Tasneef
هيئة الإمارات للتصنيف
Emirates Classification Society

Rules for the Classification of Naval Ships

Effective from 1 January 2025

Part D

Service Notations

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Tasneef® MARITIME

GENERAL CONDITIONS

Definitions:

Administration" means the Government of the State whose flag the ship is entitled to fly or under whose authority the ship is authorized to operate in the specific case.

"**IACS**" means the International Association of Classification Societies.

"Interested Party" means the party, other than the Society, having an interest in or responsibility for the Ship, product, plant or system subject to classification or certification (such as the owner of the Ship and his representatives, the shipbuilder, the engine builder or the supplier of parts to be tested) who requests the Services or on whose behalf the Services are requested.

"**Owner**" means the registered owner, the shipowner, the manager or any other party with the responsibility, legally or contractually, to keep the ship seaworthy or in service, having particular regard to the provisions relating to the maintenance of class laid down in Part A, Chapter 2 of the Rules for the Classification of Ships or in the corresponding rules indicated in the Specific Rules.

"**Rules**" in these General Conditions means the documents below issued by the Society:

(i) Rules for the Classification of Ships or other special units.
(ii) Complementary Rules containing the requirements for product, plant, system and other certification or containing the requirements for the assignment of additional class notations;
(iii) Rules for the application of statutory rules, containing the rules to perform the duties delegated by Administrations.
(iv) Guides to carry out particular activities connected with Services;
(v) Any other technical document, for example, rule variations or interpretations.

"Services" means the activities described in paragraph 1 below, rendered by the Society upon request made by or on behalf of the Interested Party.

"**Ship**" means ships, boats, craft and other special units, for example, offshore structures, floating units and underwater craft.

"Society" or "TASNEEF" means TASNEEF Maritime

"**Surveyor**" means technical staff acting on behalf of the Society in performing the Services.

"**Force Majeure**" means damage to the ship; unforeseen inability of the Society to attend the ship due to government restrictions on right of access or movement of personnel; unforeseeable delays in port or inability to discharge cargo due to unusually lengthy periods of severe weather, strikes or civil strife; acts of war; or other force majeure.

1. Society Roles

1.1. The purpose of the Society is, among others, the classification and certification of ships and the certification of their parts and components. In particular, the Society:
(i) sets forth and develops Rules.
(ii) publishes the Register of Ships.
(iii) Issues certificates, statements and reports based on its survey activities.
1.2. The Society also takes part in the implementation of national and international rules and standards as delegated by various Governments.
1.3. The Society carries out technical assistance activities on request and provides special services outside the scope of classification, which is regulated by these general conditions unless expressly excluded in the particular contract.

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2. Rule Development, Implementation and Selection of Surveyor

2.1. The Rules developed by the Society reflect the level of its technical knowledge at the time they are published therefore, the Society, although also committed through its research and development services to continuous updating of the Rules, does not guarantee the Rules meet state-of-the-art science and technology at the time of publication or that they meet the Society's or others' subsequent technical developments.
2.2. The Interested Party is required to know the Rules based on which the Services are provided. With particular reference to Classification Services, special attention is to be given to the Rules concerning class suspension, withdrawal and reinstatement. In case of doubt or inaccuracy, the Interested Party is to promptly contact the Society for clarification.
The Rules for Classification of Ships are published on the Society's website: www.tasneef.ae.
2.3. Society exercises due care and skill:
(i) In the selection of its Surveyors
(ii)In the performance of its Services, taking into account the level of its technical knowledge at the time the Services are performed.
2.4. Surveys conducted by the Society include, but are not limited to, visual inspection and non-destructive testing. Unless otherwise required, surveys are conducted through sampling techniques and do not consist of comprehensive verification or monitoring of the Ship or the items subject to certification. The surveys and checks made by the Society on board ship do not necessarily require the constant and continuous presence of the Surveyor. The Society may also commission laboratory testing, underwater inspection and other checks carried out by and under the responsibility of qualified service suppliers. Survey practices and procedures are selected by the Society based on its experience and knowledge and according to generally accepted technical standards in the sector.

3. Class Report & Interested Parties Obligation

3.1. The class assigned to a Ship, like the reports, statements, certificates or any other document or information issued by the Society, reflects the opinion of the Society concerning compliance, at the time the Service is provided, of the Ship or product subject to certification, with the applicable Rules (given the intended use and within the relevant time frame).
The Society is under no obligation to make statements or provide information about elements or facts which are not part of the specific scope of the Service requested by the Interested Party or on its behalf.
3.2. No report, statement, notation on a plan, review, Certificate of Classification, document or information issued or given as part of the Services provided by the Society shall have any legal effect or implication other than a representation that, on the basis of the checks made by the Society, the Ship, structure, materials, equipment, machinery or any other item covered by such document or information meet the Rules. Any such document is issued solely for the use of the Society, its committees and clients or other duly authorized bodies and no other purpose. Therefore, the Society cannot be held liable for any act made or document issued by other parties based on the statements or information given by the Society.
The validity, application, meaning and interpretation of a Certificate of Classification, or any other document or information issued by the Society in connection with its Services, is governed by the Rules of the Society, which is the sole subject entitled to make such interpretation. Any disagreement on technical matters between the Interested Party and the Surveyor in the carrying out of his functions shall be raised in writing as soon as possible with the Society, which will settle any divergence of opinion or dispute.
3.3. The classification of a Ship or the issuance of a certificate or other document connected with classification or certification and in general with the performance of Services by the Society shall have the validity conferred upon it by the Rules of the Society at the time of the assignment of class or issuance of the certificate; in no case shall it amount to a statement or warranty of seaworthiness, structural integrity, quality or fitness for a particular purpose or service of any Ship, structure, material, equipment or machinery inspected or tested by the Society.

3.4. Any document issued by the Society about its activities reflects the condition of the Ship or the subject of certification or other activity at the time of the check.
3.5. The Rules, surveys and activities performed by the Society, reports, certificates and other documents issued by the Society are in no way intended to replace the duties and responsibilities of other parties such as Governments, designers, shipbuilders, manufacturers, repairers, suppliers, contractors or sub-contractors, Owners, operators, charterers, underwriters, sellers or intended buyers of a Ship or other product or system surveyed.

These documents and activities do not relieve such parties from any fulfilment, warranty, responsibility, duty or obligation (also of a contractual nature) expressed or implied or in any case incumbent on them, nor do they confer on such parties any right, claim or cause of action against the Society. With particular regard to the duties of the ship Owner, the Services undertaken by the Society do not relieve the Owner of his duty to ensure proper maintenance of the Ship and ensure seaworthiness at all times. Likewise, the Rules, surveys performed, reports, certificates and other documents issued by the Society are intended neither to guarantee the buyers of the Ship, its components or any other surveyed or certified item, nor to relieve the seller of the duties arising out of the law or the contract, regarding the quality, commercial value or characteristics of the item which is the subject of transaction.
In no case, therefore, shall the Society assume the obligations incumbent upon the above-mentioned parties, even when it is consulted in connection with matters not covered by its Rules or other documents.
In consideration of the above, the Interested Party undertakes to relieve and hold harmless the Society from any third-party claim, as well as from any liability about the latter concerning the Services rendered.
Insofar as they are not expressly provided for in these General Conditions, the duties and responsibilities of the Owner and Interested Parties concerning the services rendered by the Society are described in the Rules applicable to the specific service rendered.

4. Service Request & Contract Management

4.1. Any request for the Society's Services shall be submitted in writing and signed by or on behalf of the Interested Party. Such a request will be considered irrevocable as soon as received by the Society and shall entail acceptance by the applicant of all relevant requirements of the Rules, including these General Conditions. Upon acceptance of the written request by the Society, a contract between the Society and the Interested Party is entered into, which is regulated by the present General Conditions.

4.2 In consideration of the Services rendered by the Society, the Interested Party and the person requesting the service shall be jointly liable for the payment of the relevant fees, even if the service is not concluded for any cause not pertaining to the Society. In the latter case, the Society shall not be held liable for non-fulfilment or partial fulfilment of the Services requested.

4.3 The contractor for the classification of a ship or for the services may be terminated and any certificates revoked at the request of one of the parties, subject to at least 30/60/90 days' notice, to be given in writing. Failure to pay, even in part, the fees due for services carried out by the society will entitled the society to immediately terminate the contract and suspend the service.
For every termination of the contract, the fees for the activities performed until the time of the termination shall be owned to the society as well as the expenses incurred in view of activities already programmed, this is without prejudice to the right to compensation due to the society as a consequence of the termination.
With particular reference to ship classification and certification, unless decided otherwise by the society, termination of the contract implies that the assignment of class to a ship is withheld or, if already assigned, that it is suspended or withdrawn, any statutory certificates issued by society will be withdrawn in those cases where provided for by agreements between the society and the flag state.

5. Service Accuracy

5.1. In providing the Services, as well as other correlated information or advice, the Society, its Surveyors, servants or agents operate with due diligence for the proper execution of the activity. However, considering the nature of the activities performed (see **Rule Development, Implementation and Selection of Surveyor** 2.4), it is not possible to guarantee absolute accuracy, correctness and completeness of any information or advice supplied. Express and implied warranties are specifically disclaimed.

6. Confidentiality & Document sharing

6.1. All plans, specifications, documents and information provided by, issued by, or made known to the Society, in connection with the performance of its Services, will be treated as confidential and will not be made available to any other party other than the Owner without authorization of the Interested Party, except as provided for or required by any applicable international, European or domestic legislation, Charter or other IACS resolutions, or order from a competent authority. Information about the status and validity of class and statutory certificates, including transfers, changes, suspensions, withdrawals of class, recommendations/conditions of class, operating conditions or restrictions issued against classed ships and other related information, as may be required, may be published on the website or released by other means, without the prior consent of the Interested Party.
Information about the status and validity of other certificates and statements may also be published on the website or released by other means, without the prior consent of the Interested Party.

6.2. Notwithstanding the general duty of confidentiality owed by the Society to its clients in clause 7.1 below, the Society's clients hereby accept that the Society may participate in the IACS Early Warning System which requires each Classification Society to provide other involved Classification Societies with relevant technical information on serious hull structural and engineering systems failures, as defined in the IACS Early Warning System (but not including any drawings relating to the ship which may be the specific property of another party), to enable such useful information to be shared and used to facilitate the proper working of the IACS Early Warning System. The Society will provide its clients with written details of such information sent to the involved Classification Societies.
6.3. In the event of transfer of class, addition of a second class or withdrawal from a double/dual-class, the Interested Party undertakes to provide or to permit the Society to provide the other Classification Society with all building plans and drawings, certificates, documents and information relevant to the classed unit, including its history file, as the other Classification Society may require for classification in compliance with the applicable legislation and relative IACS Procedure. It is the Owner's duty to ensure that, whenever required, the consent of the builder is obtained about the provision of plans and drawings to the new Society, either by way of the appropriate stipulation in the building contract or by other agreement.
In the event that the ownership of the ship, product or system subject to certification is transferred to a new subject, the latter shall have the right to access all pertinent drawings, specifications, documents or information issued by the Society or which has come to the knowledge of the Society while carrying out its Services, even if related to a period prior to transfer of ownership.

7. Health, Safety & Environment

7.1. The clients such as the designers, shipbuilders, manufacturers, repairers, suppliers, contractors or sub-contractors, or other product or system surveyed who have a registered office in ABU Dhabi; should have an approved OSHAD as per Abu Dhabi OHS Centre, or, if they do not need to have an approved OSHAD, they shall comply with TASNEEF standards and have procedures in place to manage the risks from their undertakings.

7.2. For the survey, audit and inspection activities onboard the ship, the ship's owner, the owner representative or the shipyard must follow TASNEEF rules regarding the safety aspects.

8. Validity of General Conditions

8.1. Should any part of these General Conditions be declared invalid, this will not affect the validity of the remaining provisions.

9. Force Majeure

9.1 Neither Party shall be responsible to the other party for any delay or failure to carry out their respective obligations insofar as such delay and failure derives, directly or indirectly, and at any time, from force majeure of any type whatsoever that lies outside the control of either Party.

9.2 The Party that is unable to fulfil the agreement due to Force Majeure shall inform the other party without delay and in all cases within 7 days from when such force majeure arose.

9.3 It is understood that if such force majeure continues for more than 30 days, the Party not affected by the event may terminate this agreement by registered letter. The rights matured until the day in which the force majeure occurred remain unaffected.

10. Governing Law and Jurisdiction

This Agreement shall be governed by and construed in accordance with the laws of Abu Dhabi and the applicable Federal Laws of the UAE.
Any dispute arising out of or in accordance with this Agreement shall be subject to the exclusive jurisdiction of the Abu Dhabi courts.

11. Code of Business conduct

The **CLIENT** declares to be aware of the laws in force about the responsibility of the legal persons for crimes committed in their interest or to their own advantage by persons who act on their behalf or cooperate with them, such as directors, employees or agents.
In this respect, the **CLIENT** declares to have read and fully understood the "**Ethical Code**" published by **TASNEEF** and available in the **TASNEEF** Web site.
The **CLIENT**, in the relationships with **TASNEEF**, guarantees to refrain from any behaviour that may incur risk of entry in legal proceedings for crimes or offences, whose commission may lead to the enforcement of the laws above.
The **CLIENT** also acknowledges, in case of non-fulfilment of the previous, the right of **TASNEEF** to unilaterally withdraw from the contract/agreement even if there would be a work in progress situation or too early terminate the contract/agreement. It's up to **TASNEEF** to choose between the two above mentioned alternatives, and in both cases a registered letter will be sent with a brief sum-up of the circumstances or of the legal procedures proving the failure in following the requirements of the above-mentioned legislation.

In light of the above, it is forbidden to all employees and co-operators to:
- receive any commission, percentage or benefits of any possible kind;
- Start and maintaining any business relationship with **Clients** that could cause conflict of interests with their task and function covered on behalf of **TASNEEF.**
- Receive gifts, travel tickets or any other kind of benefits different from monetary compensation, that could exceed the ordinary business politeness.

Violation of the above-mentioned principles allows **TASNEEF** to early terminate the contract and to be entitled to claim compensation for losses if any.

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EXPLANATORY NOTE TO PART D

1. Reference edition

The reference edition for Part D is the TasneefMIL 2003 edition, which is effective from 1st January 2003.

2. Effective date of the requirements

2.1 All requirements in which new or amended provisions with respect to those contained in the reference edition have been introduced are followed by a date shown in brackets.

The date shown in brackets is the effective date of entry into force of the requirements as amended by last updating. The effective date of all those requirements not followed by any date shown in brackets is that of the reference edition.

2.2 Item 5 below provides a summary of the technical changes from the preceding edition.

3. Rule Variations and Corrigenda

Until the next edition of the Rules is published, Rule Variations and/or corrigenda, as necessary, will be pub-lished on the Tasneef web site (www.Tasneef.ae). Except in particular cases, paper copies of Rule Variations or cor-rigenda are not issued.

4. Rule subdivision and cross-references

4.1 Rule subdivision

The Rules are subdivided into five parts, from A to E.

