

PROVISIONAL LOCAL VESSELS ADVISORY COMMITTEE

The Development of Legislation for Coastal Trade Vessels and Code of Practice - Safety Standards for Coastal Cargo Vessels (Draft, Nov 2004)

Purpose

1. This paper is a follow-up of the previous Paper No. 2/2001 - “The Development of Legislation for Coastal Trade Vessels”, to brief members on the developments of the relevant applicable requirements and safety standards, and seeks members’ endorsement on the draft documents listed below:
 - (i) Draft “Code of Practice – Safety and Technical Standard of Coastal Cargo Vessels” (CoP–CCV) (*Attachment-1*)
 - (ii) Draft “Code of Practice – Safety Standard of the Lifting Appliances on Coastal Cargo Vessels” (CoP–LA) [*This code is the content of Chapter 7 of CoP-CCV] (PLVAC Paper No. 29/2004)*
 - (iii) Draft “Mainland Trade Certificates of Competency for Deck Officers” Determinations (DO Determinations) and Draft “Mainland Trade Certificates of Competency for Marine Engineer Officers” Determinations (MEO Determinations) (*PLVAC Paper No. 30/2004*)

The above draft documents set out the safety and technical requirements with respect to vessel construction, machinery installation, equipment, survey and certification, safety management system, lifting appliances, manning and officers certification of Hong Kong coastal cargo vessels. Documents of paragraph 1(ii) and (iii) are to be submitted in separate PLVAC papers.

2. This paper introduces the “Code of Practice – Safety and Technical Standards of Coastal Cargo Vessels (Draft, Nov 2004)”.

Background on legislation

3. Merchant Shipping (Coastal Vessels) (Safety Survey) Regulation Merchant Shipping (Coastal Vessels) (Safety Survey) Regulation and Merchant Shipping (Coastal Vessels) (Certification of Officers) Regulation (tentative titles only) are proposed to be made under the new Merchant Shipping (Local Vessels) Ordinance (LVO).

4. The LVO stipulates that, inter alia, the Director of Marine may -
 - (i) approve and issue such codes of practice as in his opinion are suitable for that purpose; and
 - (ii) approve different codes of practice for different type of coastal vessels;

Setting the Standards

5. The standards in the draft documents are set out to achieve a common standard between Hong Kong and Mainland coastal cargo vessels trading between Hong Kong and Mainland China so as to facilitate the maritime authorities of both sides to exercise better control over the safety of these vessels. The following principles are adopted on the consideration of the standards for Hong Kong coastal cargo vessels:
 - (i) a normal practice for ship construction and operation, i.e. vessels' operational risk factors such as type of cargo, operating areas, manning and crew competency, etc.;
 - (ii) a standard comparable to those of the Chinese coastal vessels operating in the same areas.
6. The main points on the requirements of the CoP-CCV are as follows:-
 - (i) The Code should apply only to Hong Kong registered and licensed coastal cargo vessels.
 - (ii) Operating areas of coastal cargo vessels are categorized into: -
 - (a) Coastal class A plying zone: means Chinese waters extending from Guangxi to Liaoning for water area not more than 120 nautical miles away from the coast of the Taiwan Strait and South China Sea (including water area not more than 50 nautical miles away from the east coast and south coast of Hainan Island); and water area not more than 200 nautical miles away from the coast of Bohai, Yellow Sea and East China Sea.
 - (b) Coastal class B plying zone: means Chinese waters extending from Guangxi to Xiamen for water area not more than 20 nautical miles away from the coast; and water area not more than 10 nautical miles away from the east coast and south coast of Hainan Island.
 - (iii) A simplified Safety Management is required which is a light version of the International Safety Management Code.

Legal Status of Codes of Practice

7. The CoP–CCV may be used as proof in any proceedings under the LVO where a person failing to follow the provision of the CoP will be alleged to have breached the clause on ensuring seaworthiness.

Implications

8. The CoP–CCV and its Chapter 7 covered by CoP- LA will provide practical and transparent guidance in respect of safety and technical standards. The CoPs will also enable the authorized organizations and authorized surveyors delegated under the LVO to conduct survey and certification, partly or fully, as appropriate, for Hong Kong coastal cargo vessels.

Consultation

9. The draft documents had been studied and supported by the Technical Sub-committee of PLVAC.

Application

10. The CoP–CCV and its Chapter 7 covered by CoP–LA will come into operation by notice in the Gazette after the relevant subsidiary legislation for coastal vessels under LVO comes into force.

Amendment of the Codes of Practice

11. The Director may from time to time approve, revise or withdraw his approval of the whole or any part of any code of practice upon the advice of the LVAC and such other interested persons as he thinks fit.

Advice Sought

12. Members are invited to give comments/views and endorse the “CoP-CCV” and the preparation of relevant legislations that will apply to the Hong Kong coastal cargo vessels.

*Marine Department, Multi-lateral Policy Division
December 2004*

Draft (November 2004)

**Code of Practice -
Safety and Technical Standard
of Coastal Cargo Vessels**

(This CoP is issued under Section 8 of Merchant Shipping (Local Vessels) Ordinance, Cap 548)

Note:

1st Draft – October 2002

2nd Draft – March 2004

3rd Draft – November 2004

Hong Kong Marine Department
Government of HKSAR

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Main Principles

1 Implementation and application

- 1.1 Unless expressly provided otherwise, this Code should apply only to coastal cargo vessels registered and licensed on or after the implementation date.
- 1.2 This Code should apply only to cargo vessels of 24 metres and above in length, that engaged on non-international voyages. Unless otherwise specified, this Code does not apply to the following vessel types:
- (1) Vessels of war and government vessels;
 - (2) Vessels not propelled by mechanical means;
 - (3) Wooden Vessels;
 - (4) Pleasure Vessels;
 - (5) Fishing vessels;
 - (6) Passenger vessels;
 - (7) Oil tankers (the flashpoint of cargo is below 60°C);
 - (8) Chemical tankers;
 - (9) Gas Carriers.
- 1.3 The safety of coastal cargo vessels should comply with the Main Principles as well as the applicable provisions of each Chapter of this Code.
- 1.4 For requirements not stipulated in this Code, Marine Department should make provisions otherwise or give special consideration to them.

2 Definition

- 2.1 In relation to this Code in general, except where it is expressly provided in other Chapters, the relevant definitions are as follows:
- (1) Statutory survey: means the various surveys stipulated in this Code (including surveys stipulated in the Hong Kong Special Administrative Region (HKSAR) Ordinances and Regulations) i.e. the various inspections and surveys required for coastal cargo vessel in order to ensure the safety of the vessel, life and property, to prevent marine pollution and to ensure the safety operation of lifting appliances, etc; as well as the issue or endorsement of the appropriate statutory certificates after satisfactory inspections and surveys.
 - (2) Recognized endorsement/countersign: means approval by the Director of Marine or his delegated officers. Except where otherwise provided, the approval, permission and agreement for the specific surveys under this Code should be implemented by authorized surveyor or authorized organization.

- (3) Authorized surveyor: means a person, or a person belonging to a class of persons, who is not a public officer appointed by the Director of Marine under section 7(1) of the 《Merchant Shipping (Local Vessels) Ordinance》 .
- (4) Recognized Classification Society: means Classification Society approved or recognized by the HKSAR under section 8 of the 《Merchant Shipping (Safety) Ordinance》 .
- (5) Authorized organization: means recognized Classification Society authorized by the Director of Marine under section 7(1) of the 《Merchant Shipping (Local Vessels) Ordinance》 .
- (6) Hong Kong waters: means the Hong Kong waters specified by the Schedule 2 of the 《Interpretation and General Clauses Ordinance》 (Cap.1).
- (7) Chinese waters: means coastal ports, inland waters, territorial sea of the People's Republic of China as well as all other waters subjected to State's jurisdiction.
- (8) International voyage: means a voyage from a HKSAR port to a port outside China or vice versa.
- (9) Non-international voyage: means a voyage other than international voyage.
- (10) Particular plying zone/route: means vessel particularly plying between two or a few particular ports within specific waters.
- (11) Coastal cargo vessel: means cargo vessel plying within Hong Kong waters as well as Chinese waters which should be licensed under provisions stipulated in Section 89 of the 《Merchant Shipping (Local Vessels) Ordinance》 and be registered under the 《Merchant Shipping (Registration) Ordinance》 .
- (12) New vessel: means coastal cargo vessel, except where otherwise provided, registered and licensed on or after the implementation date of relevant Chapters of this Code.
- (13) Age of a vessel: means the elapsed period of time determined from the year of built.
- (14) Classed vessel: means a vessel incorporated into the recognized Classification Society.
- (15) Coastal class A plying zone: means Chinese waters extending from Guangxi to Liaoning for water area not more than 120 nautical miles away from the coast of the Taiwan Strait and South China Sea (including water area not more than 50 nautical miles away from the east coast and south coast of Hainan Island); and water area not more than 200 nautical miles away from the coast of Bohai, Yellow Sea and East China Sea.
- (16) Coastal class B plying zone: means Chinese waters extending from Guangxi to Xiamen for water area not more than 20 nautical miles away from the coast; and water area not more than 10 nautical miles away from the east coast and south coast of Hainan Island.
- (17) Oil: refers to Regulation 1(2) of 《Merchant Shipping (Prevention of Oil Pollution) Regulations》 .
- (18) Noxious liquid substance: refers to Regulation 1(2) of 《Merchant Shipping (Control of Pollution by Noxious Liquid Substances in Bulk) Regulations》 .
- (19) Dangerous goods: refers to para. 1.2(25), Section 2-2, Chapter 4 of this Code.

3 Application for survey and fee

- 3.1 Vessel owner or operator should apply as required to Marine Department or relevant authorized surveyor ^(Note) or authorized organization ^(Note) as appropriate for statutory survey and provide necessary survey conditions.
- 3.2 Applicant should, as required, pay survey fee, travelling fee and other necessary fees to authorized surveyor or authorized organization.
- 3.3 Vessel owner or operator, when required, may also apply to Marine Department for statutory approval and surveys, and pay the relevant fees.

Note: Director of Marine may delegate some or all of the statutory surveys specified in this Code to authorized surveyor or authorized organization as indicated in the authorization document. List of authorized surveyors or authorized organizations will be promulgated in the Marine Department Notice issued from time to time.

4 Exclusion/exemption

- 4.1 For vessel which is normally engaged in non-international voyage for particular plying zone /routes but which, in exceptional circumstances, is required to undertake a voyage beyond original plying zone/routes, Marine Department may grant exemption to the relevant requirements under this Code provided that the vessel complies with the safety requirements of which Marine Department considers appropriate for the intended voyage.
- 4.2 For any vessel which embodies features of a novel kind, if the application of any requirements of this Code concerned might, seriously impede research into the development of such features and their incorporation in vessel engaged in non-international voyages, Marine Department may consider excluding such requirements. Nevertheless, any such kind of vessel should comply with the requirements of which Marine Department considers appropriate to ensure the overall safety of the vessel.
- 4.3 Application for the above exemptions should be made to Marine Department. Owner's justifications, or survey or assessment reports issued by the authorized surveyor or authorized organization should also be submitted for Marine Department's consideration and review.

5 Equivalent

- 5.1 Marine Department may grant permission for providing on board any other fitting, material, appliance or apparatus, or type thereof, or other facilities that different from those required in this Code, provided that they have been satisfied by testing or other methods and at least possessed equivalent effectiveness with those required in this Code.
- 5.2 Application for the use of equivalent fitting, material, appliance or apparatus, or type thereof, or other facilities specified in this Code should be made to Marine Department together with the survey and test reports for consideration and review.

6 Interpretation

- 6.1 Where a question of interpretation of a part of this Code arises, a decision may be obtained on written application to Director of Marine (for attention to Local Vessels Safety Section), who will give clarification or advice as appropriate. The Director's decision is final.

Chapter 1 Surveys and Certification

Section 1 General Principles

1 General provisions

- 1.1 This Chapter applies to the statutory surveys and certification of coastal cargo vessels as required by the regulations.
- 1.2 Except as expressly provided in this Code, various surveys prescribed under 3.2(2) of this Section should generally be carried out in accordance with the current appropriate rules and regulations of the recognized Classification Society.
- 1.3 Cargo vessels trading in coastal class A plying zone must be classed vessels. Its relevant recognized Classification Society should carry out surveys and certification during construction and operation according to the safety standards of this Code.
- 1.4 Cargo vessels trading in coastal class B plying zone must be surveyed and certificated during construction and operation according to the safety standards of this Code.
- 1.5 Except those vessel types mentioned in Section 1.2 of Main Principles, licensed cargo vessels having met the safety requirements of “river trade limit” according to the 《Code of Practice – Safety Standards for Class I, II and III Vessels》 would be accepted as meeting equivalent requirements of the constructional standards specified in Sections 2-1 and 2-2 of Chapter IV in their application to trade in Coastal class B plying zone provided that other relevant requirements as stipulated in this Code and any additional requirements, mainly loose safety fittings and equipment, as considered necessary by the Marine Department are surveyed for certification.

2 Surveys

2.1 Statutory survey officers or organizations and their functions and duties

- (1) Carrying out statutory surveys on coastal cargo vessel: Other than survey officer of Marine Department, the surveys could also be carried out by authorized surveyor stipulated in paragraph 2.1(3) of the Main Principles for vessel trading in coastal class B plying zone; or by authorized organization stipulated in paragraph 2.1 (5) for vessel trading in coastal class A and coastal class B plying zones.
- (2) Survey officer of Marine Department or authorized surveyor or surveyor of authorized organization are, when carrying out statutory surveys on coastal cargo vessels, entitled to:
 - (i) require repairs to a vessel;
 - (ii) to carry out inspections and surveys if requested by the appropriate port Authority.
- (3) When carrying out statutory surveys, if the abovementioned survey officer of Marine Department or authorized surveyor or surveyor of authorized organization determines that the condition of the vessel or its equipment does not correspond substantially with the particulars of the certificate or is such

that the vessel is not fit “to proceed to sea without danger to the vessel, or persons on board”, such surveyor or organization should immediately ensure that corrective action is taken. If the master or owner of the vessel fails to carry out appropriate corrective action, the attending surveyor or organization should notify immediately to Marine Department so that the relevant certificates of the vessel could be withdrawn.

- (4) The audit of safety management system, safety surveys for coastal cargo vessels carrying noxious substances, oil, or dangerous goods should be carried out by Marine Department or in certain circumstances by recognized Classification Society.
- (5) The statutory survey on coastal cargo vessel lifting appliances should be carried out and certified in accordance with the 《Code of Practice – Safety Standards of Lifting Appliances and Lifting Gear on Coastal Cargo Vessels》 .

2.2 Personnel or organization for issuing certificates

- (1) The statutory certificates of coastal cargo vessels specified in this Code should be issued/endorsed/countersigned by Marine Department or authorized surveyor, or authorized organization or its surveyor.

3 Survey provisions and standards

3.1 Statutory Requirements

- (1) This Code should be read in conjunction with the following statutory provisions and if any, their amendments:
 - (a) Merchant Shipping (Local Vessels) Ordinance (Cap 548), (the “Ordinance”);
 - (b) Merchant Shipping (Local Vessels) (General) Regulation (Cap 548 sub. leg.);
 - (c) Merchant Shipping (Local Vessels) (Certification and Licensing) Regulation (Cap 548 sub. leg.);
 - (d) Merchant Shipping (Local Vessels) (Works) Regulation (Cap 548 sub. leg.);
 - (e) Merchant Shipping (Local Vessels) (Fee) Regulation (Cap 548 sub. leg.);
 - (f) Merchant Shipping (Local Vessels) (Safety Survey) Regulation (Cap 548 sub. leg.), (the “Safety Survey Regulation”);
 - (g) Merchant Shipping (Coastal Vessels) (Safety Survey) Regulation, (under drafting);
 - (h) Merchant Shipping (Safety) (Signals of Distress and Prevention of Collisions) Regulations (Cap 369 sub. leg.);
 - (i) Merchant Shipping (Prevention of Oil Pollution) Regulations (Cap 413 sub. leg.);
 - (j) Merchant Shipping (Prevention of Pollution by Garbage) Regulations;

- (k) Merchant Shipping (Control of Pollution by Noxious Liquid Substances in Bulk) Regulation (Cap 413 sub. leg.);
- (l) Dangerous Goods Ordinance (Cap 295);
- (m) Dangerous Goods (Application and Exemption) Regulations (Cap 295 sub. leg.);
- (n) Dangerous Goods (General) Regulations (Cap 295 sub. leg.);
- (o) Dangerous Goods (Shipping) Regulations (Cap 295 sub. leg.);
- (p) Merchant Shipping (Tonnage) Regulations issued under the provisions of the International Convention on Tonnage Measurement of Ships (1969);
- (q) Merchant Shipping (Safety) (Load Line) Regulations (Cap 369 sub. leg.).

3.2 Other standards

- (1) The relevant requirements or guidelines promulgated by Marine Department, unless otherwise clearly specified are not mandatory.
- (2) The vessel's strength, structure, arrangements, materials, scantlings, main and auxiliary machinery, boilers and pressure vessels, electrical installations, etc. should be so designed and installed as to ensure that the vessel is fit for the service for which it is intended. Apart from the requirements in this Code, present rules and standards of classification societies recognized by Marine Department or other equivalent standards should be used as assessment standards.

4. Statutory certificates

4.1.1 Certificates

Upon satisfactory completion of statutory surveys or assessment, the following relevant statutory certificates or record document would be issued by Marine Department except those specified in paragraphs 4.1.2 and 4.1.4 :-

- (1) Survey and Safety Management Certificate;
- (2) Record of Safety Equipment;
- (3) International Tonnage Certificate;
- (4) Exemption Certificate;
- (5) Minimum Safe Manning Certificate;
- (6) Hong Kong Oil Pollution Prevention Certificate;
- (7) Hong Kong Load Line Certificate;
- (8) Pollution Prevention Certificate for the Carriage of Noxious Liquid Substances in Bulk;

- (9) Certificate of Fitness for the Carriage of Dangerous Goods;
- (10) Certificate of Examination of Lifting Appliances or Certificate of Test and Examination of Lifting Appliances.

4.1.2 The certificates of items 4.1.1(2), (3), (6), (8) and (9) of the above issued in accordance with the International Conventions by the authorized organization may be considered equivalent and accepted by the Director.

4.1.3 For the certificate of item 4.1.1(5) of the above, owners may apply to Marine Department directly with reference to application details in Chapter 9.

4.1.4 The certificate of item (10) which may be issued by authorized surveyor or authorized organization in accordance with the requirements of the 《Merchant Shipping (Local Vessels)(Works) Regulation》.

4.2 Formulation of certificate format

4.2.1 The relevant statutory certificates should be prepared in both English and Chinese version. The Department would formulate the valid format of the certificates and amend as necessary.

4.3 Acceptance of certificates

4.3.1 Certificates issued/endorsed/countersigned by Marine Department or the authorized surveyor or authorized organization as mentioned in 2.2 in this Section should be accepted for all purposes covered by this Code.

4.4 Conditions of maintaining the validity of certificates

4.4.1 The surveys and inspections have been carried out to the vessels in accordance with the provisions of the Code and they are in a satisfactory technical condition and are fit for the service for which the vessels are intended.

4.4.2 The vessels should be traded/operated within the plying zones and conditions as restricted in the certificates.

5. Vessel surveys

5.1 Application

5.1.1 The owner or operator of coastal cargo vessels should, depending on its plying zones, apply for the following surveys in accordance with the provisions to Marine Department or the relevant authorized surveyor or authorized organization:

- (1) initial survey;
- (2) surveys in service

5.1.2 When one of the following situations occurs, the owner or manager should, depending on the plying zones, apply for an additional survey (provisional survey) as required with Marine Department or the relevant authorized surveyor or authorized organization:

- (1) an accident to a vessel which affects its seaworthiness;
- (2) alteration of a vessel's intended purpose or service area as restricted in its certificate;
- (3) invalidity of a vessel's statutory certificate;
- (4) changes of a vessel's owner or manager, the vessel's name;
- (5) repairs or modification involved in the safety of a vessel.

5.1.3 The manufacturers engaging the production of the essential equipment, components and materials, for use on coastal trade cargo vessels for the purpose of the safety at sea and pollution prevention of coastal waters environment should be recognized by Marine Department or recognized classification societies or maritime Administrations with reference as indicated in Appendix 1. These marine products should be surveyed for product fitness in accordance with the relevant provisions or other requirements.

5.2 Initial survey

5.2.1 The plans and documents relating to statutory certificates should be verified and approved by the authorized surveyor or authorized organization, and should comply with the applicable provisions of this Code.

5.2.2 After the surveys and tests, the vessel should be deemed to be in compliance with the relevant requirements of 2.1 of this Section, and also to be in satisfactory conditions for workmanship and installation accord with the general codes in all aspects.

5.3 Surveys in service

5.3.1 Surveys in service include: annual survey, external hull bottom and construction survey, 5 yearly survey, additional survey and extension survey.

5.3.2 Vessels should be properly maintained so that they are in a satisfactory technical condition and are fit for the service for which the vessels are intended.

5.4 Issuance, delivery and keeping of certificates

5.4.1 After completion of the relevant surveys, the authorized surveyor or authorized organization should submit the survey reports or declarations to Marine Department and with copies sent to the vessel owner/onboard the vessel/the applicant.

5.4.2 After the survey reports or declarations issued by the authorized surveyor or authorized organization being vetted and confirmed satisfactory by Marine Department, and with appropriate fees paid by owner, the authorized surveyor or authorized organization would be informed to endorse and countersign on the current statutory certificates or documents for a period of provisional validity not more than three months.

5.4.3 Marine Department would prepare the relevant full term certificates for collection by owner (usually within 10 working days).

5.4.4 For new-built vessel, relevant authorized surveyor or authorized organization should submit survey reports or declarations well in advance to Marine Department to ensure adequate time for processing of relevant full term certificates before delivery of the vessel.

5.4.5 All valid statutory certificates should be properly kept onboard and readily for inspection. For the certificates endorsed and countersigned in accordance with 5.4.2 of this Section, the vessel owner/operator should collect the full term certificates from Marine Department within the period of provisional validity of the certificates.

5.4.6 If the statutory surveys indicated in paragraphs 5.2 to 5.4 above are conducted by Marine Department, the concerned officers would ensure their satisfactory completion prior to the issuance or endorsement of relevant certificates.

Section 2 Survey and Certification

1. Type of surveys

- 1.1 **Initial survey** - an appropriate inspection before a vessel is put into service to ensure that the related items are complied with the relevant requirements and satisfactory for the service for which the vessel is intended.
- 1.2 **Annual survey** - an appropriate inspection annually to ensure that the related items have been maintained and remain satisfactory for the service for which the vessel is intended.
- 1.3 **External hull bottom inspection** (docking survey or survey on slip) - an inspection, twice in every 5 years, for the underwater part of the vessel and related items to ensure that they are in a satisfactory condition and fit for the service for which the vessel is intended.
- 1.4 **Quadrennial survey** - survey for the structure, machinery, electrical installation and equipment of the vessel should be completed quadrennial to ensure that all aspects of the vessel are in a satisfactory condition.
- 1.5 **Additional survey (provisional survey)** - according to the circumstances due to changing service purposes or modifications etc., or under the conditions stated in 5.1.2 of Section 1 and 2.6 of this Section of this Chapter, a general or partial survey should be carried out in the light of the specific situation to ensure changes or affected areas are completed effectively.
- 1.6 **Extension survey** - if survey cannot be carried out before the expiry of the certificates of the vessel, the owner or operator may request for an extension survey. Survey of the items for a particular certificate should be carried out to ensure that they are in good condition and accord with the planned usage of the vessel, and the relevant certificate should be endorsed with the extension date. The maximum period of extension should not exceed three months.

2. Survey for issue and endorsement of certificates

- 2.1 **Initial survey (new building vessel)** – survey on the items should be carried out in accordance with the Table 1 and Table 3 of 2.10 of this Section, include:
- (1) an examination of the plans, diagrams, specifications, calculations and other technical documentation to verify that the structure, machinery, electrical installations and equipment comply with the requirements relevant to the particular certificate, including safety management system procedures/documents;
 - (2) an inspection of the structure, machinery, electrical installations and equipment etc. to ensure that the materials, scantlings, construction and arrangements, as appropriate, are in accordance with the approved plans, diagrams, specifications, calculations and other technical documentation and that the workmanship and installation are in all respects satisfactory;

- (3) to audit that all the certificates, record books, operating manuals and other instructions and documentation specified in the requirements relevant to the particular certificates are placed on board the vessel, including safety management system and its implementation matters.

2.2 **Initial survey (existing vessel)** - survey and audit should be carried out on the items in accordance with the Table 1 and Table 3 of 2.10 of this Section and in the light of situation, include:

- (1) an examination of plans, including safety management system procedures/documents;
- (2) a confirmation of survey and test reports and certificates for main products related to the vessel's safety;
- (3) a general inspection to be made to the hull, machinery, electrical installations and equipment as to confirm that they are in compliance with the relevant provisions of the Regulations;
- (4) a confirmation of test and/or inspection to be carried out, if necessary;
- (5) an inspection of outside of the vessel's bottom and boilers and a stability check should be included, in general;
- (6) to audit that all the certificates, record books, operating manuals and other instructions and documentation specified in the requirements relevant to the particular certificates are placed on board the vessel, including safety management system and its implementation matters.

2.3 **Annual survey** - survey on the items should be carried out in accordance with the Table 3 of 2.10 of this Section, include:

- (1) an inspection of the certificates, visual examination of sufficient extent together with certain tests of the vessel's safety equipment to confirm that its condition is being properly maintained;
- (2) a visual examination to confirm that no unauthorized modification has been made to the vessel and its equipment;
- (3) if any doubt arises as to the maintenance of the condition of the vessel or its equipment, further inspection and testing should be carried out;
- (4) to carry out the annual survey and audit the items of the approved 5 yearly continuous survey plan;
- (5) to audit that all the certificates, record books, operating manuals and other instructions and documentation specified in the requirements relevant to the particular certificates are placed on board the vessel, including safety management system and its implementation matters.

2.4 **External hull bottom inspection (docking survey)** - should include an inspection of the underwater part of the vessel and relevant items to ensure that they are in a satisfactory condition and fit for the service for which the vessel is intended. Inspections of the outside of the vessel's bottom should normally be carried out with the vessel in a dry dock. However, if the conditions are satisfactory and the proper equipment and suitably trained staff are available, consideration may be given to alternate inspections being carried out with the vessel afloat. Special consideration should be given before vessels of 15 years of age and over are permitted to have such surveys afloat.

2.5 **5 yearly survey** - should include the following:

- (1) an inspection, with tests when necessary, of the structure, machinery, electrical installations and equipment on continuous basis in accordance with an approved 5 yearly plan to ensure that the requirements relating to the particular certificate are complied with and that they are in a satisfactory condition and are fit for the service for which the vessel is intended;
- (2) the 5 yearly survey of all items of the vessel's structure, machinery, electrical installation and equipment should be completed in the fifth year periodical survey;

2.6 **Additional survey (provisional survey)** - should be carried out for either of the following conditions:

- (1) an accident to a vessel which affects its seaworthiness;
- (2) alteration of a vessel's intended purpose or service area as restricted in its certificate;
- (3) invalidity of a vessel's statutory certificate;
- (4) changes of a vessel's owner or manager, and of a vessel's name;
- (5) repairs or modification involved in the safety of a vessel.

The additional survey, which may be either general or partial according to the circumstances, should be such to ensure that the repairs and any renewals have been effectively made and that the vessel and its equipment continue to be fit for the service for which the vessel is intended.

2.7 **Extension survey** - should include a general survey of the vessel and the survey items should not be less than that of the annual survey (refer to Table 3 of 2.10 of this Section).

2.8 When laid-up vessel is put into operation again and if the survey certificates issued previously have become invalid, it should be surveyed again. The survey items should include those items due for survey in the laid-up period.

2.9 The authorized surveyor or authorized organization responsible for the survey could request to survey any other items considered necessary.

2.10 Appropriate statutory survey programmes and survey items are tabulated as following:

Table 1 Initial Construction Survey

No.	Survey Items
1	Mould Loft – inspection
2	Material Test (*1) – hull shell plating, screw propeller shaft, coupling, rudder stock
3	Preparation of the Hull Structural Parts before Welding (including underdeck structure, superstructure, skeg, rudder, kort nozzle, etc.)
4	Hull Scantlings – verification
5	Weld – inspection
6	– hose test / flooding test
7	Hull Tanks – internal inspection
8	– hydraulic test / air test
9	Watertight / Weathertight Appliances – inspection
10	– hose test
11	Loadline Items (including Freeboard Marks) – inspection and verification
12	Structural Fire Protection Items – inspection
13	Arrangement and construction of Crew Accommodation – inspection
14	Arrangement and construction of Lifting Appliances, if any – inspection
15	Main engine, gear box – inspection of Type Approval Certification
16	Screw Propeller Shaft and Coupling – verification of dimensions
17	– taper contact surface test
18	Stern Tube – verification of dimension and hydraulic test
19	Independent Fuel Oil Tank – internal inspection and hydraulic test
20	Fire Main Pipes – inspection and hydraulic test
21	Bilge Pipes – inspection and hydraulic test
22	Steering System Hydraulic Pipes – inspection and hydraulic test

No.	Survey Items
23	Fuel Oil Pipes – inspection and hydraulic test
24	CO ₂ Pipes – inspection, hydraulic test and blowing test
25	Compressed Air Pipes –hydraulic test (applicable to P > 17.2 bar)
26	Air Receiver – verification of the internal wall thickness / dimensions
27	– hydraulic test
28	Prevention of Oil Pollution Installation – inspection and hydraulic test (vessels with the Hong Kong Oil Pollution Prevention Certificate)
29	– hydraulic test on bilge water holding tank (vessels without the Hong Kong Oil Pollution Prevention Certificate)
30	A.C. Electrical Circuit – inspection
31	Radio Communication equipment – inspection and function test
32	Navigational equipment – inspection and function test
33	Position of Navigation Lights – verification
34	Escape Routes of Accommodation and Engine Room – verification
35	Draft Marks – verification
36	Inclining Experiment – verification
37	Safety Management System Procedures/Documents - verification

Explanatory Note of Table 1

*1 Material Test may be replaced by the certificates issued or endorsed by Marine Department or authorized surveyors or surveyors of authorized organizations.

Table 2 Intermediate and Renewal Survey on External Hull Bottom and Construction

No.	Survey Items Survey Intervals (*1) (*9)	I	R
1	Hull – inspection of the hull shell plating, internal of oil tanks, water tanks and void spaces	✓	
2	– thickness gauging of deck plating, hull shell plating, bulkhead plating (*2)		✓
3	Propeller and rudder – rudder pintle bush clearance measurement, propeller shaft bush clearance measurement and inspection of stern tube fittings	✓	
4	Tailshaft, propeller, rudder, rudder stock – withdrawn for inspection		✓
5	Sea Water Intake Valves, Discharging Valves – stripped down for inspection		✓
6	Anchors, Cables – ranged out for inspection		✓
7	Main Engine – hydraulic test of coolers (including air, lubricating oil, cooling water), cylinder head and water jacket		✓
8	– fuel oil pump, fuel nozzles (overhauled by machinery maintenance workshops) (*3)		✓
9	Main Engine and Gear Box – stripped down for inspection(*4) – (done by machinery maintenance workshops)(*3)		✓
10	Generator – stripped down for inspection (done by machinery maintenance workshops (*3)		✓
11	Main Fire Pump, Emergency Fire Pump, Bilge Pump, Windlass – stripped down for inspection		✓
12	Air Receiver (P <17.2 bar) – internal inspection		✓
13	– hydraulic test		✓
14	Air Receiver (P ≥17.2 bar) – internal inspection	✓	
15	– hydraulic test	✓	

16	Oil Pollution Prevention Installation – vessels with Hong Kong Oil Pollution Prevention Certificate		(*5)
17	– vessels without Hong Kong Oil Pollution Prevention Certificate: hydraulic test of bilge water holding tank		✓
18	Fixed Fire Extinguishing Installation CO ₂ system – blown through test sprinkler system – spraying test		✓
19	– hydraulic test		(*6)
20	Fire Extinguishers – hydraulic test		✓
21	Fire Extinguishers, CO ₂ Bottles – refill and hydraulic test		(*7)
22	Buoyant Apparatus – leak test (*8)		✓
23	Watertight doors, cargo ports and hatch covers – hose test		✓
24	Cargo hold openings, hatch coamings, other hatch openings and miscellaneous openings above freeboard deck and superstructure decks, etc. and their closing devices – inspection	✓	

Explanatory Notes of Table 2

*1 Survey Intervals (may also refer to 3.2 of this Section)

I – The items listed in the Table (marked with “✓”) to be surveyed twice every 5 years

R – The items listed in the Table (marked with “✓”) to be surveyed every 5 years

*2 It is applicable to those vessels over 8 years of age. For vessels possessing the International Load Line Certificate, the gauging inspection may be arranged during the renewal of the Certificate. Unless under exceptional circumstances, otherwise vessels over 9 years of age are required to carry out the thickness gauging

*3 Inspection records issued by the machinery maintenance workshops should be submitted for reference.

*4 For a brand new gear box, the strip down inspection should begin from the fourth year after in service. In accordance with paragraph 2.5(4) of this Section, gear box may be surveyed before end of the fifth year.

*5 All oil pollution prevention installations should be stripped down for survey during the renewal of the Hong Kong Oil Pollution Prevention Certificate.

*6 Hydraulic tests for CO₂ and sprinkler systems should begin from the 10th anniversary after in service and thereafter at intervals of 10 years.

- *7 Survey for portable fire extinguishers and CO₂ bottles should be in accordance with the following table. The survey records should be retained on board for inspection.

9 l, 45 l Water, Foam, Dry Powder Extinguisher		CO ₂ Fire Extinguisher, CO ₂ Fixed Installation Bottle		
Refill/Capacity Weight (*a)	Water Test (*b)	Capacity Weight	Refill	Water Test (*b)
Owner(*c) /FSIC	FSIC/MD/(AS/AO)	FSIC	DG Reg 62	DG Reg 66

Abbreviations

FSIC : Fire Service Installation Contractors or organizations acceptable to the Director

DG Reg 62: Persons who hold the licences issued in accordance with Regulation 62 of the Dangerous Goods (General) Regulation

DG Reg 66: Persons approved by the Fire Services Department in accordance with Regulation 66 of the Dangerous Goods (General) Regulation

MD : Survey officers from Marine Department

(AS/AO) : Authorized surveyor or authorized organization

Notes

(*a) Refill the extinguishers in accordance with the instructions of the extinguisher makers.

(*b) Intervals of hydraulic test
portable fire extinguishers – 5 years
CO₂ bottles – 10 years

(*c) Officers of Marine Department may examine the vessel owner's competence on carrying out the maintenance work of fire extinguishers and may conduct random inspection of portable fire extinguishers (including function test).

- *8 Air case not filled with buoyant materials should be tested for gastight by submerging in water.

- *9 If the survey for hull and machinery installations were carried out by authorized surveyors or surveyors of authorized organizations, the survey reports or certificates issued should be submitted for records.

