to ~~*on*~~ *in 4.19.1.6.1 is to be such that, in case of a single failure of a mechanical or electrical component in any part of the system, heating can be maintained at not less than 100% of the theoretical heat requirement.*

2. Where the above requirements are met by duplication of the system components, i.e., heaters, glycol circulation pumps, electrical control panel, auxiliary boilers etc., all electrical components of at least one of the systems are to be supplied from the emergency ~~*switch borad*~~ *source of electrical power.*

3. Where duplication of the primary source of heat, e.g., oil-fired boiler is not feasible, alternative proposals can be accepted such as an electric heater capable of providing 100% of the theoretical heat requirement provided and supplied by an individual circuit arranged separately on the emergency switchboard. Other solutions may be considered towards satisfying the requirements of 4.19.1.6.1, provided a suitable risk assessment is conducted to the satisfaction of the Administration. The requirement in paragraph 2 of this note continues to apply to all other electrical components in the system.

03. Section 05 – Process Pressure Vessels and Liquid, Vapour and Pressure Piping Systems

Revision Date: August 2019

Entry into Force Date: 1 January 2020

Note was added under item 5.13.1.1.2 according to IACS UI GC26 New as below:

Note: *The expression "Each type of valve…shall be certified to a recognized standard" is interpreted to mean that:*

1. *for pressure relief valves (PRVs) that are subject to IGC Code paragraph 8.2.5, the flow or capacity are to be certified by the Administration or Recognized Organization acting on its behalf; and*
2. *for other types of valves, the manufacturer is to certify the flow properties of the valves based on tests carried out according to recognized standards.*

Revision Date: August 2019

Entry into Force Date: 1 January 2020

Item 5.13.1.1.4 was revised according to IACS UR G24 Rev.1 as below:

.....

Note: "Emergency shutdown valves, with materials having melting temperatures lower than 925°C" does not include an emergency shutdown valves ~~s~~ in which components made of ~~use~~ materials having melting temperatures lower than 925°C do not contribute to the ~~in components such as rubber handle covers where failure would not cause deterioration of~~ shell or seat tightness ~~intrinsically~~ of the valve.

04. Section 08 – Vent Systems For Cargo Containment

Revision Date: December 2019

Entry into Force Date: 1 January 2020

Item 8.1 was revised according to IACS UI GC28 Rev.1 as below:

Note: *For the purpose of second sentence of paragraph 8.1 the following applies:*

1 General

1.1 The formula for determining the relieving capacity given in section 2 is for interbarrier spaces surrounding independent type A cargo tanks, where the thermal insulation is fitted to the cargo tanks.

1.2 The relieving capacity of pressure relief devices of interbarrier spaces surrounding independent type B cargo tanks may be determined on the basis of the method given in section 2, however, the leakage rate is to be determined in accordance with 4.7.2.

1.3 The relieving capacity of pressure relief devices for interbarrier spaces of membrane and semi- membrane tanks is to be evaluated on the basis of specific membrane/semi-membrane tank design.

1.4 The relieving capacity of pressure relief devices for interbarrier spaces adjacent to integral type cargo tanks may, if applicable, be determined as for type A independent cargo tanks.

2 Size of pressure relief devices

The combined relieving capacity of the pressure relief devices for interbarrier spaces surrounding type A independent cargo tanks where the insulation is fitted to the cargo tanks may be determined by the following formula:

$$Q_{sa} = 3{,}4 \cdot A_c \frac{\rho}{\rho_v} \sqrt{h} \quad (m^3/s)$$

Where:

Q_{sa} = *minimum required discharge rate of air at standard conditions of 273 K and 1.013 bar*

A_c = *design crack opening area* (m^2)