Part A: Classification and Surveys

Part B: Hull and Stability

Part C: Machinery, Systems and Fire Protection

Part D: Service Notations

Part E: Additional Class Notations

Each Part consists of:

- Chapters
- Sections and possible Appendices
- Articles
- Sub-articles
- Requirements

Figures (abbr. Fig) and Tables (abbr. Tab) are numbered in ascending order within each Section or Appendix.

4.2 Cross-references

Examples: Pt A, Ch 1, Sec 1, [3.2.1]or Pt A, Ch 1, App 1, [3.2.1]

- Pt A means Part A

The part is indicated when it is different from the part in which the cross-reference appears. Otherwise, it is not indicated.

- Ch 1 means Chapter 1

The Chapter is indicated when it is different from the chapter in which the cross-reference appears. Otherwise, it is not indicated.

- Sec 1 means Section 1 (or App 1 means Appendix 1)

The Section (or Appendix) is indicated when it is different from the Section (or Appendix) in which the cross-reference appears. Otherwise, it is not indicated.

- [3.2.1] refers to requirement 1, within sub-article 2 of article 3.

Cross-references to an entire Part or Chapter are not abbreviated as indicated in the following examples:

- Part A for a cross-reference to Part A
- Part A, Chapter 1 for a cross-reference to Chapter 1 of Part A.

5. Summary of amendments introduced in the edition effective from 1st January 2025

This edition of the Rules for the Classification of Naval Ships contains amendments whose effective date is **1 January 2025**.

The date of entry into force of each new or amended item is shown in brackets after the number of the item concerned.

Tasneef
هيئة الإمارات للتصنيف
Emirates Classification Society

FOREWORD

This is the 2025 edition of the "Rules for the classification of naval ships" (TasneefMIL), developed ad hoc taking into account the characteristics and features of naval sur-face ships.

RULES FOR THE CLASSIFICATION OF NAVAL SHIPS

Part D
Service Notations

Chapters **1 2 3 4**

CHAPTER 1
SUPPLY SHIP

Section 1 General

Section 2 Ship Arrangement

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CHAPTER 2
AIRCRAFT CARRIER AND HELICOPTER CARRIER

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Section 1 General

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Section 4 Magnetic and Noise Signature

Part D
Service Notations

Chapter 1
SUPPLY SHIP

SECTION 1 GENERAL

1 General

1.1 Application

1.1.1 Ships complying with the requirements of this Chapter are eligible for the assignment of the service notation **Supply ship**, as defined in Pt A, Ch 1, Sec 2, [4.3].

1.1.2 Ships dealt with in this Chapter are to comply with the requirements stipulated in Parts A, B and C of the Rules and with Part D of the Rules for the Classification of Ships, as applicable, and with the requirements of this Chapter, which are specific to supply ships employed to delivery products to navy groups at sea.

1.1.3 Supply ship for the purpose of this Chapter is a ship which has generally features for all the following products: victuals, ammunitions, fittings for living or for other purposes, fresh water and oil products with flash point greater than 60 °C including JP5-NATO (F44), to be delivered to navy groups at sea as well as helicopter facilities for more than two helicopters.

1.1.4 For spaces relevant to ammunitions, fittings for leaving or for other purpose and fresh water, the requirements in item are to be complied with.

1.1.5 *(1/7/2011)*
Features for oil products with flash point equal or less 60 °C are not foreseen as such products are not used on naval ships.

In case of supply ships intended for the carriage of limited quantities of oil products with flash point equal or less 60°C, the applicable requirements will be agreed by the Society on a case by case basis.

1.1.6 Refrigerating installation for victuals spaces are to be complied with Pt C, Ch 1, Sec 13 and Part F, Chapter 8 of the Rules for the Classification of the Ships.

1.1.7 Safety measures for helicopter facilities for more than two helicopters are those given in Chapter 2.

1.1.8 Features for oil products including JP5-NATO(F44) having flash point greater than 60 °C are given in Sec 4.

1.1.9 *(1/7/2011)*
The compliance with the requirements of this Chapter doesn't ensure the automatic and full compliance with the requirements of MARPOL Convention, as amended.

1.2 Summary table

1.2.1 Tab 1 indicates, for ready reference, the Sections of this Chapter containing specific requirements applicable to supply ships.

Table 1 *(1/7/2011)*

Main subject	Reference
Ship arrangement	Sec 2
Hull and stability	Sec 3
Machinery and cargo system	Sec 4
Electrical installations	**(2)**
Automation	**(1)**
Fire protection, detection and extinction	Sec 5

(1) No specific requirements, for supply ships are given in this Chapter.
(2) No specific requirements, except as indicated in Sec 4, [3.2.2], for supply ships are given in this Chapter.

1.3 Definitions

1.3.1 Supply ships *(1/7/2011)*

Supply ships are, in general, multi-decks ships with bulkhead deck below the main deck, with limited hull section dedicated to oil product tanks whose top extends up to the bulkhead deck and whose upper decks and deck houses are dedicated to dry products and/or living quarters.

1.3.2 Cargo area *(1/7/2011)*

The cargo area is that part of the ship that contains cargo tanks as well as slop tanks, cargo pump rooms including service spaces, stores, pump rooms, cofferdams, ballast or void spaces adjacent to or above to cargo tanks or slop tanks as well as deck areas throughout the entire length and breadth of the part of the ship above these spaces.

1.3.3 Cargo pump room *(1/7/2011)*

Cargo pump room is a space containing pumps and their accessories for the handling of products covered by the service notation granted to the ship.

1.3.4 Deadweight *(1/7/2011)*

For the purpose of this chapter the deadweight is the maximum weight, in t, of the oil products that can be transported by the ship.

1.3.5 Pump room *(1/7/2011)*

Pump room is a space, located in the cargo area, containing pumps and their accessories for the handling of ballast and fuel oil, or cargoes other than those covered by the service notation granted to the ship.

1.3.6 Segregated ballast *(1/7/2011)*

Segregated ballast means the ballast water introduced into a tank which is completely separated from the cargo oil and fuel oil system and which is permanently allocated to the carriage of ballast.

1.3.7 Slop tank *(1/7/2011)*

Slop tank means a tank specifically designated for the collection of tank draining, tank washings and other oily mixtures.

SECTION 2 SHIP ARRANGEMENT

1 General

1.1 Cargo segregation

1.1.1 *(1/7/2011)*

Unless expressly provided otherwise, tanks containing cargo are to be segregated from accommodation and service spaces, drinking water and stores for human consumption by means of a cofferdam, or any other similar compartment.

Where accommodation and service compartments are arranged immediately above the compartments containing flammable liquids, the cofferdam may be omitted only where the deck is not provided with access openings and is coated with a layer of material recognized as suitable by the Society.

1.1.2 Ballast *(1/7/2011)*

Ballast is only allowed in segregated ballast tanks.

The capacity of the segregated ballast tanks is to be so determined that the ship may operate safely on ballast voyages without recourse to the use of cargo tanks for water ballast in any foreseeable weather condition.

1.1.3 Deck spills *(1/7/2011)*

Means are to be provided to contains deck spills in manifolds area during loading and discharge operations. This may be accomplished by providing a permanent continuous coaming of a suitable height, but not higher than 300 mm, around the manifolds area.

1.2 Double bottom tanks or compartments

1.2.1 General *(1/7/2011)*

Double bottom tanks adjacent to cargo tanks may not be used as fuel oil tanks.

1.2.2 Supply ships of 5000 t deadweight and above *(1/7/2011)*

a) At any cross-section, the depth of each double bottom tank or compartment is to be such that the distance h between the bottom of the cargo tanks and the moulded line of the bottom shell plating measured at right angles to the bottom shell plating, as shown in Fig 1, is not less than B/15, in m, or 2,0 m, whichever is the lesser. h is to be not less than 1,0 m.

b) Double bottom tanks or compartments as required by a) may be dispensed with, provided that the design of the tanker is such that the cargo and vapour pressure, if any, exerted on the bottom shell plating forming a single boundary between the cargo and the sea does not exceed the external hydrostatic water pressure, as expressed by the following formula:

$$fh_c\rho_c g + 1000\Delta p \le T_1\rho g$$

where:

f : Safety factor equal to 1,1

h_c : Height, in m, of cargo in contact with the bottom plating

ρ_c : Maximum cargo density, in t/m^3

g : Standard acceleration of gravity equal to 9,81 m/s^2

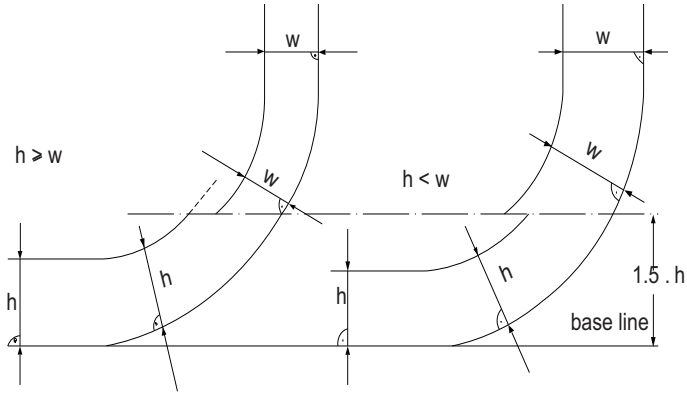
Δp : Maximum set pressure, in MPa, of pressure/vacuum valve, if any, provided for the cargo tank

T_1 : Minimum operating draught, in m, under any expected loading condition

r : Density of sea water, in t/m^3.

Any horizontal partition necessary to fulfil the above requirements is to be located at a height not less than B/6 or 6 m, whichever is the lesser, but not more than 0,6D, above the baseline where D is the moulded depth amidships.

Figure 1 : Cargo tank boundary lines *(1/7/2011)*

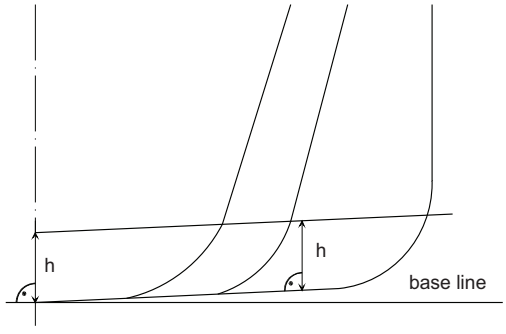


1.2.3 Supply ships of less than 5000 t deadweight *(1/7/2011)*

At any cross-section, the depth of each double bottom tank or compartment is to be such that the distance h between the bottom of the cargo tanks and the moulded line of the bottom shell plating measured at right angles to the bottom shell is not less than B/15, in m, with a minimum value of 0,76 m.

In the turn of the bilge area and at locations without a clearly defined turn of the bilge, the cargo tank boundary line is to run parallel to the line of the midship flat bottom as shown in Fig 2.

Figure 2 : Cargo tank boundary lines *(1/7/2011)*



2 Size and arrangement of cargo tanks and slop tanks

2.1 Cargo tanks

2.1.1 General *(1/7/2011)*

Supply ships are not allowed to carry oil in any compartment extending forward of a collision bulkhead located in accordance with Pt B, Ch 2, Sec 1, [2].

2.1.2 Definitions *(1/7/2011)*

- Deepest draught d_S, in m

  Vertical distance, in metres, from the moulded baseline at mid-length to the waterline corresponding to the deepest draught of the ship. Calculations pertaining to this requirement are to be based on draught d_S, notwithstanding assigned draughts that may exceed d_S, such as the tropical load line.

- Waterline d_B, in m

  Vertical distance, in metres, from the moulded baseline at mid-length to the waterline corresponding to 30% of the depth D_S.

- Breadth B_S, in m

  Greatest moulded breadth of the ship, in metres, at or below the deepest draught of the ship d_s.

- Breadth B_B in m

  Greatest moulded breadth of the ship, in metres, at or below the waterline d_B.

- Depth D_S in m

  Moulded depth measured at mid-length to the upper deck at side.

2.1.3 Supply ships of 5000 t deadweight and above *(1/7/2011)*

Supply ships of 5000 t deadweight and above are to comply with the requirements in [2.2].

2.1.4 Supply ships of less than 5000 t *(1/7/2011)*

The length of each cargo tank is not to exceed 10 metres or one of the values of Tab 1, as applicable, whichever is the greater.

Supply ships of less than 5000 t are to be provided with cargo tanks so arranged that the capacity of each cargo tank does not exceed 700 m^3 unless wing tanks or compartments are arranged in accordance with [3.1.2] complying with the following:

$$w = 0,4 + \frac{2,4DW}{20000} \quad \text{with a minimum value of 0,76 m}$$

where w is the distance, in m, as described in Fig 1 and DW is the deadweight, in t.

2.1.5 Suction wells in cargo tanks *(1/7/2011)*

Suction wells in cargo tanks may protrude into the double bottom below the boundary line defined by the distance h in [1.2.2] or [1.2.3], as applicable, provided that such wells are as small as practicable and the distance between the well bottom and bottom shell plating is not less than 0,5 h.

Table 1 : Length of cargo tanks *(1/7/2011)*

Longitudinal bulkhead arrangement	Cargo tank	Condition **(1)**	Centreline bulkhead arrangement	Length of cargo tanks, in m
No bulkhead	-	-	-	$(0,5\ b_i / B + 0,1)\ L$ **(2)**
Centreline bulkhead	-	-	-	$(0,25\ b_i / B + 0,15)\ L$
Two or more bulkheads	Wing cargo tank	-	-	0,2 L
	Centre cargo tank	$b_i / B \geq 1/5$	-	0,2 L
		$b_i / B < 1/5$	No	$(0,5\ b_i / B + 0,1)\ L$
			Yes	$(0,25\ b_i / B + 0,15)\ L$

(1) b_i is the minimum distance from the ship side to the outer longitudinal bulkhead of the i-th tank, measured inboard at right angles to the centreline at the level corresponding to the assigned summer freeboard.

(2) Not to exceed 0,2 L

2.2 Oil outflow

2.2.1 Oil outflow requirements *(1/7/2011)*

To provide adequate protection against oil pollution in the event of collision or stranding, for supply ship of 5000 tonnes deadweight (DW) and above, the mean oil outflow parameter is to be as follows:

$O_M \leq 0{,}015$ for $C \leq 200000$ m^3

$O_M \leq 0{,}012 + (0{,}003/200000)\,(400000\text{-}C)$

for 200000 m^3 < C < 400000 m^3

$O_M \leq 0{,}012$ for $C \geq 400000$ m^3

where:

O_M : mean oil outflow parameter.

C : total volume of cargo oil, in m^3, at 98% tank filling.