Table 3 Safety Equipment and General Survey (*1)

No.	Survey Items (*2)
	Part 1 – General safety survey
1	Crew protection facilities (include guardrails, stairways, alleyways etc.) – inspection
2	Watertight / Weathertight Closing Appliances (including doors, ventilators, air pipes, etc.) – inspection
3	Scuppers, sea suctions and discharges, side scuttles and dead light covers – inspection
4	Verification of Freeboard Marks or Load Lines Marks
5	Verification of Marking and Certificates of Safe Working Load of Lifting Appliances
6	General Conditions inside the Engine Room – prevent and protect the crew members from being injured – prevent the hazard of catching fire – prevent the hazard of oil pollution
7	Remote shut off installations for fuel oil tanks in ER, fuel oil pumps, ventilation equipment, ventilators and skylights in engine room – operation tests
8	Closing appliance for cargo hold ventilation fans, ventilators and other openings – operation tests
9	Main Engines, Generators, Steering Gears – operation tests
10	Inspection of the Exhaust Emission from Machinery (*3)
11	Unattended Machinery Space Installation – function test
12	Safety Valve of Air Receivers – function test
13	Bilge System and Slop Tank System – function test
14	Prevention of Oil Pollution Installation – function test
15	A.C. Electrical Circuit – earthing test
16	– insulation resistance test
17	– main circuit-breakers function test (*4)
18	Meters on Switchboard – function test
19	Liquefied Petroleum Gas Appliances for Cooking – inspection

	Part 2 – Safety equipment etc.
20	Life-saving Appliances – inspection and function test
21	Fire-fighting Equipment (including CO ₂ fixed fire extinguishing installation, emergency fire pump) – inspection and function test
22	Engine room and crew accommodation emergency escape routes – inspection
23	Lights and Sound Signals – inspection and function test
24	Fire Drill, Abandon Ship Drill
25	Permanent Ballast – confirmation of the amount and positions
26	Plans Required to be kept on board – confirmation of the numbers and contents
27	Vessel Manoeuvring Trial (including tests on emergency crash stop, astern, turning around and windlass operation)
28	Navigational equipment and radio communication equipment – function test
29	Audit of the Safety Management System and its implementation matters

Explanatory Notes of Table 3

- *1 Applicable to annual survey and certification survey.
- *2 Survey Reports on the items listed in the Table and other related items should be submitted as soon as possible on completion of survey for issuance of certificates.
- *3 Inspection of exhaust emission may be conducted together with Item 9.
- *4 Applicable to those vessels with a single generator of exceeding 50 kW output on board.

3. Survey Intervals

- 3.1 Statutory survey should be conducted before the expiry of the certificate (usually not earlier than 3 months).
- 3.2 The External Hull Bottom and Construction Survey of cargo vessels should be conducted at least twice within every five years in accordance with Table 2 of 2.10 of this Section. The period between surveys should not exceed 3 years.
- 3.3 An extension survey should be conducted before the expiry of the certificate. The extension should not exceed 3 months.

4 Application for Survey

- 4.1 Vessel owners or agents may apply to Marine Department for conducting survey to their vessels and submit the application forms and pay the fees to Marine Department.

4.2 If vessel owners or agents intend to have their vessels surveyed by authorized surveyors or authorized organizations, they should submit to Marine Department the requested survey items, names of the authorized surveyors or surveyors of authorized organizations, places and dates of survey.

5 Period of Validity of Certificates

5.1 Period of Validity of Statutory Certificates are as following:

- (1) The period of validity of Vessel Survey and Safety Management Certificate, Survey Record of Safety Equipment, Hong Kong Load Line Certificate, Declaration of Fitness for the Carriage of Dangerous Goods or Noxious Liquid Substances and Certificate of Examination of Lifting Appliances do not exceed 1 year.
- (2) International Tonnage Certificate is permanently valid under normal circumstances.
- (3) The Minimum Safe Manning Certificate is permanently under normal circumstances.
- (4) The period of validity of the Hong Kong Oil Pollution Prevention Certificate does not exceed 5 years.
- (5) The period of validity of the Certificate of Test and Examination of Lifting Appliances does not exceed 4 years.
- (6) The dates of expiry of new certificates and endorsements/countersigns may be confirmed in accordance with the Table as follows:

No.	Certification Survey Date	Dates of Expiry of New Certificates/Endorsements
(1)	New Vessels	CCSD +12 months (Note)
(2)	Laid-up Vessels that being put into service again	CCSD + 12 months
(3)	Existing Vessels	
	(a) Within 3 months before the CED	CED + 12 months
	(b) After the CED	CCSD + 12 months
	(c) More than 3 months before the CED	CCSD + 12 months

CED = The dates of expiry of the existing certificates/endorsements/countersigns

CCSD = The date upon completion of survey of Table 3 before certification

Note : For those new vessels that have to have the hull survey on slipway (or dry dock), the new certificates should be valid to a date not exceeding 15 months from the dates of the last hull survey on slipway (or dry dock).

- (7) If a vessel at the time when the annual renewal survey expires is not in a port in which it is to be surveyed, an extension of not exceeding 3 months may be granted to its certificate provided the authorized surveyor or authorized organization agreed that it is appropriate and reasonable. The vessel to which an extension is granted should not, on its arrival to the port in which it is to be surveyed, continue its voyage. It should have the renewal survey conducted. The certificate issued after the renewal survey will come into force at the date of completion of the renewal survey and it will be valid to a date not exceeding 12 months from the date of expiry of the certificate before the extension was granted.
- (8) Under exceptional circumstances, the effective date of the new certificate is not required to start from the date of expiry of the existing certificate in accordance with 5.1(6) and (7) of this Section. Under such exceptional circumstances, the new certificate will be valid to a date not exceeding 12 months from the date of completion of the renewal survey.
- (9) If the period of validity of the renewal certificate is 4 or 5 years, the arrangements for renewal survey and the period of validity are just the same as above-mentioned.

6 Maintenance of Conditions after Survey

- 6.1 Conditions of a vessel and its equipment should be maintained to conform with the provisions of this Code to ensure that the vessel in all aspects and will remain fit to proceed to sea without danger to the vessel or persons on board.
- 6.2 After any survey of a vessel in accordance with this Code has been completed, unless approval is obtained from Marine Department or authorized surveyors or authorized organizations, no change should be made in the structural arrangements, machinery, equipment and other items covered by the survey.
- 6.3 Whenever an accident occurs to a vessel or a defect is discovered, either of which affects the safety of the vessel or the efficiency or completeness of its life-saving appliances or other equipment of the vessel, the vessel master or the vessel owner should report immediately to Marine Department and the concerned authorized surveyors or authorized organizations in order to decide whether an additional survey is necessary.

7 Plans and Data

- 7.1 Plans and data of new vessels and modification on existing vessels should be submitted for approval in accordance with the items listed in the table in paragraph 7.5 below.
- 7.2 For a vessel not classed with a recognized classification society, plans and data in the following Table should be submitted to Marine Department or the authorized surveyor or authorized organization for approval. Plans and data other than those listed in the Table should also be provided, if necessary.
- 7.3 For a vessel classed with a recognized classification society, plans and data in the following table should be submitted to the recognized classification society for approval. Plans and data other than those listed in the Table should also be provided, if necessary. Copies of the approved plans and data in the Table marked with “*” should be submitted to Marine Department for record purpose.

7.4 Plans and data submitted for approval are only applicable to one vessel or sister vessels building in the same period. Plans and data are valid within a period of 2 years on completion of the approval of related construction (new vessels) or modification (existing vessels) work.

7.5 Plans and data should be submitted in accordance with the table as follows:-

No.	Plans and Data	for MD Record
General		
1	General Arrangement	*
2	Lines Plan, including offset tables and draft marks (for record purpose)	
3	Hydrostatic Curves, Cross Curves of Stability	
4	Stability Estimated Book	*
5	Inclining Experiment Report	*
6	Stability Information Calculation Book (after inclining experiment)	*
7.	Arrangement and Structure of Crew Accommodation	
8.	Arrangement and Structure of Lifting Equipment, if any	*
9.	Safety Management System Procedure/ Documents	
Hull and Safety Equipment		
1	Midship Section Plan, Basic Structure Plan, Deck Plan, Bulkhead Plan and Shell Expansion Plan	
2	Structural Plans of Kort Nozzle, Rudder Stock, Skeg and Sole Piece	
3	Weathertight / Watertight Arrangement	
4	Structural Fire Protection Arrangement	*
5	Materials and Paints Specification	
6	Arrangements of Life-Saving Appliances, Fire-fighting Equipment, Lights, Sound Signals and Escape Routes	*

Machinery Installations		
1	Engine Room Arrangement	
2	Pump Room Arrangement	
3	Plans of Screw Propeller Shaft, Stern Tube and Coupling	
4	Main Engine and Gear Box Certificates	
5	Arrangement of Fuel Oil System (including fuel oil tanks and piping)	
6	Fire-fighting Piping Arrangement (including fire main, fixed fire extinguishing system)	
7	Bilge Pumping Arrangement	
8	Compressed Air Piping System (for pressure =10 bar)	
9	Air Receiver Plan and Testing Certificate	
10	Steering Gear Hydraulic Piping System	
11	Prevention of Oil Pollution Installation	*
12	Mechanical Ventilation and Air-conditioning System	
13	Liquefied Petroleum Gas Appliances for Cooking	
Electrical Installations (including emergency power system)		
1	A.C. System Line Diagram (including emergency power system)	
2	Wiring Diagram of Main Switchboard	
3	Layout of Main Switchboard	
4	Electrical Installation Arrangement	
5	Wiring Diagram of Distribution Boxes	
Radio communication equipment and navigational equipment		
1	Radio Communication Equipment Arrangement	*
2	Navigational Equipment Arrangement	*

7.6 Every vessel should retain on board a set of copy of approved and as built plans and documents for readily inspection by the surveyors.

Chapter 2 Tonnage Measurement

(Refer to 《Merchant Shipping (Registration)(Tonnage) Regulations》)

Note: 《 Merchant Shipping (Registration)(Tonnage) Regulations 》 implements the 《International Convention on Tonnage Measurement of Ships 1969》 . This Code is applicable to vessels of 24 metres or above in length. The survey of vessel's Net Tonnage and Gross Tonnage should fulfill Regulations 4 to 7 of 《International Convention on Tonnage Measurement of Ships 1969》 . The issuance or termination of vessel Tonnage Certificates should fulfill Regulations 9 and 10 of 《International Convention on Tonnage Measurement of Ships 1969》 .

Chapter 3 Load Line

(Refer to 《Merchant Shipping (Safety) (Loadline) Regulations》 and its amendments)

Note: This Code has the following requirements with respect to 《Merchant Shipping (Safety) (Loadline) Regulations》 .

Regulation	Title	Requirements in this Code
1B(d)	Vessels applicable	This regulation is applicable to coastal cargo vessels as defined in 2.1(11) of Main Principles of this Code.
6	Issue of Load Line Certificate	The authority can issue to the vessel owner the International Load Line Certificate or the Hong Kong Load Line Certificate.
7	Validity of International Load Line Certificate	Unless stated otherwise, Hong Kong Load Line Certificate is valid for 1 year from the date of issue.

Chapter 4 Vessel Safety

Section 1 General Principles

1 Application

- 1.1 Unless expressly provided otherwise, licensed “river trade” local vessel applying to trade only in the Coastal class B plying zone may be surveyed and certificated in accordance with requirements stipulated in paragraph 1.5 of Chapter 1.
- 1.2 The applicable vessel types and extent for each Section of this Chapter, are more specifically given in each Section.
- 1.3 Vessel safety should comply with the applicable requirements of the Main Principles and Chapter 1 of this Code.

2 Definition

2.1 Unless expressly provided otherwise, the definitions under this chapter are:-

- (1) Passenger: means every person other than the following:-
 - (A) the master and crew members, or other persons employed or engaged in any capacity on board a vessel on business of the vessel;
 - (B) a child under 1 year of age.
- (2) Passenger vessel: means a vessel carries more than 12 passengers.
- (3) Cargo vessel: means any vessel which is not a passenger vessel.
- (4) Tanker: means a cargo vessel is constructed or adopted for the carriage of liquid cargoes of a flammable nature.
- (5) Fishing vessel: means a vessel used for catching fish or other living resources of the sea.
- (6) Chemical tanker: means a vessel engaged in the carriage of bulk cargoes of dangerous liquid chemical substances, other than petroleum or similar inflammable products.
- (7) Gas Carrier: means a vessel carries a cargo of products which are liquefied gases having a vapour pressure exceeding 0.28 MPa absolute at a temperature of 37.8°C, and other similar substances in bulk.
- (8) Construction: means a construction stage in which the keel is laid or under the in the following conditions:-
 - (A) construction identifiable with a specific vessel begins; and
 - (B) assembly of that vessel has commenced comprising at least 50 tonnes or is at least 1% of the estimated mass of the structural material of the vessel, whichever is the less.

Section 2-1 Construction - Subdivision and Stability, Machinery and Electrical Installations

1 Subdivision and Stability

1.1 Application

1.1.1 Marine Department may exempt certain vessel types from the requirements after considering the sheltered nature and the conditions pertaining to the voyage, and has agreed that certain specific requirements are not reasonable or not practicable in their application to the vessel type.

1.2 Definition

1.2.1 The corresponding definitions are:-

- (1) Subdivision Load Line: is a waterline used in determining the subdivision of the vessel.
- (2) Deepest subdivision Load Line: is the waterline which corresponds to the greatest draught permitted by the subdivision requirements which are applicable.
- (3) Vessel length: is the length measured between perpendiculars taken at the extremities of the deepest subdivision load line.
- (4) Vessel breadth: is the extreme width from outside of frame to outside of frame at or below the deepest subdivision load line.
- (5) Draught: is the vertical distance from the moulded base line amidships to the subdivision load line in question.
- (6) Bulkhead deck: is the uppermost deck up to which the transverse watertight bulkheads are carried.
- (7) Margin line: is a line drawn at least 76 mm below the upper surface of the bulkhead deck at side.
- (8) Permeability of a space: is the percentage of that space which can be occupied by water.
- (9) Machinery space: is the space to be taken as extending from the moulded base line to the margin line and between the extreme main transverse watertight bulkheads, bounding the spaces containing the main and auxiliary propulsion machinery, boilers serving the needs of propulsion, and all permanent coal bunkers. In the case of unusual arrangements, the boundary of machinery space would need to be agreed by Marine Department.
- (10) Passenger space: are those spaces which are provided for the accommodation and use of passengers, excluding baggage, store, provision and mail rooms. Spaces provided below the margin line for the accommodation and use of the crew should also be regarded as passenger spaces.
- (11) Weathertight: means that under any sea conditions water will not penetrate into the vessel.

- (12) Lines: the geometrical shape bound by the vessel body and the bulkhead deck.
- (13) Sheltered navigational area: the navigational area having shelters for vessels to stay away from storm.
- (14) Machinery spaces of category A: means those spaces and trunks to such spaces which contain:
 - (i) internal combustion machinery used for main propulsion;
 - (ii) internal combustion machinery used for purposes other than main propulsion where such machinery has in the aggregate a total power output of not less than 375 kW;
 - (iii) any oil-fired boiler or oil fuel unit;
 - (iv) oil burning inert gas generating unit.

1.2.2 Under normal circumstances, the vessel's volumes and areas should be calculated to the lines of the vessel.

1.3 Cargo vessel (excluding tanker) double bottom

1.3.1 A double bottom should be fitted extending from the collision bulkhead to the afterpeak bulkhead, as far as this is practicable and compatible with the design and proper working of the vessel.

1.3.2 Where a double bottom is required to be fitted, its depth should comply with the requirements of the classification societies recognized by Marine Department and any other standards recognized by the Marine Department; and the inner bottom should be continued out to the vessel's side in such a manner as to protect the bottom to the turn of the bilge.

1.3.3 Small wells constructed in the double bottom, in connection with the drainage arrangements of holds, should not extend in depth more than necessary. A well extending to the outer bottom, may, however, be permitted at the after end of the shaft tunnel of the vessel. Other wells may be permitted if the arrangements give protection equivalent to that afforded by a double bottom complying with 1.4.2 of this Section.

1.3.4 A double bottom need not be fitted in way of watertight compartments used exclusively for the carriage of liquids, provided the safety of the vessel, in the event of bottom damage, is not thereby impaired.

1.4 Watertight bulkhead tests and construction

1.4.1 Each watertight subdivision bulkhead, whether transverse or longitudinal, should be constructed in such a manner that it should be capable of supporting, with a proper margin of resistance, the pressure due to the maximum head of water which it might have to sustain in the event of damage to the vessel but at least the pressure due to a head of water up to the margin line. The construction of these bulkheads should be subject to the approval from the Marine Department.

1.4.2 Steps and recesses in bulkheads should be watertight and as strong as the bulkhead at the place where each occurs. Where frames or beams pass through a watertight deck or bulkhead, such deck or bulkhead should be made structurally watertight without the use of wood or cement.

1.5 Construction and tests of Watertight decks, trunks etc.

- 1.5.1 Watertight decks, trunks, tunnels, duct keels and ventilators should be of the same strength as watertight bulkheads at corresponding levels. The means used for making them watertight, and the arrangements adopted for closing openings in them, should be to the satisfaction of Marine Department. Watertight ventilators and trunks should be carried at least up to the bulkhead deck in passenger vessels and up to the freeboard deck in cargo vessels.
- 1.5.2 After completion, a hose or flooding test should be applied to watertight decks and a hose test to watertight trunks, tunnels and ventilators.

1.6 Watertight door, sidescuttle constructions and tests

- 1.6.1 Each watertight door should be tested by water pressure to a head up to the bulkhead deck or freeboard deck respectively. The test should be made before the vessel is put into service, either before or after the door is fitted.

1.7 Bilge pumping arrangements

- 1.7.1 The bilge pumping arrangements should comply with the requirements below:-

- (1) An efficient bilge pumping system should be provided, capable of pumping from and draining any watertight compartment other than a space permanently appropriated for the carriage of fresh water, water ballast, oil fuel or liquid cargo and for which other efficient means of pumping are provided, under all practical conditions. Efficient means should be provided for draining water from insulated holds.
- (2) Sanitary, ballast and general service pumps may be accepted as independent power bilge pumps if fitted with the necessary connections to the bilge pumping system.
- (3) All bilge pipes used in or under coal bunkers or fuel storage tanks or in boiler or machinery spaces, including spaces in which oil-settling tanks or oil fuel pumping units are situated, should be of steel or other approved material.
- (4) The arrangement of the bilge and ballast pumping system should be such as to prevent the possibility of water passing from the sea and from water ballast spaces into the cargo and machinery spaces, or from one compartment to another. Provision should be made to prevent any deep tank having bilge and ballast connections being inadvertently flooded from the sea when containing cargo, or being discharged through a bilge pump when containing water ballast.
- (5) All distribution boxes and manually operated valves in connection with the bilge pumping arrangements should be in positions which are accessible under ordinary circumstances.
- (6) Vessels built on or after 1 February 1992, drainage of enclosed cargo spaces situated on the freeboard deck should be installed. Any particular compartment if it is satisfied that by reason of size or internal subdivision of those spaces the safety of the vessel is not thereby impaired due to the dispensation of means of drainage, installation of such means of drainage to may be exempted.

- (A) Where the freeboard to the bulkhead deck or the freeboard deck, respectively, is such that the deck edge is immersed when the vessel heels more than 5°, the drainage should be by means of a sufficient number of scuppers of suitable size discharging directly overboard. Such scuppers should be fitted in compliance with the requirements for scuppers, inlets and discharges of the Loadline Regulation in Chapter 3 of this Code.
- (B) Where the freeboard is such that the edge of the bulkhead deck or the edge of the freeboard deck, respectively, is immersed when the vessel heels 5° or less, the drainage of the enclosed cargo spaces on the bulkhead deck or on the freeboard deck should be led to a suitable space, or spaces, of adequate capacity, having a high water level alarm and provided with suitable arrangements for discharge overboard. In addition it should be ensured that:
 - (i) the number, size and disposition of the scuppers are such as to prevent unreasonable accumulation of free water;
 - (ii) the pumping arrangements required by this regulation for passenger vessels or cargo vessels, as applicable, take account of the requirements for any fixed pressure water-spraying fire-extinguishing system;
 - (iii) water contaminated with petrol or other dangerous substances is not drained to machinery spaces or other spaces where sources of ignition may be present;
 - (iv) where the enclosed cargo space is protected by a carbon dioxide fire-extinguishing system the deck scuppers are fitted with means to prevent the escape of the smothering gas.

1.7.2 Additional requirements for bilge pumping arrangements

- (1) At least two power pumps connected to the main bilge system should be provided, one of which may be driven by the propulsion machinery. If it is satisfied that the safety of the vessel is not impaired, bilge pumping arrangements may be dispensed with in particular compartments.

1.8 Damage control

1.8.1 Damage control of dry cargo vessels (applicable to vessels built on or after 1 February 1992):

- (1) There should be permanently exhibited or readily available on the navigation bridge, for the guidance of the officer in charge of the vessel, a plan showing clearly for each deck and hold the boundaries of the watertight compartments, the openings therein with the means of closure and position of any controls thereof, and the arrangements for the correction of any list due to flooding. In addition, booklets containing the aforementioned information should be made available to the officers of the vessel.
- (2) Indicators should be provided for all sliding doors and for hinged doors in watertight bulkheads. Indication showing whether the doors are open or closed should be given on the navigation bridge. In addition, shell doors and other

openings which, in the opinion of the Administration, could lead to major flooding if left open or not properly secured, should be provided with such indicators.

(3) Safety precautions:-

- (A) General precautions should consist of a listing of necessary equipment, conditions and operational procedures, to maintain watertight integrity under normal vessel operations;
- (B) Specific precautions should consist of a listing of elements (i.e. closures, security of cargo, sounding of alarms, etc.) considered by the Administration to be vital to the survival of the vessel and its crew.

2 Vessel Structures

2.1 Requirements of vessel's structures and machinery and electrical installations

2.1.1 Except where it is specifically required by this Code, the design, construction and maintenance of vessels should also satisfy with the relevant requirements of the recognized classification society on vessel's structures and machinery and electrical installations, or the requirements of accepted corresponding standards.

3 Machinery Installations

3.1 General provisions

- 3.1.1 The machinery, boilers and other pressure vessels, associated piping systems and fittings should be of a design and construction adequate for the service for which they are intended and should be so installed and protected as to reduce to a minimum any danger to persons on board, due regard being paid to moving parts, hot surfaces and other hazards. The design should have regard to materials used in construction, the purpose for which the equipment is intended, the working conditions to which it will be subjected and the environmental conditions on board.
- 3.1.2 Main propulsion machinery and all auxiliary machinery essential to the propulsion and the safety of the vessel should, as fitted in the vessel, be designed to operate when the vessel is upright and when inclined at any angle of list up to and including 15° either way under static conditions and 22.5° under dynamic conditions (rolling) either way and simultaneously inclined dynamically (pitching) 7.5° by bow or stern. The deviation from these angles may be permitted, taking into consideration the type, size and service conditions of the vessel.
- 3.1.3 Sufficient power for going astern should be provided to secure proper control of the vessel in all normal circumstances.
- 3.1.4 At least two independent means should be provided for communicating orders from the navigation bridge to the position in the machinery space or in the control room from which the engines are normally controlled; one of these should be an engine-room telegraph which provides visual indication of the orders and responses both in the machinery spaces and on the navigation bridge. Appropriate means of communication should be provided from the navigation bridge and the engine-room to any other position from which the engines may be controlled.
- 3.1.5 The levels of machinery noise in machinery spaces should comply with the standards approved by Marine Department.
- 3.1.6 Special consideration should be given to the design, construction and installation of propulsion machinery systems so that any mode of their vibrations should not cause undue stresses in this machinery in the normal operating ranges.
- 3.1.7 In any cases, all spaces, where flammable or toxic gases or vapours may accumulate, including machinery room and cargo pump room should be provided with adequate ventilation.
- 3.1.8 Accessibility for the purpose of control, maintenance and overhaul of machinery and equipment should be provided in machinery and boiler spaces.
- 3.1.9 All boilers, all parts of machinery, all steam, hydraulic, pneumatic and other systems and their associated fittings which are under internal pressure should be subjected to appropriate tests including a pressure test before being put into service for the first time.

3.2 Pumping and piping systems

3.2.1 Classes of pipes

- (1) The design pressure for piping should be the maximum permissible working pressure and should comply with the following requirements:
 - (A) for the water tube boiler installation, the design pressure for steam piping between the boiler and integral superheater should be taken as the design pressure of the boiler, i.e. not less than the highest set pressure of any safety valve on the boiler drum. For piping leading from the superheater outlet, the design pressure should be taken as the highest set pressure of the superheater safety valves;
 - (B) the design pressure for boiler feed water and blow-off piping should be taken as 1.25 times the boiler design pressure, but not less than the boiler design pressure plus 0.7 MPa;
 - (C) the design pressure for air compressors and displacement pump discharging pipes should be taken as the highest set pressure of relief valves, the design pressure for centrifugal pump discharging pipes should be taken as the maximum pressure obtained from the performance curve of the pump;
 - (D) the design pressure for boiler fuel oil pressure pipes should be taken as not less than 1.6 MPa;
 - (E) for special cases, the design pressure should be specially considered.
- (2) The design temperature should be taken as the maximum temperature of the internal fluid, but in no case should it be less than 50°C. In the case of pipes for superheated steam, the temperature should be taken as the designed operating steam temperature for the pipeline, provided that the temperature at the superheater outlet is closely controlled. Where temperature fluctuations exceeding 15°C above the designed temperature are expected in normal service, the steam temperature to be used for determining the allowable stress should be increased by the amount of this excess. For special cases, the design temperature should be specially considered.
- (3) For the purpose of assigning appropriate testing requirements, types of joints to be adopted, heat treatment and weld procedure, pressure piping systems are divided into three classes in accordance with their design pressure and design temperature, as indicated in Table 3.2.1(3).

Piping class

Table 3.2.1(3)

Piping	Class I		Class II		Class III	
	Design Pressure (MPa)	Design Temperature (°C)	Design Pressure (MPa)	Design Temperature (°C)	Design Pressure (MPa)	Design Temperature (°C)
Steam	>1.6	or >300	≤1.6	and ≤300	≤0.7	and ≤170
Fuel (including heavy oil and diesel oil)	>1.6	or >150	≤1.6	and ≤150	≤0.7	and ≤60
other media	>4.0	or >300	≤4.0	and ≤300	≤1.6	and ≤200

- Note: (1) When one of the parameter of the design pressure of the piping and its design temperature has reached Class I, and when the design pressure and the design temperature both have reached the requirements of Class II or Class III in the table, they will be classified as Class II and Class III piping.
- (2) Other media means air, water, lubrication oil and hydraulic oil etc.

3.2.2 Piping arrangements

- (1) All pipes should be properly secured, and provision should be made to avoid excessive stresses, caused by thermal expansion in pipes or due to deflection of vessel structure.
- (2) Penetration pieces or steel pads should be provided for pipes passing through watertight or gastight structures.
- (3) Fresh water pipes should not be led through oil tanks, nor oil pipes through fresh water tanks. Where it is impracticable to do so, the pipes should be led inside an oiltight pipe tunnel. For other pipes passing through fuel oil tanks, their thickness should be increased, and no detachable pipe joints are permissible inside these tanks.
- (4) All steam, oil and water pipes as well as oil and other liquid tanks should not be placed above or behind the switchboards. If this is not practicable, suitable protective means should be provided.

In addition, oil pipes and oil tanks should not be directly placed above boilers, uptakes, steam pipes, exhaust gas pipes and silencers. If it is impracticable, effective means should be made to prevent oil from dropping onto the hot surfaces of the above-mentioned pipes or equipment.

3.2.3 Piping protection

- (1) Pipes in cargo spaces, coal bunkers, chain lockers and other positions where they are liable to mechanical damage should be efficiently protected by removable casings.
- (2) All pipes, fittings, pumps, filters and other equipment of piping systems should be provided with drain valves or cocks where necessary.
- (3) The pipes which may be subjected to a pressure greater than the design pressure should be fitted with relief valves at the delivery side of pumps. Heaters and air compressor coolers should also be fitted with relief valves. In general, the set pressure of relief valves should not exceed the design pressure of pipelines.
- (4) Where pressure-reducing valves are fitted in the pressure piping, a relief valve and a pressure gauge should be fitted behind the pressure-reducing valve and a by-pass pipe should be provided.
- (5) All of the steam pipes, exhaust gas pipes and pipes with high temperature should be lagged with insulation material or other effective protection measures should be taken. The insulation in way of dismountable joints and valves should be easily renewed.
- (6) Pipes passing through refrigerated spaces should be well insulated to prevent freezing.

3.2.4 Material

- (1) In general, carbon and carbon-manganese steel pipes, valves and fittings should not be used in piping systems for conveying media having a temperature exceeding 400°C. Nevertheless, they may be used for higher temperatures if their metallurgical behaviour and time dependent strength (UTS after 100 000 hours) are in compliance with the national standards and if such values are guaranteed by the steel maker.
- (2) In general, copper and copper alloy pipes, valves and fittings should not be used for media having a temperature above the following limits:
copper and aluminium brass: 200°C;
copper nickel: 300°C;
special bronze suitable for high temperature services: 260°C.
- (3) Grey cast iron pipes, valves and fittings should not be used in Class I and Class II piping systems, but the valves and fittings may be used in Class II steam piping, provided that the design pressure and temperature are not greater than 1.3 MPa and 220°C respectively.
- (4) Grey cast iron pipes, valves and fittings, in general, are accepted in Class III piping systems and in cargo lines and ballast lines within cargo tanks of oil tankers, but grey cast iron should not be used for:
 - ① clean ballast lines through cargo tanks to forward ballast tanks;
 - ② pipes for cargo lines on weather deck of oil tankers intended to carry cargo oil having a flash point less than or equal to 60°C;
 - ③ piping intended to conveying media having temperature above 220°C;
 - ④ piping subjected to pressure shock and vibrations;
 - ⑤ vessel-side valves and sea valves;
 - ⑥ valves fitted on the collision bulkhead;
 - ⑦ valves under static head on the outside fuel tank walls;
 - ⑧ boilers;
 - ⑨ pipes for steam, fire extinguishing, bilge and ballast systems.
- (5) Ordinary grey cast iron may be accepted for pressures up to 1.6 MPa for cargo pipelines on weather decks of oil tankers except for manifolds and their valves and fittings connected to cargo handling hoses.
- (6) Ferritic nodular graphite iron pipes, valves and fittings in Class II and Class III piping systems should be made in a grade having a specified minimum elongation not less than 12% on a gauge length of $5.65 \sqrt{A}$, where A is the cross-sectional area of the test piece.
- (7) Ferritic nodular graphite iron pipes, valves and fittings may be accepted for bilge, ballast and cargo pipelines within double bottom tanks or cargo tanks.
- (8) Ferritic nodular graphite iron pipes, valves and fittings should not be used in piping systems for conveying media having a temperature exceeding 350°C.
- (9) Plastic pipes used on vessels should be of an approved type, and its application and position should comply with the requirements of approved rules or standards.

- (10) Plastic pipes used on vessels should be selected in relation to their chemical composition, physical and mechanical properties, and temperature limits. The maximum permissible working pressure of plastic pipes should not exceed 1/4 of the bursting pressure at the service temperature or be determined by dividing the long-term hydrostatic test failure pressure (≥ 100000 hours) by a safety factor of 2.5, whichever is the lesser. For plastic pipes being subject to vacuum conditions inside or a head of liquid acting on the outside, the maximum permissible working pressure should not exceed 1/3 of the bursting pressure at the service temperature.
- (11) Where plastic pipes are arranged to pass through watertight or fire-resisting bulkheads or decks, provision should be made for maintaining the integrity of the bulkheads or decks in the event of pipe failure.
- (12) All plastic pipes should be adequately and freely supported. Suitable provision allowing expansion and contraction should be made in each range of pipes.
- (13) Plastic pipes should in general not be used for media with a temperature above 60°C or below 0°C.

3.2.5 Tests

- (1) Hydraulic tests before installation on board
 - (i) All class I and II pipes and their associated fittings, and all steam pipes, feed pipes, compressed air pipes and fuel oil pipes having a design pressure greater than 0.35 MPa together with their fittings should be hydraulically tested after completion of manufacture and before insulating or coating.
 - (ii) The hydraulic test pressure should not be less than 1.5 times the design pressure. Where the design temperature exceeds 300°C, the test pressure of steel pipes and their associated fittings should be determined by the following formula, but not necessarily exceeding 2 times the design pressure:

$$P_s = 1.5 \frac{[s]100}{[s] t} P$$

where P_s = test pressure, MPa;
 P = design pressure, MPa;
 $[s]100$ = Permissible stress at 100 °C, MPa;
 $[s] t$ = Permissible stress at the design temperature, MPa.

The test pressure may be reduced to 1.5 P where it is necessary to avoid excessive stress in way of bends and T-connections subject to agreement.

In no case should the membrane stress exceed 90% of the yield stress at the testing temperature.

- (iii) For pipes with an internal diameter less than 15 mm, the hydraulic test may be waived subject to agreement.

- (2) Tests after installation onboard
- (i) All piping systems should be checked for leakage under working conditions.
 - (ii) Fuel oil piping, heating coils in tanks, bilge pipes in way of double bottom tanks or deep tanks and hydraulic piping should be tested by hydraulic pressures in accordance with Table 3.2.5(2)(ii).

Table 3.2.5(2)(ii)

Fuel oil pipes	1.5 times the design pressure, but not less than 0.4MPa
Heating coils in oil tanks	
Bilge pipes passing through double bottom or deep tanks	Not less than the test pressure of the hold
Hydraulic pipes	1.25 times the design pressure, but not exceed the design pressure plus 7 MPa

(3) Hydraulic tests for pumps, valves and fittings

- ① All components of pumps, subject to pressure, should be tested by hydraulic pressures in the workshop prior to assembly. The hydraulic test pressure should be 1.5 times the design pressure, but need not exceed the design pressure plus 7 MPa.

For centrifugal pumps the design pressures should be taken as the maximum pressure head on the performance curve. For displacement pumps the design pressures should be taken as the relief valve setting pressures.

For steam driven pumps, the test pressures at the steam side should be 1.5 times the steam working pressures.

- ② All pressure components of valves and fittings should be tested under hydraulic pressures in the workshop prior to assembly. The hydraulic test pressure should be 1.5 times the design pressure, but need not exceed the design pressure plus 7 MPa.
- ③ Valves, cocks and distance pieces intended to be fitted on the vessel side below the load waterline should be tested by a hydraulic pressure not less than 0.5 MPa.

3.2.6 Bilge pumping arrangements

- (1) An efficient bilge pumping system should be provided, capable of pumping from and draining any watertight compartment other than a space permanently appropriated for the carriage of fresh water, water ballast, oil fuel or liquid cargo and for which other efficient means of pumping are provided, under all practical conditions. Efficient means should be provided for draining water from insulated holds.

- (2) Sanitary, ballast and general service pumps may be accepted as independent power bilge pumps if fitted with the necessary connections to the bilge pumping system.
- (3) All bilge pipes used in or under coal bunkers or fuel storage tanks or in boiler or machinery spaces, including spaces in which oil-settling tanks or oil fuel pumping units are situated, should be of steel or other approved material.
- (4) The arrangement of the bilge and ballast pumping system should be such as to prevent the possibility of water passing from the sea and from water ballast spaces into the cargo and machinery spaces, or from one compartment to another. Provision should be made to prevent any deep tank having bilge and ballast connections being inadvertently flooded from the sea when containing cargo, or being discharged through a bilge pump when containing water ballast.
- (5) All distribution boxes and manually operated valves in connection with the bilge pumping arrangements should be in positions which are accessible under ordinary circumstances.
- (6) At least two power pumps connected to the main bilge system should be provided, one of which may be driven by the propulsion machinery if the vessel length is equal to or less than 91.5 meters. If it is satisfied that the safety of the vessel is not impaired, bilge pumping arrangements may be dispensed with in particular compartments.
- (7) Except for passenger vessels, if the bilge water ejector has the appropriate pressure of sea water supplied by a sea water pump and is connected properly with the bilge water piping, it can be used to replace one of the required independent bilge pumps;
- (8) Cargo vessels of less than 100 gross tons can be fitted with one engine driven pump and one set of manually operated pump.

3.2.7 Steam boiler and feed water system

- (1) Every steam boiler should be provided with at least 2 safety valves of adequate capacity. For a small auxiliary boiler, one safety valve may be accepted.
- (2) Each oil-fired boiler which is intended to operate without manual supervision should have safety arrangements which shut off the fuel supply and give an alarm in the case of low water level, air supply failure or flame failure.
- (3) Every boiler essential for the safety of the vessel and designed to contain water at a specified level should be provided with at least 2 means for indicating its water level, at least one of which should be a direct reading gauge glass.
- (4) Auxiliary boilers for essential services or for heating heavy oil and cargo oil may be only provided with one independent feed system including feed pumps, but one feed water pump capable of being easily installed and connected should be provided.