$$A_c = \frac{\pi}{4} \delta \cdot l \ (m^2)$$

δ = *max, crack opening width (m)*

δ = *0.2t (m)*

t = *thickness of tank bottom plating (m)*

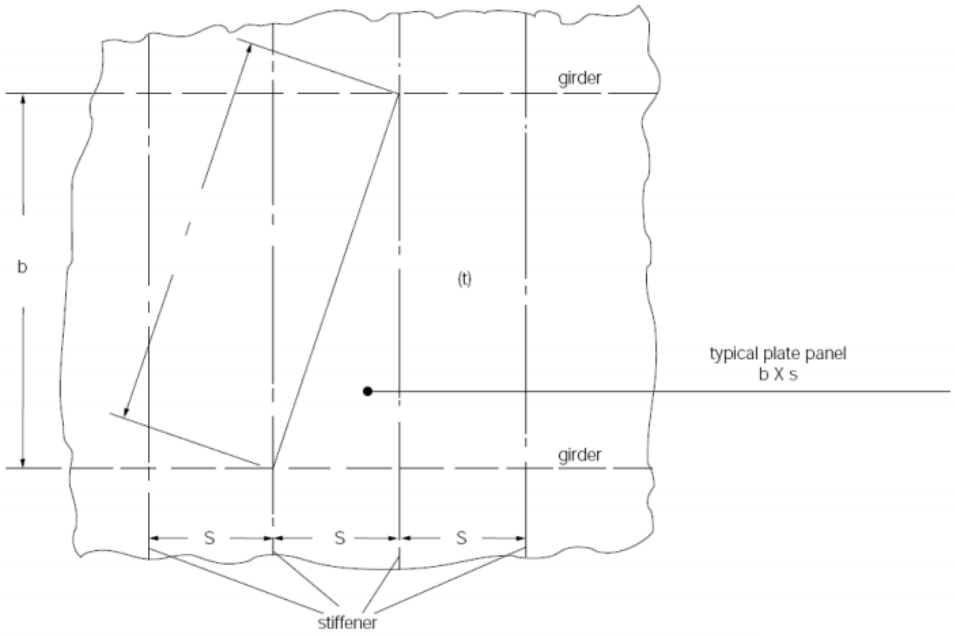
l = *design crack length (m) equal to the diagonal of the largest plate panel of the tank bottom, see sketch below.*

h = *max liquid height above tank bottom plus 10.MARVS (m)*

ρ = *density of product liquid phase* (kg/m^3) *at the set pressure of the interbarrier space relief device*

ρ_v = *density of product vapour phase* (kg/m^3) *at the set pressure of the interbarrier space relief device and a temperature of 273 K*

MARVS = max allowable relief valve setting of the cargo tank (bar).



05. Section 13 – Instrumentation and Automation Systems

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Item 13.2.2 was revised according to IACS UI GC27 New as below:

Notes:

In order to assess whether or not only one level gauge is acceptable in relation to the aforesaid sentence, 'can be maintained' means that any part of the level gauge other than passive parts can be overhauled while the cargo tank is in service.

Passive parts are those parts assumed not subject to failures under normal service conditions.

PART C – CHAPTER 36 – OFFSHORE SERVICE VESSELS

01. Section 3 – Structural Fire Protection

Revision Date: October 2019

Entry into Force Date: 1 January 2020

Item A.1.5 was revised according to MSC 404(96) as below:

.....

- Evacuation analysis (only ~~ro-ro~~ passenger ships).

.....

Item C.12.7 was revised according to MSC 404(96) as below:

See D.12.7 and D.12.8.

Item D.12.7.10 was renumbered as 12.8 and revised according to MSC 404(96) as below:

12.8 Evacuation analysis for passenger ships

Escape routes are to be evaluated by an evacuation analysis early in the design process **(13).** This analysis shall apply to ro-ro passenger ships and passenger ships carrying more than 36 passengers.

The analysis shall be used to identify and eliminate, as far as practicable, congestion which may develop during an abandonment, due to normal movement of passengers and crew along escape routes, including the possibility that crew may need to move along these routes in a direction opposite the movement of passengers. In addition, the analysis shall be used to demonstrate the escape arrangements are sufficiently flexible to provide for the possibility that certain escape routes, assembly stations, embarkation stations or survival craft may not be available as a result of a casualty.

PART D – CHAPTER 78 RULES FOR CLASSIFICATION OF SHIPS USING GASES OR OTHER LOW-FLASHPOINT FUEL

01. Section 06 – Fuel Containment System

Revision Date: August 2019

Entry into Force Date: 1 January 2020

Note was added under item 6.8.2 according to IACS UI GF16 New as below:

Note: The alternative loading limit option given under 6.8.2 is understood to be an alternative to 6.8.1 and should only be applicable when the calculated loading limit using the formulae in 6.8.1 gives a lower value than 95%.