2.2.2 General assumptions for calculation of oil outflow parameter *(1/7/2011)*

The following general assumptions are to be applied when calculating the mean oil outflow parameter:

a) The cargo block length extends between the forward and aft extremities of all tanks arranged for the carriage of cargo oil, including slop tanks.

b) Where this requirement refers to cargo tanks, it is to be understood to include all cargo tanks, slop tanks and fuel tanks located within the cargo block length.

c) The ship is to be assumed loaded to the deepest draught d_S without trim or heel.

d) All cargo oil tanks are to be assumed loaded to 98% of their volumetric capacity.

e) The nominal density of the cargo oil (ρ_n) is to be calculated as follows:

ρ_n = 1000 DW/C, where DW is the deadweight, in tonnes

f) For the purposes of these outflow calculations, the permeability of each space within the cargo block, including cargo tanks, ballast tanks and other non-oil spaces, is to be taken as 0,99, unless proven otherwise.

g) Suction wells may be neglected in the determination of tank location provided that such wells are as small as practicable and the distance between the well bottom and bottom shell plating is not less than 0,5 h, where h is the height as defined in [1.2.2].

2.2.3 General assumptions for combination of oil outflow parameters *(1/7/2011)*

The following assumptions are to be used when combining the oil outflow parameters.

The mean oil outflow is to be calculated independently for side damage and for bottom damage and then combined into the non-dimensional oil outflow parameter O_M, as follows:

$O_M = (0{,}4\ O_{MS} + 0{,}6\ O_{MB}) / C$

where:

O_{MS} : mean outflow for side damage, in m^3;

O_{MB} : mean outflow for bottom damage, in m^3.

For bottom damage, independent calculations for mean outflow are to be done for 0 m and minus 2,5 m tide conditions, and then combined as follows:

$O_{MB} = 0{,}7\ O_{MB(0)} + 0{,}3\ O_{MB(2,5)}$

where:

$O_{MB(0)}$: mean outflow for 0 m tide condition, in m^3

$O_{MB(2,5)}$: mean outflow for minus 2,5 m tide condition, in m^3.

2.2.4 Calculation of side damage outflow *(1/7/2011)*

The mean outflow for side damage O_{MS}, in m^3, is to be calculated as follows:

$$O_{MS} = C_3 \sum_i^n P_{s(i)} O_{s(i)}$$

where:

i : represents each cargo tank under consideration;

n : total number of cargo tanks;

$P_{s(i)}$: the probability of penetrating cargo tank i from side damage, calculated in accordance with [2.2.6];

$O_{s(i)}$: the outflow, in m^3, from side damage to cargo tank i, which is assumed equal to the total volume in cargo tank i at 98% filling, unless it is proven through the application of the IMO Resolution MEPC.110(49) that any significant cargo volume will be retained;

C_3 : 0,77 for ships having two longitudinal bulkheads inside the cargo tanks, provided these bulkheads are continuous over the cargo block and $P_{s(i)}$ is developed in accordance with this requirement. C_3 equals 1,0 for all other ships or when $P_{s(i)}$ is developed in accordance with [2.2.6].

2.2.5 Calculation of bottom damage outflow *(1/7/2011)*

The mean outflow for bottom damage, in m3, is to be calculated for each tidal condition as follows:

a)

$$O_{MB(0)} = \sum_i^n P_{B(i)} O_{B(i)} C_{DB(i)}$$

where:

i : represents each cargo tank under consideration;

n : total number of cargo tanks;

$P_{B(i)}$: the probability of penetrating cargo tank i from bottom damage, calculated in accordance with [2.2.7];

$O_{B(i)}$: the outflow from cargo tank i, in m^3, calculated in accordance with c);

$C_{DB(i)}$: factor to account for oil capture as defined in d)

b)

$$O_{MB(2,5)} = \sum_{i}^{n} P_{B(i)} O_{B(i)} C_{DB(i)}$$

where:

i, n, $P_{B(i)}$ and $C_{DB(i)}$ as defined above;

$O_{B(i)}$ = the outflow from cargo tank i, in m^3, after tidal change.

c) The oil outflow $O_{B(i)}$ for each cargo oil tank is to be calculated based on pressure balance principles, in accordance with the following assumptions:

- The ship is to be assumed stranded with zero trim and heel, with the stranded draught prior to tidal change equal to the load line draught d_s.
- The cargo level after damage is to be calculated as follows:

  $h_c = [(d_s + t_c - Z_l)(\rho_s) - (1000\ P) / g] / \rho_n$

  where:

  h_c : the height of the cargo oil above Z_l, in m;

  t_c : the tidal change, in m. Reductions in tide are to be expressed as negative values;

  Z_l : the height of the lowest point in the cargo tank above the baseline, in m;

  ρ_s : density of seawater, to be taken as 1025 kg/m^3;

  P : if an inert gas system is fitted, the normal overpressure, in kPa, to be taken not less than 5 kPa; if an inert gas system is not fitted, the overpressure may be taken as 0;

  g : the acceleration of gravity, to be taken as 9,81 m/s^2;

  ρ_n : nominal density of cargo oil, calculated in accordance with [3.2.3].
- For cargo tanks bounded by the bottom shell, unless proven otherwise, oil outflow $O_{B(i)}$ is to be taken not less than 1% of the total volume of cargo oil loaded in cargo tank i, to account for initial exchange losses and dynamic effects due to current and waves.

d) In the case of bottom damage, a portion from the outflow from a cargo tank may be captured by non-oil compartments. This effect is approximated by application of the factor $C_{DB(i)}$ for each tank, which is to be taken as follows:

$C_{DB(i)}$: 0,6 for cargo tanks bounded from below by non-oil compartments;

$C_{DB(i)}$: 1,0 for cargo tanks bounded by the bottom shell.

2.2.6 Calculation of probability for side damage *(1/7/2011)*

The probability P_S of breaching a compartment from side damage is to be calculated as follows:

a) $P_S = P_{SL}\ P_{SV}\ P_{ST}$

where:

P_{SL} =1 - P_{Sf} - P_{Sa} = probability the damage will extend into the longitudinal zone bounded by X_a and X_f;

P_{SV} = 1 - P_{Su} - P_{Sl} = probability the damage will extend into the vertical zone bounded by Z_l and Z_u; and

P_{ST} = 1 - P_{Sy} = probability the damage will extend transversely beyond the boundary defined by y.

b) P_{Sa}, P_{Sf}, P_{Sl}, P_{Su} and P_{Sy} are to be determined by linear interpolation from the table of probabilities for side damage provided in Tab 2,

where:

P_{Sa} : the probability the damage will lie entirely aft of location X_a/L;

P_{Sf} : the probability the damage will lie entirely forward of location X_f/L;

P_{Sl} : the probability the damage will lie entirely below the tank;

P_{Su} : the probability the damage will lie entirely above the tank; and

P_{Sy} : the probability the damage will lie entirely outboard of the tank.

Compartment boundaries X_a, X_f, Z_l, Z_u and y are to be developed as follows:

X_a : the longitudinal distance from the aft terminal of L to the aftmost point on the compartment being considered, in m;

X_f : the longitudinal distance from the aft terminal of L to the foremost point on the compartment being considered, in m;

Z_l : the vertical distance from the moulded baseline to the lowest point on the compartment being considered, in m;

Z_u : the vertical distance from the moulded baseline to the highest point on the compartment being considered, in m. Z_u is not to be taken greater than D_s;

y : the minimum horizontal distance measured at right angles to the centreline between the compartment under consideration and the side shell in m;

c) P_{Sy} is to be calculated as follows:

$P_{Sy} = (24{,}96 - 199{,}6\ y/B_S)(y/B_S)$ for $y/B_S \leq 0{,}05$

$P_{Sy} = 0{,}749 + [5 - 44{,}4\ (y/B_S - 0{,}05)]\ (y/B_S - 0{,}05)$ for $0{,}05 < y/B_S < 0{,}1$

$P_{Sy} = 0{,}888 + 0{,}56\ (y/B_S - 0{,}1)$ for $y/B_S \geq 0{,}1$

P_{Sy} is not to be taken greater than 1.

Table 2 : Probabilities for side damage *(1/7/2011)*

X_a/L	P_{Sa}	X_f/L	P_{Sf}	Z_l/D_S	P_{Sl}	Z_u/D_S	P_{Su}
0,00	0,000	0,00	0,967	0,00	0,000	0,00	0,968
0,05	0,023	0,05	0,917	0,05	0,000	0,05	0,952
0,10	0,068	0,10	0,867	0,10	0,001	0,10	0,931
0,15	0,117	0,15	0,817	0,15	0,003	0,15	0,905
0,20	0,167	0,20	0,767	0,20	0,007	0,20	0,873
0,25	0,217	0,25	0,717	0,25	0,013	0,25	0,836
0,30	0,267	0,30	0,667	0,30	0,021	0,30	0,789
0,35	0,317	0,35	0,617	0,35	0,034	0,35	0,733
0,40	0,367	0,40	0,567	0,40	0,055	0,40	0,670
0,45	0,417	0,45	0,517	0,45	0,085	0,45	0,599
0,50	0,467	0,50	0,467	0,50	0,123	0,50	0,525
0,55	0,517	0,55	0,417	0,55	0,172	0,55	0,452
0,60	0,567	0,60	0,367	0,60	0,226	0,60	0,383
0,65	0,617	0,65	0,317	0,65	0,285	0,65	0,317
0,70	0,667	0,70	0,267	0,70	0,347	0,70	0,255
0,75	0,717	0,75	0,217	0,75	0,413	0,75	0,197
0,80	0,767	0,80	0,167	0,80	0,482	0,80	0,143
0,85	0,817	0,85	0,117	0,85	0,553	0,85	0,092
0,90	0,867	0,90	0,068	0,90	0,626	0,90	0,046
0,95	0,917	0,95	0,023	0,95	0,700	0,95	0,013
1,00	0,967	1,00	0,000	1,00	0,775	1,00	0,000

2.2.7 Calculation of probability for bottom damage *(1/7/2011)*

The probability P_B of breaching a compartment from bottom damage is to be calculated as follows:

a) $P_B = P_{BL}\ P_{BT}\ P_{BV}$

where:

$P_{BL} = 1 - P_{Bf} - P_{Ba}$ = probability the damage will extend into the longitudinal zone bounded by X_a and X_f;

$P_{BT} = 1 - P_{Bp} - P_{Bs}$ = probability the damage will extend into the transverse zone bounded by Y_p and Y_s.

$P_{BV} = 1 - P_{Bz}$ = probability the damage will extend vertically above the boundary defined by z

b) P_{Ba}, P_{Bf}, P_{Bp}, P_{Bs} and P_{Bz} are to be determined by linear interpolation from the table of probabilities for bottom damage provided in Tab 3,

where:

P_{Ba} : the probability the damage will lie entirely aft of location X_a/L;

P_{Bf} : the probability the damage will lie entirely forward of location X_f/L;

P_{Bp} : the probability the damage will lie entirely to port of the tank;

P_{Bs} : the probability the damage will lie entirely to starboard of the tank

P_{Bz} : the probability the damage will lie entirely below the tank.

Compartment boundaries X_a, X_f, Y_f, Y_s and z are to be developed as follows:

X_a and X_f are as defined in [2.2.6];

Y_p : the transverse distance from the port-most point on the compartment located at or below the waterline d_B, to a vertical plane located $B_B/2$ to starboard of the ship's centreline, in metres;

Y_s : the transverse distance from the starboard-most point on the compartment located at or below the waterline d_B, to a vertical plane located $B_B/2$ to starboard of the ship's centreline, in metres;;

z : the minimum value of z over the length of the compartment, where, at any given longitudinal location, z is the vertical distance from the lower point of the bottom shell at that longitudinal location to the lower point of the compartment at that longitudinal location, in metres;

c) P_{Sy} is to be calculated as follows:

$P_{Sy} = (24{,}96 - 199{,}6\ y/B_S)\ (y/B_S)$ for $y/B_S \leq 0{,}05$

$P_{Sy} = 0{,}749 + [5 - 44{,}4\ (y/B_S - 0{,}05)]\ (y/B_S - 0{,}05)$ for $0{,}05 < y/B_S < 0{,}1$

$P_{Sy} = 0{,}888 + 0{,}56\ (y/B_S - 0{,}1)$ for $y/B_S \geq 0{,}1$

P_{Sy} is not to be taken greater than 1.

Table 3 : Probabilities for bottom damage *(1/7/2011)*

X_a/L	P_{Ba}	X_f/L	P_{Bf}	Y_p/B_B	P_{Bp}	Y_s/B_B	P_{Bs}
0,00	0,000	0,00	0,969	0,00	0,844	0,00	0,000
0,05	0,002	0,05	0,953	0,05	0,794	0,05	0,009
0,10	0,008	0,10	0,936	0,10	0,744	0,10	0,032
0,15	0,017	0,15	0,916	0,15	0,694	0,15	0,063
0,20	0,029	0,20	0,894	0,20	0,644	0,20	0,097
0,25	0,042	0,25	0,870	0,25	0,594	0,25	0,133
0,30	0,058	0,30	0,842	0,30	0,544	0,30	0,171
0,35	0,076	0,35	0,810	0,35	0,494	0,35	0,211
0,40	0,096	0,40	0,775	0,40	0,444	0,40	0,253
0,45	0,119	0,45	0,734	0,45	0,394	0,45	0,297
0,50	0,143	0,50	0,687	0,50	0,344	0,50	0,344
0,55	0,171	0,55	0,630	0,55	0,297	0,55	0,394
0,60	0,203	0,60	0,563	0,60	0,253	0,60	0,444
0,65	0,242	0,65	0,489	0,65	0,211	0,65	0,494
0,70	0,289	0,70	0,413	0,70	0,171	0,70	0,544
0,75	0,344	0,75	0,333	0,75	0,133	0,75	0,594
0,80	0,409	0,80	0,252	0,80	0,097	0,80	0,644
0,85	0,482	0,85	0,170	0,85	0,063	0,85	0,694
0,90	0,565	0,90	0,089	0,90	0,032	0,90	0,744
0,95	0,658	0,95	0,026	0,95	0,009	0,95	0,794
1,00	0,761	1,00	0,000	1,00	0,000	1,00	0,844

3 Size and arrangement of protective ballast tanks or compartments

3.1 Size and arrangement of ballast tanks or compartments

3.1.1 General *(1/7/2011)*

The entire cargo tank length is to be protected by ballast tanks or compartments other than cargo and fuel oil tanks as indicated in [3.1.2] to [3.1.4] for supply ships of 5000 t deadweight and above, or [3.1.5] for supply ships less than 5000 t deadweight.

3.1.2 Wing tanks or compartments *(1/7/2011)*

Wing tanks or compartments are to extend either for the full depth of the ship side or from the top of the double bottom to the uppermost deck, disregarding a rounded gunwale where fitted. They are to be arranged such that the cargo tanks are located inboard of the moulded line of the side shell plating, nowhere less than the distance w which, as shown in Fig 1, is measured at any cross-section at right angles to the side shell, as specified below:

- w = 0,5 + DW / 20000, or
- w = 2,0 m

whichever is the lesser.

The value of w is to be at least 1,0 m.