For the vessels of less than 500 gross tons, stand-by pumps may not be provided for the feed water system of the above-mentioned auxiliary boilers.

- (5) Feed piping should be so arranged to prevent oil or other oily water from entering into the boilers, which may cause adverse effects to the function of the boiler.

3.2.8 Steam piping

- (1) Every steam pipe and every fitting connected thereto through which steam may pass should be so designed, constructed and installed as to withstand the maximum working stresses to which it may be subjected.
- (2) Means should be taken in all steam piping systems to avoid excessive stress caused by expansion and contraction.
- (3) Means should be provided for draining every steam pipe in which dangerous water hammer action might otherwise occur.
- (4) If a steam pipe or fitting may receive steam from any source at a higher pressure than that for which it is designed a suitable reducing valve, relief valve and pressure gauge should be fitted.

3.2.9 Air pressure system

- (1) In every vessel means should be provided to prevent overpressure in any part of compressed air systems and wherever water jackets or casings of air compressors and coolers might be subjected to dangerous overpressure due to leakage into them from air pressure parts. Suitable pressure relief arrangements should be provided for all systems.
- (2) The main starting air arrangements for main propulsion internal combustion engines should be adequately protected against the effects of backfiring and internal explosion in the starting air pipes.
- (3) All discharge pipes from starting air compressors should lead directly to the starting air receivers, and all starting pipes from the air receivers to main or auxiliary engines should be entirely separate from the compressor discharge pipe system.
- (4) Provision should be made to reduce to a minimum the entry of oil into the air pressure systems and to drain these systems.

3.3 Machinery

3.3.1 Diesel engines

- (1) Rated power of a diesel engine means the power of maximum continuous rating at the corresponding rated speed of the engine.
- (2) Devices for quickly shutting off oil fuel supply or other effective arrangements for emergency stopping should be provided near the main engine control station.
- (3) A safety valve should be fitted to each cylinder cover of diesel engines having cylinder bore over 230 mm. The valve should be so arranged that no personal injury can be caused by the outburst gas.

For auxiliary engines, a cylinder relief valve may be substituted by an efficient warning device of over-pressure.

- (4) Diesel engines of a cylinder diameter of 200 mm or a crankcase volume of 0.6 m³ and above should be provided with crankcase explosion relief valves of a suitable type with sufficient relief area. The relief valves should be arranged or provided with means to ensure that discharge from them is so directed as to minimize the possibility of injury to personnel.

- (5) Lubricating oil piping of diesel engines should be provided with an audible and visible alarm device giving an indication of failure, except for the spraying lubricating oil system.
- (6) Cooling water piping of diesel engines should be provided with cooling water high temperature alarm devices except for open type cooling water systems.
- (7) Where the cylinder bore of main and auxiliary diesel engines is 250 mm and above, the fuel injection piping should be effectively secured and shielded.
- (8) Main engines should be provided with efficient governors to ensure that the speed of main engines not to exceeding 115% of the rated speed.

For each main engine developing 220 kW and above which drives a controllable pitch propeller or which can be declutched from the transmission shafting, an overspeed protective device should be provided, so as to prevent the speed of main engine not to exceeding 120% of the rated speed.

- (9) Governors should be provided for diesel engines with generators. Where the rated power of diesel engines is over 220 kW, overspeed protective devices should also be provided so as to prevent the speed of engines not to exceeding 115% of the rated speed.

3.3.2 Gear transmission arrangement

- (1) The gearing should be so designed and constructed as to be capable of being subject to maximum working stress caused under all operation conditions.
- (2) The lubricating oil system of transmission gearing should be independent.
- (3) Where lubricating oil for the transmission gearing is circulated separately under pressure, a standby lubricating oil pump should be provided. Where the gearing's input power is equal to 440 kW or less, a standby lubricating oil pump may be dispensed with.
- (4) Transmission gearing should be fitted with alarm devices for low pressure of lubricating oil. An alarm device for high temperature of lubricating oil should be fitted if the transmission gearing's input is more than 1470 kW.
- (5) For hydraulically controlled transmission gearing, emergency mechanical means should be provided to ensure that the vessel can run at a reasonable speed in the event of failure of the hydraulic control systems.

3.4 Shaft and propeller

3.4.1 Shafting and shaft transmission units

- (1) The design and construction of main propulsion shafting and its shaft transmission units should be such that they are capable of bearing the possible maximum working stress in the all operation cases.
- (2) Mechanical connection means should be provided for the clutch of single screw vessel to transmit the necessary power in the emergency cases.
- (3) In single screw vessels having hydraulic transmissions, emergency mechanical means should be provided to ensure that it can transmit a sufficient power in the event of failure of the hydraulic transmission systems.

- (4) The lubricating oil system of hydraulic transmission arrangements should be separate from other systems.
- (5) In addition to thermometers and pressure gauges, the lubricating oil system of hydraulic transmission arrangements should be fitted with alarm devices for giving warnings of an excessive temperature and appreciable reduction in pressure of the oil supply.
- (6) The maneuvering system of hydraulic controllable pitch propellers should be capable of controlling the angle of blade sensitively and correctly.

3.4.2 Propellers

- (1) The blades of propeller should be of sufficient strength.
- (2) Fasteners (studs, nuts, etc) for propellers and their accessories should be fitted with reliable devices to prevent loosening and corrosion.
- (3) Where it is proposed to fit the propeller to the screw shaft with a key, the propeller boss should be a good fit on the screw shaft cone.
- (4) For the screw shaft of a larger diameter, the key arranged to fit the propeller on the screw shaft should be of interference.
- (5) Where it is proposed to fit a keyless propeller by the oil shrink method, the pull-up, the screw shaft should meet the relevant requirements of recognized standards.
- (6) A sealing should be inserted between the blade and boss of the controllable pitch propeller to prevent the ingress of sea water and sand as well as the leakage of lubricating grease.

3.4.3 Shafting vibration and alignment

- (1) For main propulsion shafting, "restricted speed ranges" should be imposed or adequate measures should be taken to reduce the vibrations if excessive amplitude appears within normal speed range as appropriate.
- (2) The restricted speed ranges should be marked red on the tachometer and notice boards should be provided in front of the control station.
- (3) The shafting of main propulsion installations should be so aligned as to give reasonable bearing reactions and bending moments under hot conditions. The number and arrangement of bearings should be reasonable to minimize the effects on shaft alignment due to hull deflection or wear of bearings.

3.5 Steering gear arrangements

3.5.1 Definition

- (1) Main steering gear: means the machinery, rudder actuators, steering gear power units, if any, and ancillary equipment and the means of applying torque to the rudder stock (e.g. tiller or quadrant) necessary for effecting movement of the rudder for the purpose of steering the vessel under normal service conditions.

- (2) Auxiliary steering gear: means the equipment other than any part of the main steering gear necessary to steer vessel in the event of failure of the main steering gear but not including the tiller, quadrant or components serving the same purpose.
- (3) Steering gear power equipment:
 - ① in the case of electrical steering gear, means an electrical motor and its associated electrical equipment;
 - ② in the case of electric-hydraulic steering gear, means an electrical motor and its associated electrical equipment and connected pump;
 - ③ in the case of other hydraulic steering gear, means a driving engine and connected pump.
- (4) Power actuating system: means the hydraulic equipment provided for supplying power to turn the rudder stock, comprising a steering gear power unit or units, together with the associated pipes and fittings, and a rudder actuator. The power actuating systems may share common mechanical components, i.e., tiller, quadrant and rudder stock, or components serving the same purpose.
- (5) Steering gear control system: means the equipment by which orders are transmitted from the navigation bridge to the steering gear power units. Steering gear control systems comprise transmitters, receivers, hydraulic control pumps and their associated motors, motor controllers, piping and cables.
- (6) Maximum ahead service speed: means the greatest speed which the vessel is designed to maintain in service at sea at the deepest sea-going draught with the maximum revolution of propeller and the maximum continuous power of the corresponding main engine.
- (7) Maximum astern speed: means the speed which it is estimated the vessel can attain at the designed maximum astern power at the deepest sea-going draught.

3.5.2 Basic performance

- (1) Unless the main steering gear is in accordance with 3.5.2(6) of this Section, every cargo vessel of more than 500 gross tons should be provided with a main steering gear and an auxiliary steering gear. The main steering gear and the auxiliary steering gear should be so arranged that the failure of one of them will not render the other one inoperative.
- (2) The main steering gear and rudder stock should be:
 - (i) of adequate strength and capable of steering the vessel at maximum ahead service speed;
 - (ii) capable of putting the rudder over from 35° on one side to 35° on the other side with the vessel at its deepest seagoing draught and running ahead at maximum ahead service speed and under the same conditions, from 35° on either side to 30° on the other side in not more than 28 seconds;
 - (iii) operated by power where necessary to meet the requirements of the (ii) above and in the case a rudder stock (excluding strengthening for navigation in ice) of over 120 mm diameter is required in way of the tiller;

- (iv) so designed that they will not be damaged at maximum astern speed; however, this design requirement need not be proved by trials at maximum astern speed and maximum rudder angle.
- (3) Auxiliary steering should satisfy the following requirements:
 - (i) of adequate strength and capable of steering the vessel at navigable speed and of being brought speedily into action in an emergency;
 - (ii) capable of putting the rudder over from 15° on one side to 15° on the other side in not more than 60 seconds with the vessel at its deepest seagoing draught and running ahead at one half of the maximum ahead service speed or 7 knots, whichever is the greater;
 - (iii) operated by power where necessary to meet the requirements of the (ii) above and in the case a rudder stock (excluding strengthening for navigation in ice) of over 230 mm diameter is required in way of the tiller.
 - (4) Manually operated steering gears are only acceptable when the operation does not require an effort exceeding 160 Newton under normal conditions.
 - (5) The main and auxiliary steering power arrangements should satisfy the following requirements:-
 - (i) be arranged to restart automatically when power is restored after a power failure;
 - (ii) be capable of being brought into operation from a position on the navigation bridge;
 - (iii) be in the event of a power failure to any one of the steering gear power units, an audible and visual alarm should be given on the navigation bridge.
 - (6) Where the main steering gear comprises 2 or more identical power units, an auxiliary steering gear need not be fitted, provided that:
 - (i) the main steering gear is capable of operating the rudder as required by 3.5.2(2)(ii) of this Section while operating with all power units;
 - (ii) the main steering gear is so arranged that after a single failure in its piping system or in one of the power units the defect can be isolated so that steering capability can be maintained or speedily regained;
 - (iii) steering gear, other than of the hydraulic type, should comply with the standards equivalent to the above-mentioned requirements.

3.5.3 Construction and arrangement

- (1) Steering gear control system should be as follows:
 - (i) for the main steering gear, both on the navigating bridge and in the steering gear compartment;
 - (ii) where the main steering gear is arranged in accordance with 3.5.2(6) of this Section by 2 independent control systems, both operable from the navigation bridge. This does not require duplication of the steering wheel or steering lever. Where the control system consists of a

- hydraulic tele-motor, a second independent system need not be fitted, except in a tanker, chemical tanker or liquefied gas carrier of 10000 gross tons and upwards;
- (iii) for the auxiliary steering gear in the steering gear compartment and, if power-operated, it should also be operated from the navigation bridge and should be independent of the control system for the main steering gear.
- (2) Any main and auxiliary steering gear control system operable from the navigation bridge should comply with the following requirements:
- (i) if electrical, it should be served by its own separate circuit supplied from a steering gear power circuit from a point within the steering gear compartment, or directly from switchboard bus-bars supplying that steering gear power circuit at a point on the switchboard adjacent to the supply to the steering gear power circuit;
 - (ii) means should be provided in the steering gear compartment for disconnecting any control system operable from the navigation bridge from the steering gear it serves;
 - (iii) the system should be capable of being brought into operation from a position on the navigation bridge;
 - (iv) in the event of a failure of electrical power supply to the control system, an audible and visual alarm should be given on the navigation bridge;
 - (v) short circuit protection should only be provided for steering gear control supply circuits.
- (3) Rudder angle position should satisfy the following requirements:
- (i) if the main steering gear is power-operated, be indicated on the navigation bridge. The rudder angle indication should be independent of the steering gear control system;
 - (ii) it should be able to read in the steering gear compartment.
- (4) Source of electrical power and cable installation:
- (i) Each electrical or electro-hydraulic steering gear comprising one or more power units should be served by at least 2 exclusive circuits fed directly from the main switchboard, however, one of the circuits may be supplied through the emergency switchboard. Each power unit of electrical or electro-hydraulic main steering gear complying with the requirements of 3.5.2(6) of this Section should be served by one exclusive circuit fed directly from the main switchboard, and one of the afore-mentioned circuits may be fed from the emergency switchboard. An auxiliary electric or electro-hydraulic steering gear associated with a main electrical or electro-hydraulic steering gear may be connected to one of the circuits supplying this main steering gear. The circuits supplying an electrical or electro-hydraulic steering gear should have adequate rating for supplying all motors which can be simultaneously connected to them and may be required to operate simultaneously.
 - (ii) When in a vessel of less than 1600 gross tons, an auxiliary steering gear which is required by 3.5.2(3)(iii) of this Section to be operated by

power is not electrically powered or is powered by an electrical motor primarily intended for other services, the main steering gear may be fed by one circuit from the main switchboard.

- (iii) Each main and auxiliary steering gear control system, if electrical and operable from the navigation bridge, should be served by its own separate circuit supplied from a steering gear power circuit from a point within the steering gear compartment. Or alternatively, this control system may be supplied by a separate circuit directly from the same section of main or emergency switchboard bus-bars at a point on the switchboard adjacent to that supplying the said steering gear power circuit.
- (5) Where the rudder stock (excluding strengthening for navigation in ice) is required to be over 230 mm diameter in way of the tiller, an alternative power supply, sufficient at least to supply the steering gear power unit which complies with the requirements of 3.5.2(3)(ii) of this Section and also its associated control system and the rudder angle indicator, should be provided automatically, within 45 seconds, either from the emergency source of electrical power or from an independent source of power located in the steering gear compartment. This independent source of power should be used only for this purpose. In every vessel of 10000 gross tons and upwards, the alternative power supply should have a capacity for at least 30 minutes of continuous operation and in any other vessel for at least 10 minutes.
- (6) For vessels engaged on sheltered water service, the requirements of 3.5.3(5) of this Section may be exempted.

3.5.4 Monitoring and alarms

- (1) Short circuit protection and an overload alarm should be provided for the circuits and motors referred to in 3.5.3(4) of this Section. Protection against excess current, including starting current, if provided, should be for not less than twice the full load current of the motor or circuit so protected, and should be arranged to permit the passage of the appropriate starting currents. Where a three-phase supply is used, an alarm should be provided that will indicate failure of any one of the supply phases. The alarms required by this regulation should be both audible and visual, and should be located in the main engine space or at a prominent position in the engine control room which is for the normal control of the main machinery. Audible and visual alarm should also be fitted in the navigation bridge.
- (2) When in a vessel of less than 1600 gross tons, an auxiliary steering gear which is required by 3.5.3(4)(ii) of this Section is powered by an electrical motor primarily intended for other services, if the protection arrangement is deemed satisfactory together with the requirements of 3.5.2(5) and 3.5.3(1) of this Section applicable to auxiliary steering gear, the requirements of 3.5.4(1) of this Section may be waived.

3.5.5 Additional requirements

- (1) For every oil tanker of 10000 gross tons and upwards, every other vessel of 70000 gross tonnage and upwards the main steering gear should comprise two or more identical power units complying with the provisions of 3.5.2(6) of this Section.

- (2) For every oil tanker of 10000 gross tons and upwards, in addition to the requirements specified in 3.5.5(3) of this Section, the steering gear should comply with the following requirements:
- (i) The main steering gear should be so arranged that: in the event of loss of steering capability due to a single failure in any part of one of the power actuating systems of the main steering gear, (excluding the tiller, quadrant or components serving the same purpose), or seizure of the rudder actuators, steering capability should be regained in not more than 45 seconds after the loss of one power actuating system.
 - (ii) The main steering gear should include either:
 - (a) 2 independent and separate power actuating systems, each capable of meeting the requirements of 3.5.2(2)(ii) of this Section; or
 - (b) at least 2 identical power actuating systems which, acting simultaneously in normal operation, are capable of meeting the requirements of 3.5.2(2)(ii) of this Section. Where necessary to comply with these requirements, inter-connection of hydraulic power actuating systems should be provided. Loss of hydraulic fluid from one system should be capable of being detected and the defective system should be automatically isolated so that the other actuating systems remain fully operational;
 - (c) steering gear other than of the hydraulic type should achieve the equivalent standards.
- (3) For every oil tanker of 10000 gross tons and upwards but of less than 100000 tons deadweight, solutions other than those set out in 3.5.5(2) of this Section which need not apply the single failure criterion to the rudder actuator or actuators, may be permitted provided that an equivalent safety standard is achieved and that:
- (i) following loss of steering capability due to a single failure of any part of the piping system or in one of the power units, steering capability is regained within 45 seconds;
 - (ii) where the steering gear includes only a single power actuator, special consideration is given to stress analysis for the design including fatigue analysis and fracture mechanics analysis, as appropriate, the material used, the installation of sealing arrangements and the testing and inspection and provision of effective maintenance.
- (4) The requirements for acceptance of non-duplicated power actuators for oil tankers of 10000 gross tons and upwards but less than 100000 tons deadweight should be specially approved.

4 Electrical Installations

4.1 General requirements

- 4.1.1 The design, construction, testing and installation of main electrical installations involving vessel's navigation and safety should comply with the relevant requirements of 3 under this Section and the corresponding requirements of the recognized classification society or the applicable standards.
- 4.1.2 The electrical installations should comply with the applicable requirements in addition to the Main Principles, Chapter 1, and 4 of this Section of this Chapter, of this Code.
- 4.1.3 The electrical installations should be such that:
- (1) all electrical auxiliary services necessary for maintaining the vessel in normal operational and habitable conditions will be assured without recourse to the emergency source of electrical power;
 - (2) electrical services essential for safety will be assured under various emergency conditions;
 - (3) the safety of passenger, crew and vessel from electrical hazards will be ensured.

4.2 Main source of electrical power

- 4.2.1 A main source of electrical power of sufficient capacity to supply all the services mentioned in 4.1.3(1) of this Section. Unless otherwise stated in 4.2.2 of this Section, this main source of electrical power should consist of at least two generating sets.
- 4.2.2 For vessels plying in the sheltered water areas or its corresponding plying zone and those in permitted coastal plying zone with some specific routes, the main source of electrical power may be provided by only one generating set.
- 4.2.3 Except for the cases specified in 4.2.2 of this Section, the number and ratings of these generating sets should be such that in the event of any one generating set being stopped it will still be possible to supply those services necessary to provide normal operational conditions of propulsion and safety of the vessel.
- 4.2.4 The main source of electrical power should be capable of maintaining the arrangements mentioned in 4.1.3(1) of this Section under working condition regardless of the speed and direction of rotation of the propulsion machinery or shafting.
- 4.2.5 Where transformers constitute an essential part of the electrical supply system required in 4.2.1 of this Section, the number and ratings should be such as to ensure the same continuity of the supply to essential services as required in 4.2.3 of this Section in case one transformer is out of service.
- 4.2.6 The main switchboard should be so placed relative to one main generating station that, as far as is practicable, the integrity of the normal electrical supply may be affected only by a fire or other casualty in one space. An environmental enclosure for the main switchboard, such as may be provided by a machinery control room situated within the main boundaries of the space, should not be considered as separating the switchboards from the generators.

4.2.7 Where the main electrical source is necessary for vessel's propulsion and the total installed electrical power of the main generating sets is in excess of 400 kW, the main bus bars should be subdivided into at least two parts which should normally be connected by circuit breaker or other approved means, so far as is practicable, the connection of generators and any other duplicated equipment should be equally divided between the parts.

4.2.7 Where the main electrical source is necessary for vessel's propulsion and the total installed electrical power of the main generating sets is in excess of 400 kW, the main bus-bars should be subdivided into at least two parts which should normally be connected by circuit breaker or other approved means, so far as is practicable, the connection of generators and any other duplicated equipment should be equally divided between the parts.

4.3 General requirements for emergency source of electrical power

4.3.1 Except the vessels plying in sheltered water areas or its corresponding plying zone, all cargo vessels of 1600 gross tons and upwards plying in other areas should be provided with a self-contained emergency source of electrical power.

4.3.2 The emergency source of electrical power should be so arranged as to comply with the following:

- (1) the emergency source of electrical power, associated transforming equipment (if any), transitional source of emergency power, emergency switchboard and emergency lighting switchboard should be located above the uppermost continuous deck and should be readily accessible from the open deck. Also, they should not be located forward of the collision bulkhead, except it is agreed under special circumstances.
- (2) the location of the emergency source of electrical power, associated transforming equipment (if any), the transitional source of emergency power, the emergency switchboard and emergency electric lighting switchboard in relation to the main source of electrical power, associated transforming equipment (if any), and the main switchboard should be such as to ensure that a fire or other casualty in spaces containing the main source of electrical power, associated transforming equipment, if any, and the main switchboard, or in any machinery space of category A will not interfere with the supply, control and distribution of emergency electrical power. As far as practicable, the space containing the emergency source of electrical power, associated transforming equipment (if any), the transitional source of emergency electrical power and the emergency switchboard should not be contiguous to the boundaries of machinery spaces of category A or those spaces containing the main source of electrical power, associated transforming equipment (if any), or the main switchboard.

4.3.3 The emergency source of electrical power may be a generating set, which should comply with the following requirements:

- (1) driven by a suitable prime-mover with an independent supply of cooling and fuel, and with an accessory starting arrangements complying with the requirements of 4.6 of this Section;

- (2) started automatically upon failure of the main source of electrical power supply and connected automatically to the emergency switchboard, unless for cargo vessels a transitional source of emergency electrical power in accordance with 4.3.5 is provided. And those services referred to 4.5.1 of this Section should then be transferred automatically to the emergency generating set. The automatic starting system and the characteristics of the prime-mover should be such as to permit the emergency generator to carry its full rated load as quickly (a maximum of 45 seconds) as is safe and practicable.

4.3.4 The emergency source of electrical power may also be an accumulator battery, which should be capable of :

- (1) carrying the emergency electrical load without recharging while maintaining the voltage of the battery throughout the discharge period within $\pm 12\%$ above or below its nominal voltage;
- (2) automatically connecting to the emergency switchboard in the event of failure of the main source of electrical power;
- (3) supplying those services (except as otherwise stated) specified in 4.5.1 of this Section, and immediately supplying at least those services specified in 4.5.2 of this Section.

4.3.5 Where the emergency source of electrical power is a generator, a transitional source of emergency electrical power which consists of an accumulator battery should be provided, unless for cargo vessels where automatically started emergency generator in accordance with 4.3.3(2) is provided. The transitional source of emergency electrical power should comply with the following requirements:

- (1) it can carry the emergency electrical load without recharging while maintaining the voltage of the battery throughout the discharge period within $\pm 12\%$ above or below its normal voltage;
- (2) it is so arranged as to supply automatically in the event of failure of either the main or emergency source of electrical power at least those services referred to 3.5.2 of this Section.

4.3.6 The emergency switchboard should be installed as near as is practicable to the emergency source of electrical power and to comply with the following requirements:

- (1) where the emergency source of electrical power is a generator, the emergency switchboard should be located in the same space unless the operation of the emergency switchboard would thereby be impaired;
- (2) where the emergency source of electrical power is an accumulator battery, the accumulator battery should not be installed in the same space as the emergency switchboard;
- (3) water, oil and steam lines, oil tanks and other liquid vessels should not be installed on the back or top of the emergency switchboard, if it is impracticable, reliable protection means should be taken.

4.3.7 An indicator should be mounted in a suitable place on the main switchboard or in the machinery control room to indicate when the batteries constituting either the emergency source of electrical power or transitional source of emergency electrical power are being discharged.

- 4.3.8 The emergency switchboard should be supplied during normal operation from the main switchboard by an interconnection feeder which should be protected against overload and short-circuit at the main switchboard and which should be disconnected automatically at the emergency switchboard upon failure of the main source of electrical power. Where the system is arranged for feed-back operation, the interconnection feeder should also be protected at least against short-circuit at the emergency switchboard.
- 4.3.9 In order to ensure ready availability of the emergency source of electrical power, arrangements should be made where necessary to disconnect automatically non-emergency circuits from the emergency switchboard to ensure that electrical power should be available to the emergency circuits.
- 4.3.10 Provided that suitable measures are taken for safeguarding independent emergency operation under all circumstances, the emergency generator may be used exceptionally, and for short periods, to supply non-emergency circuits.
- 4.3.11 The emergency generator and its prime mover and any emergency accumulator battery should be so designed and arranged as to ensure that they will function at full rated power when the vessel is upright and when inclined at any angle of list up to 22.5° or when inclined up to 10° either in the fore or aft direction, or is in any combination of angles within those limits.

4.4 Scope and period of the supply of the emergency source of electrical power

- 4.4.1 The electrical power available should be sufficient to supply all those services that are essential for safety in an emergency, due regard being paid to such services as may have to be operated simultaneously.

The emergency source of electrical power should be capable, having regard to starting currents and the transitory nature of certain loads, of supplying simultaneously at least the following services (if they depend upon an electrical source for their operation) for the periods specified below :

- (1) for a period of 3 hours, emergency lighting at every muster and embarkation station and over the sides;
- (2) The electricity supply for emergency lighting to the following locations should be 6 hours for vessels trading at coastal class **A** plying zone, and 3 hours for vessels trading at coastal class **B** plying zone:
 - (i) all passageways, stairways and exits;
 - (ii) machinery spaces and at emergency switchboards;
 - (ii) all control stations.
- (3) The electricity supply to the following equipment should be 3 hours:
 - (i) the navigation lights and other light signals required by Section 8 of this Chapter;
 - (ii) the radio communication equipment required by and in compliance with Section 4 of this Chapter;
 - (iii) all the internal communication equipment as required in an emergency;

- (iv) fire detection and fire alarm systems;
- (v) for intermittent operation of the daylight signalling lamp, the vessel's whistle, the manually operated call points and all internal signals that are required in an emergency (e.g. general alarms pre-warning for extinguishing media, etc.);
- (vi) one of the fire pumps required by Chapter 2-2 (if power supplied from emergency generator).

The various equipment mentioned in (iii) to (v) above, unless such equipment have an independent supply for the specified period of time from an accumulator battery suitably located for use in an emergency.

- (4) If electricity supply to the steering gear from the emergency power source is required by 3.5.3(5) of this Section, the electricity supply should comply with the period of that requirement.

4.4.2 The transitional source of emergency electrical power required by 4.3.5 of this Section should be of sufficient capacity to supply to the following equipment (if they depend upon an electrical source for their operation):

- (1) the lighting required by 4.4.1(1) and (2) of this Section and the navigation lights and signal lights required by 4.4.1(3)(i) of this Section. However, for the emergency lighting of machinery space, service and accommodation spaces, may be provided by permanently fixed, individual, automatically charged, relay operated accumulator lamps;
- (2) the various equipment mentioned in 4.4.1(3)(iii) to (v) of this Section, unless such equipment have an independent supply for the period specified from an accumulator battery suitably located for use in an emergency.

4.5 Starting arrangements for emergency generating sets

4.5.1 Emergency generating sets should be capable of being readily started in their cold condition at a temperature of 0°C. If this is impracticable, or if lower temperatures are likely to be encountered, provision acceptable to the Surveyor should be made for the maintenance of heating arrangements, to ensure ready starting of the generating sets.

4.5.2 Each emergency generating set arranged to be automatically started should be equipped with the approved starting devices with a stored energy capability of at least 3 consecutive starts. Unless a second independent starting unit is fitted, the reserved energy should be stored as to prevent from wear out of automatic starting of the system.

A second source of energy should also be provided for an additional 3 starts within 30 min unless manual starting can be demonstrated to be effective.

4.5.3 The stored energy should be maintained at all times as following:

- (1) electrical and hydraulic starting systems should be maintained from the emergency switchboard;
- (2) compressed air starting systems may be maintained by the main or auxiliary compressed air receivers through a suitable non-return valve or by an

emergency air compressor which, if electrically driven, is supplied from the emergency switchboard;

- (3) all of these starting, charging and energy storing devices should be located in the emergency generator space; these devices should not be used for any purpose other than the operation of the emergency generating set. This does not preclude the supply to the air receiver of the emergency generating set from the main or auxiliary compressed air system through the non-return valve fitted in the emergency generator space.

4.5.4 Where automatic starting is not required, manual starting is permissible, such as manual cranking, inertia starts, manually charged hydraulic accumulators, or powder charge cartridges, where they can be demonstrated as being effective. When manual starting is not practicable, the requirements of 4.5.2 and 4.5.3 of this Section should be complied with except that starting may be manually initiated.

4.6 Spare electrical source

4.6.1 For cargo vessels less than 1600 gross tons, if the emergency sources of electrical power required by 4.3 of this Section is not fitted, there should be independent spare source electrical power supply.

4.6.2 The spare source of electrical power should be the accumulator sets in compliance with the following requirements:

- (1) not to be provided in the same space with the main electrical source and fitted above the uppermost continuous deck as far as possible;
- (2) to comply with the requirements of 4.3.4(1), (2) and 4.3.11 of this Section;
- (3) to supply the power to all services as specified in 4.6.3 of this Section.

4.6.3 The capacity of spare source of electrical power should supply power to the following for at least 3 hours:

- (1) lighting at muster and embarkation stations of lifeboat and liferaft and overboard, all alleyways, stairways and exits, spaces containing main switchboard, spare source of electrical power as well as control stations;
- (2) the navigation lights and other lights as specified in Section 8 of this Chapter;
- (3) the internal communication equipment as required in an emergency;
- (4) the radio communication equipment required by Section 4 of this Chapter.

4.7 Lighting

4.7.1 A main electrical lighting system which provides illumination throughout those parts of the vessel normally accessible to and used by passengers or crew should be supplied from the main source of electrical power.

4.7.2 The arrangement of the main electrical lighting system should be such that a fire or other casualty in spaces containing the emergency source of electrical power, associated transforming equipment (if any), the emergency switchboard and the emergency lighting switchboard will not render a damage to the main electrical lighting system throughout the means of escape, including stairways and exits.

- 4.7.3 The special requirements for emergency lighting (including that supplied from the spare source of electrical power required in 3.6 of this Section) are:
- (1) the emergency lighting points should comply with the relevant requirements of 4.5 and 4.6 of this Section;
 - (2) all emergency lighting fittings should be provided with a permanent mark or structurally different from other lights;
 - (3) no switch should be installed in the transitional emergency lighting feeders;
 - (4) no local switch should be installed in the emergency lighting circuits except for the emergency lights in the navigating bridge and at the stowage spaces of lifeboats and liferafts and those used for main lighting;
 - (5) the emergency electric lighting system should be so arranged as not to be impaired in the event of a fire or other casualty in spaces containing the main source of electrical power, associated transforming equipment (if any), the main switchboard and the main lighting switchboard.

4.8 Precautions against shock, fire and other hazards of electrical origin

4.8.1 All accessible metal parts of electrical equipment, other than current-carrying accessible parts, should be earthed with the exception of:

- (1) lamp caps;
- (2) shades, reflectors and guards, supported on lamp holders or lighting fittings constructed of, or shrouded in, non-conducting material;
- (3) metal parts on, or screws in or through, non-conducting material, which are separated by such material from current-carrying parts, and from earthed non-current-carrying parts, in such a way that in normal use they cannot become live or come into contact with earthed parts;
- (4) portable appliances having double and/or reinforced insulation, provided that the appliances conform with recognized safety requirements;
- (5) bearing housing which are insulated in order to prevent circulation of current in the bearings;
- (6) clips for fluorescent lighting tubes;
- (7) apparatus supplied working voltage not more than 50 V. For A.C., this voltage is a value of root mean square between conductors. Auto-transformers should not be used for the purpose of achieving this voltage;
- (8) cable clips.

4.8.2 Bonding straps are required for cargo tanks, process plant and piping systems, for inflammable liquid, combustible gas and/or inflammable dust solid, which should not be permanently connected to the hull of the vessel either directly or via their bolted or welded supports and where the resistance between them and the hull exceeds 1 MO.

Such bonding straps should have a cross-sectional area of at least 10 mm².

4.8.3 Portable electric apparatus should be of one of the following types:

- (1) earthing by means of an earth-continuity conductor in the soft cables or wires with the working voltage not more than 250 V;

- (2) double isolation with the working voltage not more than 250 V;
- (3) supply from a safety isolating-transformer supplying one consuming apparatus with the working voltage not more than 250 V;
- (4) supply at a working voltage not more than 50 V.

Equipment mentioned in (3) to (4) should be adopted in exceptionally damp or confined spaces where particular risks may occur due to conductivity.

4.8.4 All electrical apparatus should be so constructed and so installed as not to cause injury when handled or touched in the normal manner.

4.9.5 The construction and installation of switchboards should comply with the following requirements:

- (1) accessibly to the internal electrical equipment;
- (2) two sides and the rear of the switchboard with the suitable protection including the front, if necessary;
- (3) the bared electrical part with the earthing or working voltage more than 50 V should not be fitted on the face plate;
- (4) where necessary, the front and back of the switchboards should be fitted with anti-skid and oil-resistant insulation carpets or be insulation platforms.

4.8.6 Necessary protection should be taken to ensure the normal work and safety to personnel if A.C. high-voltage electrical installations with the voltage from 1 kV to 15 kV are employed.

4.8.7 The hull return system of distribution should not be used for any purpose in an oil tanker, or for power, heating, or lighting in any other vessel of 1600 gross tons and upwards.

4.8.8 The requirement in 4.8.7 of this Section does not preclude the following:

- (1) impressed current cathodic protective systems;
- (2) limited and locally earthed systems if any electrical current so caused by that not directly passing through any of the dangerous zones;
- (3) insulation level monitoring devices provided the circulation current does not exceed 30 mA under the most unfavourable conditions.

4.8.9 Where the hull return systems is used, all final sub-circuits, i.e. all circuits fitted after the last protective devices, should be two-wire.

4.8.10 Earthed distribution system should not be used on oil tankers, except that:

- (1) intrinsically safe electrical circuits;
- (2) power supply, control and instrument circuits have to adopt earthed system due to technical or safety reasons with the current not exceeding 5A under normal or trouble conditions;
- (3) limited and locally earthed systems if any electrical current so caused not directly passing through any of the dangerous spaces;

- (4) Alternating current distribution system with the voltage of 1000V and above, if any electrical current so caused not directly passing through any of the dangerous spaces.
- 4.8.11 When a distribution system, whether primary or secondary, for power, heating or lighting, with no connection to earth is used, a device capable of continuously monitoring the insulation level to earth and of giving an audible or visual indication of abnormally low insulation values should be provided. However, except for oil tankers or the vessels carrying dangerous cargoes, insulation resistance alarm may be substituted by an earthed indicator for the vessels less than 1600 gross tons.
- 4.8.12 Except as permitted in exceptional circumstances subject to agreement, all metal sheaths and the metal outer protection layer of cables should be electrically continuous and should be earthed.
- 4.8.13 All electric cables and wiring external to equipment should be at least of a flame-retardant type and should be so installed as not to impair their original flame-retarding properties. Where necessary for particular applications the use of special types of cables may be permitted, subject to agreement, such as radio frequency cables or cables of a transmission system for computer data, which do not comply with the foregoing.
- 4.8.14 Cables and wiring serving essential or emergency power, lighting, internal communications or signals should so far as practicable be routed clear of galleys, laundries, machinery spaces of category A and their casings and other high fire risk areas. Cables connecting fire pumps to the emergency switchboard should be of a fire-resistant type where they pass through high fire risk areas. Where practicable all such cables should be run in such a manner as to preclude their being rendered unserviceable by heating of the bulkheads that may be caused by a fire in an adjacent space.
- 4.8.15 Where cables which are installed in hazardous areas introduce the risk of fire or explosion in the event of an electrical fault in such areas, special precautions against such risks should be taken.
- 4.8.16 Cables and wiring should be installed and supported in such a manner as to avoid abrasion or other damage.
- 4.8.17 Terminations and joints in all conductors should be so made as to retain the original electrical, mechanical, flame-retarding and, where necessary, fire-resisting properties of the cable.
- 4.8.18 Each separate circuit should be protected against short circuit and against overload, except as permitted otherwise, such as electrical circuits of power supply for steering gear or overload protection may be exempted subject to agreement.
- 4.8.19 The rating or appropriate setting of the overload protective device for each circuit should be permanently indicated at the location of the protective device.
- 4.8.20 Lighting fittings should be so arranged as to prevent temperature rises which could damage the cables and wiring, and to prevent surrounding material from becoming excessively hot.