02. Section 11 – Fire Safety

Revision Date: August 2019

Entry into Force Date: 1 January 2020

Item 11.3.2 was revised according to MSC 422(98) as below:

11.3.2 Any boundary of accommodation spaces, service spaces, control stations, escape routes and machinery spaces, facing fuel tanks on open deck, shall be shielded by A-60 class divisions. The A-60 class divisions shall extend up to the underside of the deck of the navigation bridge~~, and any boundaries above that, including navigation bridge windows, shall have A-0 class divisions~~. In addition, fuel tanks shall be segregated from cargo in accordance with the requirements of the International Maritime Dangerous Goods (IMDG) Code where the fuel tanks are regarded as bulk packaging. For the purposes of the stowage and segregation requirements of the IMDG Code, a fuel tank on the open deck shall be considered a class 2.1 package.

Note was added under Item 11.3.3 according to IACS UI GF17 New as below:

Note: The following "other rooms with high fire risk" should as a minimum be considered, but not be restricted to:

1. cargo spaces except cargo tanks for liquids with flashpoint above 60°C and except cargo spaces exempted in accordance with SOLAS regulations II-2/10.7.1.2 or II-2/10.7.1.4;

2. vehicle, ro-ro and special category spaces;

3. service spaces (high risk): galleys, pantries containing cooking appliances, saunas, paint lockers and store-rooms having areas of 4 m2 or more, spaces for the storage of flammable liquids and workshops other than those forming part of the machinery space, as provided in SOLAS regulations II-2/9.2.2.4, II-2/9.2.3.3 and II-2/9.2.4; and

4. accommodation spaces of greater fire risk: saunas, sale shops, barber shops and beauty parlours and public spaces containing furniture and furnishing of other than restricted fire risk and having deck area of 50 m2 or more, as provided in SOLAS regulation II-2/9.2.2.3

03. Section 15 – Control, Monitoring and Safety Systems

Revision Date: August 2019

Entry into Force Date: 1 January 2020

Note was added under item 15.3.2 according to IACS UI GF18 New as below:

Note: The "level indicator" required by 15.3.2 is understood to be required for the purposes of indicating an alarm status only; a level switch (float switch) is an instrument example considered to meet this requirement.

ADDITIONAL RULE – SURVEY and CERTIFICATION RULES ON ENERGY EFFICIENCY OF SHIPS (MARPOL 73/78 ANNEX VI, CHAPTER 4)

01. General

Revision Date: August 2019

Entry into Force Date: 1 January 2020

Table for preliminary EEDI Technical File and final EEDI Technical File after sea trial were revised according to MEPC 322(74) as below:

f_m	For ice-classed ships having IA Super or IA f_m is determined by the standard given in MEPC. 308(73), as amended by MEPC.322(74). Documentation on intended ice class	

f_m	Class certificate including ice class notation	

ADDITIONAL RULE – REGULATIONS FOR THE PERFORMANCE OF THE TYPE TESTS PART 1 – TEST SPECIFICATION FOR TYPE APPROVAL

01. General

Revision Date: August 2019

Entry into Force Date: 1 January 2020

Test specification for 5, 14 and 19 were revised according to UR E10 Rev.7 as below:

NO.	TEST	PROCEDURE ACC. TO:*	TEST PARAMETERS	OTHER INFORMATION

NO.	TEST	PROCEDURE ACC. TO:*	TEST PARAMETERS	OTHER INFORMATION
5.	Dry heat (see note 1)	IEC 60068-2-2 Test Bb for non-heat dissipating equipment	Temperature: 55° ± 2°C Duration: 16 hours or Temperature: 70°C ± 2°C Duration: 16 hours	- equipment operating during conditioning and testing; - functional test (b) during the last hour at the test temperature. - for equipment specified for increased temperature the dry heat test is to be conducted - at the agreed test temperature and duration.
		IEC 60068-2-2 Test Be for heat dissipating equipment	Temperature: 55° ± 2°C Duration: 16 hours or Temperature: 70°C ± 2°C Duration: 16 hours	- equipment operating during conditioning and testing with cooling system on if provided; - functional test (b) during the last hour at the test temperature. - for equipment specified for increased temperature the dry heat test is to be conducted at the agreed test temperature and duration
14.	Electromagnetic field	IEC 61000-4-3	Frequency range: 80 MHz to 6 GHz Modulation**: 80% AM at 1000Hz Field strength: 10V/m Frequency sweep rate: ≤1.5 x 10^{-3} decades/s (or 1%/3 sec) According to test level 3.	- to simulate electromagnetic fields radiated by different transmitters; - the test is to be confined to the appliances exposed to direct radiation by transmitters at their place of installation. - Performance criterion A (See Note 5) **If for tests of equipment an input signal with a modulation frequency of 1000 Hz is necessary a modulation frequency of 400 Hz may be chosen. - If an equipment is intended to receive radio signals for the purpose of radio communication (e.g. wifi router, remote radio controller), then the immunity limits at its communication frequency do not apply, subject to the provisions in TL- R E22.5.2.