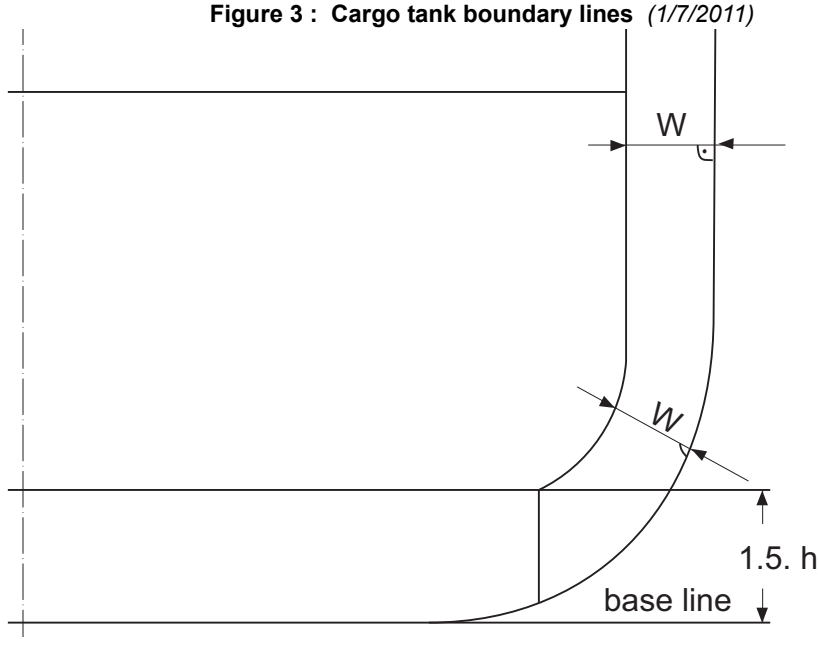
3.1.3 Wing tanks or compartments of supply ships complying with 1.2.2 b) *(1/7/2011)*

The location of wing tanks or compartments of supply ships of 5000 t deadweight and above which are exempted from the requirements of [1.2.2] a) is to be as defined in [3.1.2], except that, below a level 1,5 h above the baseline where h is as defined in [1.2.2] a), the cargo tank boundary line may be vertical down to the bottom plating, as shown in Fig 3.

3.1.4 Double bottom tanks or compartments *(1/7/2011)*

The requirements of [1.2.1] and [1.2.2] apply.

Figure 3 : Cargo tank boundary lines *(1/7/2011)*



3.1.5 Supply ships of less than 5000 t deadweight *(1/7/2011)*

Supply ships of less than 5000 t deadweight are to comply with [1.2.3] and [2.1.4].

4 Access arrangement

4.1 Access to pipe tunnel and opening arrangement

4.1.1 Access to the pipe tunnel in the double bottom *(1/7/2011)*

The pipe tunnel in the double bottom is to comply with the following requirements:

- it may not communicate with the engine room
- provision is to be made for at least two exits to the open deck arranged at a maximum distance from each other. One of these exits fitted with a watertight closure may lead to the cargo pump room.

4.1.2 Doors between pipe tunnel and main pump room *(1/7/2011)*

Where there is a permanent access from a pipe tunnel to the main pump room, a watertight door is to be fitted complying with the requirements in Pt B, Ch 2, Sec 1, [6.2] for watertight doors open at sea and located below the main deck. In addition the following is to be complied with:

- in addition to bridge operation, the watertight door is to be capable of being manually closed from outside the main pump room entrance
- the watertight door is to be kept closed during normal operations of the ship except when access to the pipe tunnel is required. A notice is to be affixed to the door to the effect that it may not be left open.

4.2 Access to compartments in the cargo area

4.2.1 General *(1/7/2011)*

Access to cofferdams, ballast tanks, cargo tanks and other compartments in the cargo area is to be direct from the open deck and such as to ensure their complete inspection. Access to double bottom compartments may be through a cargo pump room, pump room, deep cofferdam, pipe tunnel or similar compartments, subject to consideration of ventilation aspects.

4.2.2 Access to the fore peak tank *(1/7/2011)*

The access to the fore peak tank is to be direct from the open deck or through an enclosed space outside cargo area.

4.2.3 Access through horizontal openings *(1/7/2011)*

For access through horizontal openings the dimensions are to be sufficient to allow a person wearing a self-contained, air-breathing apparatus and protective equipment to ascend or descend any ladder without obstruction and also to provide a clear opening to facilitate the hoisting of an injured person from the bottom of the compartment. The minimum clear opening is to be not less than 600 mm by 600 mm.

4.2.4 Access through vertical openings *(1/7/2011)*

For access through vertical openings the minimum clear opening is to be not less than 600 mm by 800 mm at a height of not more than 600 mm from the bottom shell plating unless gratings or other footholds are provided.

4.2.5 Supply ships less than 5000 t deadweight *(1/7/2011)*

For supply ships of less than 5000 t deadweight smaller dimensions may be approved by the Society in special circumstances, if the ability to traverse such openings or to remove an injured person can be proved to the satisfaction of the Society.

SECTION 3 HULL AND STABILITY

1 Stability

1.1 Intact stability

1.1.1 General *(1/7/2011)*

The stability of the ship is to be in compliance with the requirements in Pt B, Ch 3, Sec 2 considering, in addition to the load cases indicated in Pt B, Ch 1, Sec 2, [5], the following load cases:

- Ship at 33% load of cargoes (both tanks and stores) in departure and arrival conditions for consumables; tanks are to be considered slack.
- Ship at 66% load of cargoes (both tanks and stores) in departure and arrival conditions for consumables; tanks are to be considered slack.
- Light and heavy ballast conditions.
- Any loading condition specified in the loading manual considered by the Society more severe than the above listed.

In addition, it is to be verified that in the worst possible condition of loading and ballasting, considering liquid transfer operations at sea, the ship is not subjected to lolling; for such purpose, the initial metacentric height GMo, in m, corrected for free surface measured at 0° heel, is to be not less than 0,15.

2 Design loads

2.1 Hull girder loads

2.1.1 Still water loads *(1/7/2011)*

In addition to the requirements in Pt B, Ch 5, Sec 2, [2.1.2], still water loads are to be calculated for the following loading conditions, subdivided into departure and arrival conditions as appropriate:

- homogeneous loading conditions (excluding tanks intended exclusively for segregated ballast tanks) at maximum draft
- partial loading conditions
- any specified non-homogeneous loading condition
- light and heavy ballast conditions
- mid-voyage conditions relating to tank cleaning or other operations where, at the Society's discretion, these differ significantly from the ballast conditions.

2.1.2 Loading conditions for the analyses of primary supporting members *(1/7/2011)*

The still water and wave loads are to be calculated for the most severe loading conditions as given in the loading manual, with a view to maximising the stresses in the longitudinal structure and primary supporting members.

Where the loading manual is not available, the loading conditions to be considered in the analysis of primary supporting members in cargo and ballast tanks are to be considered by the Society on a case by case basis.

3 Protection of hull metallic structures

3.1 Protection of sea water ballast tanks

3.1.1 *(1/7/2011)*

All dedicated seawater ballast tanks are to have an efficient corrosion prevention system, such as hard protective coatings or equivalent.

The coatings are preferably to be of a light colour, i.e. a colour easily distinguishable from rust which facilitates inspection.

Where appropriate, sacrificial anodes may also be used.

3.2 Protection by aluminium coatings

3.2.1 *(1/7/2011)*

The use of aluminium coatings is prohibited in cargo tanks, the cargo tank deck area, pump rooms, cofferdams or any other area where cargo vapour may accumulate.

4 Replenishment at Sea system (RAS)

4.1 General

4.1.1 *(1/7/2011)*

For the purpose of this Section Replenishment at Sea (RAS) systems are intended to transfer liquids and solids from a supply ship to another ship.

The transfer of personnel, if required, is to be in accordance with Naval Authority requirements.

4.2 RAS Station

4.2.1 RAS Structures *(1/7/2011)*

RAS systems which are integral part of the ship are to be in accordance with the Rules for loading and unloading arrangements and for other lifting appliances on board ships (RES.13/E), as applicable.

The transfer of personnel, if required, is to be in accordance with Naval Authority requirements.

4.2.2 Deck structures *(1/7/2011)*

Deck structures in the area surrounding RAS station is to be verified in respect to the loads induced by the RAS system and in respect to the landing of the maximum weight that can be handled by the system.

4.3 Loose gears and ropes

4.3.1 *(1/7/2011)*

Loose gears and ropes are to be built in accordance with recognised standards and are to be tested in accordance with the Rules for loading and unloading arrangements and for other lifting appliances on board ships (RES.13/E).

4.4 Construction and testing

4.4.1 *(1/7/2011)*

The construction and installation of the RAS system is to be witnessed by the Society in accordance with the approved drawings.

Load test and functional tests of the system after installation on board are to be agreed with the Society.

5 Construction and testing

5.1 Welding and weld connections

5.1.1 *(1/7/2011)*

The welding factors for some hull structural connections are specified in Tab 1. These welding factors are to be used, in lieu of the corresponding factors specified in Pt B, Ch 11, Sec 1, Tab 2, to calculate the throat thickness of fillet weld T connections according to Pt B, Ch 11, Sec 1, [2.3]. For the connections of Tab 1, continuous fillet welding is to be adopted.

Table 1 : Welding factor w_F *(1/7/2011)*

Hull area	Connection		Welding factor w_F
	of	to	
Double bottom in way of cargo tanks	girders	bottom and inner bottom plating	0,35
		floors (interrupted girders)	0,35
	floors	bottom and inner bottom plating	0,35
		inner bottom in way of bulkheads or their lower stools	0,45
		girders (interrupted floors)	0,35

SECTION 4 MACHINERY AND OIL PRODUCT INCLUDING JP5-NATO (F44) SYSTEMS

1 General

1.1 Application

1.1.1 This Section provides , for ship having the service notation **Auxiliary ships - supply ships** and the deliveling the products indicated in Sec 1, [1.1.3], in addition to the provisions in Sec 1, [1.1.2] and Sec 1, [1.1.7] requirements for:

- machinery systems
- tanks and piping systems for oil products including JP5-NATO(F44) having flash point greater than 60 °C
- electrical equipment properties.

1.2 Documents to be submitted

1.2.1 The documents listed in Tab 1 are to be submitted.

2 Machinery systems

2.1 Bilge systems

2.1.1 General

a) The pump room(s) of oil products and of JP5-NATO(F44) as well as double skin spaces, dry cofferdams and dry double bottom compartments which are adjacent to oil product tanks or to JP5-NATO(F44) tanks shall be drained by the water oil bilge system required in Pt C, Ch 1, Sec 10, [6.6.1] a).

b) Double skin spaces , dry cofferdam and dry double bottom compartments , adjacent to oil product or JP5-NATO(F44) tanks shall be drained by power pumps having capacity in compliance with Pt C, Ch 1, Sec 10, [6.6.3].

c) Furthermore, the ship shall be provided with bilge systems as stated in Pt C, Ch 1, Sec 10.

2.1.2 Drainage of oil product pump room(s) and of JP5-NATO (F44) pump room(s)

A dedicated pump room(s) shall be provided for oil products and as a dedicated pump room(s) shall be provided for JP5-NATO(F44).

Each of such pump rooms shall be provided with a dedicated power pump having capacity in accordance with Pt C, Ch 1, Sec 10, [6.6.3] d), for the drainage of such room and provided with a transfer line capable to delivery, through non-return valve, to oil tanks in the case of oil products and to an appropriate tank in the case of JP5-NATO(F44).

Such provisions are intended to enable the drainage of such spaces in the event of oil product or of JP5-NATO (F44) leakages without the risk of sea pollution.

2.2 Other piping systems not intended for delivering oil products or JP5-NATO (F44)

2.2.1 Ballast systems, scuppers and sanitary discharges, and, sounding and overflow pipes

The ship shall be provided with ballast systems, with air, sounding and overflow pipes and with sanitary scuppers and discharges in compliance with Pt C, Ch 1, Sec 10, [7], Pt C, Ch 1, Sec 10, [8] and Pt C, Ch 1, Sec 10, [9] which in respect to delivering oil products and delivering JP5-NATO(F44) shall comply with the same requirements stated in such items respectively for fuel oil and for refuelling ship's JP5-NATO(F44).

2.2.2 Independence of piping systems *(1/7/2011)*

a) Bilge, ballast and scupper systems serving spaces located within the cargo area:
   - are to be independent from any piping system serving spaces located outside the cargo area
   - are not to lead outside the cargo area.

b) Fuel oil systems are to:
   - be independent from the cargo piping system
   - have no connections with pipelines serving cargo or slop tanks.

2.2.3 Passage through cargo tanks and slop tanks *(1/7/2011)*

a) Unless otherwise specified, bilge, ballast and fuel oil systems serving spaces located outside the cargo area are not to pass through cargo tanks or slop tanks. They may pass through ballast tanks or void spaces located within the cargo area.

b) Where expressly permitted, ballast pipes passing through cargo tanks are to fulfil the following provisions:
   - they are to have welded or heavy flanged joints the number of which is kept to a minimum
   - they are to be of extra-reinforced wall thickness as per Pt C, Ch 1, Sec 10, Tab 5
   - they are to be adequately supported and protected against mechanical damage.

2.3 Steering gear

2.3.1 The steering gear is to be capable of putting the rudder from 35° on either side to 30° on the other side in not more than 20 seconds with the ship at its deepest seagoing draught and running ahead at maximum service speed.

3 Delivering oil products or JP5-NATO (F44) systems

3.1 Delivering oil products or JP5-NATO (F44) segregation

3.1.1 General

a) For handling of oil products or of JP5-NATO(F44) a dedicated pumping and piping system shall be provided. Each of such systems shall be completely separate from other pumping and piping systems on board.

b) As far as practicable oil product and JP5-NATO(F44) piping systems are to run in the vertical section of ship's hull containing the relevant tanks except as stipulated in [3.5].

c) The handling systems are not to pass through any accommodation, service or machinery space other than handling pump rooms, except as necessary for loading and delivering to other ships.

Table 1 : Documents to be submitted

Item N°	A/I **(1)**	Description of the document
1	I	General plan with indication of the use of each space and in particular for oil products, JP5-NATO(F44), fresh water, ammunitions, victuals, refrigerated victuals, fittings for living, or for other fittings, helicopters
2	A	Plan of loading, unloading and delivering systems including the automatic shut-off devices fitted to delivering oil products and JP5-NATO(F44) hose couplings **(2)**
3	A	Plan of bilge and ballast systems
4	A	Plans of ship systems
5	A	Diagram of venting and sounding systems
6	A	Delivering tank level gauging system with overfill safety arrangements
7	A	Diagram of oil product and JP5-NATO(F44) tank cleaning system

(1) A: To be submitted for approval in four copies
I: To be submitted for information in duplicate

(2) Diagrams are also to include, where applicable, the (local and remote) control and monitoring systems and automation systems.