- 4.8.21 All lighting and power circuits terminating in a bunker or cargo space should be provided with a multi-pole switch outside the space for disconnecting such circuits.
- 4.8.22 Accumulator batteries should be suitably housed, and compartments used primarily for their accommodation should be properly constructed and efficiently ventilated.
- 4.8.23 Except as permitted in 4.8.24 of this Section, electrical or other equipment which may constitute a source of ignition of flammable vapours should not be permitted to fit inside these compartments.
- 4.8.24 Accumulator batteries should not be located in accommodation spaces except where hermetically sealed subject to approval.
- 4.8.25 No electrical equipment should be installed in any space where flammable mixtures or dust are liable to collect including those on board tankers or in compartments assigned principally to accumulator batteries, in paint lockers, acetylene stores or similar spaces unless such equipment is:
- (1) essential for operational purposes;
 - (2) of a type which will not ignite the mixture concerned;
 - (3) appropriate to the space concerned;
 - (4) appropriately certified for safe usage in the dusts, vapours or gases likely to be encountered.
- 4.8.26 Lightning conductor should be provided on all the mast made of non-conductor material. The lightning conductor onboard the vessel of non-conductor construction should be connected with the copper plate of hull firmly fixed below the light waterline by suitable conductor.

5 Automation Requirements for Periodically Unattended Machinery Space

5.1 General requirements

- 5.1.1 Except those vessels plying in the sheltered water areas, this Section only applies to all cargo vessels with periodically unattended machinery spaces including main engine control room or main engine control position, the vessels have the automatic control and remote automation system (hereinafter called automation system) for machinery and electrical installation and equipment in the machinery spaces.
- 5.1.2 The main automation system for vessel's navigation and safety should be designed and manufactured to comply with the related requirements of 5 in this Section and the current rules of the recognized classification society or the accepted corresponding standards.
- 5.1.3 The automation system of 5.1.1 of this Section should be such as to ensure the safety of the vessel in all sailing conditions, and the safety of machinery and electrical installation should be equivalent to that of a vessel having the machinery space manned. Means should be taken to ensure the effective manual manoeuvring for machinery and electrical equipment when the automation system fails.
- 5.1.4 In addition, the automation system should comply with the requirements of 4 of this Section and the other applicable requirements of this Chapter.
- 5.1.5 The automation system should be capable of working continuously and normally under every kind of sea conditions, vessel's movement, vibration, humidity, temperature and wave motion of electrical source. And it should be subject to testing required by the related standards.
- 5.1.6 The automation system should be supplied directly from main switchboard or emergency switchboard (if any). If the main source of electrical power is out of service, the power supply should be automatically changed over to spare independent accumulator batteries of automation system and this should be indicated. The capacity of accumulator batteries should be sufficient to ensure the power supply. Every system (control, safety, alarm) in the automation system should give out alarm as its main source of electrical power is out of service.

5.2 Fire precautions

- 5.2.1 Means should be provided to detect and give alarms at an early stage in case of fires:
- (1) in boiler air supply casings and exhaust (uptakes);
 - (2) in scavenging air belts of propulsion machinery, unless it is considered to be unnecessary in a particular case.
- 5.2.2 Internal combustion engines of 2250 kW and above or having cylinders of more than 300 mm bore should be provided with crankcase oil mist detectors or engine bearing temperature monitors or equivalent devices.

5.3 Protection against flooding

- 5.3.1 Bilge wells in periodically unattended machinery spaces should be located and monitored in such a way that the accumulation of liquids is detected at normal angles of trim and heel, and should be large enough to accommodate easily the normal drainage during the unattended period.
- 5.3.2 For the vessels of 500 gross tons and upwards, where the bilge pumps are capable of being started automatically, means should be provided to indicate when the influx of liquid is greater than the pump capacity or when the pump is operating more frequently than would normally be expected. In these cases, smaller bilge wells to cover a reasonable period of time may be permitted. Where automatically controlled bilge pumps are provided, special attention should be given to oil pollution prevention requirements.
- 5.3.3 The location of the controls of any valve serving a sea inlet, a discharge below the waterline or a bilge injection system should be so sited as to allow adequate time for operation in case of influx of water to the space. If the level to which the space could become flooded with vessel in the fully loaded condition so requires, arrangements should be made to operate the controls from a position above such level.

5.4 Control of propulsion machinery from the navigation bridge

- 5.4.1 Under all sailing conditions including manoeuvring (frequent manoeuvring) the speed, direction of thrust and, if applicable, direction of thrust of propeller and the pitch of the controllable pitch propeller should be fully controllable from the navigation bridge.
- 5.4.2 Such remote control should be performed by a single control device for each independent propeller, with automatic performance of all associated services, including, where necessary, means of preventing overload of the propulsion machinery.
- 5.4.3 The main propulsion machinery should be provided with an emergency stopping device on the navigation bridge which should be independent of the navigation bridge control system.
- 5.4.4 Propulsion machinery orders from the navigation bridge should be indicated in the main machinery control room or at the propulsion machinery control position as appropriate.
- 5.4.5 Remote control of the propulsion machinery should be possible only from one location at a time; at such locations interconnected control positions are permitted. At each location there should be an indicator showing which location is in control of the propulsion machinery. The transfer of control between the navigation bridge and machinery spaces should be possible only in the main machinery space or in the main machinery control room. The system should include means to prevent the propelling thrust from altering significantly when transferring control from one location to another.
- 5.4.6 It should be possible for all machinery essential for the safe operation of the vessel to be controlled from a local position, even in the case of failure in any part of the automatic or remote control systems.

5.4.7 The design of the remote automatic control system should be such that in case of its failure an alarm will be given. Unless it is considered impracticable, the preset speed and direction of thrust of the propeller should be maintained until local control is in operation.

5.4.8 Indications should be fitted in the navigation bridge for:

- (1) propeller speed and direction of rotation in the case of fixed pitch propellers;
- (2) propeller speed and pitch position in the case of controllable pitch propellers.

5.4.9 The required low pressure of starting air to restart the main engine should be indicated in the navigation bridge and machinery space. If the remote system of main engine is designed to start automatically, the failure of automatic consecutive starting should be limited in 3 times so that it will have sufficient starting air pressure for starting at site.

5.5 Communication

5.5.1 A reliable means of vocal communication should be provided between the main machinery control room or the propulsion machinery control position (if appropriate), the navigation bridge and the engineer's accommodation.

5.6 Alarm system

5.6.1 An alarm system should be provided indicating any fault requiring attention and should:

- (1) be capable of sounding an audible alarm in the main machinery control room or at the propulsion machinery control position, and indicate visually each separate alarm function at a suitable position;
- (2) have a connection to the engineers' public rooms and to each of the engineers' cabins through a selector switch, to ensure connection to at least one of those cabins. Equivalent arrangements may be used subject to agreement;
- (3) activate an audible and visual alarm on the navigation bridge for any situation which requires action by or attention of the officer on watch;
- (4) as far as is practicable be designed on the fail-to-safety principle;
- (5) activate the engineer's alarm if an alarm function has not received any reply or attention locally within a limited time.

5.6.2 The alarm system should be capable of giving alarms to all faults at the same time. The alarm to one fault and/or response to the alarm should not inhibit another alarm to another fault and /or another response.

5.6.3 After the response of alarm, the audible signal may be cancelled but the visual indication should remain until the fault has been corrected, when the alarm system should automatically reset to the normal operating condition.

5.7 Safety systems

5.7.1 A safety system should be provided to ensure that serious malfunction in machinery or boiler operations, which presents an immediate danger, should initiate the automatic shutdown of that part of the plant and that an alarm should be given. Shutdown of the

propulsion system should not be automatically activated except in cases which could lead to serious damage, complete breakdown or explosion.

5.7.2 Where arrangements for overriding the shutdown of the main propelling machinery are fitted, these should be such as to preclude inadvertent operation, visual means should be provided to indicate when the override has been acted.

5.8 Special requirements for machinery, boiler and electrical installations

5.8.1 The special requirements for the machinery, boiler and electrical installations should be subject to agreement of the vessel inspection authority and should include at least the requirements of this Section.

5.8.2 The main source of electrical power should comply with the following requirements:

- (1) Where the electrical power can normally be supplied by one generator, suitable load-shedding arrangements should be provided to ensure the integrity of supplies to services required for propulsion and steering as well as the safety of the vessel. In the case of loss of the generator in operation, adequate provision should be made for automatic starting and connecting to the main switchboard of a standby generator of sufficient capacity to permit propulsion and steering and to ensure the safety of the vessel with automatic restarting of the essential auxiliaries including, where necessary, sequential operations. This requirement may be dispensed with for a vessel of less than 1600 gross tons.
- (2) If electricity is usually supplied by the parallel run of more than one generator sets, there should be facilities, for example off-loading, to ensure that when one of the generator sets is damaged, the other ones can continue to run for propulsion and steering, without being overloaded and that vessel safety is guaranteed.

5.8.3 Where stand-by machines are required for other auxiliary machinery essential to propulsion, automatic change-over devices should be provided.

5.8.4 Automatic control and alarm system:

- (1) The control system should be such that the services needed for the operation of the main propulsion machinery and its auxiliaries are ensured through the necessary automatic arrangements.
- (2) An alarm should be given on the automatic change.
- (3) An alarm system complying with 5.6 of this Section should be provided for all important pressures, temperatures and fluid levels and other essential parameters.
- (4) A centralized control position should be arranged with the necessary alarm panels and instrumentation including any alarm.

5.8.5 Means should be provided to keep the starting air pressure at the required level where internal combustion engines are used for main propulsion.

Section 2-2 Construction --- Fire prevention, fire detection and fire extinction installations

1 General Provisions

1.1 Application

- 1.1.1 Unless expressly provided otherwise, the application of this Section should refer to the Main Principles of this Code.

1.2 Definition

- (1) Non-combustible material: means a material which neither burns nor gives off flammable vapours in sufficient quantity for self-ignition when heated to about 750°C, and that it has passed the required testing procedure to ensure such properties are found acceptable. Any other material is a combustible material.
- (2) Steel and other equivalent material: Where the words steel or other equivalent material occur, equivalent material means any non-combustible material which, by itself or due to insulation provided, has structural and integrity properties equivalent to steel at the end of the applicable exposure to the standard fire test (e.g. aluminium alloy with appropriate insulation).
- (3) Low flame spreading: means that the surface thus described will adequately restrict the spread of flame, and should have passed through the required test procedure.
- (4) Standard fire endurance tests: means placing the samples of the bulkheads or deck that required to be tested in the furnace, and testing them by heating to the approximately equivalence of the standard time - temperature curve given below. The exposed surface of the samples should not be less than 4.65 m², and its height (or the length for deck sample) should not be less than 2.44 metres. The samples should be as very similar to the design structures as possible, and should include at least one joint where appropriate. Standard time - temperature curve would be a smooth curve joining the following indicated temperature (from and above the initial furnace temperature):
- | | |
|---|-------|
| At the end of the first 5 minutes..... | 556°C |
| At the end of the first 10 minutes..... | 659°C |
| At the end of the first 15 minutes..... | 718°C |
| At the end of the first 30 minutes..... | 821°C |
| At the end of the first 60 minutes..... | 925°C |
- (5) “A” class division: means the divisions that are formed by bulkheads and decks which complying with the following requirements:
- (i) They should be constructed of steel or other equivalent material;
 - (ii) They should be suitably stiffened;
 - (iii) They should be so constructed as to be capable of preventing passage of smoke and flame at the end of the 1 hour standard fire test;

- (iv) They should be insulated with approved non-combustible materials such that the average temperature of the unexposed side will not rise more than 140°C above the original temperature, nor will the temperature, at any one point, including any joint, rise more than 180°C above the original temperature, within the time listed below:
- | | |
|----------------------|------------|
| “A – 60” class | 60 minutes |
| “A – 30” class | 30 minutes |
| “A – 15” class | 15 minutes |
| “A – 0” class | 0 minutes |
- (v) According to the needs, it may require a test to be carried out on a prototype bulkhead or deck to ensure that it meets the above requirements for integrity and temperature rise.
- (6) “B” class divisions: means the divisions formed by bulkheads, decks, ceiling or linings which comply with the following requirements:-
- (i) They should be so constructed as to be capable of preventing the passage of flame to the end of the first half hour of the standard fire test;
- (ii) They should have an insulation value such that the average temperature of the unexposed side will not rise more than 140°C above the original temperature, nor will the temperature at any one point, including any joint, rise more than 225°C above the original temperature, within the time listed below:
- | | |
|---------------------|------------|
| “B – 15” class..... | 15 minutes |
| “B- 0” class | 0 minute |
- (iii) They should be constructed of approved non-combustible materials and all materials entering into the construction and erection of “B” class divisions should be non-combustible, with the exception that combustible veneers may be permitted provided they meet other requirements of this chapter;
- (iv) According to the needs, it may require a test to be carried out on a prototype division to ensure that it meets the above requirements for integrity and temperature rise.
- (7) “C” class divisions: means divisions are constructed of approved noncombustible materials. They need meet neither requirements relative to the passage of smoke and flame nor limitations relative to the temperature rise. Combustible veneers are permitted provided they meet other requirements of this chapter.
- (8) Continuous “B” class ceilings or linings: means the “B” class ceilings or linings which terminate only at an “A” or “B” class divisions.
- (9) Main vertical zones: means those sections into which the hull, superstructure, and deckhouses are divided by “A” class divisions, the mean length of which on any deck does not in general exceed 40 m.

- (10) Accommodation spaces: means those spaces used for public spaces, corridors, lavatories, cabins, offices, hospitals, cinemas, games and hobbies rooms, barber shops, pantries containing no cooking appliances and similar spaces.
- (11) Public areas: means those portions of the accommodation which are used for halls, dining rooms, lounges and similar permanently enclosed spaces.
- (12) Service spaces: means those spaces used for galleys, pantries containing cooking appliances, lockers, mail and specie rooms, store-rooms, workshops other than those forming part of the machinery spaces, and similar spaces and trunks to such spaces.
- (13) Cargo space: means all spaces (including liquid cargo holds) that are used for carrying cargoes and the enclosed passage way leading to these spaces.
- (14) Ro-ro cargo spaces: means spaces not normally subdivided in any way and extending to either a substantial length or the entire length of the vessel in which goods (packaged or in bulk, in or on rail or road cars, vehicles (including road or rail tankers), trailers, containers, pallets, demountable tanks or in or on similar stowage units or other receptacles) can be loaded and unloaded normally in a horizontal direction.
- (15) Opened type ro-ro cargo space: means ro-ro cargo spaces either open at both ends, or open at one end and provided with adequate natural ventilation effective over their entire length through permanent openings in the side plating or deckhead.
- (16) Enclosed ro-ro cargo space: means neither being an opened type ro-ro cargo space nor a ro-ro cargo space at the opened deck.
- (17) Opened deck: means ro-ro cargo spaces which are neither open ro-ro cargo spaces nor weather decks.
- (18) Special category spaces: means those enclosed spaces above or below the bulkhead deck intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion, into and from which such vehicles can be driven and to which passengers have access.
- (19) Machinery spaces of category A: means those spaces and trunks to such spaces which contain:
 - (i) internal combustion machinery used for main propulsion;
 - (ii) internal combustion machinery used for purposes other than main propulsion where such machinery has in the aggregate a total power output of not less than 375 kW;
 - (iii) any oil-fired boiler or oil fuel unit;
 - (iv) oil burning inert gas generating unit.
- (20) Machinery spaces: means all machinery spaces of category A and all other spaces containing propulsion machinery, boilers, oil fuel units, steam and internal combustion engines, generators and major electrical machinery, oil filling stations, refrigerating, stabilizing, ventilation and air-conditioning machinery, and similar spaces, and trunks to such spaces.

- (21) Oil Fuel Unit: means the equipment used for the preparation of oil fuel for delivery to an oil-fired boiler, or equipment used for the preparation for delivery of heated oil to an internal combustion engine, and includes any oil pressure pumps, filters and heaters dealing with oil at a pressure more than 0.18 MPa.
- (22) Control Stations: means those spaces in which the vessel's radio or main navigating equipment or the emergency source of power is located or where the fire recording or fire control equipment is centralized.
- (23) Crude Oil: means any oil occurring naturally in the earth whether or not treated to render it suitable for transportation and includes:
- (i) crude oil from which certain distillate fractions may have been removed;
 - (ii) crude oil to which certain distillate fraction may have been added.
- (24) Combination carrier: means a tanker designed to carry oil or alternatively solid cargoes in bulk.
- (25) Dangerous goods: means those goods referred to the 《 International Maritime Dangerous Goods Code 》 and should be divided into the following classes:
- Class 1 - Explosives.
 - Class 2 - compressed, liquefied or dissolved gases under pressure.
 - Class 3 - Inflammable liquids.
 - Class 4.1 - Inflammable solids.
 - Class 4.2 - Inflammable solids, or substances, liable to spontaneous combustion.
 - Class 4.3 - Inflammable solids, or substances, which in contact with water emit inflammable gases.
 - Class 5.1 - Oxidizing substances.
 - Class 5.2 - Organic peroxides.
 - Class 6.1 - Poisonous (toxic) substances.
 - Class 6.2 - Infectious substances.
 - Class 7 - Radioactive substances.
 - Class 8 - Corrosives.
 - Class 9 - Miscellaneous dangerous substances (that is any other substance which experience has shown, or may show, to be of such a dangerous character that the provisions of this standard should apply to it.)
- (26) Inert condition: means a condition in which the oxygen content throughout atmosphere of a cargo tank has been reduced to 8% or less of volume by the addition of inert gas.

- (27) Inerting: means the introduction of inert gas into a cargo tank with the object of attaining the condition defined in 1.2(26) of this Section.
- (28) Purging: means the introduction of inert gas into a cargo tank already in the inerting condition with objective of:
 - (i) further reducing the oxygen content;
 - (ii) reducing the existing hydrocarbon gas content to a level below which combustion can not be supported if air is subsequently introduced into the cargo tank.
- (29) Gas freeing: means the introduction of fresh air into a compartment with the object of removing toxic, flammable and inert gases and increasing the oxygen content to 21% by volume.
- (30) Cargo area: means the part of the vessel that contains cargo tanks, slop tanks and cargo pump-rooms including pump rooms, cofferdams, ballast and void spaces adjacent to cargo tanks and also deck areas throughout the entire length and breadth of the part of the vessel over the above-mentioned spaces.

1.3 Water fire extinguishing system

1.3.1 Every vessel should be provided with the water fire extinguishing system in compliance with requirements of this regulation.

1.3.2 Capacity of fire pumps:

- (1) The required fire pumps should be capable of delivering for fire-fighting purposes a quantity of water, at the pressure specified under 1.3.4 of this Section, other than any emergency pump, not less than 4/3 of the quantity by each of the independent bilge pumps, provided that in no case need the total required capacity of the fire pumps exceed 180 m³/h.
- (2) Each of the required fire pumps (other than any emergency pump required for cargo vessels) should have a capacity not less than 80% of the total required capacity divided by the minimum number of required fire pumps but in any case less than 25 m³/h and each pump should in any event be capable of delivering at least the two required jets of water. These fire pumps should be capable of supplying the fire main system under the required conditions.

1.3.3 Arrangement of fire pumps and fire mains:

- (1) Vessels should be provided with independently driven fire pumps as follows:

<u>Gross Tonnage</u>	<u>Number of pumps</u>
≥ 1000	2
500 ≤ GT < 1000	1
< 500	1 (pump may be driven by main engine; hand pump is acceptable if only operating within harbour limit.)

- (2) Sanity, ballast, bilge or general service pumps may be accepted as fire pumps, provided that they are not normally used for pumping oil and that if they are subject to occasional duty for the transfer or pumping of oil fuel, suitable change-over arrangements are fitted and cleaned.
- (3) In cargo vessels of 2000 gross tons and upwards, if a fire in any one compartment could put all the pumps out of action there should be an alternative means consisting of a fixed independently driven emergency pump which should be capable of supplying two jets of water. The pump and its location should comply with the following requirements:
 - (a) The capacity of the emergency fire pump should not be less than 40% of the total capacity of the fire pumps required by this regulation and in any case not less than 25 m³/h.
 - (b) When the emergency fire pump is delivering the quantity of water required by above paragraph (a), the pressure at any hydrant should be not less than the minimum pressure given in 1.3.4(2) of this section.
 - (c) Any diesel driven power source for the emergency fire pump should be capable of being readily started in its cold condition down to a temperature of 0°C by hand cranking. If this is impracticable, or if lower temperatures are likely to be encountered, consideration is to be given to the provision and maintenance of heating arrangements, acceptable to Marine Department, so that ready starting will be assured. If hand starting is impracticable, other means of starting may be permitted. These means should be such as to enable the diesel driven power source to be started at least six times within a period of 30 minutes, and at least twice within the first 10 minutes.
 - (d) Any service fuel tank should contain sufficient fuel to enable the pump on full load for at least 3 hours and sufficient reserves of fuel should be available outside the main machinery space to enable the pump to be run on full load for an additional 15 hours.
 - (e) The total suction head and the net positive suction head of the emergency fire pump should be such that the requirements of 1.3.3(3), 1.3.3(3)(a), 1.3.3(3)(b) and 1.3.4 of this section should be obtained under all conditions of list, trim, roll and pitch likely to be encountered in service.
 - (f) The boundaries of the space containing the fire pump should be insulated to a standard of structural fire protection equivalent to that required for a control station in this section.
 - (g) No direct access should be permitted between the machinery space and the space containing the emergency fire pump and its source of power. When this is impracticable, it may be acceptable by an arrangement where the access is by means of an airlock, each of the two doors being self-closing, or through a watertight door capable of being operated from a space remote from the machinery space and the space containing the emergency fire pump and unlikely to be cut off in the event of fire in those spaces. In such cases a second means of access to the space containing the emergency fire pump and its source of power should be provided.

- (h) Ventilation arrangements to the space containing the independent source of power for the emergency fire pump should be such to preclude, as far as practicable, the possibility of smoke from a machinery space fire entering or being drawn into that space.
 - (i) In cargo vessels of less than 2000 gross tons, if a fire in any one compartment could put all the pumps out of action the alternative means of providing water for fire-fighting purposes should be accepted by Marine Department.
 - (j) Where other pumps, such as general service, bilge and ballast, etc., are fitted in a machinery space, arrangements should be made to ensure that at least one of these pumps, having the capacity and pressure required by 1.3.2 and 1.3.4 of this section, is capable of providing water to the fire main.
- (4) In cargo vessels of 1600 gross tons and upwards, the arrangements for the ready availability of water supply should be such that at least one effective jet of water is immediately available from any hydrant. For a periodically unattended machinery space or when only one person is required on watch, there should be immediate water delivery from the fire main system at a suitable pressure, either by remote starting of one of the main fire pumps with remote starting from the navigation bridge and fire control station, if any, or permanent pressurization of the fire main system by one of the main fire pump. For cargo vessels less than 1600 gross tons, if the arrangement of the machinery space access makes it unnecessary, such requirement can be waived subject to agreement.
- (5) Relief valves should be provided in conjunction with all fire pumps if the pumps are capable of developing a pressure exceeding the design pressure of the water service pipes, hydrants and hoses. These valves should be so placed and adjusted as to prevent excessive pressure in any part of the fire main system.
- (6) In tankers, isolation valves should be fitted in the fire main at poop front in a protected position and on the tank deck at intervals of not more than 40 m to preserve the integrity of the fire main system in case of fire or explosion.

1.3.4 Diameter of, and pressure in, the fire mains:

- (1) The diameter of the fire main and water service pipes should be sufficient for the discharge of 140 m³/h water quantity.
- (2) With the two pumps simultaneously delivering through nozzles specified in 1.3.8 of this section the quantity of water specified in 1.3.4(1) of this section through any adjacent hydrants, the following minimum pressures should be maintained at all hydrants:

<u>Gross tonnage</u>	<u>Pressure</u> (MPa)
≥ 6000	0.27
1000 ≤ GT < 6000	0.25
500 ≤ GT < 1000 (1 pump)	2 water jets each with at least 12 m ejecting distance
< 500	1 water jet

- (3) The maximum pressure at any hydrant should not exceed that at which the effective control of a fire hose can be demonstrated.

1.3.5 The number and position of hydrants should be such that at least 2 jets of water not emanating from the same hydrant, one of which should be from a single length of hose, may reach any part of the vessel normally accessible to the passengers or crew while the vessel is being navigated and any part of any cargo space when empty, any ro-ro cargo space or any special category space in which latter case the 2 jets should reach any part of such space, each from a single length of hose. Further more, such hydrants should be positioned near the accesses to the protected spaces.

1.3.6 Fire pipes and hydrants:

- (1) Materials readily rendered ineffective by heat should not be used for the fire mains and hydrants unless adequately protected. The pipes and hydrants should be so placed that the fire hoses may be easily coupled to them. The arrangement of pipes and hydrants should be such as to avoid the possibility of freezing. In vessels where deck cargo may be carried, the positions of the hydrants should be such that they are always readily accessible and the pipes should be arranged as far as practicable to avoid risk of damage by such cargo. Unless one hose and nozzle is provided for each hydrant in the vessel, there should be complete interchangeability of hose couplings and nozzles.
- (2) A valve should be fitted to serve each fire hose so that any fire hose may be removed while the fire pumps are at work.
- (3) Isolating valves to separate the section of the fire main within the machinery space containing the main fire pump or pumps from the rest of the fire main should be fitted in an easily accessible and tenable position outside the machinery spaces. The fire main should be so arranged that when the isolating valves are shut all the hydrants on the vessel (except those in the machinery space referred to above) can be supplied with water by a fire pump not located in this machinery space through pipes which do not enter this space. Exceptionally, short lengths of the emergency fire pump suction and discharge piping to penetrate the machinery space may be permitted if it is impracticable to route it externally provided that the integrity of the fire main is maintained by the enclosure of the piping in a substantial steel casing.

1.3.7 Fire hoses:

- (1) Fire hoses should be made of approved non-perishable material. Fire hoses of non-perishable material should be provided in vessels constructed before 1 February 1992 when the existing fire hoses are replaced. Fire hoses should be sufficient in length to project a jet of water to any of the spaces in which they may be required to be used and their maximum length should not be more than 20 m. Each hose should be provided with a nozzle and the necessary couplings. Each of the fire hoses should together with any necessary fittings and tools be kept ready for use in conspicuous positions near the water service hydrants or connections.

- (2) Vessels should be provided with fire hoses the number and diameter of which should be agreed by Marine Department.
- (3) In cargo vessels of 1000 gross tons and upwards the number of the fire hoses to be provided should be one for each 30 m length of the vessel and one spare but in no case less than five in all. This number does not include any hoses required in any engine or boiler room. The number of hoses may be required to increase so as to ensure that hoses in sufficient number are available and accessible at all times, having regard to the type of vessel any nature of trade in which the vessel is employed. In cargo vessels of more than 500 but less than 1000 tons gross tonnage, at least 3 fire hoses to be provided. In cargo vessels of less than 500 gross tons, at least 1 fire hose to be provided.

1.3.8 Nozzles:

- (1) For the purposes of this section, standard nozzle sizes should be 12mm , 16mm and 19mm or as near thereto as possible. Larger diameter nozzles may be permitted subject to agreement of Marine Department.
- (2) For accommodation and service spaces, a nozzle size greater than 12mm need not be used.
- (3) For machinery spaces and exterior locations, the nozzle size should be such as to obtain the maximum discharge possible from two jets at the pressure mentioned in the paragraphs of this chapter from the smallest pump (except emergency fire pump), provided that a nozzle size greater than 19mm need not be used.
- (4) All nozzles should be of an approved dual purpose type (i.e., spray/jet type) incorporating a shut-off.

1.3.9 Location and arrangement of water pumps, etc., for other fire-extinguishing systems:

Pumps required for the provision of water for other fire-extinguishing systems required by this Chapter, their sources of power and their controls should be installed outside the space or spaces protected by such systems and should be so arranged that a fire in the space or spaces protected will not put any such system out of action.

1.3.10 International Shore Connection

Vessels of 1000 gross tons and upwards should be provided with at least one international shore connection, complying with the following provisions:

- (1) Facilities should be available enabling such a connection to be used on either side of the vessel.
- (2) Standard dimensions of flanges for the international shore connection should be in accordance with the requirements of the table 1.3.10(2).
- (3) The international connection should be of steel or other suitable material and should be designed for 1.0 MPa services. The flange should have a flat face on one side and on the other should be permanently attached to a coupling that will fit the vessel's hydrant and hose. The connection should be kept aboard the vessel together with a gasket of any material suitable for 1.0 MPa services, together with four 16 mm bolts, 50 mm in length, and 8 washers.

Flange size of the International Shore Connection

Table 1.3.10(2)

Description	Dimension
Outside diameter	178 mm
Inside diameter	64 mm
Bolt circle diameter	132 mm
Slots in flange	Four holes 19 mm in diameter spaced equidistantly on a bolt circle of the above diameter, slotted to the flange periphery
Flange thickness	14.5 mm minimum
Bolts and nuts	Four, each of 16mm diameter, 50 mm in length

1.4 Fixed gas fire-extinguishing systems

1.4.1 General requirements:

- (1) The use of a fire-extinguishing medium which, either by itself or under expected conditions of use gives off toxic gases in such quantities as to endanger persons, should not be permitted.
- (2) The necessary pipes for conveying fire-extinguishing medium into protected spaces should be provided with control valves so marked as to indicate clearly the spaces to which the pipes are led. Suitable provision should be made to prevent inadvertent admission of the medium to any space.
- (3) The piping for the distribution of fire-extinguishing medium should be arranged and discharge nozzles so positioned that a uniform distribution of medium is obtained.
- (4) Means should be provided to close all openings which may admit air to or allow gas to escape from a protected space.
- (5) Where the volume of free air contained in air receivers in any space is such that, if released in such space in the event of fire, such release of air within that space would seriously affect the efficiency of the fixed fire-extinguishing system, the provision of an additional quantity of fire-extinguishing medium should be required.
- (6) Means should be provided for automatically giving audible warning of the release of fire-extinguishing medium into any space in which personnel normally work or to which they have access. The alarm should operate for a suitable period before the medium is released. For tankers carrying petroleum products having a flashpoint less than 60°C (closed cup test), the automatically audible warning alarm of the release of fire extinguishing medium in the cargo pump rooms, the air supply should be clean and dry if operated by air. And if operated electrically, the arrangements are to be such that the electrical operating mechanism should be located outside the pump room, unless the electrical warning alarm system is a safety type approved by Marine Department.

- (7) The means of control of any fixed gas fire-extinguishing system should be readily accessible and simple to operate and should be grouped together in as few locations as possible at positions not likely to be cut off by a fire in a protected space. These locations should be sufficiently illuminated by lightings by both main and emergency electrical power supplies. At each location there should be clear instructions relating to the operation of the system having regard to the safety of personnel.
- (8) Automatic release of fire-extinguishing medium should not be permitted.
- (9) Where the quantity of extinguishing medium is required to protect more than one space, the quantity of medium available need not be more than the largest quantity required for any one space so protected.
- (10) Pressure containers required for the storage of fire-extinguishing medium, other than steam, should be located outside protected spaces in accordance with below paragraph (13).
- (11) Means should be provided for the crew to safely check the quantity of medium in the containers.
- (12) Containers for the storage of fire-extinguishing medium and associated pressure components should be designed in accordance with the agreed regulation or standard having regard to their locations and maximum ambient temperatures expected in service.
- (13) When the fire-extinguishing medium is stored outside a protected space, it should be stored in a room which should be situated in a safe and readily accessible position and should be effectively ventilated to the satisfaction of Marine Department. Any entrance to such a storage room should preferably be from the open deck and in any case should be independent of the protected space. Access doors should open outwards, and bulkheads and decks including doors and other means of closing any opening therein, which form the boundaries between such rooms and adjoining enclosed spaces should be gas tight. For the purpose of the application of the integrity tables 2.4, 3.2 and 4.4 of this Section, such storage rooms should be treated as control stations.
- (14) When the gas is used as an extinguishing medium, for cargo pump-rooms in tankers, the quantity of the gas should be sufficient to give a minimum volume of free gas equal to 45% of the gross volume of the cargo pump-rooms including the casing.
- (15) Spare parts for the system as required by this Section should be stored on board.

1.4.2 Carbon dioxide (CO₂) systems:

- (1) For cargo spaces the quantity of carbon dioxide available should, unless otherwise provided, be sufficient to give a minimum volume of free gas equal to 30% of the gross volume of the largest cargo space so protected in the vessel.
- (2) For machinery spaces the quantity of carbon dioxide carried should be sufficient to give a minimum volume of free gas equal to the larger of the following volumes, either:

- (i) 40% of the gross volume of the largest machinery space so protected, the volume to exclude that part of the casing above the level at which the horizontal area of the casing is 40% or less of the horizontal area of the space concerned taken midway between the tank top and the lowest part of the casing; or
- (ii) 35% of the gross volume of the largest machinery space protected, including the casing.

For cargo vessels of less than 2000 gross tons, the above-mentioned percentages may be reduced to 35% and 30% respectively; if two or more machinery spaces are not entirely separated, they should be considered as forming one space.

- (3) When CO₂ is used as an extinguishing medium for cargo pump room in tankers, the quantity of CO₂ is to be sufficient to give a minimum volume of free gas equal to 45% of the gross volume of the cargo pump room (including the casing).
- (4) For cargo spaces intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion, if a CO₂ system is fitted, the quantity of gas available is to be at least sufficient to give a minimum volume of free gas equal to 45% of the gross volume of the largest such cargo space which is capable of being sealed.
- (5) For the purpose of this paragraph the volume of free carbon dioxide should be calculated at 0.56 m³/kg.
- (6) For machinery spaces the fixed piping system should be such that 85% of the gas can be discharged into the space within 2 minutes.
- (7) The control of the carbon dioxide system should comply with the following requirements:

Two separate controls should be provided for releasing carbon dioxide into a protected space and to ensure the activities of the alarm. One control should be used to discharge the gas from its storage containers. A second control should be used for opening the valve of the piping which conveys the gas into the protected space.

- (8) Carbon dioxide containers:
 - (i) CO₂ containers should be of seamless steel bottles, and are to be hydraulically tested at 24.5 MPa. Each bottle is to be furnished with an approved certificate and to have on its body permanent identifications of weight, capacity, hydraulic test pressure, data of tests, serial number of the factory and also inspection stamp.
 - (ii) For inspection purposes, the bottles should be wholly painted in red but white in way of the markings, and with yellow letter of "CO₂".
 - (iii) The charging ratio for CO₂ bottles should not be more than 0.67 kg/litre.
 - (iv) Bottle head valves should be associated with steel or copper seamless tubes having a diameter of 10 ~ 12 mm snipped off at their lower end and terminated near the bottom of the bottles.