<table>
<tr><th>NO.</th><th>TEST</th><th>PROCEDURE
ACC. TO:*</th><th>TEST PARAMETERS</th><th>OTHER INFORMATION</th></tr>
<tr><td>19.</td><td>Radiated Emission</td><td>CISPR 16-2-3
IEC 60945 for 156-165 MHz</td><td>Limits below 1000 MHz

For equipment installed in the bridge and deck zone.

<table><tr><td>Frequency range:</td><td>Quasi</td></tr><tr><td>0.15 - 0.3 MHz
0.3 - 30 MHz
30 - 1000 MHz

except for:
156 -165 MHz</td><td>80 - 52
52 - 34
54

24</td></tr></table>
For equipment installed in the general power distribution zone.

<table><tr><td>Frequency range:</td><td>Quasi</td></tr><tr><td>0.15 - 30 MHz
30 - 100 MHz
100 - 1000 MHz

except for:
156 -165 MHz</td><td>80 - 50
60 - 54
54

24</td></tr></table>
Limits above 1000 MHz
<table><tr><td>Frequency range:</td><td>Averag</td></tr><tr><td>1000-6000 MHz</td><td>54</td></tr></table></td><td>- procedure in accordance with the standard but distance 3 m between equipment and antenna

- for the frequency band 156 MHz to 165 MHz the measurement shall be repeated with a receiver bandwidth of 9 kHz (as per IEC 60945).

- alternatively the radiation limit at a distance of 3 m from the enclosure port over the frequency 156 MHz to 165 MHz shall be 30 dB micro-V/m peak (as per IEC 60945).

- procedure in accordance with the standard (distance 3 m between equipment and antenna)
- Equipment intended to transmit radio signals for the purpose of radio communication (e.g. wifi router, remote radio controller) may be exempted from limit, within its communication frequency range, subject to the provisions in TL-R E22.5.2</td></tr>
</table>

Notes:

1. Dry heat at 70°C is to be carried out to automation, control and instrumentation equipment subject to high degree of heat, for example mounted in consoles, housing, etc. together with other heat dissipating power equipment.

TURK LOYDU RULES – IMO References

01. IMO References

Revision Date: December 2019

Entry into Force Date: 1 January 2020

IMO References, indicated in below sections of Turk Loydu Rules, were revised:

Chapter 4 – Machinery → Section 1, Section 16, Section 18

Chapter 5 – Electrical Installation → Section 8, Section 12, Section 14, Section 17, Section 18

Chapter 7 – High Speed Crafts → Section 1, Section 7, Section 8, Section 13, Section 14, Section 18

Chapter 21 – High Speed Crafts → Section 1, Section 3, Section 4

Chapter 28 - Ventilation

Chapter 33 - Construction of Polar Class Ships

Chapter 34 - Tentative Rules for the Classification of Special Crafts - Patrol Boat → Section 1

Chapter 35 - Tentative Rules for Ships Less Than 500 GRT → Section 2

Chapter 36 - Offshore Service Vessels → Section 1, Section 3, Section 7, Section 15, Section 18, Section 19, Section 23

Chapter 76 - Environmental Service System → Section 1, Section 2

Chapter 78 - Rules for Classification of Ships Using Gases or Other Low-Flashpoint Fuel

Additional Rules – Survey and Certification Rules on Energy Efficiency of Ships (MARPOL 73/78 Annex VI, Chapter 4)

Guidelines – Design, Test and Approval of Fixed Fire Extinguishing Systems other than CO2 installed on Yachts

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