Table 2 : Electrical equipment permitted in hazardous areas for supply ships delivering oil poducts including JP5-NATO (F44) having a flashpoint exceeding 60°C unheated

Hazardous area	Spaces		Electrical equipment
	N°	Description	
Zone 1	1	Interior of oil products or JP5-NATO (F44) tanks, any pipework of pressure relief or other venting systems for oil products or JP5-NATO (F44) tanks, pipes and equipment containing oil products or JP5-NATO (F44) or developing flammable gases or vapours.	a) certified intrinsically safe apparatus Ex(ia) or Ex(ib); b) simple electrical apparatus and components (e.g. thermocouples, photocells, strain gauges, switching devices), included in intrinsically safe circuits of category “ia” or “ib” not capable of storing or generating electrical power or energy in excess of limits stated in the relevant rules; c) electrical cables passing through the spaces. Such cables are to be installed in heavy gauge steel pipes with gas-tight joints. Expansion bends are not to be fitted in these spaces.
Zone 2	2	Oil products or JP5-NATO (F44) pump rooms.	a) any type considered for Zone 1; b) electrical equipment of a type which ensures the absence of sparks, arcs and "hot spots" during its normal operation; c) electrical equipment tested specially for Zone 2 (e.g. type "n" protection); d) electrical equipment for use in an explosive gas-air mixture with type of protection by total encapsulation "m".

3.1.2 Dedicated tanks for delivering products

Tanks for delivering oil products or delivering JP5-NATO(F44) shall not be used as ballast tanks or for any other purpose.

3.2 Materials and electrical equipment

3.2.1 Materials for the construction of pumps, piping and fittings are to be as follows:

a) Pumps are to be of materials suitable , as appropriate , for delivering oil products or JP5-NATO(F44)

b) Materials for piping, valves, couplings and other fittings for delivering oil products or JP5-NATO(F44) are to comply respectively with the requirements for fuel oil and JP5-NATO(F44) in Pt C, Ch 1, Sec 10.

3.2.2 Electrical equipments are to comply with requirements stated in Tab 2.

3.3 Handling pump rooms

3.3.1 General

a) The handling pumps of delivering oil products or of JP5-NATO(F44) are to be installed in own dedicated room set aside for that purpose. The deliver side of pumps is to be fitted with valves discharging back to the suction side of the pump (by pass) in closed circuit.

b) Each oil products or JP5-NATO(F44) tank is to be served by at least two separated fixed means of discharging . For both oil products and JP5-NATO(F44) a dedicated pump is to be provided for the drainage of the decanted liquids and stripping . The arrangements are to be such that such liquids can be delivered to a ship's dedicated tank which after depuration may be used as ship's fuel oil.

c) The pumps in item a) are to be used exclusively for handling the oil products or the JP5-NATO(F44) and are not to have any connections to any other compartment other than oil products or JP5-NATO(F44) tanks.

d) Primer movers of pumps in items a) and b) are to be of suitable type for mixtures of air and vapour of oil products or JP5-NATO(F44), as appropriate.

e) Pumps in items a) and b) are to be capable to be stopped from:

- a position outside the pump rooms, and
- a position next to the pumps.

3.4 Delivering piping systems

3.4.1 General

a) The air, sounding and overflow pipes of delivering oil products tanks or JP5-NATO(F44) tanks shall be dedicated to oil products or to JP5-NATO(F44) and the two systems shall be entirely separated from each other.

b) The delivering JP5-NATO(F44) tanks shall not be crossed by any other piping systems. However where such crossing can not be avoided due to ship design the relevant passage shall be of jacketed type with means for drainage in bilge.

c) Where necessary, oil products piping delivering system or JP5-NATO(F44) piping delivering system is to be provided with joints or expansion bends.

d) Each delivering oil products tank and each delivering JP5-NATO(F44) tank shall be provided with its own filling, delivering pipe and overflow pipe(s). Such delivering pipe shall terminate in the relevant pump room where shall be provided with non return valve and operating valve and an additional operating valve shall be fitted on terminal bulkhead of tanks in the cofferdam or in the cofferdam-pump room. Such valves shall be controlled locally and from outside the spaces where they are fitted.

e) The outlets of filling lines of tanks piping systems are to be led as low as possible in the tanks to avoid electrostatic generation.

f) In addition tank piping systems are to be designed and constructed according to the requirements of Pt C, Ch 1, Sec 10 applicable to piping systems of class III

g) Pumps , piping and fittings are to be tested in accordance with Pt C, Ch 1, Sec 10, [18].

3.5 Loading and unloading connections

3.5.1 General

a) Pipe ends, valves and other fittings to which hoses for oil products, or JP5-NATO (F44), loading and unloading are connected are to be of steel or other ductile material and are to be of solid construction and effectively secured.

b) Connecting couplings for loading and unloading hoses are to be fitted with devices which automatically shut off the loading and unloading piping when the hose is disconnected and with means for quick-release of the hose, to be provided by the installation either of a coupling hydraulically controlled or of a weak link assembly which will break when subjected to a predetermined pull.

c) Means shall be provided to contain deck spills in way of loading and unloading connecting couplings and to drainage leakages.

3.6 Tank venting systems

3.6.1 General

a) The delivering oil products tanks as well as the delivering JP5-NATO(F44) tanks shall be provided with its own dedicated venting and overflow system entirely separated from any vent piping serving other compartments.

Such tank venting systems shall comply with the relevant provisions in Pt C, Ch 1, Sec 10, [9] and Pt C, Ch 1, Sec 10, [10] which in respect of delivering oil products and of delivering JP5-NATO(F44) shall comply with the same requirements stated in such items for fuel oil and for refuelling ship's JP5-NATO(F44) .

b) Tank venting systems are to discharge to open atmosphere at an height of at least 450 mm above the open deck.

c) Tanks may be fitted with venting systems of the open type provided with a flame screen.

3.7 Prevention of pollution

3.7.1 General

The discharges of residues of delivering oil products and of delivering JP5-NATO(F44) or other mixtures of such products are to comply with the relevant conditions stated by MARPOL 73/78 , Annex I , as amended , for which the supply ships of this Chapter are to considered as oil tanker.

SECTION 5 FIRE PROTECTION, DETECTION AND EXTINCTION

1 General

1.1 Application

1.1.1 *(1/7/2011)*

This Section provides for ships having the service notation Supply ship, requirements for:

- Ventilation of pump room of oil products including JP5-NATO (F44) with flash point greater than 60 °;
- Fire stations nearby to the accesses to trunk of oil product including JP5-NATO (F44) tanks to oil product including JP5-NATO (F44) tank top, and to the deck location of oil product including JP5-NATO (F44) loading and unloading connections;
- Skylights;
- Oil product including JP5-NATO (F44) tank gas-freeing;
- Vapour detection;
- Fixed low expansion foam fire extinguishing system.

2 Fire prevention, protection and extinction

2.1 General

2.1.1 Fire prevention, protection and extinction

Fire prevention, protection and extinction of ships having the service notation Supply ships are to comply with the applicable requirement of Part C, Chapter 4 as well as with the provisions stated in the following item [2.2].

2.2 Additional requirements for supply ships

2.2.1 Ventilation of pump rooms and skylights *(1/1/2025)*

Pump rooms for oil products and for JP5-NATO(F44) shall be mechanically ventilated.

Skylights to such pump room are not allowed.

Note 1: More stringent ventilation capacity requirements may arise from other regulations e.g. IBC Code requirements for spaces located in the cargo area.

2.2.2 Oil product including JP5-NATO (F44) tank gas-freeing

Fixed or potable equipment for gas-freeing of oil product including JP5-NATO (F44) tanks and adjacent spaces is not required to be installed or stored on board.

2.2.3 Vapour detection

At least two portable gas or vapour detectors of a type recognised by the Society are to be available on board in a suitable position.

2.2.4 Fire stations

Fire stations nearby the accesses to trunk to oil product including JP5-NATO (F44) tanks, to oil product including JP5-NATO (F44) tank top, and to the deck location of oil product including JP5-NATO (F44) loading and unloading, are to be provided with foam making arrangements by a 12 m length fire hose.

2.2.5 Pump room fire extinguishing systems

Pump rooms of oil product and of JP5-NATO(F44) shall be protected by fire-extinguishing systems required in Pt C, Ch 4, Sec 6, [4.5.2] and Pt C, Ch 4, Sec 6, [8] of the Rules.

2.2.6 Fixed low expansion foam fire extinguishing system *(1/7/2011)*

Open deck areas that are directly located on top of oil cargo tanks or where oil product lines pass through are to be protected by means of a fixed low expansion foam fire extinguishing system at satisfaction of the Society.

2.2.7 BWMS located in the cargo area *(1/1/2025)*

Notwithstanding the above, where a BWMS is located in the cargo area as allowed by Pt C, Ch 1, App 8, [3.2.1], b), of the Rules for the Classification of ships, the BWMR is to be categorized as (12), machinery spaces and main galleys, according to Sec 5.

Note 1: The cargo area of a tanker is defined in Pt D, Ch 1, Sec 1, [1.3.2].

Part D
Service Notations

Chapter 2

AIRCRAFT CARRIER AND HELICOPTER CARRIER

SECTION 1 GENERAL

1 General

1.1 Application

1.1.1 Ships complying with the requirements of this Chapter are eligible for the assignment of one of the following service notations:

- **helicopter carrier**
- **aircraft carrier**

as defined in Pt A, Ch 1, Sec 2, [4.3.1] .

1.1.2 Ships dealt with in this Chapter are to comply with the requirements stipulated in Parts A, B, C of the Rules and Part D of the Rules for the Classification of Ships, as applicable and with the requirements of this Chapter, which are specific to helicopter carriers and to aircraft carriers.

1.1.3 For the purpose of this Chapter:

a) **aircraft carrier** or **helicopter carrier** means a ship having in the open upper part a flyght-deck and generally an hangar below that deck which is served by elevator(s).

b) **flight deck** means the open deck used for parking of aircrafts or helicopters and to take off and to landing on of aircrafts, or of helicopters for ships carrying more than two helicopters.

c) **hangar** means the enclosed ship's spaces used to house the aircrafts and/or helicopters.

1.2 Summary table

1.2.1 Tab 1 indicates, for ready reference, the Sections of this Chapter containing specific requirements applicable to aircraft carriers, and helicopter carriers carrying more than two helicopters.

Table 1

Main subject	Reference
Ship arrangement	**(1)**
Hull and stability	Sec 2
Machinery and cargo system	Sec 3
Electrical installations	**(1)**
Automation	**(1)**
Fire protection, detection and extinction	Sec 4
(1) No specific requirements for helicopter carriers and aircraft carriers are given in this Chapter.	

SECTION 2 HULL AND STABILITY

1 General

1.1 Application

1.1.1 This Section provides, for ships having the service notation **aircraft carrier** and or **helicopter carrier** carrying more than two helicopters, requirements for the definition of the design loads induced by the helicopter or aircraft operations and for checking the flight deck and hangar structures.

1.1.2 The assignment of the notations (see [2.1]) implies that a sea-keeping assessment is performed with the scope of verifying the compliance with the specified performance levels relevant to flight operations.

1.2 Documentation to be submitted

1.2.1 The sea state number X(L,M,H), up to which the required sea-keeping performance is to be maintained (see [2.1] and Pt E, Ch 1, Sec 8, is to be provided for information.

1.2.2 For ships with the service notation **aircraft carrier**, the aircraft loads, as specified in [3.2.1], are to be provided for information.

2 Stability, manoeuvrability and sea-keeping

2.1 Seakeeping

2.1.1 The requirements in Pt E, Ch 1, Sec 8 relevant to the additional class notation **SEA-KEEP-FLY-X(L,M,H)** are to be complied with.

3 Design loads

3.1 General

3.1.1 In general, the design loads are to be calculated as specified in [3.2] or [3.3], as applicable depending on the service notation assigned to the ship.

3.1.2 Other loads are to be considered when deemed necessary by the Society, depending on the operation that will be carried out on the ships (e.g. the loads induced by the aircraft engine test operations). In these cases, the design loads are to be provided by the Designer.

3.2 Ships with the service notation helicopter carrier

3.2.1 The loads transmitted by the helicopters to flight deck and hangars structures are to be calculated according to Pt B, Ch 8, Sec 10.

3.3 Ships with the service notation aircraft carrier

3.3.1 *(1/7/2011)*

The loads transmitted by the aircraft to the flight deck and hangars structures are to be provided by the Designer.

The loads to be taken into account for structural scantling are:

- the landing and parking loads transmitted through the aircraft tyres
- the pressure and thermal loads induced by the jet thrust.

3.3.2 The inertial forces induced by the ship motion and accelerations are to be calculated, on the basis of the above still water loads, according to Pt B, Ch 5, Sec 6.

4 Hull scantlings

4.1 General

4.1.1 *(1/7/2011)*

In general, the flight deck and hangar structures are to be checked according to Part B, Chapter 7, considering the design local loads and their combination with the hull girder loads as specified in the above paragraph [3] and in [4.1.2].

Landing loads and garage loads are to be applied with aircrafts and/or helicopters oriented both in longitudinal direction both in athwartships direction.

4.1.2 In addition, the requirements in [4.2] or [4.3] are to be complied with, depending on the service notation assigned to the ship.

4.2 Scantling of flight deck and hangar deck

4.2.1 *(1/1/2025)*

Unless otherwise specified in the Regulatory Framework, the hangar deck is to be verified for parking of aircrafts and/or helicopters taking into account the ship's accelerations related to mid sea-state 7 conditions (see Pt B, Ch 3, Sec 4, Tab 1); the flight deck is to be verified for parking of aircrafts and/or helicopters taking into account the ship's accelerations related to mid sea-state 7 conditions and an athwart wind speed of 50 knots.

The evaluations are to be carried out by taking into account information on tiedown layout which are to be provided by the manufacturer of the aircraft/ helicopter.

4.3 Ships with the service notation aircraft carrier

4.3.1 When checking the flight deck and hangar structures according to Part B, Chapter 7, the design loads specified in [3.3] are to be considered.

SECTION 3 MACHINERY AND JP5-NATO (F44) SYSTEM

1 General

1.1 Application

1.1.1 This Section provides, for ships having the service notation **aircraft carrier** or **helicopter carrier** carrying more than two helicopter, specific requirements for JP5-NATO(F44) tanks, pumps, and piping systems.

1.2 Documentation to be submitted

1.2.1 The documents listed in Tab 1 are to be submitted.

2 Machinery systems

2.1 General

2.1.1 For the JP5-NATO(F44) to be used to refuel aircrafts, or helicopters, tanking, treatment, purification, pumping and piping systems entirely separated from other tanking, treatment, purification, pumping and piping on board of the ship are to be provided.

The de-refuelling system shall comply with the same requirements.

2.2 Refuelling pump sunctions

2.2.1 The suction of refuelling pumps are to be so arranged as to prevent the pumping of water or other sludge like to accumulate after decanting at lower parts of service tanks.

2.3 Number of service tanks

2.3.1 *(1/1/2025)*

There shall be at least two service tanks with capacity sufficient to refuel carried aircrafts and helicopters as stated in the Regulatory Framework.

2.4 Position of storage tanks

2.4.1 All surfaces of ship's JP5-NATO(F44) storage, service and slop tanks shall be clear of machinery spaces of Category A. Furthermore such tanks as well as JP5-NATO(F44) pump rooms shall be clear of tanks and pump rooms of fuel oil.