- (v) Bottle head valves should be provided with safety diaphragms or other approved safety devices. The bursting pressure of the safety diaphragms is to be 18.6 ± 1 MPa. After bursting of safety diaphragms, the escape gas should be led to the open atmosphere through suitable piping. This requirement should also be met if other safety devices are used.
 - (vi) Bottle head valves should be made of forged bronze, stainless steel or other suitable materials.
 - (vii) CO₂ bottles should be divided into groups according to the required quantity for different spaces to be protected. If releasing the carbon dioxide is hand-operated, the number of bottles in each group should not exceed 12.
- (9) Carbon dioxide piping:
- (i) Each connecting pipe led from each bottle head valve to the collecting pipe should be provided with a non-return valve.
 - (ii) The manifold connecting the collecting pipes and control valves should be provided with a pressure gauge having a range of 0 ~ 24.5 MPa.
 - (iii) The CO₂ piping should not be led through the accommodation spaces and should also avoid passing through the service spaces. If it is impracticable to avoid CO₂ piping passing through service spaces, CO₂ piping within the service spaces should not be fitted with detachable joints.
 - (iv) For machinery spaces of Category A or cargo pump rooms, the piping should be provided with sufficient number and adequate size of nozzles so that 85% of carbon dioxide can be discharged into the space within 2 minutes.
 - (v) The diameter of CO₂ piping leading to the above mentioned spaces as stated in above (iv) should be determined in accordance with the proposed quantity conveyed by the corresponding pipe diameters is given in Table 1.4.2(10)(v).
 - (vi) The minimum wall thickness of CO₂ pipes should be complied with the requirements of Table 1.4.2(10)(vi). Slight difference from the thickness listed in the Table will be accepted for the purpose of selecting standard steel pipes.
 - (vii) Distribution piping leading to cargo spaces should not be less than 20 mm bore, and those leading to the nozzles should not be less than 15 mm bore.
 - (viii) CO₂ piping should be provided with compressed air cleaning connections at its manifold.
 - (ix) CO₂ pipes should be of seamless steel pipes.

Maximum quantity of carbon dioxide conveyed by the pipe

Table 1.4.2(10)(v)

Internal diameter of pipes (mm)	Maximum quantity of carbon dioxide conveyed by the pipe (kg)	Internal diameter of pipes (mm)	Maximum quantity of carbon dioxide conveyed by the pipe (kg)
15	45	76	2000
20	100	90	3250
25	135	100	4750
32	275	114	6800
40	450	127	9500
50	1100	152	15250

Minimum wall thickness of carbon dioxide pipes

Table 1.4.2(10)(vi)

External diameter (mm)	Wall thickness (mm)	
	Piping forward of control valves	Piping after control valves
21.3~26.9	3.2	2.6
30.0~48.3	4.0	3.2
51.0~60.3	4.5	3.6
63.5~76.1	5.0	3.6
82.5~88.9	5.6	4.0
101.6	6.3	4.0
108.0~114.3	7.1	4.5
127	8.0	4.5
133.0~139.7	8.0	5.0
152.4~168.3	8.8	5.6

(10) Testing of carbon dioxide extinguishing system:

- (i) CO₂ bottles and bottle head valves should be hydraulically tested at 24.5 MPa. Safety diaphragms should be burst tested in accordance with the requirements of 1.4.2(9)(v) of this section by selecting 10% at random.
- (ii) On completion of fitting the bottle head valves, CO₂ bottles should be air tested in the workshop to a pressure equal to the design pressure of the bottle.

- (iii) The pipes and valves of CO₂ piping systems should be hydraulically tested. For manifold and pipes between control valves should be tested at 11.8 MPa. For bottle head valves and pipes between manifold should be tested at 11.8 MPa. For pipes between manifold and nozzles should be tested at 1 MPa. The above tests may be carried out in workshop. On completion of installation on board, CO₂ piping should be air tested of not less than 0.69 MPa with the ends closed.
- (iv) On completion of installation on board, the CO₂ piping system should be function tested with a pneumatically pressure not less than 2.47 MPa for checking the operation of releasing mechanism.

1.4.3 Other gas extinguishing systems:

- (1) Where gas other than carbon dioxide is used on the vessel as fire-extinguishing medium, it should be a gaseous product of fuel combustion in which the oxygen content, the carbon monoxide content, the corrosive elements and any solid combustible elements have been reduced to a permissible minimum.
- (2) Where such gas is used as the fire-extinguishing medium in a fixed fire-extinguishing system for the protection of machinery spaces, it should afford protection equivalent to that provided by a fixed system using carbon dioxide as the medium.
- (3) Where such gas is used as a fire-extinguishing medium in a fixed fire-extinguishing system for the protection of cargo spaces, a sufficient quantity of such gas should be available to supply hourly a volume of free gas at least equal to 25% of the gross volume of the largest space protected in this way for a period of 72 hours.

1.5 Fire extinguishers

1.5.1 Portable fire extinguishers:

- (1) Approval:
 - (i) All fire extinguishers should be of approved types and designs.
 - (ii) The equivalents of the fire extinguishers should be subject to determination.
- (2) Fire extinguishing medium:
 - (i) Fire extinguishing medium, which either by itself or under expected conditions of use, gives off toxic gases in such quantities as to endanger persons should not be permitted.
 - (ii) Sufficient spare charges should be provided.
- (3) Portable fluid extinguishers: the capacity of required portable fluid extinguishers should be not more than 13.5 litres and not less than 9 litres.
- (4) Other portable extinguishers: other portable extinguishers should be at least as portable as the 13.5 litres fluid extinguisher and should have a fire-extinguishing capability equivalent to that of a 9 litres extinguisher.

- (5) Portable foam applicator unit: the portable foam applicator unit should consist of an air-foam nozzle of an inductor type capable of being connected to the fire main by a fire hose, together with a portable tank containing at least 20 litres of foam-making liquid and one spare tank. The nozzle should be capable of producing effective foam suitable for extinguishing an oil fire, at the rate of at least 1.5 m³/min. The expansion ratio of foam should not exceed 12 to 1.
- (6) Arrangement of fire extinguishers: one of the portable fire extinguishers intended for use in any space should be stowed near the entrance to that space.
- (7) Number of fire extinguishers: accommodation spaces, service spaces and control stations should be provided with portable fire extinguishers of appropriate types and in sufficient number. Vessels of 1000 gross tons and upwards should carry at least 5 portable fire extinguishers.

1.6 Fire extinguishing arrangements in machinery spaces

1.6.1 Spaces containing oil-fired boilers or oil fuel units:

- (1) Machinery spaces of category A containing oil-fired boilers or oil fuel units should be provided with any one of the following fixed fire-extinguishing system:
 - (i) A gas system complying with the provisions of 1.4 of this Section.
 - (ii) A high-expansion foam system complying with the provisions of 1.8 of this Section.
 - (iii) A pressure water spraying system complying with the provisions of 1.9 of this Section.

In each case if the engine and boiler rooms are not entirely separate, or if fuel oil can drain from the boiler room into the engine-room, the combined engine and boiler rooms should be considered as one compartment.

- (2) There should be at least 2 portable foam extinguishers or equivalent in each fire space in each boiler room and in each space in which a part of the oil fuel installation is situated. There should be not less than one approved foam-type extinguisher of at least 135 litres capacity or equivalent in each boiler room. These extinguishers should be provided with hoses on reels suitable for reaching any part of the boiler room. In the case of domestic boilers of less than 175 kW in cargo vessels, this requirement may be relaxed, as appropriate.
- (3) In each firing space there should be a receptacle containing sand, sawdust impregnated with soda, or other approved dry material in such quantity as may be required. An approved portable fire extinguisher may be substituted as an alternative.

1.6.2 Machinery spaces of category A containing internal combustion machinery:

- (1) Machinery spaces of category A containing internal combustion machinery should be provided with one of the fixed fire-extinguishing systems required by 1.6.1(1) of this Section.
- (2) In each such space approved foam-type fire extinguishers, each of at least 45 litres capacity or equivalent, sufficient in number to enable foam or its equivalent to be directed on to any part of the fuel and lubricating oil pressure systems, gearing and other fire hazards.

- (3) In addition, there should be provided a sufficient number of portable foam extinguishers or equivalent which should be so located that no point in the space is more than 10 m walking distance from an extinguisher and that there are at least 2 such extinguishers in each such space. For smaller spaces of cargo vessels, this requirement may be suitably relaxed subject to agreement.

1.6.3 In spaces containing steam turbines (used either for main propulsion or for other purposes), when such machinery has in the aggregate a total output of not less than 375 kW, the following should be provided:

- (1) Approved foam fire extinguishers each of at least 45 litres capacity or equivalent sufficient in number to enable foam or its equivalent to be directed on to any part of the pressure lubrication system, on to any part of the casings enclosing pressure lubricated parts of the turbines, engines or associated gearing, and any other fire hazards. However, such extinguishers should not be required if protection at least equivalent to that of a fixed fire-extinguishing system fitted in compliance with 1.6.1(1) of this section.
- (2) A sufficient number of portable foam extinguishers or equivalent which should be so located that no point in the space is more than 10 m walking distance from an extinguisher and that there are at least two such extinguishers in each such space, except that such extinguishers should not be required in addition to any provided in compliance with 1.6.1(3) of this Section.
- (3) One of the fire-extinguishing systems required by 1.6.1(1) of this Section where such spaces are periodically unattended.

1.6.4 Tankers of less than 500 gross tons

- (1) Machinery and boiler spaces may be installed with a water-spraying extinguishing system in lieu of the requirements of 1.6.1(1) and 1.6.2(1) of this Section.
- (2) Machinery and boiler spaces should be provided with the following fire extinguishers in lieu of the requirements of 1.6.1(2), (3), (4) and 1.6.2(2), (3) and (4) of this Section:
 - (i) One foam fire extinguishers of 45 litres capacity complying with the provisions of 1.5.1(4) of this Section or equivalent equipment, to enable foam or its equivalent to be directed on to any part of fire hazards. In cargo vessels of less than 500 gross tons, such requirement may be accepted in lieu by 2 approved portable fire extinguishers.
 - (ii) One fire extinguishing box, containing with sand, sawdust impregnated with soda, or other approved dry material in such quantity as may be required. An approved portable fire extinguisher may be substituted as an alternative.

1.6.5 Cargo vessels of less than 1000 gross tons

- (1) Machinery and boiler spaces may be installed with a water-spraying extinguishing system in lieu of the requirements of 1.6.1(1) and 1.6.2(1) of this Section.

- (2) Machinery and boiler spaces should be provided with the following fire extinguishers in lieu of the requirements of 1.6.1(2), (3), (4) and 1.6.2(2), (3) and (4) of this Section:
- (i) One foam fire extinguishers of 45 litres capacity complying with the provisions of 1.5.1(4) of this Section or equivalent equipment, to enable foam or its equivalent to be directed on to any part of fire hazards. In cargo vessels of less than 500 gross tons, such requirement may be accepted in lieu by 2 approved portable fire extinguishers.
 - (ii) One fire extinguishing box, containing with sand, sawdust impregnated with soda, or other approved dry material in such quantity as may be required. An approved portable fire extinguisher may be substituted as an alternative.

1.6.7 Fire-extinguishing appliances in other machinery spaces:

Where a fire hazard exists in any machinery space for which no specific provisions for fire-extinguishing appliances, there should be provided in, or adjacent to, that space such a number of approved portable fire extinguishers or other means of fire extinguishing equipment.

1.7 Fixed low-expansion foam fire-extinguishing system in machinery spaces

1.7.1 Where in any machinery space a fixed low-expansion foam fire-extinguishing system is fitted in addition to the requirements of this chapter, such system should be capable of discharging through fixed discharge outlets in not more than 5 minutes a quantity of foam sufficient to cover to a depth of 150 mm the largest single area over which oil fuel is liable to spread. The system should be capable of generating foam suitable for extinguishing oil a permanent system of piping and control valves or cocks to suitable discharge outlets, and for the foam to be effectively directed by fixed sprayers on other main fire hazards in the protected space. The expansion ratio of the foam should not exceed 12 to 1.

1.7.2 The means of control of any such systems should be readily accessible and simple to operate and should be grouped together in as few locations as possible at positions not likely to be cut off by a fire in the protected space.

1.7.3 The installed system on board should be tested in accordance with the procedure approved by Marine Department or the surveyor recognized by Marine Department.

1.8 Fixed high-expansion foam fire-extinguishing systems in machinery spaces

1.8.1 Any required fixed high-expansion foam system in machinery spaces should be capable of rapidly discharging through fixed discharge outlets a quantity of foam sufficient to fill the greatest space to be protected at a rate of at least 1 m in depth per minute. The quantity of foam-forming liquid available should be sufficient to produce a volume of foam equal to five times the volume of the largest space to be protected. The expansion ratio of the foam should not exceed 1000 to 1.

Marine Department may permit the use of alternative arrangements and discharge rates subjected to equivalent protection is satisfactorily provided.

- 1.8.2 Supply ducts for delivering foam, air intakes to the foam generator and the number of foam-producing units should in the opinion of the surveyor be such as will provide effective foam production and distribution. When the gross horizontal area of machinery spaces larger than 400 m², at least two foam-producing units should be provided.
- 1.8.3 The arrangement of the foam generator delivery ducting should be such that a fire in the protected space will not affect the foam generating equipment. As such, the ducting must provide with manual or automatic flap; means should also be included to change from automatic to manual control if automatic flap is fitted.
- 1.8.4 The foam generator, its sources of power supply, foam-forming liquid and means of controlling the system should be readily accessible and simple to operate and should be grouped in as few locations as possible at positions not likely to be cut off by a fire in the protected space.
- 1.8.5 The installed system on board should be tested in accordance with the criteria and requirement to the satisfaction of Marine Department or authorized surveyor or authorized organization.

1.9 Fixed pressure water-spraying fire-extinguishing systems

1.9.1 General requirements:

- (1) The fixed pressure water-spraying fire-extinguishing systems should be effectively extinguishing the oil type fire.
- (2) The system should be provided with an independent water pump which should not be any of the fire pump as required under this chapter. The fire pump may have a connection from the fire main with the system as a spare pump, provided that a screw-down non-return valve is fitted to prevent a backflow from the sprinkler system to the fire main.
- (3) The pump should be capable of simultaneously supplying at the necessary pressure all sections of the system in any one compartment to be protected. The pump and its controls should be installed outside the space or spaces to be protected. It should not be possible for a fire in the space or spaces protected by the water-spraying system to put the system out of action.
- (4) The pump may be driven by independent internal combustion machinery, which should be so situated that a fire in the protected space will not affect the air supply to the machinery. If the pump is dependent upon power being supplied from the emergency generator, that generator should be so arranged as to start automatically in case of main power failure so that power for the pump required is immediately available.
- (5) The nozzles of the required fixed pressure water-spraying fire-extinguishing systems for the protected space should be approved type.
- (6) The number and arrangement of nozzles should be such as to ensure an effective average distribution of at least 5 litres/m²/min in the spaces to be protected. Application rates are to be appropriate increased if considered necessary.

- (7) The system may be divided into sections, the distribution valves of which should be operated from easily accessible positions outside the spaces to be protected so as not to be readily cut off by a fire in the protected space.
- (8) The piping of the system should be hydraulically tested with a pressure at 1.5 times of the design pressure before installation on board. On completion of installation on board, the system should be operation tested.

1.9.2 Fixed pressure water-spraying fire-extinguishing systems in machinery spaces

In addition to the requirements of 1.9.1 of this section, fixed pressure water-spraying fire-extinguishing systems in machinery spaces should also comply with the following:

- (1) The system should be kept charged at the necessary pressure and the pump supplying the water for the system should be put automatically into action by a pressure drop in the system.
- (2) Nozzles should be fitted above bilges, tank tops and other areas over which oil fuel is liable to spread and also above other specific fire hazards in the machinery spaces.
- (3) Precautions should be taken to prevent the nozzles from becoming clogged by impurities in the water or corrosion of piping, nozzles, valves and pump. The piping system should be of steel pipes galvanized internally and externally.

1.10 Special arrangements in machinery spaces

1.10.1 The following provisions should apply to machinery spaces of category A and, where considered desirable to other machinery spaces.

1.10.2 Cargo vessels of 1000 gross tons and upwards, and tankers above 500 gross tons:

- (1) Means of control outside the machinery space and cargo spaces should be provided for closing all the openings in way of these protected spaces such as door way, ventilation trunks, skylights, funnels, and other miscellaneous openings, in the event of fire.
- (2) Skylights should be of steel and should not contain glass panels. Suitable arrangements should be made to permit the release of smoke, in the event of fire, from the space to be protected.
- (3) Means of remote control should be provided outside the protected space for stopping the forced and induced draught fans, ventilation fans, oil fuel transfer pumps, oil fuel unit pumps and other similar fuel pumps, in the event of fire.
- (4) For periodically unattended machinery spaces in cargo vessels (including tankers), special consideration to maintaining fire integrity of the machinery spaces, the location and centralization of the fire-extinguishing system controls, the required shutdown arrangements (e.g. ventilation, fuel pumps, etc.) and may require additional fire-extinguishing appliances and other fire-fighting equipment and breathing apparatus.

1.10.3 Cargo vessels of less than 1000 gross tons, and tankers above 500 gross tons:

- (1) The following arrangements should be provided:

- (i) Opening and closure of skylights, closure of openings in funnels which normally allow exhaust ventilation, and closure of ventilator dampers.
 - (ii) Stopping ventilation fans.
 - (iii) Stopping forced and induced draught fans, oil fuel transfer pumps, oil fuel unit pumps and other similar fuel pumps.
- (2) Skylights should be of steel and should not contain glass panels, other alternative means of equivalent arrangements may be accepted.

1.11 Automatic sprinkler, fire detection and fire alarm system

1.11.1 General requirements:

- (1) Any required automatic sprinkler, fire detection and fire alarm system should be capable of immediate operation at all times and no action by the crew should be necessary to set it in operation. It should be of the wet pipe type but small exposed sections may be of dry pipe as agreed for a necessary precaution. Any parts of the system, which may be subjected to freezing temperatures in service should be suitably protected against freezing. It should be kept charged at the necessary pressure and should have provision for a continuous supply of water as required in this paragraph.
- (2) Each section of sprinklers should include means for giving a visual and audible alarm signal automatically at one or more indicating units whenever any sprinkler comes into operation. Such alarm systems should be such as to indicate if any fault occurs in the system. Such units should indicate in which section served by the system fire has occurred and should be centralized on the navigation bridge and in addition, visible and audible alarms from the unit should be located in a position other than on the navigation bridge, so as to ensure that the indication of fire is immediately received by the crew.
- (3) The sprinkler system should have a connection from the vessel's fire main by way of a lockable screw-down non-return valve at the connection which will prevent a backflow from the sprinkler system to the fire main.

1.11.2 Sprinklers

- (1) Sprinklers should be grouped into separate sections, each of which should contain not more than 200 sprinklers.
- (2) Each section of sprinklers should be capable of being isolated by one stop valve only. The stop valve in each section should be readily accessible and its location should be clearly and permanently indicated. Means should be provided to prevent the operation of the stop valves by any unauthorized person.
- (3) A gauge indicating the pressure in the system should be provided at each section stop valve and at a central station.
- (4) The sprinklers should be resistant to corrosion by marine atmosphere. In accommodation and service spaces the sprinklers should come into operation within the temperature range from 68°C to 79°C, except in locations such as drying rooms, where high ambient temperatures might be expected, the operating temperature may be increased by not more than 30°C above the maximum deck head temperature.

- (5) A list or plan should be displayed at each indicating unit showing the spaces covered and the location of the zone in respect of each section. Suitable instructions for testing and maintenance should be available.
- (6) Sprinklers should be placed in an overhead position and spaced in a suitable pattern to maintain an average application rate of not less than 5 litres/m²/min over the nominal area covered by the sprinklers. However, the use of sprinklers providing such an alternative amount of water suitably distributed as has been shown to be not less effective may be permitted.

1.11.3 Pressure tank:

- (1) A pressure tank having a volume equal to at least twice that of the charge of water specified below should be provided. The tank should contain a standing charge of fresh water, equivalent to the amount of water which would be discharged in one minute by the pump referred to 1.11.4 of this Section, and the arrangements should provide for maintaining an air pressure in the tank such as to ensure that where the standing charge of fresh water in the tank has been used the pressure will be not less than the working pressure of the sprinkler, plus the pressure exerted by a head of water measured from the bottom of the tank to the highest sprinkler in the system. Suitable means of replenishing the air under pressure and of replenishing the fresh water charge in the tank should be provided. A glass gauge should be provided to indicate the correct level of the water in the tank.
- (2) Means should be provided to prevent the passage of seawater into the tank.

1.11.4 Sprinkler pumps and arrangement:

- (1) An independent power pump should be provided solely for the purpose of containing automatically the discharge of water from the sprinklers. The pump should be brought into action automatically by the pressure drop in the system before the standing fresh water charge in the pressure tank is completely exhausted.
- (2) The pump and the piping system should be capable of maintaining the necessary pressure at the level of the highest sprinkler to ensure a continuous output of water sufficient for the simultaneous coverage of a minimum area of 280 m² at the application rate specified in 1.11.2(6) of this Section.
- (3) The pump should have fitted on the delivery side a test valve with a short open-ended discharge pipe. The effective area through the valve and pipe should be adequate to permit the release of the required pump output while maintaining the pressure in the system specified in 1.11.3(1) of this Section.
- (4) The sea inlet to the pump should wherever possible be in the space containing the pump and should be so arranged that when the vessel is afloat it will not be necessary to shut off the supply of seawater to the pump for any purpose other than the inspection or repair of the pump.
- (5) The sprinkler pump and tank should be situated in a position reasonably remote from any machinery space of category A and should not be situated in any space required to be protected by the sprinkler system.

1.11.5 Power supply of cargo vessels:

- (1) If the pump is electrically driven it should be connected to the main source of electrical power.
- (2) The source of power for the automatic fire detection and alarm system should be provided by main and emergency electrical power supply.
- (3) If the power supply of the pump is from an internal combustion machinery, in addition to the provisions of 1.11.4(5) of this Section, the internal combustion machinery should be so situated that a fire in the protected space will not affect the air supply to the machinery.

1.11.6 Testing:

- (1) A test valve should be provided for testing the automatic alarm for each section of sprinklers by a discharge of water equivalent to the operation of one sprinkler. The test valve for each section should be situated near the stop valve for that section.
- (2) Means should be provided for testing the automatic operation of the pump on reduction of pressure in the system.
- (3) Switches should be provided at one of the indicating positions referred to 1.11.1(2) of this Section which will enable the alarm and the indicators for each section of sprinklers to be tested.

1.12 Fixed fire detection and fire alarm systems

1.12.1 General requirements:

- (1) Any required fixed fire detection and fire alarm system with manually operated call points should be capable of immediate operation at all times.
- (2) Power supplies and electric circuits necessary for the operation of the system should be monitored for loss of power or fault conditions as appropriate. Occurrence of a fault condition should initiate a visual and audible fault signal at the control panel which should be distinct from a fire signal.
- (3) There should be not less than 2 sources of power supply for the electrical equipment used in the operation of the fire detection and fire alarm system, one of which should be an emergency source. The supply should be provided by separate feeders reserved solely for that purpose. Such feeders should run to an automatic change-over switch situated in or adjacent to the control panel for the fire detection system.
- (4) Detectors and manually operated call points should be grouped into sections. The activation of any detector or manually operated call point should initiate a visual and audible fire signal at the control panel and indicating units. If the signals have not received attention within 2 minutes an audible alarm should be automatically sounded throughout the crew accommodation and service spaces, control stations and machinery spaces of category A. This alarm sounder system need not be an integral part of the detection system.
- (5) The control panel should be located on the navigating bridge or in the main fire control station.

- (6) Indicating units should, as a minimum, denote the section in which a detector or manually operated call point has operated. At least one unit should be so located that it is easily accessible to responsible members of the crew at all times, when at sea or in port, except when the vessel is out of service. One indicating unit should be located on the navigating bridge if the control panel is located in the main fire control station.
- (7) Clear information should be displayed on or adjacent to each indicating unit about the spaces covered and the location of the sections.
- (8) Where the fire detection system does not include means of remotely identifying each detector individually, no section covering more than one deck within accommodation, service and control stations should normally be permitted except a section which covers an enclosed stairway. In order to avoid delay in identifying the source of fire, the number of enclosed spaces included in each section should be limited as determined by Marine Department. In no case should more than 50 enclosed spaces be permitted in any section. If the detection system is fitted with remotely and individually identifiable fire detectors, the sections may cover several decks and serve any number of enclosed spaces.
- (9) A section of fire detectors which covers a control station, a service space or an accommodation space should not include a machinery space of category A.
- (10) Detectors should be operated by heat, smoke or other products of combustion, flame, or any combination of these factors. Detectors operated by other factors indicative of incipient fires may be considered by Marine Department provided that they are no less sensitive than such detectors. Flame detectors should only be used in addition to smoke or heat detectors.
- (11) Suitable instructions and components spares for testing and maintenance should be provided.
- (12) The function of the detection system should be periodically tested by means of equipment producing hot air at the appropriate temperature, or smoke or aerosol particles having the appropriate range of density or particle size, or other phenomena associated with incipient fires to which the detector is designed to respond. All detectors should be of a type such that they can be tested for correct operation and restored to normal surveillance without the renewal of any component.
- (13) The fire detection system should not be used for any other purpose, except that closing of fire doors and similar functions may be permitted at the control panel.
- (14) Newly fitted fire detection systems with a zone address identification capability should be so arranged that:
 - (i) a loop cannot be damaged at more than one point by a fire;
 - (ii) means are provided to ensure that any fault (e.g. power break, short circuit; earth) occurring in the loop will not render the whole loop ineffective;
 - (iii) all arrangements are made to enable the initial configuration of the system to be restored in the event of failure (electrical, electronic, informatic);

- (iv) the first initiated fire alarm will not prevent any other detector to initiate further fire alarms.

1.12.2 Installation requirements:

- (1) Manually operated call points should be installed throughout the accommodation spaces, service spaces and control stations. One manually operated call point should be located at each exit. Manually operated call points should be readily accessible in the corridors of each deck such that no part of the corridor is more than 20 m from a manually operated call point.
- (2) Smoke detectors should be installed in all stairways, corridors and escape routes within accommodation spaces. Consideration should be given to the installation of special purpose.
- (3) Where a fixed fire detection and fire alarm system is required for the protection of spaces other than those specified in above paragraph (2), at least one detector complying with 1.12.1(11) of this Section should be installed in each such space.
- (4) Detectors should be located for optimum performance. Positions near beams and ventilation ducts or other positions where patterns of air flow could adversely affect performance and positions where impact or physical damage is likely should be avoided. In general, detectors which are located on the overhead should be a minimum distance of 0.5 m away from bulkheads.
- (5) The maximum spacing of detectors should be in accordance with the Table 1.12.2(5) of this Section. Other spacing based upon test data, which demonstrate the characteristics of the detectors may be permitted.

Installation Arrangement of Detectors

Table 1.12.2(5)

Type of detector	Maximum floor area per detector (m ²)	Maximum distance apart between centers (m)	Maximum distance away from bulkheads (m)
Heat	37	9	4.5
Smoke	74	11	5.5

- (6) Electrical wiring which forms part of the system should be so arranged as to avoid galleys, machinery spaces of category A, and other enclosed spaces of high risk except where it is necessary to provide for fire detection or fire alarm in such spaces or to connect to the appropriate power supply.

1.12.3 Design requirements:

- (1) The system and equipment should be suitably designed to withstand supply voltage variation and transients, ambient temperature changes, vibration, humidity, shock, impact and corrosion normally encountered in vessels.
- (2) Smoke detectors required by 1.12.2(2) of this Section should be certificated to operate before the smoke density exceeds 12.5% obscuration per metre, but not until the smoke density exceeds 2% obscuration per metre. Smoke detectors to be installed in other spaces should operate within sensitivity limits having regard to the avoidance of detector insensitivity or over sensitivity.

- (3) Heat detectors should be certified to operate before the temperature exceeds 78°C but not until the temperature exceeds 54°C, when the temperature is raised to those limits at a rate less than 1°C per minute. At higher rates of temperature rise, the heat detector should operate within temperature limits having regard to the avoidance of detector insensitivity or over sensitivity.
- (4) The permissible temperature of operation of heat detectors may be increased to 30°C above the maximum deckhead temperature in drying rooms and similar spaces of a normal high ambient temperature.

1.13 Sample extraction smoke detection system

1.13.1 General requirements:

- (1) Wherever in the text of 1.13 of this Section the word “system” appears, it should mean “sample extraction smoke detection system”.
- (2) Any required system should be capable of continuous operation at all times except that systems operating on a sequential scanning principle may be accepted, provided that the interval between scanning the same position twice gives an overall response time to the satisfaction of the surveyor.
- (3) Power supplies necessary for the operation of the system should be monitored for loss of power. Any loss of power should initiate a visual and audible signal at the control panel and the navigating bridge, which should be distinct from a signal indicating smoke detection.
- (4) An alternative power supply for the electrical equipment used in the operation of the system should be provided.
- (5) The control panel should be located on the navigating bridge or in the main fire control station.
- (6) The detection of smoke or other products of combustion should initiate a visual and audible signal at the control panel and the navigating bridge.
- (7) Clear information should be displayed on or adjacent to the control panel designating the spaces covered.
- (8) The sampling pipe arrangements should be such that the location of the fire can be readily identified.
- (9) Suitable instructions and component spares should be provided for the testing and maintenance of the system.
- (10) The functioning of the system should be periodically tested to the satisfaction of the Administration. The system should be of a type that can be tested for correct operation and restored to normal surveillance without the renewal of any component.
- (11) The system should be designed, constructed and installed so as to prevent the leakage of any toxic or flammable substances or fire-extinguishing media into any accommodation and service space, control station or machinery space.

1.13.2 Installation requirements:

- (1) At least one smoke accumulator should be located in every enclosed space for which smoke detection is required. However, where a space is designed to

carry oil or refrigerated cargo alternatively with cargoes for which a smoke sampling system is required, means may be provided to isolate the smoke accumulators in such compartments for the system.

- (2) Smoke accumulators should be located for optimum performance and should be spaced so that no part of the overhead deck area is more than 12 m measured horizontally from an accumulator. Where systems are used in spaces which may be mechanically ventilated, the position of the smoke accumulators should be considered having regard to the effects of ventilation.
- (3) Smoke accumulators should be positioned where impact or physical damage is unlikely to occur.
- (4) Not more than 4 accumulators should be connected to each sampling point.
- (5) Smoke accumulators from more than one enclosed space should not be connected to the same sampling point.
- (6) Sampling pipes should be self-draining and suitably protected from impact or damage from cargo working.

1.13.3 Design requirement:

- (1) The system and equipment should be suitably designed to withstand supply voltage variation and transients, ambient temperature changes, vibration, humidity, shock, impact and corrosion normally encountered in vessels and to avoid the possibility of ignition of flammable gas air mixture.
- (2) The sensing unit should be certified to operate before the smoke density within the sensing chamber exceeds 6.65% obscuration per metre.
- (3) Duplicate sample extraction fans should be provided. The fans should be of sufficient capacity to operate with the normal conditions or ventilation in the protected area and should give an overall response time to the satisfaction of the surveyor.
- (4) The control panel should permit observation of smoke in the individual sampling pipe.
- (5) Means should be provided to monitor the airflow through the sampling pipes so designed as to ensure that as far as practicable equal quantities are extracted from each interconnected accumulator.
- (6) Sampling pipes should be a minimum of 12 mm internal diameter except when used in conjunction with fixed gas fire-extinguishing systems when the minimum size of pipe should be sufficient to permit the fire-extinguishing gas to be discharged within the appropriate time.
- (7) Sampling pipes should be provided with an arrangement for periodically purging with compressed air.

1.14 Fixed fire detection and fire alarm systems for periodically unattended machinery spaces

- 1.14.1 A fixed fire detection and fire alarm system of an approved type in accordance with the relevant provisions of 1.12 should be installed in periodically unattended machinery spaces.

- 1.14.2 This fire detection system should be so designed and the detectors so positioned as to detect rapidly the onset of fire in any part of those spaces and under any normal conditions of operation of the machinery and variations of ventilation as required by the possible range of ambient temperatures. Except in spaces of restricted height and where their use is specially appropriate, detection systems using only thermal detectors should not be permitted. The detection system should initiate audible and visual alarms distinct in both respects from the alarms of any other system not indicating fire, insufficient places to ensure that the alarms are heard and observed on the navigating bridge and by a responsible engineer officer. When the navigating bridge is unmanned the alarm should sound in a place where a responsible member of the crew is on duty.
- 1.14.3 After installation the system should be tested under varying conditions of engine operation and ventilation.

1.15 Arrangement for oil fuel, lubricating oil and other flammable oils

- 1.15.1 Cargo vessels of 4000 gross tons and upwards should comply with the following relevant provisions (1) to (6) for the cargo vessels.
- (1) Limitations in the use of oil as fuel:
 - (i) Except as otherwise permitted by this paragraph, no oil fuel with a flashpoint of less than 60°C should be used.
 - (ii) In emergency generators oil fuel with a flashpoint of not less than 43°C may be used.
 - (iii) Subject to such additional precautions as it may consider necessary and on condition that the ambient temperature of the space in which such oil fuel is stored or used should not be allowed to rise to within 10°C below the flashpoint of the oil fuel, the general use of oil fuel having a flashpoint of less than 60°C but not less than 43°C may be permitted.
 - (iv) In cargo vessels the use of fuel having a lower flashpoint than otherwise specified in the above requirements, for example crude oil, may be permitted provided that such fuel is not stored in any machinery space of the complete installation. The flashpoint of oils should be determined by an approved closed cup method.
 - (2) Oil fuel arrangements: In a vessel which oil fuel is used, the arrangements for the storage, distribution and utilization of the oil fuel should be such as to ensure the safety of the vessel and persons on board, other than the provisions of 3, Section 2-1 of Chapter 4, should at least comply with the following provisions:
 - (i) As far as practicable, parts of the oil fuel system containing heated oil under pressure exceeding 0.18 MPa should not be placed in a concealed position such that defects and leakage cannot readily be observed. The machinery spaces in way of such parts of the oil fuel system should be adequately illuminated.
 - (ii) The ventilation of machinery spaces should be sufficient under all normal conditions to prevent accumulation of oil vapour.

- (iii) As far as practicable, oil fuel tanks should be part of the vessel's structure and should be located outside machinery spaces of category A. Where oil fuel tanks, other than double bottom tanks, are necessarily located adjacent to or within machinery spaces of category A, at least one of their vertical sides should be contiguous to the machinery space boundaries, and should preferably have a boundary common with the machinery spaces should be kept to a minimum. Where such tanks are situated within the boundaries of machinery spaces of category A they should not contain oil fuel having a flashpoint of less than 60°C. In general the use of free-standing oil fuel tanks should be avoided. When such tanks are employed their use should be prohibited in category A machinery spaces on passenger vessels. When permitted, they should be placed in an oil-tight spill tray of ample size having a suitable drain pipe leading to a suitably sized spill oil tank.
- (iv) No oil fuel compartment (tank) should be situated where spillage or leakage there from can constitute a hazard by falling on heated surfaces. Precautions should be taken to prevent any oil that may escape under pressure from any pump, filter or heater from coming into contact with heated surfaces.
- (v) Every oil fuel pipe, which, if damaged, would allow oil to escape from a storage, settling or daily service tank situated above the double bottom should be fitted with a cock or valve directly on the tank capable of being closed from a safe position outside the space concerned in the event of a fire occurring in the space in which such tanks are situated. In the special case of deep tanks situated in any shaft or pipe tunnel or similar space, valves on the tank should be fitted but control in the event of fire may be effected by means of an additional valve on the pipe or pipes outside the tunnel or similar space. If such additional valve is fitted in the machinery space it should be operated from a position outside this space.
- (vi) Safe and efficient means of ascertaining the amount of oil fuel contained in any oil fuel compartment (tank) should be provided:
 - (A) Where sounding pipes are used, they should not terminate in any space where the risk of ignition of spillage from the sounding pipe might arise. In particular, they should not terminate in passenger or crew spaces. As a general rule, they should not terminate in machinery spaces. However, where the above requirements are considered impracticable, it may permit termination of sounding pipes in machinery spaces on condition that all the following requirements are met:
 - (a) in addition, an oil-level gauge is provided meeting the requirements of below paragraph (B);
 - (b) the sounding pipes terminate in locations remote from ignition hazards unless precautions are taken such as the fitting of effective screens to prevent the oil fuel in the case of spillage through the terminations of the sounding pipes from coming into contact with a source of ignition;
 - (c) the termination of sounding pipes are fitted with self-closing blanking devices and with a small-diameter

self-closing control cock located below the blanking device for the purpose of ascertaining before the blanking device is opened that oil fuel is not present. Provision should be made so as to ensure that any spillage of oil fuel through the control cock involves no ignition hazard.