2.5 Other requirements

2.5.1 In addition to the requirements of this Section the requirements of Pt C, Ch 1, Sec 10 and Part C, Chapter 4 are to be complied with accounting that in absence of requirement for a particular topic the requirements for fuel oil, as appropriate, shall apply.

Table 1 : Documents to be submitted

Item No	I/A **(1)**	Documents **(2)**
1	A	Diagram of aircrafts and helicopters refuelling and de-refuelling JP5-NATO(f44) system
2	A	Diagram of the air, sounding and overflow JP5-NATO(F44) for refuelling and de-refuelling tanks of aircraft and helicopter system
3	A	Arrangement of JP5-NATO(F44) tanks including gauging system, pumps rooms for transferring and refuelling , purifiers and treatment , and refuelling and de-refuelling station
4	I	General plan shown the ship's spaces and the position of main components of JP5-NATO(F44) systems

(1) A = to be submitted for approval;
I = to be submitted for information.

(2) Diagrams are also to include, where applicable, the (local and remote) control and monitoring systems and automation systems

SECTION 4 FIRE PROTECTION, DETECTION AND EXTINCTION

1 General

1.1 Application

1.1.1 This Section provides, for ships having the service notation **aircraft carrier** or **helicopter carrier** carrying more than two helicopters, specific requirements for fire-extinguishing measures to protect flight deck and hangars in addition to the provisions in Sec 1, [1.1.2].

1.2 Documentation to be submitted

1.2.1 The documents listed in Tab 1 are to be submitted.

2 Additional fire safety measures for hangars and arrangements

2.1 General

2.1.1 The provisions of this Article supplement those given in Pt C, Ch 4, Sec 12.

2.2 Fixed low expansion foam fire-extinguishing system

2.2.1 In addition of the low expansion foam fire-extinguishing system required in Pt C, Ch 4, Sec 12, [4.1.1] hangars of aircraft carriers and of helicopter carriers carrying more than two helicopters shall be provided with a low expansion foam fire-extinguishing system with foam making branches fitted at the hangar top.

Such system may also be provided with arrangements so that the requirements of Pt C, Ch 4, Sec 12, [4.1.1] are complied with. In any case uniform distribution of low expansion foam is to be assured.

2.2.2 Provided that the water-spray system, required in Pt C, Ch 4, Sec 12, [4.1.1] and sectioned as stated in Pt C, Ch 4, Sec 13, [7.1], has piping and water-spray heads suitable for making low foam expansion, such system provided with arrangements for sea water and foam concentrate may be used for both systems.

2.2.3 *(1/1/2025)*

The low expansion foam fire-extinguishing hangar top system shall cover the whole hangar deck at a rate of 5 l/m^2 min.

Unless otherwise specified in the Regulatory Framework, the system shall be divided into sections as stated by the Naval Authority and shall be capable to delivery of such rate for at least 15 minutes.

A quantity of foam concentrate sufficient for two discharges sized on the section of greater length, shall be available.

The hangar pressure water-spray system shall be sectioned as the top hangar low expansion foam system. It shall be possible to deliver spray water on adjacent sections of the section delivering low expansion foam. In any case it shall be possible to deliver sprayed water everywhere.

2.2.4 It shall be possible to change-over from the water-spray fire-extinguishing system to the low foam expansion fire-extinguishing system both locally and from central damage control station.

2.2.5 The local or remote operation of the system shall activate visual and audible alarms in the protected spaces, in the relevant valve positions, and in the central damage control station.

2.3 Refuelling and de-refuelling station in hangars

2.3.1 Hangars shall be provided with station(s) for the de-refuelling of helicopters and aircrafts. The refuelling is allowed.

2.3.2 The de-refuelling pipe system shall comply with the requirements of Pt C, Ch 1, Sec 10.

2.3.3 The fire station adjacent to the de-refuelling station shall be provided with foam making fittings by the two length fire hose.

2.3.4 All equipment used in de-refuelling operation shall be electrically bonded.

Table 1 : Documents to be submitted

Item No	I/A **(1)**	Documents **(2) (3)**
1	I	General plans shown the position of ship's spaces and hangar, flight deck, refuelling and de-refuelling stations and JP5-NATO(F44) pump rooms, helicopter and aircraft positions, take off areas, landing areas, as well as spaces dedicated to fire-extinguishing units
2	A	Diagram of fire-extinguishing water-spray system for hangar or other system
3	A	Diagram of low expansion foam fire-extinguishing systems for hangar and flight deck
4	A	Diagram of two media fire-extinguishing system for flight deck including pressure containers
5	A	Diagram of JP5-NATO(F44) pump room fire-extinguishing systems
6	A	Plan(s) of fire appliances for flight deck as well as refuelling and de-refuelling stations and drainage facilities

(1) A = to be submitted for approval;
I = to be submitted for information.
(2) Diagram are also to include, where applicable, the (local and remote) control and monitoring systems and automation systems
(3) Diagrams are to be schematic and functional and have to contain all information necessary for their correct interpretation and verification

3 Additional fire safety measures for flight deck and arrangements

3.1 General

3.1.1 *(1/1/2025)*

Unless otherwise specified in the Regulatory Framework, the aircraft or helicopter flight deck shall be provided with the following fire-fighting appliances in number and of type:

a) Semi-portable carbon dioxide extinguishers each having capacity of at least 18 kg with necessary fittings to direct the carbon dioxide to the engine of aircraft or helicopter when in the take off position.

b) Semi-portable foam fire-extinguishers each of at least 45 l capacity with necessary fittings to direct the foam on deck area of crashed aircraft or crashed helicopter.

c) A low expansion foam flight deck system.

d) A twin media flight deck system.

e) Outfits and fittings for fire-rescue.

f) Autonomous mobile twin media system.

3.1.2 Furthermore the aircraft or helicopter flight deck shall be provided with arrangements for refuelling and the ship's with operations manuals and fire-fighting procedures.

3.2 Fire insulation of exterior boundaries of deckhouses and islands

3.2.1 *(1/7/2011)*

Fire insulation of exterior boundaries of deckhouses and islands in aircraft carriers, determined in accordance with Pt C, Ch 1, Sec 5, Tab 1, shall be extended up to the ship wheelhouse deck for the whole of the portions which face the flight deck and for 3 m on the other sides from athwart bulkheads which face the flight deck. In such boundary windows, if considered necessary by Naval Authority for operation of the ship, may be fitted provided they are of the same class A standard as required for the bulkhead on which they are fitted.

3.3 Low expansion foam flight deck system

3.3.1 The low expansion foam system shall provide continuous and complete coverage of flight deck with foam.

3.3.2 The foam system branch piping applicators may be of fixed or revolving type producing low expansion foam with expansion rate not exceeding 12 to 1.

3.3.3 The system shall be capable to delivery foam making liquid at rate of not less than 5 l/m^2 min for not less than 15 minutes.

3.3.4 The flight deck foam system shall be fed by the fire main. The system shall be divided into sections which shall be fed by the relevant sections of the fire main.

3.3.5 The system section valves shall be monitored from the central damage control station. The operation of such valves shall be from control room of flight deck operations. Local operation of the section valves shall be also possible.

3.3.6 The low expansion foam deck system may be combined with the pre-washing system provided for NBC protection, if present, on the condition that the provisions for both systems are complied with.

3.4 Twin media flight deck system

3.4.1 The two media shall be dry chemical powder, and foam solution (that is water plus foam concentrate).

3.4.2 The two media shall be stored in pressure vessels which shall be pressurized by pressure air in dedicated pressurized bottles.

3.4.3 In addition the system shall be provided with control, fixed media pressurizing piping and fixed media delivering pipes to monitors and/or hand hose lines.

3.4.4 The two media shall be simultaneously delivered by in pairs monitors and/or by the in pairs nozzles of relevant hand hoses.

3.4.5 The system shall be capable to delivery the two media on any part of an aircraft, or an helicopter, on flight deck which has caught fire.

3.4.6 Except for the parking area for aircrafts or helicopters on flight deck, the system may be provided with only hose line nozzles (foam line and powder line). The hand hose line shall not exceed 33 metres. The nozzles throw is to be assumed as documented by the manufacturer.

3.4.7 Any part of flight deck parking area for aircrafts or/and helicopters shall be covered by the throw of twin media in pairs monitors. The throw of monitors is to be assumed as documented by the manufacturer.

3.4.8 The discharge rate of a:

- powder hose line nozzle shall be not less than 3,5 kg/s;
- foam hose line nozzle shall be not less than 5 l/s;
- powder monitor shall be respectively not less than 10, 25 and 45 kilograms per second for the maximum coverage distance of 10, 30 and 40 meters;
- foam monitor shall be not less 20 l/s.

3.4.9 The quantity of chemical powder and foam solution in the system containers shall not be less than the quantity required for 45 seconds discharge time for all monitors and/or nozzle hoses attached to each powder and to each foam solution unit. The container volume shall be that required for housing the medium and that of the gap necessary for the pressurization of the container with air.

3.4.10 The flight deck shall be provided with the twin media units necessary to comply with the provisions of items [3.4.6] and [3.4.7]. Such units shall be positioned as not to interfere with aircraft and helicopter operations.

3.4.11 In pairs nozzles shall have features by one man operation.

3.4.12 Monitors shall have features for manual and remote control laying as well as for media discharge operations.

3.5 Nozzles and rescue equipment

3.5.1 At least two nozzles of an approved type (jet/spray) each fed by two hose lengths complying with Pt C, Ch 4, Sec 6, [1.2.5] and Pt C, Ch 4, Sec 6, [1.4.3] shall be capable to reach any part of flight-deck.

3.5.2 All fire stations relevant to flight deck shall be capable to delivery water or low expansion foam.

3.5.3 There shall be provided fire rescue outfits and rescue equipment, in number and type, as stated by the Naval Authority.

3.6 Refuelling

3.6.1 Aircrafts and helicopters JP5-NATO (F44) system components shall be as remote as practicable from accommodation spaces and escape route.

3.6.2 The actual refuelling operation of aircrafts and of helicopters shall be carried out on the flight deck. Their de-refuelling is not permitted except in emergency situations.

3.6.3 The refuelling stations shall be placed in dedicated rooms effectively ventilated. The station shall be provided with fixed arrangements for filtering and sampling. Electrical parts in the refuelling stations shall be of type suitable for ship's filling stations.

3.6.4 The refuelling piping systems shall comply with the provisions of Pt C, Ch 1, Sec 10.

3.6.5 The JP5-NATO (F44) pumping system shall incorporate a device which will prevent over-pressurization of the delivering hose.

3.6.6 The refuelling pumps shall be capable of being automatically started from the refuelling station by the refuelling device. Shut down from a safe remote location of the refuelling pumps in the event of fire shall be possible.

3.6.7 All equipment used in refuelling operations shall be electrically bonded.

3.7 Drainage facilities

3.7.1 Drainage facilities of flight deck shall be constructed of steel and lead directly overboard independent of other systems and designated so that drainage does not fall onto any part of the ship.

3.7.2 The refuelling station shall be provided with drainage facilities as a ship's filling station.

3.8 “No smoking” signs

3.8.1 "No smoking" signs shall be displayed at appropriate locations to and above flight deck.

4 JP5-NATO (F44) pump room(s)

4.1 Fire extinguishing systems

4.1.1 The ship's JP5-NATO(F44) transferring and refuelling pumps rooms shall be protected by the fire extinguishing systems stated in Pt C, Ch 4, Sec 6, [4.5.2] and Pt C, Ch 4, Sec 6, [8].

4.2 Pump room ventilation

4.2.1 Skylights to JP5-Nato(F44) transferring and /or refuelling pump rooms are not allowed.

4.2.2 JP5-NATO(F44) transferring and/or refuelling pump rooms shall be mechanically ventilated.

5 Operations manuals

5.1 General

5.1.1 The ship shall be provided with a flight deck operations manual including a checklist of safety precautions, procedures and equipment requirements. This manual may be part of ship's emergency response procedures.

Part D
Service Notations

Chapter 3
AMPHIBIOUS WARFARE SHIP

SECTION 1 GENERAL

1 General

1.1 Application

1.1.1 *(1/7/2011)*

Ships complying with the requirements of this Chapter are eligible for the assignment of the service notation **amphibious warfare ship**, as defined in Pt A, Ch 1, Sec 2, [4.3.3].

1.1.2 *(1/7/2011)*

Ships dealt with in this Chapter are to comply with the requirements stipulated in Parts A, B, C of the Rules and Part D of the Rules for Classification of Ships, as applicable, and with the requirements of this Chapter, which are specific to amphibious warfare ships (e.g. LPD, LHD, etc.) employed in amphibious warfare or disaster relief for the transportation and landing of troops, helicopters, vehicles and landing craft.

1.1.3 ***(1/7/2011)***

For the purpose of this Chapter, amphibious warfare ship is a ship which has, generally, the following features:

- flight deck for landing, take off and carriage of two or more helicopters;
- garage deck for the carriage of vehicles and/or landing crafts;
- well dock for amphibious operations;
- accommodation spaces for transported troops;
- enhanced hospital area and possibility to operate as support ship in disaster relief operations.

1.2 Summary table

1.2.1 *(1/7/2011)*

Tab 1 indicates, for easy reference, the Sections of this Chapter containing specific requirements applicable to amphibious warfare ships.

Table 1 *(1/7/2011)*

Main subject	Reference
Ship arrangement	Sec 2 **(1)**
Hull and stability	Sec 3 **(1)**
Machinery system	**(2)**
Electrical installations	**(2)**
Automation	**(2)**
Fire protection, detection and extinction	**(2)**

(1) The requirements of this Section applies only to amphibious warfare ships provided with a well dock in direct communication with the garage deck.

(2) No specific requirements, for amphibious warfare ships are given in this Chapter.

SECTION 2 SHIP ARRANGEMENT

1 General

1.1 Application

1.1.1 *(1/7/2011)*

The requirements of this Section applies in addition to the requirements of Part B, Chapter 1 and Part B, Chapter 2.

1.2 Definitions

1.2.1 Garage area *(1/7/2011)*

Garage area is the part of the ship intended for the carriage of landing crafts and vehicles and comprehends, on the aft part of the ship, a floodable well.

2 General arrangement design

2.1 Boundaries in garage area

2.1.1 *(1/7/2011)*

Deck in garage area is to be watertight and is to be delimited forward and laterally by watertight boundaries extending up the bulkhead deck.

Elsewhere, longitudinal and transversal boundaries of garage area are to be at least weathertight. See Fig 1.

2.2 Transversal watertight bulkheads

2.2.1 *(1/7/2011)*

Transversal watertight bulkheads are to extend up to the bulkhead deck from side to side.

2.2.2 *(1/7/2011)*

In the garage area, vertical extension of transversal watertight bulkheads is indicated in Fig 2.

The minimum distance between transversal watertight bulkheads, therefore minimum length of a compartment, is provided by the formulas:

- 3 m + 3% Lpp, for ships of with length L between perpendiculars less than 250 m.
- 10,5 m for ships of with length L not less than 250 m.

Collision bulkhead is to extend watertight up to the first deck above the bulkhead deck.

2.3 Submergible areas

2.3.1 *(1/7/2011)*

Provided [2.1] is complied with, garage deck area is to be considered as submergible area according to Pt B, Ch 1, Sec 2, [3.2.2].

3 Openings in subdivision bulkheads and decks

3.1 Openings in the watertight boundary of garage area

3.1.1 *(1/7/2011)*

Horizontal openings (watertight hatches) in the watertight boundary of garage area are not permitted unless they are permanently closed at sea.

3.1.2 *(1/7/2011)*

Watertight doors complying with the requirements of Pt B, Ch 2, Sec 1, [6] may be fitted in the watertight boundary of garage area. Such doors may be hinged or sliding type according to Pt B, Ch 3, Sec 2, Tab 1.

3.1.3 *(1/7/2011)*

All openings in the garage boundary that lead to spaces below the bulkhead deck and having lowest point which is not less than 2,5 m above the bulkhead deck are to be watertight, alarmed and indicated on the navigation bridge and damage control station(s).

4 Integrity of the hull and superstructure

4.1 Damage prevention and control

4.1.1 *(1/7/2011)*

Indicators are to be provided on the navigation bridge and damage control station(s) for all shell doors, loading doors and other closing appliances which, if left open or not properly secured, could, in the opinion of the Society, lead to flooding of garage area. The indicator system is to be designed on the fail-safe principle and is to show by visual alarms if the door is not fully closed or if any of the securing arrangements are not in place and fully locked and by audible alarms if such door or closing appliances become open or the securing arrangements become unsecured. The indicator panels on the navigation bridge and damage control station(s) are to be equipped with a mode selection function "harbour/sea voyage/amphibious operation" so arranged that an audible alarm is given on the navigation bridge and damage control station(s) if the ship leaves harbour or completes amphibious operations with the bow doors, inner doors, stern ramp or any other side shell doors not closed or any closing device not in the correct position. The power supply for the indicator system is to be independent of the power supply for operating and securing the doors and is to be provided with a backup power supply.

4.1.2 *(1/7/2011)*

The sensors of the indicator system are to be protected from water, ice formation and mechanical damage.

4.1.3 *(1/7/2011)*

The indication panels are to be provided with a lamp test function. It is not to be possible to turn off the indicator light.

4.1.4 *(1/7/2011)*

Television surveillance and a water leakage detection system are to be arranged to provide an indication to the navigation bridge and to and damage control station(s) of any leakage through inner and outer bow doors, stern doors or any other shell doors which could lead to flooding of garage area.

4.1.5 *(1/7/2011)*

Garage area is to be continuously patrolled or monitored by effective means, such as television surveillance, so that any movement of vehicles in adverse weather conditions can be detected whilst the ship is underway.

4.1.6 *(1/7/2011)*

Documented operating procedures for closing and securing all shell doors, loading doors and other closing appliances which, if left open or not properly secured, could, in the opinion of the Society, lead to flooding of garage area, are to be kept on board and posted at an appropriate place. The operating procedures may be included in the stability information or in the damage control booklet.

4.1.7 *(1/7/2011)*

A closing indicator is to be fitted for the inner bow doors which constitute a prolongation of the collision bulkhead above the bulkhead deck as requested in [4.1.1].

4.2 Flooding detection system

4.2.1 *(1/7/2011)*

A flooding detection system for the watertight spaces below the bulkhead deck shall be provided at satisfaction of the Society.

Figure 1 : Garage area boundary *(1/7/2011)*

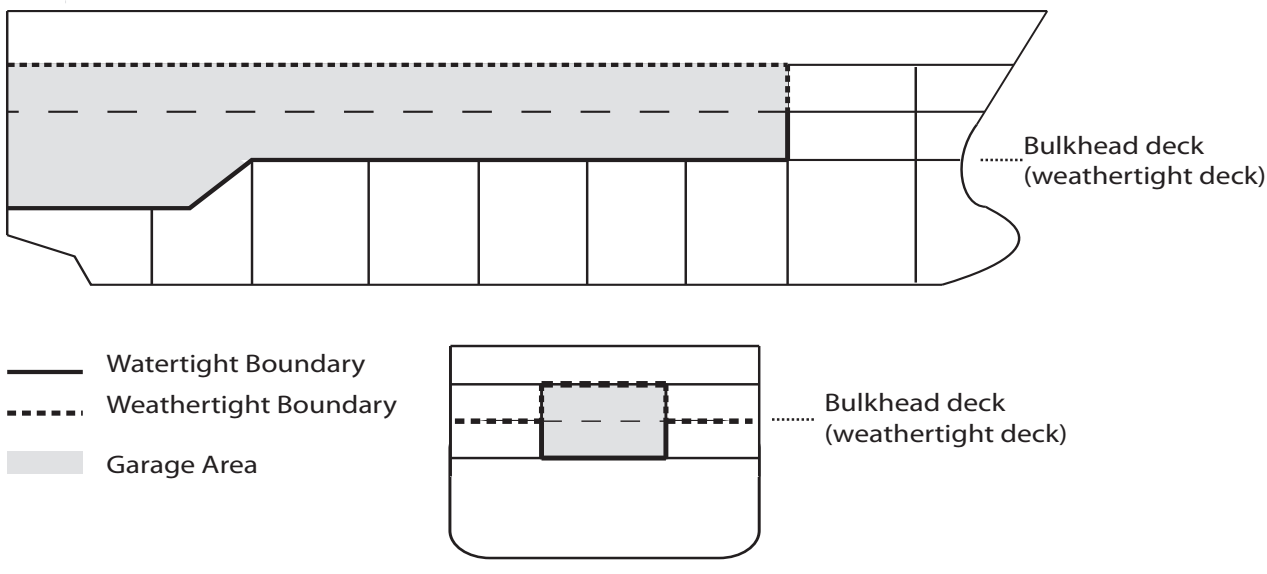
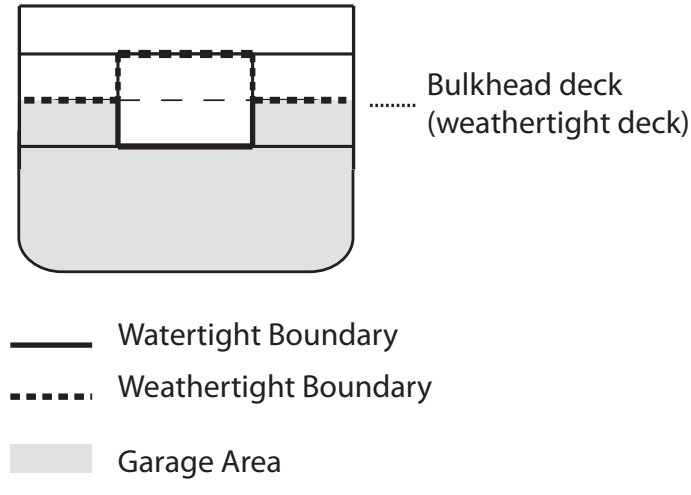


Figure 2 : Transversal Watertight Bulkheads *(1/7/2011)*



SECTION 3 HULL AND STABILITY

1 Stability

1.1 General

1.1.1 *(1/1/2017)*

Intact and damage stability criteria are to be complied with all loading case foreseen at the design stage as specified in Pt B, Ch 1, Sec 2 Tab 2 and including also ship with flooded well dock as far as applicable.

1.2 Intact stability

1.2.1 Stability during amphibious operations *(1/7/2011)*

When the ship has flooded well dock, for the calculation of the heeling moment due to athwart wind according to the procedure indicated in Pt B, Ch 3, App 5, the reference wind speed may be reduced to the maximum value corresponding to the maximum sea state at which the amphibious operations can be carried out.

Correspondence between sea state and wind speed are to be determined according to STANAG 4194 (See Table D-1 – NATO Sea-state numeral table for the open ocean North Atlantic – wind speed mean value column).

1.3 Damage Stability

1.3.1 Damage stability during amphibious operations *(1/7/2011)*

For damage stability case non involving the well dock but with the ship engaged in amphibious operation with flooded well dock, for the calculation of the heeling moment due to athwart wind, the wind speed may be reduced to the maximum value corresponding to the maximum sea state at which the amphibious operations can be carried out.

Proportional reduction can be applied to the rolling angle.

Correspondence between sea state and wind speed are to be determined according to STANAG 4194 (See Table D-1 - NATO Sea-state numeral table for the open ocean North Atlantic - wind speed mean value column).

2 Sea-keeping

2.1 Sea-keeping in amphibious operations

2.1.1 *(1/7/2011)*

A sea-keeping study for the determination of limiting sea state for the ship engaged in amphibious operation with flooded well dock is to be submitted to the Society for information. As an alternative, the contractual limiting sea state for amphibious operation may be considered without further investigation.

2.1.2 *(1/7/2011)*

The limiting sea state for the ship engaged in amphibious operation will be recorded in the Remarks section of the ship's Certificate of Class.

3 Structure design principles

3.1 Hull structure

3.1.1 Framing *(1/7/2011)*

In general, the strength deck and the bottom are to be longitudinally framed.

Where a transverse framing system is adopted for such ships, it is to be considered by the Society on a case by case basis.

3.1.2 Side structures *(1/7/2011)*

Where decks are fitted with ramp openings adjacent to the ship's side, special consideration is to be given to the supports for the side framing.

4 Hull girder strength

4.1 Dynamic analysis

4.1.1 General *(1/7/2011)*

In lieu of the complete ship model requested by Pt B, Ch 6, Sec 1, [1.2.1] for the dynamic analysis of the hull girder, the Society could accept a simplified calculation method.

The possibility to accept a simplified method will be evaluated by Society on a case by case basis.

5 Hull girder strength

5.1 Plating

5.1.1 Deck plating in way of side doors and stern doors *(1/7/2011)*

The plating net thickness of all decks in way of the position of side doors and stern doors, where closing and support door devices are located, is to be increased over a length of at least 1/3 of the door width.

This increase in net thickness is to be not less than 50% and the resulting thickness is not required to be greater than 8,0 mm, provided that all other requested structural checks are satisfied.

5.1.2 Plating under wheeled loads *(1/7/2011)*

The net thickness of plating subjected to wheeled loads is to be obtained according to Pt B, Ch 7, Sec 1 taking also into account, where applicable, the loads induced by helicopter parking according to Pt B, Ch 8, Sec 10.

5.2 Ordinary stiffeners

5.2.1 Stiffeners under wheeled loads *(1/7/2011)*

The net scantlings of ordinary stiffeners subjected to wheeled loads are to be obtained according to Pt B, Ch 7, Sec 2

5.3 Primary supporting members

5.3.1 Double bottom structures *(1/7/2011)*

In ships where pillars are widely spaced and transmit very high loads to the double bottom, the net scantlings of double bottom structures are to be considered by the Society on a case-by-case basis, taking into account the results of direct calculations to be carried out according to the criteria in Pt B, Ch 7, App 1.

Where deemed necessary, on the basis of the above results, additional floors and bottom girders may be required.

5.3.2 Primary supporting members under wheeled loads *(1/7/2011)*

The net scantlings of primary supporting members subjected to wheeled loads are to be obtained according to Pt B, Ch 7, Sec 3 and Pt B, Ch 7, App 2 taking also into account, where applicable, the loads induced by helicopter parking according to Pt B, Ch 8, Sec 10.

5.4 Side doors and stern doors

5.4.1 *(1/7/2011)*

The requirements applicable to side doors and stern doors are defined in Pt B, Ch 8, Sec 6.

5.4.2 *(1/7/2011)*

The requirements in [5.4.3] to [5.4.6] apply to doors in the boundary of garage area, as defined in Sec 2, [1.2.1], through which such spaces may be flooded.

5.4.3 *(1/7/2011)*

Separate indicator lights and audible alarms are to be provided on the navigation bridge, on the damage control station(s) and on the operating panel to show that the doors are closed and that their securing and locking devices are properly positioned.

The indication panel is to be provided with a lamp test function. It is not to be possible to turn off the indicator light.

5.4.4 *(1/7/2011)*

The indicator system is to be designed on the fail-safe principle and is to show by visual alarms if the door is not fully closed and not fully locked and by audible alarms if securing devices become open or locking devices become unsecured.

The power supply for the indicator system is to be independent of the power supply for operating and closing the doors and is to be provided with a backup power supply.

The sensors of the indicator system are to be protected from water, ice formation and mechanical damage.

5.4.5 *(1/7/2011)*

The indication panel on the navigation bridge is to be equipped with a mode selection function "harbour/sea voyage/amphibious operation", so arranged that an audible alarm is given if the vessel leaves harbour or completes amphibious operations with the doors not closed and with any of the securing devices not in the correct position.

5.4.6 *(1/7/2011)*

A water leakage detection system with audible alarm and television surveillance is to be arranged to provide an indication to the navigation bridge and to the damage control station(s) of leakage through the inner door.

Part D
Service Notations

Chapter 4
MINE COUNTERMEASURE VESSEL

SECTION 1 GENERAL

1 General

1.1 Application

1.1.1 *(1/7/2011)*

Ships complying with the requirements of this Chapter are eligible for the assignment of the service notation **mine countermeasure vessel**, as defined in Pt A, Ch 1, Sec 2, [4.3.1].

1.1.2 *(1/7/2011)*

Ships dealt with in this Chapter are to comply with the requirements stipulated in Parts A, B, C of the Rules and Part D of the Rules for the Classification of Ships, as applicable, and with the requirements of this Chapter, which are specific for mine countermeasure vessels.

1.1.3 *(1/7/2011)*

For the purpose of this Chapter, mine countermeasure vessel is a ship which has, generally, the following features:

- shock resistance capability;
- low noise, vibration and magnetic signature.

1.2 Summary table

1.2.1 Tab 1 indicates, for easy reference, the Sections of this Chapter containing specific requirements applicable to mine countermeasure vessel.

Additional requirements related to magnetic and noise signature are provided in Sec 4.

Table 1 *(1/7/2011)*

Main subject	Reference
Ship arrangement	**(1)**
Hull and stability	Sec 2
Machinery system	**(1)**
Electrical installations	**(1)**
Automation	**(1)**
Fire protection, detection and extinction	Sec 3
(1) No specific requirements, for mine countermeasure vessel are given in this Chapter.	

SECTION 2 HULL AND STABILITY

1 Stability

1.1 General

1.1.1 *(1/1/2025)*

Unless otherwise specified in the Regulatory Framework, in lieu of Pt B, Ch 3, Sec 3, [2.4.2], for the damage stability calculation may be taken into account one flooded compartment having length in accordance with Pt B, Ch 1, Sec 2, [6.7].

2 Structures

2.1 General

2.1.1 *(1/7/2011)*

Mine countermeasure vessels are to be built in low magnetic signature material and the structural scantling is to be such as to withstand the loads induced by an underwater non-contact explosion.

In this respect, the requirements of Pt E, Ch 1, Sec 6 for the assignment of **SHOCK-FUNCT** additional class notation are to be complied with.