- (B) Other oil-level gauges may be used in place of sounding pipes. Such means, (like the means provided in (a) of the above (A)), are subject to the following conditions:
 - (a) in cargo vessels, the following method may be used:
 - a The failure of such means or overfilling of the compartment (tank) should not permit release of fuel into the space. The use of oil-level gauges with flat glasses and self-closing valves between the gauges and fuel tanks may be permitted (the use of cylindrical gauge glasses is prohibited).
 - b Such means should be penetrated through the compartment (tank) top and not endangered the safety.
 - c Other approved facility and arrangements.
 - (b) The above accepted means should be maintained in the proper condition to ensure their continued accurate functioning service.
- (vii) Provision should be made to prevent overpressure in any oil compartment (tank) or in any part of the oil fuel system, including the filling pipes. Any relief valves and air or overflow pipes should discharge to a position which is safe.
- (viii) Oil fuel pipes and their valves and fittings should be of steel or other approved material, except that restricted use of flexible pipes should be permissible in positions where that they are necessary. Such flexible pipes and end attachments should be of approved fire-resisting materials of adequate strength and its construction should be approved.
- (3) Lubricating oil arrangements: The arrangements for the storage, distribution and utilization of oil used in pressure lubrication systems should be such as to ensure the safety of the vessel and persons on board. The arrangements made in machinery spaces of category A (and whenever practicable in other machinery spaces), should at least comply with the provisions (i), (iv)~(viii) of 1.15.1(2) of this Section; except that:
 - (i) this does not preclude the use of sight-flow glasses in lubricating systems provided that they are shown by test to have a suitable degree of fire resistance;
 - (ii) sounding pipes may be authorized in machinery spaces; the requirements of (a) and (c) of 1.15.1(2) (vi) (A) need not be applied on condition that the sounding pipes are fitted with appropriate means of closure.
- (4) Arrangements for other flammable oils: The arrangements for the storage, distribution and utilization of other flammable oils employed under pressure in power transmission systems, control and activating systems and heating systems should be such as to ensure the safety of the vessel and persons on

board. In locations where means of ignition are present, such arrangements should at least comply with the provisions of (iv), (vi)~(viii) of 1.15.1(2) of this Section in respect of strength and construction.

- (5) Periodically unattended machinery spaces: In addition to the requirements of 1.15.1(1) ~ 1.15.1(4) of this Section, the oil fuel and lubricating oil systems should comply with the following:
- (i) If necessary, oil fuel lines should be screened or otherwise suitably protected to avoid, as far as possible, oil spray or oil leakages onto hot surfaces, into machinery air intakes, or sources of ignition. The number of joints in such piping systems should be kept to a minimum.
 - (ii) Where daily service oil fuel tanks are filled automatically, or by remote control, means should be provided to prevent overflow spillages. Other equipment which treats flammable liquids automatically, e.g. oil fuel purifiers, which, whenever practicable, should be installed in a special space reserved for purifiers and their heaters, should have arrangements to prevent overflow spillages.
 - (iii) Where daily service oil fuel tanks or settling tanks are fitted with heating arrangements, a high temperature alarm should be provided if the flashpoint of the oil fuel can be exceeded.
- (6) Prohibition of carriage of flammable oils in forepeak tanks Fuel oil, lubrication oil and other flammable oils should not be carried in forepeak tanks.

1.15.2 Cargo vessels of less than 4000 gross tons and tankers of less than 2000 gross tons should at least comply with the provisions of 1.15.1(1) and (6) of this Section.

1.16 Ventilation

1.16.1 Ventilation ducts should be of non-combustible material. Short ducts, however, not generally exceeding 2 m in length and with a cross-section not exceeding 0.02 m² need not be non-combustible, subject to the following conditions:

- (1) these ducts should be of a material which has low flame spread characteristics;
- (2) they may only be used at the end of the ventilation device;
- (3) they should not be situated less than 600 mm, measured along the duct, from an opening in an “A” or “B” class division (including continuous “B” class ceilings).

1.16.2 Where the ventilation ducts with a free-sectional area exceeding 0.02 m² pass through class “A” bulkheads or decks, the opening should be lined with a steel sheet sleeve unless the ducts passing through the bulkheads or decks are of steel in the vicinity of passage through the deck or bulkhead and the ducts and sleeves should comply in this part with the following:

- (1) The sleeves should have a thickness of at least 3 mm and a length of at least 900 mm. When passing through bulkheads, this length should be divided preferably into 450 mm on each side of the bulkhead. These ducts, or sleeves lining such ducts, should be provided with fire insulation. The insulation should have at least the same fire integrity as the bulkhead or deck through which the duct passes. Equivalent penetration protection may be provided subject to agreement.

- (2) Ducts with a free cross-sectional area exceeding 0.075 m² should be fitted with fire dampers in addition to the requirements of above paragraph (1). The fire damper should operate automatically but should also be capable of being closed manually from both sides of the bulkhead or deck. The damper should be provided with an indicator, which shows whether the damper is open or closed. Fire dampers are not required, however, where ducts pass through spaces surrounded by “A” class divisions, without serving those spaces, provided those ducts have the same fire integrity as the divisions which they pierce.

1.16.3 Ducts provided for the ventilation of machinery spaces of category A, galleys or special category spaces should not pass through accommodation spaces, service spaces or control stations unless they comply with the conditions specified below:

- (1)
 - (i) the ducts are constructed of steel having a thickness of at least 3 mm and 5 mm for ducts the widths or diameters of which are up to and including 300 mm and 760 mm and over respectively and, in the case of such ducts, the widths or diameters of which are between 300 mm and 760 mm having a thickness to be obtained by interpolation;
 - (ii) the ducts are suitably supported and stiffened;
 - (iii) the ducts are fitted with automatic fire dampers close to the boundaries penetrated;
 - (iv) the ducts are insulated to “A-60” standard from the machinery spaces, galleys, to a point at least 5 m beyond each fire damper. This requirement may be waived for cargo vessels of less than 1000 gross tons.
- (2)
 - (i) the ducts are constructed of steel in accordance with 1.16.3(1) (i) and (ii) of this Section;
 - (ii) the ducts are insulated to “A-60” standard throughout the accommodation spaces, service spaces or control stations; except that penetrations of main zone divisions should also comply with the requirements of 1.16.8. In cargo vessels of less than 1000 gross tons, where ducts pass through the accommodation spaces, service spaces or control stations should be insulated to “A-0” class standard.

1.16.4 Ducts provided for ventilation to accommodation spaces, service spaces or control stations should not pass through machinery spaces of category A and galleys, unless they comply with the conditions specified in (1) and (2) below:

- (1)
 - (i) the ducts where they pass through a machinery space of category A and galley are constructed of steel in accordance with 1.16.3(1)(i) and (ii) of this Section;
 - (ii) automatic fire dampers are fitted close to the boundaries penetrated;
 - (iii) the integrity of the machinery space and galley is maintained at the penetrations.
- (2)
 - (i) the ducts where they pass through a machinery space of Category A and galley are constructed of steel in accordance with 1.16.3(1)(i) and (ii) of this Section.

- (ii) the ducts are insulated to “A-60” standard within the machinery space and galley; except that penetrations of main zone divisions should also comply with the requirements of 1.16.8 of this section. In cargo vessels of less than 1000 gross tons and tankers of less than 500 gross tons, where ducts pass through the accommodation spaces, service spaces or control stations should be insulated to “A-0” class standard.
- 1.16.5 Ventilation ducts with a free cross-sectional area exceeding 0.02 m² passing through “B” class bulkheads should be lined with steel sheet sleeves of 900 mm in length divided preferably into 450 mm on each side of the bulkheads unless the duct is of steel for this length.
- 1.16.6 Such measures as are practicable should be taken in respect of control stations outside machinery spaces in order to ensure that ventilation, visibility and freedom from smoke are maintained, so that in the event of fire the machinery and equipment contained therein may be supervised and continue to function effectively. Alternative and separate means of air supply should be provided; air inlets of the two sources of supply should be so disposed that the risk of both inlets drawing in smoke simultaneously is minimized. At the discretion of the Administration, such requirements need not apply to control stations situated on, and opening on to, an open deck, or where local closing arrangements would be equally effective.
- 1.16.7 Where the ducts pass through accommodation spaces or spaces containing combustible materials, the exhaust ducts from galley ranges should be constructed of “A” class divisions. Each exhaust duct should be fitted with:
 - (1) a grease trap readily removable for cleaning;
 - (2) a fire damper located in the lower end of the duct;
 - (3) arrangements, operable from within the galley, for shutting off the exhaust fans;
 - (4) fixed means for extinguishing a fire within the duct.
- 1.16.8 The main inlets and outlets of all ventilation systems should be capable of being closed from outside the spaces being ventilated.
- 1.16.9 Power ventilation of accommodation spaces, service spaces, cargo spaces, control stations and machinery spaces should be capable of being stopped from an easily accessible position outside the space being served. This position should not be readily cut off in the event of a fire in the spaces served. The means provided for stopping the power ventilation of the machinery spaces should be entirely separate from the means provided for stopping ventilation of other spaces.
- 1.16.10 The ventilation system for cargo spaces carrying dangerous cargoes should comply with the relevant provisions of 3.11 of this Section, in addition to the provisions of this paragraph.

1.17 Fireman’s outfit

- 1.17.1 A fireman's outfit should consist of personal equipment, a breathing apparatus and a fireproof lifeline:

- (1) Personal equipment comprising:
 - (i) Protective clothing of material to protect the skin from the heat radiating from the fire and from burns and scalding by steam. The outer surface should be water-resistant.
 - (ii) Boots and gloves of rubber or other electrically non-conducting material.
 - (iii) A rigid helmet providing effective protection against impact.
 - (iv) An electric safety lamp (hand lantern) of an approved type with a minimum burning period of 3 hours.
 - (v) An approved axe.
- (2) A breathing apparatus of an approved type which may be either of the following:
 - (i) a smoke helmet or smoke mask which should be provided with a suitable air pump and a length of air hose sufficient to reach from the open deck, well clear of hatch or doorway, to any part of the holds or machinery spaces. If, in order to comply with this subparagraph, an air hose exceeding 36 m in length would be necessary, a self-contained breathing apparatus should be substituted or provided in addition;
 - (ii) a self-contained compressed-air-operated breathing apparatus, the volume of air contained in the cylinders of which should be at least 1200 litres, or other self-contained breathing apparatus which should be capable of functioning for at least 30 min. A number of spare cylinders suitable for use with the apparatus provided, should be available on board and the required quantity is to be agreement.
- (3) For each breathing apparatus a fireproof lifeline of sufficient length and strength should be provided capable of being attached by means of a snap hook to the harness of the apparatus or to a separate belt in order to prevent the breathing apparatus becoming detached when the lifeline is operated.

1.17.2 The fireman's outfits or sets of personal equipment should be so stored as to be easily accessible and ready for use and, where more than one fireman's outfit or more than one set of personal equipment is carried, they should be stored in widely separated positions.

1.17.3 Equipment requirement:

- (1) Each cargo vessel should carry at least the following specified number of fireman's outfits complying with the above requirements:

2000 gross tons and upwards	2 sets of fireman's outfits
500 gross tons and upwards but less than 2000 gross tons	1 set of fireman's outfit
Less than 500 gross tons	Not required
- (2) Each tankers should carry at least the following specified number of fireman's outfits complying with the above requirements:

2000 gross tons and upwards	4 sets of fireman's outfits
500 gross tons and upwards but less than 2000 gross tons	2 set of fireman's outfit
Less than 500 gross tons	Not required

1.18 Fire control plan

1.18.1 Cargo vessels of 1000 gross tons and upwards, and tankers above 500 gross tons should be provided with fire control plan.

1.18.2 The fire control plan should comply with the following requirements:

- (1) In vessels general arrangement plans should be permanently exhibited for the guidance of the vessel's officers, showing clearly for each deck the control stations, the various fire sections enclosed by "A" class divisions, the sections enclosed by "B" class divisions together with particulars of the fire detection and fire alarm systems, the sprinkler installation, the fire-extinguishing appliances, means of access to different compartments, decks, etc. and the ventilating system including particulars of the fan control positions, the position of dampers and identification numbers of the ventilating fans serving each section. Alternatively, the aforementioned details may be set out in a booklet a copy of which should be supplied to each officer, and one copy should at all times be available on board in an accessible position. Plans and booklets should be kept up to date, any alterations being recorded thereon as soon as practicable.
- (2) Instructions concerning the maintenance and operation of all the equipment and installations on board for the fighting and containment of fire should be kept under one cover, readily available in an accessible position.
- (3) In vessels a duplicate set of fire control plans or a booklet containing such plans should be permanently stored in a prominently marked weathertight enclosure outside the deckhouse for the assistance of shore side fire-fighting personnel.
- (4) Unified "graphical symbols for fire control plan" should be adopted in the fire control plan.

1.19 Ready availability of fire-extinguishing appliances

1.19.1 Fire-extinguishing appliances should be kept in good order and be available for immediate use at all times.

1.20 Acceptance of substitutes

1.20.1 Where in this chapter any special type of appliance, apparatus, extinguishing medium or arrangement is specified in any vessel, any other type of appliance etc. may be allowed, provided it is not less effective and subject to agreement.

1.21 Others

1.21.1 Paints, varnishes or other material may be used on exposed interior surfaces in lieu of insulation on the deck/bulkhead, provided that these materials are approved in accordance with a fire standard test and complying with the temperature rise with the relevant requirements of "A" or "B" class fire division, and also not capable of producing excessive quantity of flammable gas, smoke and toxic products.

1.21.2 Where "A" class fire divisions are penetrated for the passage of electrical cables, pipes, trunks, ducts, etc., or for girders, beams or other structural members, arrangements are to be made to ensure that the fire resistance is not impaired.

- 1.21.3 Where “B” class fire divisions are penetrated for the passage of electrical cables, pipes, trunks, ducts, etc., or for the fitting of ventilation terminals, lighting fixtures and similar devices, arrangements are to be made to ensure that the fire resistance is not impaired.
- 1.21.4 Piping passing through the “A” or “B” class fire division, should be of approved material suitable for the intended use having consideration to the temperatures on both sides of the division.
- Piping conveying oil and combustible liquid passing through the crew accommodation and service spaces, should be of approved material having consideration to the fire risk.
- Material sensitive to heat should not be used in systems essential to the operation of the vessel, such as shipside piping for conveying sea water, and grey water discharge closely to the waterline where leakage or failure could result in fire causing flooding.
- 1.21.5 Electrical heating radiators should be installed permanently in positions constructed properly to minimize the fire risk. For radiator with exposed electrical heating lines/tubes that may cause fire to clothes, curtains or other similar material should not be installed.
- 1.21.6 Cellulose-nitrate based films should not be used for cinematograph installation.
- 1.21.7 All waste receptacles should be constructed of non-combustible materials with openings in the sides or bottom.
- 1.21.8 In spaces where penetration of oil products may be possible, the surface of insulation should be impervious to oil or oil vapour.
- 1.21.9 Crosshead type diesel engine scavenge spaces in open connection with cylinders should be provided approved fire extinguishing arrangements which should be independent of the fire extinguishing system of the engine spaces.

2 Fire safety installations and measures for cargo vessels

2.1 Structure

2.1.1 Cargo vessels of 4000 gross tons and upwards:

- (1) The hull, superstructure, structural bulkheads, decks and deckhouses should be constructed of steel or other equivalent material.
- (2) The insulation of aluminium alloy components of “A” or “B” class divisions, except structure which in the opinion of the Administration is non-load-bearing, should be such that the temperature of the structural core does not rise more than 200°C above the ambient temperature at any time during the applicable exposure to the standard fire test.
- (3) Special attention should be given to the insulation of aluminium alloy components of columns, stanchions and other structural members required to support lifeboat and liferaft stowage, launching and embarkation areas, and “A” and “B” class divisions, to ensure:
 - (i) that for such members supporting lifeboat and liferaft areas and “A” class divisions, the temperature rise limitation specified in 2.1.1(2) of this Section should apply at the end of 1 hour;
 - (ii) that for such members required to support “B” class divisions, the temperature rise limitation specified in 2.1.1(2) of this Section should apply at the end of half an hour.
- (4) Crowns and casings of machinery spaces of category A should be of steel construction.
- (5) Within the accommodation and service spaces, all bulkheads required to be “B” class divisions should extend from deck to deck and to the shell or other boundaries; unless continuous “B” class ceilings or linings are fitted on both sides of the bulkhead in which case the bulkhead may terminate at the continuous ceiling or lining.
- (6) One of the following methods of protection should be adopted in accommodation and service spaces:
 - (i) any accommodation and service space or spaces bounded by a continuous “A” or “B” class division should normally not exceed 50 m²; for public space should normally not exceed 70 m²;
 - (ii) In all spaces in which a fire might be expected to originate, should be fitted with a fixed fire detection and fire alarm system as required by 1.12 of this Section, generally with no restriction on the type of internal divisional bulkheads.

2.1.2 Cargo vessels of less than 4000 gross tons, should comply with the requirements of 2.1.1(1) to (4) of this Section.

2.2 Fire integrity of bulkheads and decks

2.2.1 In addition to complying with the specific provisions for fire integrity of bulkheads and decks mentioned elsewhere in this part, the minimum fire integrity of bulkheads and decks should be as prescribed in Table 2.2.3a, Table 2.2.3b, Table 2.2.4a, Table 2.2.4b and paragraph 2.2.5.

2.2.2 The following requirements should govern application of the Table 2.2.3a, Table 2.2.3b, Table 2.2.4a and Table 2.2.4b:

(1) For determining the appropriate fire integrity standards to be applied to divisions between adjacent spaces, such spaces are classified according to their fire risk. The title of each category is intended to be typical rather than restrictive. The number in parentheses preceding each category refers to the applicable column or row in the Tables.

- ① Control stations:
Spaces containing emergency sources of power and lighting;
Wheelhouse and chartroom;
Spaces containing the vessel's radio equipment;
Fire-extinguishing rooms, fire control rooms and fire-recording stations;
Control room for propulsion machinery when located outside the machinery space;
Spaces containing centralized fire alarm equipment.
- ② Corridors:
Corridors and lobbies.
- ③ Accommodation spaces:
Spaces as defined in 1.2(10) of this Section excluding corridors.
- ④ Stairways:
Interior stairway, lifts and escalators (other than those wholly contained within the machinery spaces) and enclosures thereto.
In this connection, a stairway which is enclosed only at one level should be regarded as part of the space from which it is not separated by a fire door.
- ⑤ Service spaces (low risk)
Lockers and store-rooms not having provisions for the storage of flammable liquids and having areas less than 4 m² and drying rooms and laundries.
- ⑥ Machinery spaces of category A:
Spaces as defined in 1.2(19) of this Section.
- ⑦ Other machinery spaces:
Spaces as defined in 1.2(20) of this Section excluding machinery spaces of category A.
- ⑧ Cargo spaces:
All spaces used for cargo (including cargo oil tanks) and trunkways and hatchways to such spaces.

- ⑨ Service spaces (high risk):
Galley, pantries containing cooking appliances, paint and lamp rooms, lockers and store-rooms having areas of 4 m² or more, spaces for the storage of flammable liquids, and workshops other than those forming part of the machinery spaces.
- ⑩ Open decks:
Open deck spaces and enclosed promenades having no fire risk. Air spaces (the space outside superstructures and deckhouses).
- (2) External boundaries which are required in 2.1.1(1) of this Section to be of steel or other equivalent material may be pierced for the fitting of windows and sidescuttles provided that there is no requirement for such boundaries to have “A” class integrity elsewhere in this part. Similarly, in such boundaries which are not required to have “A” class integrity, doors may be of agreed materials.
- (3) Continuous “B” class ceilings or linings, in association with the relevant decks or bulkheads, may be accepted as contributing, wholly or in part, to the required insulation and integrity of a division.

2.2.3 Cargo vessels of 4000 gross tons and upwards, should comply with the requirements of fire integrity of bulkheads and decks as prescribed in Tables 2.2.3.

Fire integrity of bulkheads separating adjacent spaces

Table 2.2.3a

Spaces	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
Control stations ①	A-0 ^c	A-0	A-15	A-0	A-0	A-60	A-0	A-15	A-15	*
Corridors ②		C	B-0	A-0 ^g B-0	B-0	A-60	A-0	A-0	A-0	*
Accommodation spaces ③			₋ ^h	A-0 ^g B-0	C	A-60	A-0	A-0	A-0	*
Stairways ④				A-0 ^g B-0	A-0 ^g B-0	A-60	A-0	A-0	A-0	*
Service spaces (low risk) ⑤					*	A-0	C	C ^m	C	*
Machinery spaces of category A ⑥						*	A-0	A-0 ^j	A-15	*
Other machinery spaces ⑦							*	A-0	A-0	*
Cargo spaces ⑧								*	A-0	*
Service spaces (high risk) ⑨									A-0 ^k	*
Open decks ⑩										-

Fire integrity of decks separating adjacent spaces

Table 2.2.3b

Space above \ Space below	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
Control stations ①	A-0	A-0	A-0	A-0	A-0	A-15	A-0	A-0	A-0	*
Corridors ②	A-0	*	*	A-0	*	A-15	A-0	A-0	A-0	*
Accommodation spaces ③	A-15	A-0	*	A-0	*	A-15	A-0	A-0	A-0	*
Stairways ④	A-0	A-0	A-0	*	*	A-15	A-0	A-0	A-0	*
Service spaces (low risk) ⑤	A-0	A-0	*	A-0	*	A-0	*	* ^m	*	*
Machinery spaces of category A ⑥	A-60	A-60	A-60	A-60	A-15	*	A-0	A-0 ^j	A-60	*
Other machinery spaces ⑦	A-0	A-0	A-0	A-0	*	A-0	*	A-0	A-0	*
Cargo spaces ⑧	A-15	A-0	A-0	A-0	*	A-0 ^j	*	*	A-0	*
Service spaces (high risk) ⑨	A-15	A-0	A-0	A-0	A-0	A-15	*	* ^m	A-0 ^k	*
Open decks ⑩	*	*	*	*	*	*	*	* ^m	*	-

Notes: To be applied to Tables 2.2.3a and 2.2.3b, as appropriate.

c - Bulkheads separating the wheelhouse, chartroom and radio room from each other may be “B-0” rating.

g – Stairways which penetrate only a single deck should be protected at least at one level by at least “B” class divisions and self-closing doors. Stairways which penetrate more than a single deck should be surrounded by at least “A-0” class divisions and be protected by self-closing doors at all levels.

h - In case of method 2.1.1(6)(i), “B” class bulkheads of “B-0” rating should be provided between spaces or groups of spaces of 50 m² and over in area.

j - For cargo spaces in which dangerous goods are intended to be carried, should comply with the requirements of 2.11.3(8) of this Section.

k - A bulkhead or deck of the rating shown in the tables is only required when the adjacent spaces are for a different purpose, e.g. a galley next to a galley does not require a bulkhead but a galley next to a paint room requires an “A-0” bulkhead.

m - Bulkheads and decks separating ro-ro cargo spaces and cargo spaces fitted with fixed fire extinguishing system should be capable of being closed reasonably gastight and such divisions should have “A” class integrity in so far as is reasonable and practicable.

* - The division is required to be of steel or other equivalent material but is not required to be of “A” class standard.

2.2.4 Cargo vessels of 1000 gross tons and upwards but less than 4000 gross tons, should comply with the requirements of fire integrity of bulkheads and decks as prescribed in Tables 2.2.4.

Fire integrity of bulkheads separating adjacent spaces

Table 2.2.4a

Spaces	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
Control stations ①	B-0	B-0	A-0	B-0	B-0	A-15 ^p A-0	B-0	A-0	A-0	*
Corridors ②		C	C	B-0 ^q C	C	A-15 ^p A-0	C	C ^m	A-0	*
Accommodation spaces ③			-	B-0 ^q C	-	A-15 ^p A-0	C	C ^m	A-0	*
Stairways ④				B-0 ^q C	B-0 ^q C	A-15 ^p A-0	B-0	B-0	A-0	*
Service spaces (low risk) ⑤					-	*	*	-	*	*
Machinery spaces of category A ⑥						*	A-0	A-15 ^l A-0	A-0	*
Other machinery spaces ⑦							-	* ^m	*	*
Cargo spaces ⑧								-	*	*
Service spaces (high risk) ⑨									* ^k	*
Open decks ⑩										-

Fire integrity of decks separating adjacent spaces

Table 2.2.4b

Space above \ Space below	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
Control stations ①	*	*	*	*	*	A-15 ^p A-0	*	* ^m	*	*
Corridors ②	*	*	*	*	*	A-15 ^p A-0	*	* ^m	*	*
Accommodation spaces ③	A-0	A-0	*	A-0	-	A-15 ^p A-0	*	* ^m	*	*
Stairways ④	*	*	*	*	*	A-15 ^p A-0	*	* ^m	*	*
Service spaces (low risk) ⑤	A-0	*	*	*	-	A-0	-	- ^m	-	*
Machinery spaces of category A ⑥	A-15 ^p A-0	A-15 ^p A-0	A-15 ^p A-0	A-15 ^p A-0	A-0	*	A-0	A-15 ^l A-0	A-15 ^p A-0	*
Other machinery spaces ⑦	A-0	A-0	*	A-0	-	*	-	- ^m	-	*
Cargo spaces ⑧	A-0	A-0	*	A-0	-	A-15 ^l A-0	-	- ^m	-	*
Service spaces (high risk) ⑨	A-0	A-0	A-0	A-0	-	A-15 ^p A-0	-	- ^m	*	*
Open decks ⑩	*	*	*	*	*	*	*	* ^m	*	-

Notes: To be applied to Tables 2.2.4a and 2.2.4b, as appropriate.

- p – Separating standard should be adopted for main propulsion internal combustion machinery having total power output greater than 375 kW.
 - g – Stairways which penetrate only a single deck should be protected at least at one level by at least “B” class divisions and self-closing doors.
 - l – For cargo spaces in which dangerous goods and ro-ro cargo spaces, should comply with the requirements of 2.11.3(8) of this Section, but the requirement of “A-60” may be relaxed to “A-15” standard.
- Others please refer to the notes of Tables 2.2.3a and Tables 2.2.3b.

2.2.5 Cargo vessels of less than 1000 gross tons:

- (1) The doors on corridor bulkheads should be of steel or non-combustible material.
- (2) The boundary bulkheads between machinery spaces of category A and galley should be of steel construction, and the doors on the bulkheads should be of steel or non-combustible material.

2.3 Means of escape

2.3.1 Cargo vessels of 1000 gross tons and upwards:

- (1) Stairways and ladders should be so arranged as to provide, from all accommodation spaces and from spaces in which the crew is normally employed (other than machinery spaces), ready means of escape to the open deck and thence to the lifeboat and liferaft embarkation deck. In particular the following general provisions should be complied with:
 - (i) At all levels of accommodation there should be provided at least two widely separated means of escape from each restricted space or group of spaces.
 - (ii)
 - (a) Below the lowest open deck the main means of escape should be a stairway and the second escape may be a trunk or a stairway.
 - (b) Above the lowest open deck the means of escape should be stairways or doors to an open deck or a combination thereof.
 - (iii) One of the means of escape, due regard being paid to the nature and location of spaces and to the numbers of persons who normally might be quartered or employed there, may be exceptionally dispensed.
 - (iv) The length of a corridor or part of a corridor from which there is only one escape route should not be more than 7 m.
 - (v) The width and continuity of the means of escape should be to the satisfaction of Marine Department.
 - (vi) If a radiotelegraph station has no direct access to the open deck, two means of access to or egress from such station should be provided, one of which may be a porthole or window of sufficient size or other means to provide an emergency escape.
- (2) Two means of escape should be provided from each machinery space of category A. In particular, one of the following provisions should be complied with:

- (i) Two sets of steel ladders as widely separated as possible leading to doors in the upper part of the space similarly separated and from which access is provided to the open deck. In general, one of these ladders should provide continuous fire shelter from the lower part of the space to a safe position outside the space. This shelter should be of steel, insulated, where necessary, and be provided with a self-closing steel door at the lower end.
 - (ii) One steel ladder leading to a door in the upper part of the space from which access is provided to the open deck and additionally, in the lower part of the space and in a position well separated from the ladder referred to, a steel door capable of being operated from each side and which provides access to a safe escape route from the lower part of the space to the open deck.
- (3) One means of escape may be dispensed from a machinery space of category A so long as either a door or a steel ladder provides a safe escape route to the open deck and thence to the lifeboat and liferaft embarkation deck, due regard being paid to the nature and location of the escape and whether persons are normally employed in that space.
 - (4) From machinery spaces other than those of category A, at least one escape route should be provided to the open deck and thence to the lifeboat or liferaft embarkation deck.
 - (5) Lifts should not be considered as forming one of the required means of escape.

2.3.2 Cargo vessels of less than 1000 gross tons:

- (1) At all levels of accommodation there should be provided at least one escape route from each restricted space or group of spaces to the open deck and thence to the lifeboat and liferaft embarkation deck.
- (2) From each machinery space, at least one escape route should be provided to the open deck and thence to the lifeboat and liferaft embarkation deck.
- (3) The length of a corridor or part of a corridor from which there is only one escape route should not be more than 7 m.
- (4) The width and continuity of the means of escape should be to the satisfaction of Marine Department.
- (5) Lifts should not be considered as forming one of the required means of escape.

2.4 Protection of stairways and lift trunks in accommodation spaces, service spaces and control stations

2.4.1 Cargo vessels of 4000 gross tons and upwards:

- (1) Stairways which penetrate only a single deck should be protected at least at one level by at least "B-0" class divisions and self-closing doors. Lifts which penetrate only a single deck should be surrounded by "A-0" class divisions with steel doors at both levels. Stairways and lift trunks which penetrate more than a single deck should be surrounded by at least "A-0" class divisions and be protected by self-closing doors at all levels.

- (2) On vessels having accommodation for 12 persons or less, where stairways penetrate more than a single deck and where there are at least two escape routes direct to the open deck at every accommodation level, consideration may be given by the Administration to reducing the “A-0” requirements of paragraph (1) to “B-0”.
- (3) All stairways should be of steel frame construction.

2.4.2 Cargo vessels of 1000 gross tons and upwards but less than 4000 gross tons:

- (1) Stairways which penetrate only a single deck should be protected at least at one level by at least “B-0” class divisions and self-closing doors.
- (2) All stairways should be of steel frame construction.

2.4.3 Cargo vessels of less than 1000 gross tons: Stairways forming part of escape routes should be of steel frame construction.

2.5 Doors in fire-resisting divisions

2.5.1 Cargo vessels of 1000 gross tons and upwards:

- (1) The fire resistance of doors should, as far as practicable, be equivalent to that of the division in which they are fitted. Doors and door frames in “A” class divisions should be constructed of steel. Doors in “B” class divisions should be non-combustible.
- (2) Doors fitted in boundary bulkheads of machinery spaces of category A should be reasonably gastight and self-closing.
- (3) Doors required to be self-closing should not be fitted with hold-back hooks. However, hold-back arrangements fitted with remote release devices of the fail-safe type may be utilized.
- (4) In corridor bulkheads ventilation openings may be permitted only in and under the doors of cabins and public spaces. The openings should be provided only in the lower half of a door. Where such opening is in or under a door the total net area of any such opening or openings should not exceed 0.05 m². When such opening is cut in a door it should be fitted with a grille made of non-combustible material.
- (5) Watertight doors need not be insulated.

2.6 Restricted use of combustible materials

2.6.1 Cargo vessels of 4000 gross tons and upwards:

- (1) In corridors and stairways enclosures serving accommodation and service spaces and control stations, ceilings, linings, draught stops and their associated grounds should be of non-combustible materials. However, other materials have low flame-spread characteristics may be used after approval.
- (2) Where non-combustible bulkheads, linings and ceilings are fitted in the above mentioned corridors and stairways, the total volume of combustible facings, mouldings, decorations and veneers should not exceed a volume equivalent to a 2.5 mm veneer on the combined area of the walls and ceilings, and the

combustible veneer should have a calorific value not exceeding 45 MJ/m² of the area for the thickness used.

- (3) Except in cargo spaces or refrigerated compartments of service spaces, insulating materials should be non-combustible. Vapour barriers and adhesives used in conjunction with insulation, as well as the insulation of pipe fittings, for cold service systems, need not be of non-combustible materials, but they should be kept to the minimum quantity practicable and their exposed surfaces should have low flame spread characteristics.
- (4) All exposed surfaces in corridors and stairway enclosures and surfaces including grounds in concealed or inaccessible spaces in accommodation and service spaces and control stations should have low flame-spread characteristics. Exposed surfaces of ceilings in accommodation and service spaces and control stations should have low flame-spread characteristics.
- (5) Primary deck coverings, if applied within accommodation and service spaces and control stations, should be of approved material which will not readily ignite, or give rise to toxic or explosive hazards at elevated temperatures.

2.6.2 Cargo vessels of 1000 gross tons and upwards but less than 4000 gross tons should comply with the requirements of 2.6.1(3), (4) and (5) of this Section.

2.6.3 Cargo vessels of less than 1000 gross tons should comply with the requirements of 2.6.1(5) of this Section.

2.7 Details of construction

2.7.1 Air spaces enclosed behind ceilings, panellings, or linings, should be divided by closed-fitting draught stops spaced not more than 14 m apart. In the vertical direction, such air spaces, including those behind linings of stairways, trunks, etc., should be closed at each deck.

2.8 Arrangements for gaseous fuel for domestic purposes

2.8.1 Where gaseous fuel is used for domestic purposes the arrangements for the storage, distribution and utilization of the fuel should be such that, having regard to the hazards of fire and explosion which the use of such fuel may entail, the safety of the vessel and the persons on board is preserved.

2.9 Fixed fire detection and fire alarm systems Automatic sprinkler, fire detection and fire alarm systems

2.9.1 Cargos vessels of 4000 gross tonnage and upwards:

- (1) For the method 2.1.1(6)(i) of this Section is adopted, fixed manually operated call points of an approved type complying with the provisions of 1.12 of this Section should be so installed and arranged in all corridors, stairways and escape routes within accommodation spaces.
- (2) For the method 2.1.1(6)(ii) of this Section is adopted, a fixed fire detection and fire alarm system of an approved type complying with the provisions of 1.12 of this Section should be so installed and arranged in all accommodation and service spaces (except void and sanitary spaces).

2.9.2 In cargo vessels of 1000 gross tons and upwards but less than 4000 gross tons, only fixed manually operated call points should be so installed and arranged in all accommodation spaces and service spaces.

2.10 Fire protection arrangements in cargo spaces

2.10.1 General requirements:

- (1) Except for cargo spaces covered in 2.10.2 and 2.10.3 of this Section, cargo spaces of vessels of 2,000 tons gross tons and upwards should be protected by a fixed gas fire-extinguishing system complying with the provisions of 1.4 of this Section or by a fire-extinguishing system which gives equivalent protection.
- (2) The requirements of above (1) may be exempted for the cargo spaces of any cargo vessel if constructed and solely intended for the carriage of ore, coal, grain, unseasoned timber, non-combustible cargoes or cargoes constitute a low fire risk. Such exemptions may be granted only if the vessel is fitted with steel hatch covers and effective means of closing all ventilators and other openings leading to the cargo spaces. When such exemptions are granted, the list of cargoes the vessel is permitted to carry should be endorsed on the Exemption Certificate.
- (3) Notwithstanding the provisions of above (1), any cargo spaces in a vessel engaged in the carriage of dangerous goods should be provided with a fixed gas fire-extinguishing system complying with the provisions of 1.4 of this Section with a fire-extinguishing system which, gives equivalent protection for the cargoes carried.

2.11 Special requirements for vessels carrying dangerous goods

2.11.1 When cargo vessels carrying dangerous goods as defined in 1.2.1(25), should comply with the relevant provisions of 2.11.2 ~ 2.11.4 of this Section.

2.11.2 General requirement:

- (1) In addition to complying with the requirements of 2.10 of this Section for cargo vessels, the types of vessels and modes of carriage of dangerous goods are referred to 2.11.2(2) should comply with the appropriate requirements of 2.11.3 of this Section. Except when carrying dangerous goods in limited quantities unless such requirements have already been met by compliance with the requirements elsewhere in this Section. The types of vessels and modes of carriage of dangerous goods are referred to below (2) and in table 2.11.2, where the numbers appearing in below (2) are referred to in the top line. Cargo vessels of less than 500 gross tons should comply with the requirement of this section, but the above requirements may be reduced, and such reduced requirements should be recorded in the document of compliance referred to 2.11.4 of this Section.
- (2) The following vessel types and cargo spaces should govern the application of tables 2.11.2(1) and 2.11.2(2):
 - ① Vessels and cargo spaces not specifically designed for the carriage of freight containers but intended for the carriage of dangerous goods in packaged form including goods in freight containers.

- ② Purpose-built container vessels and cargo spaces intended for the carriage of dangerous goods in freight containers.
- ③ Vessels and cargo spaces intended for the carriage of solid dangerous goods in bulk.
- ④ Vessels and cargo spaces intended for carriage of dangerous goods other than liquids and gases in bulk in shipborne barges.

2.11.3 Special requirements: Unless otherwise specified the following requirements should govern the application of Tables 2.11.2(1), 2.11.2(2) and 2.11.2(3) to both “on-deck” and “under-deck” stowage of dangerous goods where the numbers of the following paragraphs are indicated in the first column:

(1) Water supplies

- ① Arrangements should be made to ensure immediate availability of a supply of water from the fire main at the required pressure either by permanent pressurization or by suitably placed remote starting arrangements for the fire pumps.
- ② The quantity of water delivered should be capable of supplying four nozzles of a size and at pressures as specified in 1.3 of this Section, capable of being trained on any part of the cargo space when empty. This amount of water may be applied by equivalent means to the satisfaction of Marine Department.
- ③ Means of effectively cooling the designated under deck cargo space by copious quantities of water, either by a fixed arrangement of spraying nozzles, or flooding the cargo space with water, should be provided. Hoses may be used for this purpose in small cargo spaces and in small areas of larger cargo spaces at the discretion of Marine Department. In any event the drainage and pumping arrangements should be such as to prevent the build-up of free surfaces. If this is not possible the adverse effect upon stability of the added weight and free surface of water should be taken into account to the extent deemed necessary by Marine Department in its approval of the stability information.
- ④ Provision to flood a designated under deck cargo space with suitable specified media may be substituted for the requirements in above provision ③.

(2) Sources of ignition:

Electrical equipment and wiring should not be fitted in enclosed cargo spaces, closed vehicle deck spaces, or open vehicle deck spaces unless it is essential for operational purposes. However, if electrical equipment is fitted in such spaces, it should be of a certified safe type for use in the dangerous environments to which it may be exposed unless it is possible to completely isolate the electrical system (by removal of links in the system, other than fuses). Cable penetrations of the decks and bulkheads should be sealed against the passage of gas or vapour. Through runs of cables and cables within the cargo spaces should be protected against damage from impact. Any other equipment which may constitute a source of ignition of flammable vapour should not be permitted.

(3) Detection system:

Ro-ro cargo spaces should be fitted with a fixed fire detection and fire alarm system complying with the requirements of 1.12 of this Section. All other types of cargo spaces should be fitted with either a fixed fire detection and fire alarm system complying with the requirements of 1.12 of this Section or a sample extraction smoke detection system complying with the requirements of 1.13 of this Section. If a sample extraction smoke detection system is fitted, particular attention should be made to the requirements of 1.13(1) of this Section in order to prevent the leakage of toxic fumes into occupied areas.

(4) Ventilation:

- ① Adequate power ventilation should be provided in enclosed cargo spaces. The arrangement should be such as to provide for at least six air changes per hour in the cargo space based on an empty cargo space and for removal of vapours from the upper or lower parts of the cargo space, as appropriate.
- ② The fans should be such as to avoid the possibility of ignition of flammable gas air mixtures. Suitable wire mesh guards should be fitted over inlet and outlet ventilation openings.

(5) Bilge pumping:

Where it is intended to carry flammable or toxic liquids in enclosed cargo spaces, the bilge pumping system should be designed to ensure against inadvertent pumping of such liquids through machinery space piping or pumps. Where large quantities of such liquids are carried, consideration should be given to the provision of additional means of draining those cargo spaces. These means should be subject to agreement.

(6) Personnel protection:

- ① 4 sets of full protective clothing resistant to chemical attack should be provided in addition to the fireman's outfits required by 1.17 of this Section. The protective clothing should cover all skin, so that no part of the body is unprotected.
- ② At least 2 self-contained breathing apparatuses additional to those required by 1.17 of this Section should be provided.

(7) Portable fire extinguishers:

Portable fire extinguishers with a total capacity of at least 12 kg of dry powder or equivalent should be provided for the cargo spaces. These extinguishers should be in addition to any portable fire extinguishers required elsewhere in this chapter.

(8) Insulation of machinery space boundaries:

Bulkheads forming boundaries between cargo spaces and machinery spaces of category A should be insulated to "A-60" standard, unless the dangerous goods are stowed at least 3 m horizontally away from such bulkheads. Other boundaries between such spaces should be insulated to "A-60" standard.

Application of the requirements to different modes of carriage of dangerous goods in vessels and cargo spaces

Table 2.11.2(1)

2.11.2(2) stipulated vessels and cargo spaces Applicable regulation 2.11.3	(2)① Not specially designed	(2)② Container cargo spaces	(2) ③ Solid dangerous goods in bulk	(2) ④ shipborne barges
(1)①	x	x	For application of requirements of regulation 2.11 to different classes of dangerous goods, see table 2.11.2(2)	x
(1)②	x	x		-
(1)③	x	x		x
(1)④	x	x		x
(2)	x	x		x ^d
(3)	x	x		x ^d
(4)①	x	x ^a		x ^d
(4)②	x	x ^a		x ^d
(5)	x	x		-
(6)①	x	x		-
(6)②	x	x		-
(7)	x	-		-
(8)	x	x ^b		-
(9)	-	-		-

Application of the requirements to different classes of dangerous goods for vessels and cargo spaces carrying solid dangerous goods in bulk

Table 2.11.2(2)

Cargo names 1.2.25 Applicable regulation 2.11.3	4.1	4.2	4.3 ^f	5.1	6.1	8	9
(1)①	x	x	-	X	x ^g	x ^g	x
(1)② ^e	x	x	-	X	-	-	x
(2)	x	x ^g	x	x ^g	-	-	x ^g
(4)① ^h	x ^a	x ^g	x	x ^g	-	-	x ^g
(4)② ^h	x	x ^g	x	x ^g	-	-	x ^g
(6)	x	x	x	X	x	x	x
(8)	x	x	x	x ^g	x ^g	x ^g	x

Application of the requirements to different classes of dangerous goods except solid dangerous goods in bulk

Table 2.11.2(3)

Cargo names 1.2.25 Applicable regulation 2.11.3	1	2	3	4	5.1	5.2	6.1	8
(1)①	x	x	x	x ^p	x	x ^p	x	x
(1)② ^l	x	x	x	x ^p	x	x ^p	-	-
(1)③	x ^k	-	-	-	-	-	-	-
(1)④	x ^k	-	-	-	-	-	-	-
(2)	x ^k	x ^l	x ^m	-	-	-	x ^{m,p}	x ^{m,p}
(3)	x	x	x	X	x	-	x	x
(4)①	-	x ^j	x ^m	x ^p	x ^p	-	x ^{m,p}	x ^{m,p}
(4)②	-	x ^l	x ^m	-	-	-	x ^{m,p}	x ^{m,p}
(5)	-	-	x ^m	-	-	-	x ⁿ	x ^m
(6)	-	x	x	X	x	x ^p	x	x
(7)	-	-	x	X	x	x ^p	x ^p	x ^p
(8)	x ^{k,o}	x	x	X	x ^p	-	x ^p	x ^p
(9)	x	x	x ^m	x ^p	x	-	x ^m	x ^m

Notes: To be applied to Tables 2.11.2(1), 2.11.2(2) and 2.11.2(3), as appropriate. Where “x” appears in

Table 2.11.2(1), it means that this requirement is applicable to all classes of dangerous goods as given in the appropriate line of Table 2.11.2(2) except as indicated by the notes.

- a – For Classes and 5.1 not applicable to closed freight container. For Classes 2, 3, 6.1 and 8 when carried in closed freight containers the ventilation rate may be reduced to not less than two air changes. For purpose of this requirement a portable tank is a closed freight container.
- b – Applicable to decks only.
- c – Applies only to closed ro-ro cargo spaces, not capable of being sealed.
- d – In the special case where the barges are capable of containing flammable vapours or alternatively if they are capable of discharging flammable vapours to a safe space outside the barge carrier compartment by means of ventilation ducts connected to the barges, these requirements may be reduced or waived.
- e – This requirement is applicable when the characteristics of substance call for large quantities of water for fire fighting.
- f – The hazards of substances in this class which may be carried in bulk are such that special consideration must be given to the construction and equipment of the vessel involved in addition to meeting the requirements enumerated in this table.
- g – Reference is made to the International Maritime Dangerous Goods Code (Resolution A.81(IV) as amended) or the Code of Safe Practice for Solid Bulk Cargoes (Resolution A.434(XI), as amended), as appropriate.
- h – At least natural ventilation is required in enclosed cargo spaces intended for carriage of solid dangerous goods in bulk. In cases where power ventilation is required in the Code of Safe Practice for Solid Bulk Cargoes (Resolution A.434(XI), as amended), ventilation units (equipment) may suffice.
- i – This requirement is applicable when the characteristics of substance call for large quantities of water for fire fighting.
- j – Applicable to flammable or poisonous gases.
- k – Except goods of Class 1 S in division (1)④
- l – All flammable gases.
- m – All liquids having a flashpoint below 23°C (closed cup test).
- n – Liquids only.
- o – Goods of Class 1 is to be stowed 3 m horizontally away from the machinery space boundaries in all cases.
- p – Reference is made to the International Maritime Dangerous Goods Code (Resolution A.81(IV) as amended) or the Code of Safe Practice for Solid Bulk Cargoes (Resolution A.434(XI), as amended), as appropriate.

2.11.4 Document of compliance: The vessel should be issued with an appropriate document as evidence of compliance of construction and equipment with the requirements of 3 of this Section.

3 Fire safety installations and measures for tankers

3.1 Application

3.1.1 Tankers carrying petroleum products having a flashpoint exceeding 60°C (closed cup test, as determined by an approved flashpoint apparatus) should comply with the provisions of 2 of this Section, except that in lieu of the fixed fire-extinguishing system required in 2.10 of this Section, they should be fitted with a fixed deck foam system which should comply with the provisions of 3.2 of this Section.

3.2 Fixed deck foam system

3.2.1 General requirements

- (1) The arrangements for providing foam should be capable of delivering foam to the entire cargo tanks deck area as well as into any cargo tank the deck of which has been ruptured.
- (2) The deck foam system should be capable of simple and rapid operation. The main control station for the system should be suitably located outside the cargo area, adjacent to the accommodation spaces and readily accessible and operable in the event of fire in the areas protected.

3.2.2 The rate of supply of foam mixtures

- (1) The rate of supply of foam solution should not be less than the greatest of the following:
 - ① 0.6 L/min/m² of cargo tanks deck area, where cargo tanks deck area means the maximum breadth of the vessel multiplied by the total longitudinal extent of the cargo tank spaces;
 - ② 6 L/min/m² of the horizontal sectional area of the single tank having the largest such area;
 - ③ 3 L/min/m² of the area protected by the largest monitor, such area being entirely forward of the monitor, but not less than 1250 L/min.
- (2) Sufficient foam concentrate should be supplied to ensure at least 20 min of foam generation in tankers fitted with an inert gas installation or 30 min of foam generation in tankers not fitted with an inert gas installation when using solution rates stipulated in above-mentioned (1), whichever is the greatest. The foam expansion ratio (i.e., the ratio of the volume of foam produced to the volume of the mixture of water and foam-making concentrate supplied) should not generally exceed 12 to 1. Where systems essentially produce low-expansion foam but an expansion ratio slightly in excess of 12 to 1, the quantity of foam solution available should be calculated as for 12 to 1 expansion ratio systems. When medium-expansion ratio foam (between 50 to 1 and 150 to 1 expansion ratio) is employed, the application rate of the foam and the capacity of a monitor installation should be subject to agreement by.

3.2.3 Monitors and foam applicators

- (1) Foam from the fixed foam system should be supplied by means of monitors and foam applicators. At least 50% of the foam solution supply rate required in 3.2.2(1) ① and ② of this Section should be delivered from each monitor. On

tankers of less than 4000 tonnes deadweight, installation of monitors may not be required but only applicators. However, in such a case the capacity of each applicator should be at least 25% of the foam solution supply rate required in 3.2.2(1) ① and ② of this Section.

- (2) The number and position of monitors should be such as to comply with 3.2.1(1) of this Section. The capacity of any monitor should be at least 3 L/min/m² of foam solution of deck area protected by that monitor, such area being entirely forward of the monitor. Such capacity should not be less than 1250 L/min.
- (3) The distance from the monitor to the farthest extremity of the protected area forward of that monitor should not be more than 75% of the monitor throw in still air conditions.
- (4) A monitor and hose connection for a foam applicator should be situated both port and starboard at the front of the poop or accommodation spaces facing the cargo tanks deck. On tankers of less than 4000 tonnes deadweight a hose connection for a foam applicator should be situated both port and starboard at the front of the poop or accommodation spaces facing the cargo tanks deck.
- (5) Applicators should be provided to ensure flexibility of action during fire-fighting operations and to cover areas screened from the monitors. The capacity of any applicator should not be less than 400 L/min and the applicator throw in still air conditions should not be less than 15 m. The number of foam applicators provided should not be less than four. The number and disposition of foam main outlets should be such that foam from at least two applicators can be directed on to any part of the cargo tanks deck area.

3.2.4 Pipelines

- (1) Valves should be provided in the foam main, and in the fire main when this is an integral part of the deck foam system, immediately forward of any monitor position to isolate damaged sections of those mains.
- (2) Operation of a deck foam system at its required output should permit the simultaneous use of two jets of water at the required pressure from the fire main.

3.2.5 The pipelines of the deck foam system should be hydraulically tested in the workshop with a pressure of 1.5 times the design pressure and subject to a tightness test with a pressure of 1.25 times the design pressure after installation on board.

Section 3 Life-saving appliances and arrangement

1 General Provisions

1.1 Application

- 1.1.1 The life-saving appliances and arrangements should be manufactured in accordance with the relevant requirements of this Section and they may be used onboard only after a satisfactory examination is carried out and the related certificate is obtained.
- 1.1.2 The life-saving appliances on board as required by this section, may be substituted by other life-saving appliances provided that they are to be tested satisfactorily and subject to approval.
- 1.1.3 In addition, the life-saving appliances should also comply with the applicable provisions of Main Principles of this Code.

1.2 Definition

- 1.2.1 For the purpose of this chapter, unless expressly provided otherwise:
- (1) Embarkation ladder: is the ladder provided at survival craft embarkation stations to permit safe access to survival craft after launching.
 - (2) Float-free launching: is that method of launching a survival craft whereby the craft is automatically released from a sinking vessel and is ready for use.
 - (3) Inflatable appliance: is an appliance which depends upon non-rigid, gasfilled chambers for buoyancy and which is normally kept uninflated until ready for use.
 - (4) Rescue boat: is a boat designed to rescue persons in distress and to marshal survival craft.
 - (5) Survival craft: means the lifeboat and liferaft capable of sustaining the lives of persons in distress from the time of abandoning the vessel.
 - (6) Vessel length: is 96% of the total length on a waterline at 85% of the least moulded depth measured from the top of the keel, or the length from the fore-side of the stem to the axis of the rudder stock on that waterline, if that be greater. In vessels designed with a rake of keel the waterline on which this is measured should be parallel to the designed waterline.
 - (7) Certificated survival craft person: is a person who holds a certificate of proficiency in lifeboat and liferaft survival issued under the authority of, or recognized as valid by, the competent Authority.

2 Equipment requirements

2.1 Provision of survival craft

2.1.1 General requirements

- (1) Unless expressly provided otherwise, the lifeboat, liferaft and buoyant apparatus required by this Section should comply with Appendix 1 “Standard and acceptance of material and equipment”. Rescue boat should comply with the relevant requirements.
- (2) Buoyant apparatus may be substituted by the liferafts when the life-saving appliances are provided in accordance with the requirements of this Section. Where the lifebuoys provided as required in accordance with 2.2.1 of this Section are taken into account as the capacity of buoyant apparatus, every lifebuoy should be used by one person only.
- (3) The inflatable liferafts provided in accordance with 2 of this Section should be distributed evenly, as possible, on both sides of the vessel.
- (4) Where a rescue boat complies with the requirements of the lifeboats, the carrying capacity in the rescue boat may be taken into account as the capacity of lifeboats in accordance with the requirements of this Section.

2.1.2 Cargo vessels

- (1) The percentage of aggregate capacity of the survival craft carried on a cargo vessel to the total number of persons onboard the vessel should not be less than those listed in Table 2.1.3.

Cargo vessel life-saving appliances requirement (%) Table 2.1.3

Plying zone	Vessel length(m)	Lifeboat	Inflatable liferaft	Vessel total capacity
Coastal class A plying zone	$L \geq 60$	150 ^(A)		150
	$L < 60$	---	150	150
Coastal class B plying zone	---	---	110	110

Note : ^(A) One motor lifeboat or rescue boat should be provided on board.

- (2) For conveying cargoes with a flash point above 60°C (Closed cup test), the life-saving appliances should comply with the requirements of a cargo vessel.

2.2 Provision of personal life-saving appliances

2.2.1 Lifebuoys

- (1) Every vessel should carry not less than the number of lifebuoys, self-igniting lights and smoke signals prescribed in the Table 2.2.1, complying with Appendix 1 “Standard and acceptance of material and equipment”.

2.2.2 Lifejackets

- (1) For all vessels, a lifejacket complying with Appendix 1 “Standard and acceptance of material and equipment” should be provided for every person on board.
- (2) Every vessel should provide a sufficient number of lifejackets for persons on watch and at remotely located survival craft stowage stations.

Lifebuoys arrangements

Table 2.2.1

Vessel length L (m)	Total number of lifebuoys (number)	Lifebuoys		
		with self-igniting light		with buoyant lifelines (number)
		total (number)	with smoke signal(number)	
45>L≥20	4	1	---	One per vessel
75>L≥45	6	3	---	At least one on each side of vessel
100>L≥75	8	4	At least one on each side of vessel	
150>L≥100	10	5		
200>L≥150	12	6		
L≥200	14	7		

2.3 Provision of life-saving communication equipment

- 2.3.1 The communication equipment of survival craft should be provided in accordance with the provisions of Section 4 of this Chapter.

2.4 Provision of other life-saving appliances

2.4.1 Line-throwing appliances

Vessels (other than non propelled vessels), should be provided with 4 sets of portable type line-throwing appliance or one set of pistol-fired rocket line-throwing appliance (including one line throwing pistol, 4 sets of lines, projectiles and means of ignition). The line-throwing appliance should be of an approved type.

2.4.2 Distress flares

Every cargo vessel more than 500 gross tons should be provided with 12 approved rocket parachute flare signals. For vessels of 500 gross tons and less, the required number of rocket parachute flare signals may be reduced half. The distress flares for survival craft should comply with Appendix 1 “Standard and acceptance of material and equipment”.

2.4.3 Emergency alarm system

- (1) Vessels of more than 40 metres in length, should be provided with a general emergency alarm system, to be used for summoning passengers and crew to muster stations and to initiate the actions included in the muster list. The system should be supplemented by a public address system
- (2) The general emergency alarm system should be capable of sounding the general emergency alarm signal consisting of 7 or more short blasts followed by one long blast on the vessel's whistle or siren and additionally on an electrically operated bell or klaxon or other equivalent warning system, which should be powered from the vessel's main supply and the emergency source of electrical power. The system should be capable of operation from the navigation bridge and other strategic points. The system should be audible throughout all of the accommodation and normal crew working spaces under the normal working conditions of main and auxiliary machineries.

3 Stowage, embarkation, launching, recovery and servicing of life-saving appliances

3.1 Stowage and launching of Life-saving appliances

3.1.1 Lifeboats and liferafts

- (1) Survival craft should be stowed as near as possible to the accommodation and service spaces. Any stowage arrangements should not interfere with the operation of any other survival craft or rescue boat and the muster and embarkation of passengers.
- (2) Each lifeboat should be stowed attached to a set of independent launching appliances in a state of continuous readiness so that two crew members can carry out preparations for embarkation and launching in less than 5 min.
- (3) Lifeboats for lowering down the vessel's side should be stowed as far forward of the propeller as practicable. On cargo vessels of 80 m in length and upwards but less than 120 m in length, each lifeboat should be so stowed that the after end of the lifeboat is not less than the length of the lifeboat forward of the propeller. On cargo vessels of 120 m in length and upwards, each lifeboat should be so stowed that the after end of the lifeboat is not less than 1.5 times the length of the lifeboat forward of the propeller. All vessels should be so arranged that lifeboats to be launched from flat and straight parts of the vessel.
- (4) Each lifeboat and liferaft should be stowed as near the water surface as is safe and practicable, and in such a position that the survival craft in the embarkation position is not less than 2 m above the waterline with the vessel in the fully loaded condition under unfavourable conditions listed up to 20° either way, or to the angle at which the vessel's weather deck edge becomes submerged, whichever is less.
- (5) Inflatable liferafts should be stowed on special frames with their painters permanently attached to the vessel, and provided with an approved float-free arrangement so that the liferafts can leave the vessel and inflate automatically when the vessel sinks. In addition, liferafts should be so stowed as to permit manual release of one raft from their securing arrangements.

- (6) Davit-launched liferafts should be stowed within reach of the lifting hooks, unless some means of transfer is provided which does not render inoperable under unfavourable conditions of trim and listed up to 20° either way or by vessel motion or power failure.

3.1.2 Rescue boat

- (1) Rescue boats should be stowed in a state of continuous readiness for launching in not more than 5 min, and in a suitable position so that neither the rescue boat nor its stowage arrangements will interfere with the operation of any survival craft at any other launching station.
- (2) If the rescue boat is also a lifeboat, the stowage, embarkation and launching arrangements should comply with the applicable requirements of this Section.

3.1.3 Life-saving buoyant apparatus

The life-saving buoyant apparatus should be stowed in suitable places to avoid high temperature and capable of being rapidly thrown overboard and freely floated. When buoyant apparatus are stowed stacking together, suitable material should be provided to separate them to avoid bonding to each other.

3.1.4 Lifejackets and lifebuoys

- (1) Lifejackets should be so placed as to be readily accessible. The lifejackets for persons on duty stowed on the bridge, in the radiotelegraph station, the engine control room and the service spaces etc. should be plainly indicated.
- (2) Lifebuoys should be so distributed as to be readily available on both sides of the vessel, at least one should be placed in the vicinity of the stern; and not permanently secured in any way. Each lifebuoy should be marked in Chinese and English with the name and port of registry of the vessel on which it is carried.

The lifebuoys provided with self-igniting lights and self-activating smoke signals should be stowed on both sides of the navigation bridge and capable for readily use.

3.1.5 Line throwing appliance and distress flares should be stowed on or near the navigation bridge for easily accessible, and capable for rapidly available.

3.1.6 Life-saving communication equipment should be stowed in the chart room or a suitable space, such that they can be rapidly placed in any survival craft. Where the survival craft are located amidship and astern, the life-saving communication equipment should be stowed in suitable locations in vicinity of survival craft further from the main radiotelegraph transmitter.

3.2 Embarkation, launching, recovery and overhaul of Survival craft

3.2.1 Muster and embarkation arrangements

- (1) Vessels should be provided with embarkation arrangements for boarding the lifeboats and davit launched liferafts, to allow embarkation of persons enabling descent from the stowage location or from another deck.

- (2) All alleyways, stairways and exits giving access to the survival crafts, including embarkation stations, survival craft stowage spaces and the launching area at sea level should be adequately illuminated by emergency lighting.
- (3) Each embarkation station or at every two adjacent embarkation stations for survival craft should be provided with an approved embarkation ladder down the side of the vessel for persons to board the survival crafts at sea level.

3.2.2 Provision of launching and recovery arrangements

- (1) Each lifeboat should be provided with an appliance which is capable of launching and recovering the lifeboat. Such appliance should be so arranged that it may be operated by one person on the deck. Launching and recovery arrangements should be such that the appliance operator on the vessel is able to observe the survival craft at all times during launching and for lifeboats during recovery.
- (2) Means should be available to prevent any discharge of water onto survival craft during abandonment.

3.2.3 Requirements for the launching and recovery appliances

- (1) Lifeboat launching appliance should normally be gravity type, however, luffing type may be accepted if the lifeboat weighs less than 2300 kg in turning out condition.
- (2) Each launching appliance together with all its lowering and recovery gear should be so arranged and strengthened that the fully equipped survival craft or rescue boat it serves can safely reach the water under conditions of a trim of up to 10° and a list of up to 20° either way, by its full complement of persons or without persons in the survival craft or rescue boat.
- (3) The survival craft required to provide for abandonment by the total number of persons on board should be capable of being launched with their full complement of persons and equipment within a period of 10 min from the time the abandon vessel signal is given.
- (4) Each launching appliance should be so constructed that only a minimum amount of routine maintenance is necessary. All parts requiring regular maintenance by the vessel's crew should be readily accessible and easily maintained.
- (5) The winch brakes of a launching appliance should be of sufficient strength to withstand:
 - (i) static test with a proof load of not less than 1.5 times the maximum working load;
 - (ii) dynamic test with a proof load of not less than 1.1 times the maximum working load at maximum lowering speed.
- (6) The launching appliance and attachments other than winch brakes should be of sufficient strength to withstand a static proof load on test of not less than 2.2 times the maximum working load.
- (7) The safety factors of structural members and all blocks, falls, pad eyes, links, fastenings and all other fittings used in connection with launching equipment

should be designed with a minimum factor of safety (on the basis of the maximum working load assigned and the ultimate strength of the material used for construction) should comply with the following requirements:

A minimum factor of safety of 4.5 should be applied to all davit and structural members;

A minimum factor of safety of 6 should be applied to all falls, suspension chains, links and blocks.

- (8) Launching appliances should comply with the following requirements:
 - (i) Manual brakes and automatic governors should be provided so as to ensure a safe lowering speed of 0.6 to 1.0 m/s.
 - (ii) An efficient hand gear arrangement should be provided for recovery of each survival craft and rescue boat. Hand gear handles or wheels should not be rotated by moving parts of the winch when the survival craft or rescue boat is being lowered or when it is being hoisted by power.
 - (iii) Where davit arms are recovered by power, safety devices should be fitted which will automatically cut off the power before the davit arms reach the stops.
- (9) Each rescue boat launching appliance should be capable in a short period, to enable persons to boarding and lowering the rescue boat, and raising the rescue boat from the water with its full rescue boat complement of persons and equipment rapidly.

3.2.4 Testing of launching appliances

- (1) There should be no evidence of permanent deformation or other damage as a result after a static proof load test for 5 minutes.
- (2) Launching appliances should be tested in workshop in accordance with the requirements of 3.2.3(2), (5) and (6) of this section.
- (3) After installation on board, each set of launching appliance should be capable of withstanding the following tests and the appliance and its equipment should not be damaged or deformed.
 - (i) Each set of launching appliance should be such as to enable the survival craft to be turned out when loaded with weights representing full complement of persons and equipment, from inboard to the outboard position, and then, subjected to lowering tests, and it should ensure that the survival craft carrying crew can be recovered to the stowage position.
 - (ii) Lowering tests of lifeboat loaded with weights representing its full complement of persons and equipment should be carried out to check the strength in the launching appliance (including the supporting deck) as well as the reliability of safety launching.
 - (iii) During the lowering tests, the survival craft at a lowering speed of between 0.6 and 1.0 m/s should be stopped abruptly on the winch brake to check the strength in the whole launching appliance and reliability of the winch brake.

- (iv) The reliability of disengaging gear should be checked.
 - (v) The reliability of hand gear for launching appliance of survival craft should be checked.
- (4) After satisfactory testing, safety working load, type, name of manufacturer, serial number, date of manufacture and the marking of inspection organization should be marked on name plates and at the required position of the certificated launching appliance.

3.2.5 Servicing of life-saving appliances

- (1) Every inflatable liferaft and hydrostatic release unit should be serviced at intervals not exceeding 12 months; However, after an external visual inspection and found satisfactory, the servicing intervals may be extended to 17 months subject to agreement.
- (2) The inflatable liferaft should be serviced at an approved servicing station.

4 Muster arrangement and life-saving drills

4.1 Muster list

- 4.1.1 The muster list should be provided for every vessel and should show the duties to members of the crew in case of emergency and should indicate, in particular, the post to which each member must go, and the duties that he has to perform.

The muster list should be prepared before the vessel proceeds to sea, and after signed by the Master, should be posted up navigation bridge, engine room, accommodation and public spaces. If any change takes place in the crew, which necessitates an alteration in the muster list, the muster list should be revised immediately.

- 4.1.2 The muster list should show the duties assigned to the different members of the crew including:

- (1) closing of the watertight doors, fire doors, valves, scuppers, sidescuttles, skylights, portholes and other similar openings in the vessel;
- (2) equipping of the survival craft and other life-saving appliances;
- (3) preparation and launching of survival craft;
- (4) general preparations of other life-saving appliances;
- (5) muster of passengers;
- (6) use of communication equipment;
- (7) manning of fire parties assigned to deal with fires;
- (8) special duties assigned in respect to the use of fire-fighting equipment and installations.

- 4.1.4 The muster list should specify which officers are assigned to ensure that life-saving and fire appliances are maintained in good condition and are ready for immediate use.

4.1.5 The muster list should specify substitutes for key persons who may become disabled, taking into account that different emergencies may call for different actions.

4.1.6 The muster list should specify definite signals for calling all the crew to the survival craft, and should give full particulars of these signals, which should be sounded by the emergency alarm system.

4.2 Life-saving drills

4.2.1 Certificated survival craft person:

Certificated survival craft person should be any of the crew who is of proficiency in survival craft and has the following abilities, and holds a certificate of proficiency after being qualified by examinations:

- (1) having been trained in all the operations connected with launching lifeboats and other life-saving appliances, and in the use of oars and propelling gears;
- (2) being acquainted with the practical handling of lifeboats and of other life-saving appliances;
- (3) being capable of understanding and answering the orders related to all kinds of life-saving appliances.

4.2.2 Manning of certificated survival craft person

Every life boat should be in charge by a deck officer or certificated survival craft person, and a second-in-command should also be nominated. The person in charge of the boat should have a list of the passengers (crew members), and should see that the persons under his command are acquainted with their duties.

4.2.3 Manning of un-certificated survival craft person

- (1) Every motorized lifeboat should have a person assigned who is capable of operating the engine and carrying out minor adjustments.
- (2) Every motorized lifeboat provided with the radio and search light installations, should have a person assigned who is capable of operating the equipment.
- (3) Members of crew should prove that they have been trained in the operations connected with launching liferafts and in the use of liferafts.

4.2.4 Training manual:

A training manual complying with the requirements of this regulation should be provided in each crew mess room and recreation room or in each crew cabin.

The training manual should contain instructions and information, in easily understood terms illustrated wherever possible, on the life-saving appliances provided in the vessel and on the best methods of survival. Any part of such information may be provided in the form of audio-visual aids (video or slide) to improve the effectiveness of training.

The main content of training manual should include the following:

- (1) donning of lifejackets;

- (2) muster at the assigned stations;
- (3) boarding, launching, and clearing the survival craft and rescue boats (if provided);
- (4) illumination in launching areas;
- (5) use of all survival equipment and associated equipment (such as sea anchor, radio life-saving appliances, distress flares);
- (6) use of engine and accessories;
- (7) recovery of survival craft and rescue boats (including stowage and securing);
- (8) methods of retrieval, including the use of helicopter rescue gear (slings, baskets, stretchers), breeches-buoy and shore life-saving apparatus and vessel's line-throwing apparatus;
- (9) all other functions contained in the muster list and emergency instructions;
- (10) instructions for emergency repair of the life-saving appliances.

4.2.5 Drill time, operation requirements and record

- (1) For cargo vessels and other vessels, every crew member should participate in at least one abandon vessel drill every month. If more than 25% of the crew have been replaced at a port, a drill of the crew should take place within 24 hours of the vessel leaving that port.
- (2) The date when musters are held, and details of life-saving drills which are carried out onboard should be recorded in the log-book. If a life-saving drill is not held at the appointed time, an entry should be made in the log-book stating the circumstances, and date of the proposed drill to be held for the absent one.
- (3) During drills, inspection of the survival craft, including their equipment, should be carried out to ensure that they are complete and in good order. A report of the inspection, including the time when lifeboats are swung and lowered, should be entered in the log-book.
- (4) Different lifeboat should be lowered at successive drills, and each survival craft should be swung out and, if practicable and reasonable, lowered at least once every four months, and lowered into the water once a year. The life-saving drills and inspections should be so arranged that the crew thoroughly understand and are practiced in the duties they have to perform, including instructions in the handling and operation of liferafts (un-inflatable davit-launched liferafts);
- (5) The emergency alarm signal for summoning passengers to muster stations should consist of 7 short blasts followed by one long blast on the vessel's whistle or siren and other electrical signals. Clear instructions on the meaning of all signals, and on the action to be followed for passengers in the event of emergency should be drawn up in simple and precise language and posted in conspicuous places throughout the accommodation and public spaces.

Section 4 Radio communication equipment

1 General provisions

1.1 Application

- 1.1.1 Radio communication equipment should comply with the basic technical requirements and performance standards specified in 3 of this Section or other recognized standards, and should be of an approved type.
- 1.1.2 In addition, radio communication equipment should comply with the appropriate requirements of Main Principles of this Code.
- 1.1.3 If the conditions affecting safety are such as to render the full application of this section unreasonable or unnecessary, suitable exemption may be granted subject to agreement.

1.2 Implementation date

- 1.2.1 All vessels to which this Section applies should be provided with NAVTEX receiver, satellite emergency position indicating radio beacon (EPIRB), survival craft VHF two-way radiotelephone apparatus and radar transponders (SART) according to the Table 2.1.1.

1.3 Terms and definitions

- 1.3.1 For the purpose of this Chapter, the following terms should have the meanings defined below:
- (1) Bridge-to-bridge communications: means safety communications between vessels from the position from which the vessels are normally navigated.
 - (2) Continuous watch: means that the radio watch concerned should not be interrupted other than for brief intervals when the vessel's receiving capability is impaired or blocked by its own communications or when the facilities are under periodical maintenance or checks.
 - (3) Digital selective calling (DSC): means a technique using digital codes which enables a radio station to establish contact with, and transfer information to, another station or group of stations, and complying with the relevant recommendations of the International Radio Consultative Committee (CCIR)[®].
 - (4) Direct-printing telegraphy: means automated telegraphy techniques which comply with the relevant recommendations of the International Radio Consultative Committee.
 - (5) General radio communications: means operational and public correspondence traffic, other than distress, urgency and safety messages, conducted by radio.
 - (6) INMARSAT[®]: means the Organization established by the Convention on the International Maritime Satellite Organization adopted on 3 September 1976.