2.2 Construction materials other than steel

2.2.1 General *(1/7/2011)*

For mine countermeasure vessels built in materials other than steel, in lieu of Pt B, Ch 4, the requirements of Pt B, Ch 4 of the Tasneef Rules for the Classification of Fast Patrol Ves-sels are to be applied.

2.2.2 Construction in composite materials *(1/7/2011)*

For mine countermeasure vessels built in composite materials, the Shipyard is to implement a Production Quality Control System certified by the Society in accordance with the Tasneef "Rules for the certification of the production quality control system of manufacturers of yachts or other products built in composite materials.

Materials used for lamination are to be approved by the Society in accordance with the Tasneef "Rules for the type-approval of components of composite materials intended for hull construction"; approval issued by other notified bodies in accordance with recognised standards will be considered by the Society on a case by case basis.

2.3 Structural scantling

2.3.1 General *(1/7/2011)*

The structural scantling of hull and superstructures is to be verified by means of direct calculation with finite element model of the whole ship as required for the assignment of **SHOCK-FUNCT** notation; furthermore, the Society may request evidence that the scantling is verified in respect of the design loads provided in Pt B, Ch 5.

2.3.2 Experimental data *(1/1/2025)*

Experimental data deriving from shock tests witnessed by a recognised third party or by the Naval Administration may be taken into account for the verification of structural strength and for the validation of direct calculation methods.

2.3.3 Criteria for composite materials *(1/7/2011)*

For mine countermeasure vessels built in composite materials, the global FEM calculation is to be carried out by the use of a complete structural model of the ship and, in lieu of the criteria given in Pt E, Ch 1, Sec 6, [2.3], the acceptance criteria are to be based on polynomial failure criteria such as Tsai-Wu criteria or equivalent.

At discretion of the Society, critical areas identified by the global FEM calculation are to be investigated by means of local FEM calculation carried out by the use of a ply-by-ply model; in such case the acceptance criteria are to be based on the "first ply failure" by means of polynomial failure criteria such as Hashin or Puck criteria or equivalent. In order to take into account interlaminar stresses, three-dimensional stress analysis is required in the local FEM calculation.

SECTION 3 FIRE PROTECTION, DETECTION AND EXTINCTION

1 Suppression of fire and explosion - Containment of fire

1.1 General

1.1.1 *(1/7/2011)*

For mine countermeasure vessels built in materials other than steel, il lieu of the requirements provided in Pt C, Ch 4, Sec 5, the following requirements apply:

- for hull built in aluminium alloy: the Rules for the Classification of Fast Patrol Vessels Pt C, Ch 4, Sec 6 are to be applied;
- for hull built in composite materials: the requirements of the following paragraph [2] are to be applied.

2 Structural fire protection for hull built in composite materials

2.1 Structural protection time

2.1.1 *(1/7/2011)*

The structural fire protection times for separating bulkheads and decks shall be in accordance with [2.3], and the structural fire protection times are all based on providing protection for a period of 60 min. If any other lesser structural fire protection time is determined taking into account the evacuation time in accordance with [2.1.2], then the times given below in [2.3] may be amended pro rata.

2.1.2 *(1/7/2011)*

The structural fire protection time (SFP), in minutes, can be calculated, in respect of the evacuation time with the following criteria:

$SFP = 3 \cdot ET + 7$

where:

ET : evacuation time, in min, estimated by means of specific evacuation analysis and verified by an evacuation demonstration.

In no case the structural fire protection time is to be taken less than 30 min.

2.2 Classification of space use

2.2.1 *(1/7/2011)*

For the purposes of classification of space use in accordance with fire hazard risks, the following grouping shall apply:

a) "Areas of major fire hazard", include the following spaces:
   - machinery spaces
   - special category spaces
   - store-rooms containing flammable liquids
   - galleys
   - trunks in direct communication with the above spaces.

b) "Areas of moderate fire hazard", include the following spaces:
   - auxiliary machinery spaces
   - crew accommodation
   - service spaces
   - trunks in direct communication with the above spaces.

c) "Areas of minor fire hazard", include the following spaces:
   - auxiliary machinery spaces with little or no fire risk
   - fuel tank compartments
   - public spaces
   - tanks, voids and areas of little or no fire risk
   - trunks in direct communication with the above spaces.

d) "Control Stations"

e) "Evacuation stations and external escape routes"

f) "Open Spaces".

2.2.2 *(1/7/2011)*

Areas of moderate fire hazard can be treated as areas of minor fire hazard provided that:

- a fixed water-spraying automatic system is provided for each space of the vessel; the necessity for protection of spaces with no fire risk can be considered by the Society on a case by case basis;
- fire detection and alarm is provided for each space of the vessel;
- furniture and furnishings in public spaces and crew accommodation are to be certified as with limited fire risk;
- all deck finish materials comply with the Fire Test Procedures Code.

Special cases such as large stores or spaces with presence of considerable quantity of combustible material will be given special consideration and treated in a case by case basis.

2.2.3 *(1/7/2011)*

Ammunition stores and lockers will be treated in a case by case basis taking in to account the typology and quantity of stored ammunitions and the presence of additional measures for detection, alarm and fire fighting, if any.

2.3 Fire integrity of bulkheads and decks

2.3.1 *(1/7/2011)*

Areas of Major and Moderate fire hazard are to be bounded by fire-resisting bulkheads and ceilings constructed to resist exposure to the standard fire test for a period of 30 min for areas of moderate fire hazard and 60 minutes for areas of major fire hazard except as provided in [2.1.1] and [2.2.2].

2.3.2 *(1/7/2011)*

Main load-carrying structures within areas of major fire hazard and areas of moderate fire hazard and structures supporting control stations containing centralized controls for flooding and fire fighting shall be arranged to distribute load such that there will be no collapse of the construction of the hull and superstructure when it is exposed to fire for the appropriate fire protection time.

2.3.3 *(1/7/2011)*

In ship sides and divisions bounding open spaces different from evacuation stations, provided that the load carrying capability is ensured as requested in [2.3.2], the fire division, if required, may be replaced by:

- the application of fire retardant gelcoat or resin for the parts that are located under the design waterline, or
- a division with low flame spread characteristic.

2.3.4 *(1/7/2011)*

Escape routes are to be bounded by bulkheads and ceilings constructed with non combustible or fire restricting materials.

2.3.5 *(1/7/2011)*

Control stations bounding spaces belonging to a different category are to be protected with fire-resisting bulkheads and decks constructed to resist exposure to the standard fire test for a period of 30 min. For divisions between control stations and escape routes, the use of non combustible or fire restricting material instead of fire resisting division may be accepted provided that [2.2.2] is complied with.

2.3.6 *(1/7/2011)*

The construction of all doors, and door frames in fire-resisting divisions, with the means of securing them when closed, shall provide resistance to fire as well as to the passage of smoke and flame equivalent to that of the bulkheads in which they are situated. Sliding watertight doors of steel need not be insulated. Also, where a fire-resisting division is penetrated by pipes, ducts, electrical cables etc., arrangements shall be made to ensure that the fire-resisting integrity of the division is not impaired, and necessary testing shall be carried out in accordance with the Fire Test Procedures Code.

2.3.7 *(1/7/2011)*

Any thermal and acoustic insulation shall be of non-combustible or of fire-restricting material.

Where insulation is installed in areas in which it could come into contact with any flammable fluids or their vapours, its surface shall be impermeable to such flammable fluids of vapours.

2.3.8 *(1/7/2011)*

Vapour barriers and adhesives used in conjunction with insulation, as well as insulation of pipe fittings for cold service systems need not be non-combustible or fire-restricting, but they shall be kept to the minimum quantity practicable and their exposed surfaces shall have low flame spread characteristics.

2.3.9 *(1/7/2011)*

All separating divisions, ceilings or linings if not a fire resisting division, shall be of non-combustible or fire restricting materials. Draught stops shall be of non-combustible or fire-restricting material.

2.3.10 *(1/7/2011)*

If [2.2.2] is complied with:

- separating divisions indicated in [2.3.9] may be constructed with combustible or non fire restricting materials provided that exposed surfaces have low flame spread characteristics;
- the upper side of the decks need not be insulated.

2.3.11 *(1/7/2011)*

Where adjacent spaces are in the same category, a smoke-tight division made of material having low flame spread characteristics is required provided that the load carrying capability is ensured as requested in [[2.3.2].

SECTION 4 MAGNETIC AND NOISE SIGNATURE

1 Magnetic signature

1.1 Ferro-magnetic Signature Control

1.1.1 *(1/7/2011)*

All materials and equipments used for the construction of the ship are to have low magnetic signature, as compatible with the functional and operational requirements.

1.1.2 *(1/7/2011)*

The contribution to magnetic signature of each material/equipment installed on board is to be taken into account.

At a preliminary stage of design the Shipyard is to provide an estimation of the final magnetic signature (Low magnetic construction plan) calculated on the basis of the estimated contribution of all materials and equipments.

1.1.3 *(1/7/2011)*

The estimated value of final magnetic signature is to be periodically updated during construction by taking into account the effective magnetic signature of installed materials and equipments.

1.2 Degaussing

1.2.1 General *(1/7/2011)*

The ship is to be provided of degaussing system to compensate the residual permanent magnetism and the induced magnetism.

1.2.2 Design of the system *(1/7/2011)*

Design of degaussing system (definition of coiling system type, degaussing loop positions and ampere turns) is to be carried out taking into account:

- the magnetic model obtained from Ship's drawings
- the estimate un-degaussed signatures
- the estimated degaussed signatures

Unless otherwise stated by the Naval Authority, the ship is to be fitted with degaussing loops which are positioned around the compartments containing the main groups of ferrous material, e.g. machinery spaces, as follows:

- Main coils laid in a horizontal plane along the total vessel length to compensate the vessel's vertical magnetisation;
- Longitudinal coils placed in a vertical athwartships plane to compensate the vessel's longitudinal magnetisation;
- Athwartships Coils placed in a vertical longitudinal plane to compensate the vessel's athwartships magnetisation.

Large ferrous items may require individual sets of equipment coils.

Degaussing system is to be regarded as an essential service and is to be protected against the effects of single and multiple degaussing coil earth faults and power supply single fault.

1.2.3 Cable routing *(1/7/2011)*

Cable routing is to be defined at the preliminary stage of design during the modelling of the ship and the impact of obstacles in the ideal routing is to be evaluated.

Special cable preferences and constraints are to be defined prior to modelling.

The Shipyard is to provide indication on allowable deviations during construction in order to take into account minor cable routing problems.

Electro-Magnetic Current (EMC) requirements related to cable routing are also to be taken in to account.

The number of connections are to be kept to a minimum for system reliability reasons and all connections are to be made in junction boxes. Junction boxes are to be mounted in readily accessible places.

Degaussing cables passing through special compartments (e.g. oil tanks, water tanks, ammunition spaces, etc.) are to be specially considered by the Society.

1.2.4 Use of standard machinery *(1/7/2011)*

Exceptionally, standard machinery may be used in lieu of low magnetic machinery provided that the contribution to the global magnetic signature has been taken into account in the preliminary analysis and suitable solutions for minimise the effect are applied (e.g. fitting of closed loop degaussing compensation or deperming treatment).

1.2.5 Eddy current fields *(1/7/2011)*

Magnetic fields generated by eddy currents induced in electrically conducting materials or structures by the ship's motion in the earth's magnetic field are to be minimised and, when necessary, compensated by means of the degaussing system.

1.3 Testing

1.3.1 Machinery and equipment *(1/7/2011)*

Magnetic signature of main machinery and equipment is to be verified before the installation on board by means of a land range facility.

Evidence of calibration of the instruments is to be provided to the Society.

1.3.2 Final test *(1/1/2025)*

After completion and calibration of the degaussing system, the ship is to undergo to a full scale magnetic signature test in accordance with a Recognised Standard.

Evidence of positive results of full scale magnetic signature test witnessed by the Naval Administration can be accepted by the Society.

Unless otherwise stated by the Naval Administration, the above test may be waived for sister ships provided that the results of measurements on single machinery and equipment (see [1.3.1]) don't significantly exceed those of the first ship.

2 Noise signature

2.1 General

2.1.1 *(1/7/2011)*

Requirements provided in present paragraph [2] are intended to minimise the underwater radiated noise when the ship is employed in mine hunting operation.

2.1.2 *(1/1/2025)*

The maximum levels of underwater radiated noise are to be provided by the Shipyard, as confidential information.

2.1.3 *(1/7/2011)*

At a preliminary stage of design, the Shipyard is to provide an estimation of the underwater radiated noise and of the airborne noise levels by means of underwater/airborne noise prediction analysis.

2.2 Technical requirements

2.2.1 Noise radiated by the propulsion system *(1/7/2011)*

Absence of cavitation phenomena in propellers, even if not of erosive nature, is to be demonstrated in the operating range corresponding to mine hunting operation; see also Pt C, Ch 1, Sec 8, [2.6.1].

2.2.2 Noise radiated through the hull *(1/7/2011)*

All machineries intended to operate in mine hunting service are to be installed on resilient mounting providing adequate reduction of noise and vibration transmitted to the hull; the resilient mountings may accomplish also the function of shock mounts for the assignment of the **SHOCK-FUNCT** notation.

2.2.3 Noise radiated through sea-connected systems *(1/7/2011)*

Means for reduction of noise radiated through sea-connected systems are to be adopted.

In particular, pumps are to be connected to sea-water pipeline by means of flexible hoses and/or pulsation dampers.

2.2.4 Noise radiated through airborne path *(1/7/2011)*

Propulsion diesel engines and diesel generators are to be preferably enclosed in an acoustically insulated box; alternatively, all the perimeter of the engine room is to be acoustically insulated for reduction of airborne noise outside the space. Requirements for structural fire protection are to be complied with in addition to acoustical insulation.

2.3 Testing

2.3.1 Machinery and equipment *(1/7/2011)*

Main machineries (such as engines, gearing, pumps, compressors, fans etc.) intended to operate in mine hunting are to undergo to:

- "airborne noise testing in accordance with recognised standards (e.g. MIL STD 740-1), and
- "structureborne noise testing in accordance with recognised standards (e.g. MIL STD 740-2), and
- "environmental and internally excited vibration testing, as applicable, in accordance with recognised standards (e.g. MIL-STD-167-1A).

Results of testing are to be compared with the airborne/underwater radiated noise prediction analysis required in [2.1.3] and, in case estimated limits are overtaken, proper corrective actions are to be agreed with the Society.

Evidence of calibration of the instruments used for the above tests is to be provided to the Society.

2.3.2 Final test *(1/1/2025)*

After completion, the ship is to undergo to a full scale measurement of underwater radiated noise in accordance with a Recognised Standard (e.g. Pt F, Ch 13, Sec 25 of the Tasneef Rules for Classification of Ships or NATO AMP 15 - "Stand-ards for Mine Warfare Acoustic Measurements".

Unless otherwise stated by the Naval Administration, the above test may be waived for sister ships provided that the results of measurements on single machinery and equipment (see [2.3.1]) don't significantly exceed those of the first ship.