- (7) International NAVTEX service: means the coordinated broadcast and automatic reception on 518 kHz of maritime safety information by means of narrow-band direct-printing telegraphy using the English language^③.
- (8) Locating: means the finding of vessels, aircraft, units or persons in distress.
- (9) Maritime safety information: means navigational and meteorological warnings, meteorological forecasts and other urgent safety related messages broadcast to vessels.
- (10) Polar orbiting satellite service: means a service which is based on polar orbiting satellites which receive and relay distress alerts from satellite EPIRBs and which provides their position.
- (11) Radio Regulations: means the Radio Regulations annexed to, or regarded as being annexed to, the most recent International Telecommunication Convention which is in force at any time.
- (12) Sea area A1: means an area within the radiotelephone coverage of at least one VHF coast station in which continuous DSC alerting is available, as may be defined by a Contracting Government^④.
- (13) Sea area A2: means an area, excluding sea area A1, within the radiotelephone coverage of at least one MF coast station in which continuous DSC alerting is available, as may be defined by a Contracting Government^④.
- (14) Sea area A3: means an area, excluding sea areas A1 and A2, within the coverage of an INMARSAT geo-stationary satellite in which continuous alerting is available.¹

1.3.2 All other terms and abbreviations which are used in this section and which are defined in the Radio Regulations should have the meanings as defined in those Regulations.

1.4 Radio personnel

1.4.1 Every vessel should carry personnel qualified for distress and safety radio communication purposes. The personnel should be holders of certificates specified in the Radio Regulations as appropriate issued by the competent authority, any one of whom should be designated to have primary responsibility for radio communications during distress incidents.

① The name of the Committee was changed to “ITU Radiocommunication Sector” (ITU-R) due to Article 1 of the International Telecommunication Constitution, Geneva, 1992.

② The name of the Organization was changed to “International Mobile Satellite Organization” (Inmarsat) by virtue of amendments to its Convention and Operating Agreement adopted by the 10th (extraordinary) Assembly (5~9 December 1994).

③ Refer to the NAVTEX Manual approved by the Organization (publication IMO-951E).

④ Refer to resolution A.801(19) concerning provision of radio services for the global maritime distress and safety system (GMDSS).

1.5 Watches

1.5.1 Every vessel, while at sea should maintain a continuous watch:

- (1) on VHF DSC channel 70, if the vessel is fitted with a VHF radio installation of DSC function;
- (2) on the distress and safety DSC frequency 2187.5 kHz, if the vessel is fitted with an MF radio installation;
- (3) on the distress and safety DSC frequencies 2,187.5 kHz and 8,414.5 kHz and also on at least one of the distress and safety DSC frequencies 4,207.5 kHz, 6,312 kHz, 12,577 kHz or 16,804.5 kHz, appropriate to the time of day and the geographical position of the vessel, if the vessel is fitted with an MF/HF radio installation. This watch may be kept by means of a scanning receiver;
- (4) for satellite shore-to-vessel distress alerts, if the vessel is fitted with an INMARSAT vessel earth station.

1.5.2 Until 1 February 2005 or other date as may be determined, every vessel while at sea should maintain, when practicable, a continuous listening watch on VHF channel 16. This watch should be kept at the position from which the vessel is normally navigated.

1.6 Radio records

1.6.1 Every vessel should be provided with a radio communication log-book. A record should be kept of all incidents connected with the radio communication service which appear to be of importance to safety of life at sea. The records should comply with the requirements of the Radio Regulations.

2 Equipment Requirements

2.1 Equipment

2.1.1 Unless expressly provided otherwise, sea going vessels engaged on non-international voyages should be provided with radio communication equipment in accordance with the requirements as prescribed in table 2.1.1 of this section.

Radio communication equipment installations

Table 2.1.1

	Radio communication equipment	Number of radio communication equipment installation [ⓐ] required for the trading sea areas	
		sea area A1	beyond sea area A1
1	Very high frequency radio installation (VHF)	1 set	1 set
2	NAVTEX receiver		Cargo vessels of 500 gross tons and upwards - 1 set
3	Satellite emergency position indicating radio beacon (S-EPIRB)		Cargo vessels of 500 gross tons and upwards - 1 set
4	Medium frequency radio installation (MF)		According to the trading sea areas to select one of the suitable types
5	Medium/high frequency radio installation (MF/HF)		
6	Vessel earth station (SES)		
7	Survival craft two-way radiotelephone apparatus (Two-way VHF)	2 sets	Cargo vessels of 500 gross tons and upwards - 3 sets; vessels of 24m and over in length but less than 500 gross tons - 2 sets
8	Radar transponder	1 set for cargo vessels of 300 gross tons and upwards	Cargo vessels of 500 gross tons and upwards - 2sets; vessels of 24m and over in length but less than 500 gross tons - 1 set

Note ⓐ Vessels trading within sheltered waters are not required to install the NAVTEX receiver, VHF emergency position indicating radio beacon and satellite emergency position indicating radio beacon.

2.1.2 In table 2.1.1, the required medium frequency radio installation and medium/high frequency radio installation should be equipped with DSC and radiotelephony functions. VHF radio installation should be equipped with radiotelephony function, and after 1 February 2005 or other date as may be determined, should also be equipped with DSC function.

3 Technical requirements and performance standards

3.1 General requirements

3.1.1 Operation of radio communication installations

- (1) The number of operational controls, their design and manner of function, location, arrangement and size should provide for simple, quick and effective operation. The controls should be arranged in a manner which minimizes the chance of inadvertent operation.
- (2) All operational controls should permit normal adjustments to be easily performed and should be easy to identify from the position at which the equipment is normally operated. Controls not required for normal operation should not be readily accessible.
- (3) Adequate illumination should be provided in the equipment or in the vessel to enable identification of controls and facilitate reading of indicators at all times. Means should be provided for dimming the output of any equipment light source which is capable of interfering with navigation.
- (4) The design of the equipment should be such that misuse of the controls should not cause damage to the equipment or injury to personnel.
- (5) If a unit of equipment is connected to one or more other units of equipment the performance of each should be maintained.
- (6) If a digital input panel is provided, the digits “0” to “9” should be arranged to conform the relevant standard^①.

3.1.2 Electrical power requirements

- (1) Means should be incorporated for the protection of equipment from the effects of excessive current and voltage, transients and accidental reversal of the power supply polarity.
- (2) If provision is made for operating equipment from more than one source of electrical energy, arrangements for rapidly changing from one source to the other should be provided but not necessarily incorporated in the equipment.

3.1.3 Durability and resistance to environmental conditions:

- (1) Equipment should be capable of continuous operation under the conditions of various sea states, vessel's motion, vibration, humidity and temperature likely to be experienced in vessels.
- (2) The environmental conditions and tests of the radio communication equipment should comply with the relevant provisions.

① Where a digital input panel with the digits “0” to “9” is provided, the digits should be arranged to conform with the relevant recommendations E161/Q11 of Comité Consultatif International Telegraphique et Telephonique (CCITT). However, where an alphanumeric keyboard layout, as used on office machinery and data processing equipment, is provided, the digits “0” to “9” may, alternatively, be arranged to conform with the relevant standard 3791 of the International Standard Organization (ISO).

3.1.4 Prevention of interference:

- (1) All reasonable and practicable steps should be taken to ensure electromagnetic compatibility between the equipment concerned and other radio communication and navigational equipment carried on board.
- (2) Mechanical noise from all units should be limited so as not to prejudice the hearing of sounds on which the safety of the vessel might depend.
- (3) Each unit of equipment normally to be installed in the vicinity of a standard compass or a magnetic steering compass should be clearly marked with the minimum safe distance at which it may be mounted from such compasses.

3.1.5 Safety protection precautions:

- (1) As far as is practicable, accidental access to dangerous voltages should be prevented. All parts and wiring in which the direct or alternating voltages or both (other than radio frequency voltages) combine to give a peak voltage greater than 55 V should be protected against accidental access and should be isolated automatically from all sources of electrical energy when the protective covers are removed. Alternatively, the equipment should be so constructed that access to such voltages may only be gained after having used a tool for this purpose, such as spanner or screwdriver, and warning labels should be prominently displayed both within the equipment and on protective covers.
- (2) Means should be provided for earthing exposed metallic parts of the equipment but this should not cause any terminal of the source of electrical energy to be earthed.
- (3) All steps should be taken to ensure that electromagnetic radio frequency energy radiated from the equipment should not be a hazard to personnel.
- (4) Equipment containing elements such as vacuum tubes which are likely to cause X-radiation should comply with the following requirement:
 - (i) External X-radiation from the equipment in its normal working condition should not exceed the limits laid down by the Administration concerned.
 - (ii) When X-radiation can be generated inside the equipment above the levels laid down by the Administration, a prominent warning should be fixed inside the equipment and the precautions to be taken when working on the equipment should be included in the equipment manual.
 - (iii) If malfunction of any part of the equipment can cause an increase in X-radiation, adequate advice should be included in the information about the equipment, warning of the circumstances which could cause the increase and stating the precautions which should be taken.

3.1.6 Maintenance

- (1) Equipment should be so designed that the main units can be replaced readily, without elaborate recalibration or readjustment.
- (2) Equipment should be so constructed and installed that it is readily accessible for inspection and maintenance purposes.

3.1.7 Marking and identification

The external of each unit of the equipment should be marked clearly visible in the normal installation position with the information of identification of the manufacturer, equipment type or model, serial number, date of manufacture, and the identity marking of the inspection organization.

3.2 Performance standards

3.2.2 All equipment to which this section applies should be of a type approved. The performance standards of such equipment should comply with Appendix 1 “Standard and acceptance of material and equipment”.

4 Installation requirements

4.1 Location of installation

4.1.1 Radio communication equipment should be installed in the navigation bridge or in a dedicated radio room located not below lower lifeboat deck. If the radio communication equipment is installed in a dedicated radio room, there should be provided between the navigation bridge and the radio room, an efficient two-way direct system for calling and voice communication.

4.1.2 The radio communication equipment should be so located that no harmful interference of mechanical, electrical or other origin affects its proper use, and so as to ensure electromagnetic compatibility and avoidance of harmful interaction with other equipment and systems.

4.1.3 Radio installation should be so located as to ensure the greatest possible degree of safety and operational availability; and be protected against harmful effects of water, extremes of temperature and other adverse environmental conditions.

4.1.4 In the space of radio equipment installations, should be provided with reliable, permanently arranged electrical lighting, independent of the main and emergency sources of electrical power, for the adequate illumination of the radio controls for operating the radio installation.

4.1.5 In the space of radio equipment installations, should be clearly marked with the call sign, the vessel station identity and other codes as applicable for the use of the radio installation.

4.1.6 Control of the VHF radiotelephone channels, required for navigational safety, should be immediately available on the navigation bridge convenient to the conning position and, where necessary, facilities should be available to permit radio communications from the wings of the navigation bridge. Portable VHF equipment may be used to meet the latter provision.

4.1.7 One radar transponder should be carried on each side of the vessel if 2 radar transponders are provided on board. The radar transponders should be stowed in such locations that they can be rapidly placed in any survival craft.

4.2 Electrical power supply

- 4.2.1 Distribution boards of electrical power for the radio communication installations should be supplied directly from the main or emergency switchboard by separate feeders. Any current consuming appliances, which have no relation to the radio installations should not be connected to the electrical system of the radio installations. Other electrical power distributions non-relevant to the radio installations should not be connected to the electrical system of the radio installations. For vessels of less than 300 gross tons, and vessels less than 500 gross tons operating in A1 sea areas or sheltered waters, electrical power for the radio communication installations may be supplied from the other distribution board located in the navigation bridge and the distribution board should be supplied from the main or emergency switchboards.
- 4.2.2 A reserve source or sources of energy should be provided on every vessel, to supply radio installations, for the purpose of conducting distress and safety radio communications, in the event of failure of the vessel's main and emergency sources of electrical power. The reserve source of energy need not supply the independent MF and MF/HF radio installations at the same time. For vessels of less than 300 gross tons, and vessels less than 500 gross tons operating in A1 sea areas or sheltered waters reserve source dedicated to radio communication equipment may not be provided, and the power source for radio installations should be supplied from emergency electrical power or other reserve electrical power on board.
- 4.2.3 The supply period of reserve sources should be at least:
- (1) 1 hour on vessels provided with an emergency source of electrical power to the radio installation;
 - (2) 4 hours if emergency source of electrical power is not provided to the radio installation or can not comply with the requirements of above (1).
- 4.2.4 There should be available at all times, while the vessel is at sea, a supply of electrical energy sufficient to operate the radio installations and to charge any batteries used as part of a reserve source or sources of energy for the radio installations.
- 4.2.5 Where a reserve source of energy consists of a rechargeable accumulator battery or batteries, vessels should be provided with a means of automatically charging such batteries which should be capable of recharging them to minimum capacity requirements within 10 hours. The charging facilities should be provided with measuring instruments for checking the voltage of the power supply network and the accumulator batteries and also for checking the charging current. The charging facilities should also be provided with reverse current protection so as to prevent the current from being discharged to the vessel's electrical network.
- 4.2.6 The siting and installation of accumulator batteries which provide a reserve source of energy should be such as to ensure the highest degree of service, and that when fully charged, the batteries will provide at least the minimum required hours of operation under all weather conditions.
- 4.2.7 If an uninterrupted input of information from the vessel's navigational or other equipment to a radio installation required by this chapter is needed to ensure its proper performance, means should be provided to ensure the continuous supply of such information in the event of failure of the vessel's main or emergency source of electrical power.

4.2.8 The accumulator batteries of reserve sources should be placed above the uppermost continuous deck and should be readily accessible from the open deck. It is allowed to locate the accumulator batteries on the exposed deck which is on or above the uppermost continuous deck, provided that they are installed in watertight boxes and placed at a height of not less than 50 mm above the deck.

4.3 Antenna installation

4.3.1 Vessels may be fitted with an antenna of any type provided that it provides the highest operational efficiency of the radio communication equipment. If necessary, shielding screens for the antenna should be installed to prevent the harmful effect of electro-magnetic radiation to persons.

4.3.2 The structures of the antenna installations should be capable of withstanding wind force up to Beaufort Wind Scale 11 (wind speed 29 m/s).

4.3.3 The construction of the transmitting antenna should be such as to eliminate any possibility of corona effect.

4.3.4 The antenna insulators should be made of insulating materials resistant to high voltage and high frequency, and capable of withstanding an appropriate mechanical load.

4.3.5 The receiving antenna and the transmitting antenna should be located as wide apart as practicable.

4.3.6 The insulation resistance of the antenna in relation to the vessel's hull should not be less than 10 M Ω in dry weather and not less than 1 M Ω under high humidity weather.

4.3.7 The antenna assembly should be located at a distance of not less than 1m from the funnels, ventilators, masts and other metal objects of the superstructure.

4.3.8 On oil tankers, all steel rigging of masts (such as shrouds, stays, whistle or siren pull, joining rope between masts, etc.) should be broken up with insulators spaced not more than 6m apart, and the lower ends of the mast guys should be electrically connected to the hull by copper stranded wire.

4.3.9 In order to minimize the output energy losses while the transmitter is in operation, the riggings around the antenna should be broken up with insulators into unequal lengths of 2 to 5 m.

4.3.10 The transmitting antenna should be led into room by means of a special lead in fitted with high frequency, high voltage insulators, and arrangements should be made to preclude accumulation of water. The lead in wiring should be made of copper bar of not less than 12 mm in diameter or of high frequency cable. The construction of the end of the lead in should provide for easy connection and disconnection of the antenna.

4.3.11 The NAVTEX receiver should have an independent antenna so as to ensure its continuous operation.

4.3.12 Where the lead in of the antenna is installed vertically in a readily accessible position, protective measures should be taken to guard against accidental touching, and the guard for the lead in should be so positioned as not to obstruct visual bearing taking at the vessel's compass.

- 4.3.13 Feeders fitted between the transmitter and the end of the lead in should be as short as practicable, and should be made of copper pipe of not less than 8 mm in diameter or of high frequency cable. Such feeders should be secured to the ceiling or bulkheads by means of insulators.
- 4.3.14 The non screened high frequency feeders and the unprotected antenna change over switches of transmitters should be so arranged as to preclude the possibility of being accidentally touched by the radio officer while operating the radio installation.
- 4.3.15 Each feeder of the receiving antenna should be made of high frequency screened cable with the continuity of screening being maintained. Such feeders should be as short as practicable.
- 4.3.16 The antenna for transmitters and receivers should not be used for other purposes. The antenna attached to broadcast receiver should be located as far away from other antennae as practicable.
- 4.3.17 The parallel antenna should be made of copper or copper alloy stranded wire. If:
a span of less than 45 m: cross-sectional is 16 mm^2 ;
a span of 45 m and upwards: cross-sectional is 25 mm^2
- 4.3.18 The halyards used for handling the antenna should be capable of hoisting and lowering the antenna from both ends. The sagging of the antenna should not exceed 6% of its span.
- 4.3.19 Where parallel antenna are used, the spacing between the wires should not be less than 700 mm.
- 4.3.20 Each parallel antenna should be made of one piece stranded wire. Where it is impracticable for the horizontal wire and the corresponding down lead wire to be made of one piece stranded wire, the connection of the horizontal wire with the down lead should be made by means of splicing and proper soldering.
- 4.3.21 In order to increase the reliability and durability of the "T" type antenna, the electrical connection and the mechanical connection of the horizontal antenna with the down lead should be separated (see Figure 4.3.21).

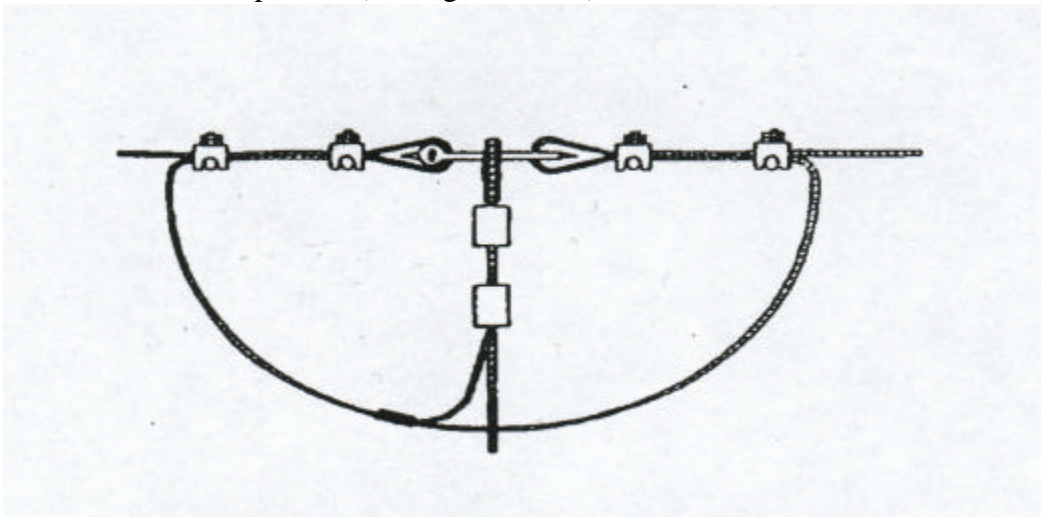


Fig. 4.3.21 connection of the horizontal antenna with the down-lead

- 4.3.22 The down lead wire of the antenna should be secured near the lead in to a guy fitted with insulators, and the lower end of the down lead wire should be effectively connected to the lead in by means of a copper thimble.
- 4.3.23 In order to protect the main antenna (parallel antenna) from breakage due to strong wind or other forces, a safety device should be provided (see Figure 4.3.23). But such requirement may be waived for vessels of less than 500 gross tons.

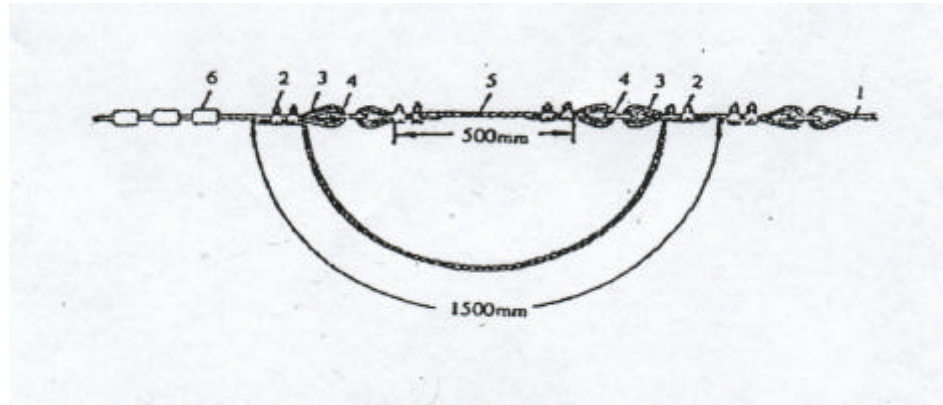


Figure 4.3.23 Antenna safe protection installation

1 – Antenna halyard; 2 – Clamp; 3 – Thimble; 4 – Shackle;
5 – Copper stranded wire have a cross-sectional area smaller than the main antenna; 6 – insulator

4.4 Earthing

- 4.4.1 The earthing of the radiocommunication equipment is divided into high frequency earthing and protective earthing. The high frequency earthing for transmitters should be effected by means of a separate copper bus bar. This copper bus-bar should run directly from the casing of the transmitter to the metal part of vessel's hull (the length of the bus-bar should not exceed 1.5 m and the total resistance of earthing not exceed 0.02Ω).
- 4.4.2 The earthing bus-bar of the transmitter and that of the receiver should be separately installed.
- 4.4.3 The protective earthing of the receiving equipment may be connected to the main earthing bus-bar, or may be effected by means of a flexible copper wire having a cross-sectional area of at least 5 mm^2 run to a bolt of not less than 6 mm in diameter welded to the metal part of the vessel's hull.
- 4.4.4 The protective earthing of the casing of the converter and its auxiliary equipment should be effected by means of a copper tape having a cross-sectional area of at least 6 mm^2 run as directly as possible to a bolt of not less than 6 mm in diameter reliably connected to the metal part of the vessel's hull.

Section 5 Navigational Equipment

1 General provisions

1.1 General requirements

- 1.1.1 The navigational equipment installed on board vessel should comply with the provisions of this Section, or other appropriate accepted standards.
- 1.1.2 In addition, the navigational equipment should also comply with the Main Principles and the applicable provisions of Chapter 1 of this Code.
- 1.1.3 Cargo vessels of less than 300 gross tons, except otherwise stipulated in the provisions, the navigational equipment may be provided in the light of the specific circumstance, subject to agreement.
- 1.1.4 Except the inspections required under Section 3 of Chapter 1, all reasonable steps should be taken to maintain the navigational equipment in efficient working order to ensure compliance with all the functional requirements specified in this section, malfunction of the equipment should not be considered as making a vessel un-seaworthy or as a reason for delaying the vessels in ports where repair facilities are not readily available.

1.2 General requirements for navigational equipment

- 1.2.1 Where a unit of navigational equipment provides a facility which is additional to the minimum requirements of this section, the operation and, as far as is reasonably practicable, the malfunction of such additional facility should not degrade the performance of the main unit of the navigational equipment.
- 1.2.2 The number of operational controls, their design and manner of function, location, arrangement and size should provide for simple, quick and effective operation. The controls should be arranged in a manner which minimizes the chance of inadvertent operation.
- 1.2.3 All operational controls should permit normal adjustments to be easily performed and should be easy to identify from the position at which the equipment is normally operated. Controls not required for normal operation should not be readily accessible.
- 1.2.4 Adequate illumination should be provided (in the equipment or in the vessel) to enable identification of controls and facilitate reading of indicators at all times. Means should be provided for dimming the output of any equipment light source.
- 1.2.5 If a digital input panel is provided, the digits “0” to “9” should be arranged to conform with the relevant standard of the International Standard Organization.
- 1.2.6 Equipment should be capable of continuous operation under the conditions of various sea states, vessel's motion, vibration, humidity and temperature likely to be experienced in vessels. Equipment should conform with the relevant tests required by the provisions.

- 1.2.7 Means should be incorporated for the protection of navigational equipment from the effects of excessive current and voltage, transients and accidental reversal of the power supply polarity.
- 1.2.8 The power source of navigational equipment may be only supplied from the vessel's main electrical power, except for vessels of 5000 gross tons and upwards that should be supplied from main and emergency electrical power.
- 1.2.9 If navigational equipment is operated from more than one source of electrical energy, arrangements for rapidly changing from one source to the other should be provided but not necessarily incorporated in the equipment.
- 1.2.10 Means should be provided for earthing exposed metallic parts of the equipment but this should not cause any terminal of the source of electrical energy to be earthed.
- 1.2.11 All steps should be taken to ensure that electromagnetic radio frequency energy radiated from the equipment should not be a hazard to personnel.
- 1.2.12 Equipment containing elements such as vacuum tubes which are likely to cause X-radiation should comply with the following requirement:
- (1) External X-radiation from the equipment in its normal working condition should not exceed the limits laid down by the Administration concerned.
 - (2) When X-radiation can be generated inside the equipment above the levels laid down by the Administration, a prominent warning should be fixed inside the equipment and the precautions to be taken when working on the equipment should be included in the equipment manual.

(**Note:** Where a digital input panel with the digits "0" to "9" is provided, the digits should be arranged to conform with the relevant recommendations of Comité Consultatif International Télégraphique et Téléphonique (CCITT) of the International Telecommunication Union (ITU). However, where an alphanumeric keyboard layout, as used on office machinery and data processing equipment, is provided, the digits "0" to "9" should be arranged to conform with the relevant standard of the International Standard Organization (ISO).
 - (3) If malfunction of any part of the equipment can cause an increase in X-radiation, adequate advice should be included in the information about the equipment, warning of the circumstances which could cause the increase and stating the precautions which should be taken.
- 1.2.13 Reasonable and practicable procedures should be taking to ensure the electromagnetic compatibility between the navigational equipment and other equipment on board.
- 1.2.14 Mechanical noise from all units of navigational equipment should be limited so as not to prejudice the hearing of sounds on which the safety of the vessel might depend. The noise level, produced by the navigational equipment and its associated units installed in the navigation bridge, chart room and other spaces sensitive to noise, should not exceed 65 dB(A).
- 1.2.15 Each unit of equipment normally to be installed in the vicinity of a standard compass or a magnetic steering compass should be clearly marked with the minimum safe distance at which it may be mounted from such compasses.

- 1.2.16 The type of protective casing for navigational equipment should be appropriate to the conditions of the location where such equipment is installed.
- 1.2.17 Cables feeding the navigational equipment should be laid out in compliance with the relevant requirements of section 2-1 of this chapter.
- 1.2.18 Equipment should be so designed that the main units can be replaced readily, without elaborate recalibration or readjustment.
- 1.2.19 Where applicable, equipment should be so constructed and installed that it is readily accessible for inspection and maintenance purposes.
- 1.2.20 Navigational equipment should be fitted with an identification plate marked clearly visible, the manufacturer, model type and serial number, date of manufacture, and the identity marking of the inspection organization.
- 1.2.21 Every vessel should carry personnel qualified for distress and safety radiocommunication purposes. The personnel should be holders of certificates specified in the Radio Regulations as appropriate issued by the Administration, any one of whom should be designated to have primary responsibility for radiocommunications during distress incidents.

2 Equipment requirements

2.1 Provision of navigational equipment

- 2.1.1 Navigational equipment for various sea-going vessels should be provided depending on the navigation areas, vessel's purpose, and gross tons, in accordance with the provisions of 2.1.3 of this Section. For the classification of navigation areas, see the Main Principles of this Code.
- 2.1.2 The navigational equipment required by this Section, after special consideration by Marine Department, may be replaced by other equipment equivalent thereto.
- 2.1.3 Cargo vessels should be provided with navigational equipment depending on the navigation areas and gross tonnage of the vessel, complying the requirements specified in the table 2.1.3.

Requirements of cargo vessel navigational equipment

Table 2 1.3

Equipment quantity	Navigation areas	Coastal class A plying zone	Coastal class B plying zone	Requirements of equipment
Navigational equipment				
Standard magnetic compass		1	1	Sips \geq 300 gross tons, Vessels < 300 gross tons require only a steering magnetic compass
Steering magnetic compass		1	1	Sips \geq 300 gross tons, may be waived if fitted with reflected magnetic compass
Spare magnetic compass		1	1	Sips \geq 300 gross tons, may be waived if already fitted with steering magnetic compass or gyro-compass
Gyro-compass		1		Vessels \geq 5000gross tons
Gyro repeaters for taking bearings		2		If the gyro repeaters for taking bearings are fitted at the bridge wings that are under sun shaded casing, an additional gyro repeater should be installed on the exposed deck on top of the navigation bridge.
Gyro-compass, repeater for- heading information		Depends on the number required		At least provided at the main steering position (except can be clearly readable from the master gyro-compass) and at the emergency steering position
Rudder angle indicator		1	1	Vessels \geq 500gross tons
Propeller revolution indicator		1	1	
Radar		1	1	(1) Cargo vessels \geq 500gross tons (2) Radar installation should be capable of operating in the GHz frequency band
Electronic position-fixing equipment (GPS)		1	1	Vessels \geq 500gross tons
Echo sounding device		1	1	Vessels \geq 500gross tons
Hand sounding lead		1	1	Vessels \geq 500gross tons
AIS		1	1	Vessels \geq 500gross tons

2.2 Nautical publications

2.2.1 All vessels should carry adequate and up-to-date charts, sailing directions, lists of lights, notices to mariners, tide tables and all other nautical publications necessary for the intended voyage.

3 Performance standards

3.1.1 All navigational equipment installations required under the provisions of this Section should be of an approved type accepted by Marine Department. The performance standards of such navigational equipment should comply with Appendix 1 “Standard and acceptance of material and equipment”.

Section 6 Safety on carriage of cargoes

1 General provisions

1.1 Application

- 1.1.1 This Section applies to the carriage of cargoes (except liquids in bulk, gases in bulk and those aspects of carriage covered by other regulations) which, owing to their particular hazards to vessels or persons on board, may require special precautions in all vessels. However, for cargo vessels of less than 500 gross tons, if it is considered that the sheltered nature and conditions of voyage are such as to render the application of any specific requirements of 1 and 2 of this Section unreasonable or unnecessary, other effective measures may be taken to ensure the required safety for these vessels subject to agreement.
- 1.1.2 To supplement the provisions of 1 and 2 of this Section, appropriate information on cargo and its stowage and securing should be provided, specifying, in particular, precautions necessary for the safe carriage of such cargoes.

1.2 Cargo information

- 1.2.1 The shipper should provide the master or his representative with appropriate information on the cargo sufficiently in advance of loading to enable the precautions which may be necessary for proper stowage and safe carriage of the cargo to be put into effect. Such information should be confirmed in writing and by appropriate shipping documents prior to loading the cargo on the vessel.
- 1.2.2 The cargo information should include:
- (1) In the case of general cargo, and of cargo carried in cargo units, a general description of the cargo, the gross mass of the cargo or of the cargo units, and any relevant special properties of the cargo.
 - (2) In the case of bulk cargo, information on the stowage factor of the cargo, the trimming procedures and, in the case of a concentrate or other cargo which may liquefy, additional information in the form of a certificate on the moisture content of the cargo and its transportable moisture limit.
 - (3) In the case of a bulk cargo not classified in accordance with the provisions for category of dangerous goods, but which has chemical properties that may create a potential hazard, in addition to the information required by the preceding subparagraphs, information on its chemical properties.
- 1.2.3 Prior to loading cargo units on board vessels, the shipper should ensure that the gross mass of such units is in accordance with the gross mass declared on the Shipping documents.

1.3 Oxygen analysis and gas detection equipment

- 1.3.1 When transporting a bulk cargo which is liable to emit a toxic or flammable gas, or cause oxygen depletion in the cargo space, an appropriate instrument for measuring the concentration of gas or oxygen in the air should be provided together with detailed instructions for its use. Such an instrument should be subject to approval.

1.3.2 The competent authorities should take steps to ensure that crews of vessels are trained in the use of such instruments.

1.4 The use of pesticides in vessels

1.4.1 Appropriate precautions should be taken in the use of pesticides in vessels, in particular for the purposes of fumigation.

1.5 Stowage and securing

1.5.1 Cargo and cargo units carried on or under deck should be so loaded, stowed and secured as to prevent as far as is practicable, throughout the voyage, damage or hazard to the vessel and the persons on board, and loss of cargo overboard.

1.5.2 Cargo carried in a cargo unit should be so packed and secured within the unit as to prevent, throughout the voyage, damage or hazard to the vessel and the persons on board.

1.5.3 Appropriate precautions should be taken during loading and transport of heavy cargoes or cargoes with abnormal physical dimensions to ensure that no structural damage to the vessel occurs and to maintain adequate stability throughout the voyage.

1.5.4 Containers should not be loaded to more than the maximum gross weight indicated on the Safety Approval Plate.

2 Special provisions for bulk cargoes other than grain

2.1 Acceptability for shipment

- 2.1.1 Prior to loading a bulk cargo, the master should be in possession of comprehensive information on the vessel's stability and on the distribution of cargo for the standard loading conditions.
- 2.1.2 Concentrates or other cargoes which may liquefy should only be accepted for loading when the actual moisture content of the cargo is less than its transportable moisture limit. However, such concentrates and other cargoes may be accepted for loading provided that safety arrangements are made to ensure adequate stability in the case of cargo shifting, and also the vessel has adequate structural integrity.
- 2.1.3 Prior to loading a bulk cargo which is not a cargo classified in accordance with the provisions for category of dangerous goods but which has chemical properties that may create a potential hazard, special precautions for its safe carriage should be taken.

2.2 Loading and stowage of bulk cargoes

- 2.2.1 Bulk cargoes should be loaded and trimmed reasonably level, as necessary, to the boundaries of the cargo space so as to minimize the risk of shifting and to ensure that adequate stability will be maintained throughout the voyage.
- 2.2.2 When bulk cargoes are carried in tween-decks, the hatchways of such tween-decks should be closed in those cases where the loading information indicates an unacceptable level of stress of the bottom structure if the hatchways are left open. The cargo should be trimmed reasonably level and should either extend from side to side or be secured by additional longitudinal divisions of sufficient strength. The safe load-carrying capacity of the tween-decks should be observed to ensure that the deck-structure is not overloaded.

3 Carriage of grain cargoes

3.1 Application

3.1.1 Regulation 3 of this Section only applies to vessels engaged on non-international voyages in the carriage of grain in bulk, including special purpose vessels, multi-purpose vessels and general dry cargo vessels,

3.1.2 After partly unloading bulk grain from the partly filled compartments, the vessel should comply with the following conditions:

- (1) The vessels should have sufficient longitudinal strength, and no excessive stress on the hull should be avoided after unloading.
- (2) The master should be familiar with the weather conditions to be possibly encountered during the voyage. And take precautions against bad weather in time or delay the voyage.
- (3) Partly filled compartments should be as few as possible to reduce the heeling moment.
- (4) Partly filled compartments should be trimmed to keep the vessel upright.

3.2 Definition

- (1) Grain: includes wheat, maize (corn), oats, rye, barley, rice, pulses and seeds and processed forms thereof, whose behaviour is similar to that of grain in its natural state.
- (2) Filled compartment - trimmed: means any compartment in which, after loading and trimming in accordance with requirements of 3.6.2 of this Section, the bulk grain is at its highest possible level.
- (3) Filled compartment – untrimmed: means a cargo space which is filled to the maximum extent possible in way of the hatch opening but which has not been trimmed outside the periphery of the hatch opening;
- (4) Partly filled compartment: means any cargo space in which bulk grain is in the manner prescribed in 3.2.1(2) and 3.2.1(3) of this Section.
- (5) Combined filled compartment: means a cargo space regarding the bottom tank and its above tween-deck cargo space as one compartment for loading without closing the hatch covers of the bottom tank when the bulk grain is carried on a multi-purpose vessel or general dry cargo vessel.
- (6) Specially suitable compartment: means a cargo space constructed with not less than 2 vertical or sloping, longitudinal, grain-tight divisions which are coincident with the hatch side girders or so positioned as to limit the effect of any transverse shift of grain, and if sloping, have an inclination of not less than 30° to the horizontal.
- (7) Grain shifting heeling moment: means the heeling moment due the shift of grain in cargo holds.
- (8) Permissible heeling moment: means the maximum heeling moment of grain shift subjected by the vessel in accordance with the vessel's characteristics and the stability requirements of any vessels in 3.5.2 of this Section for the carriage of grain in bulk.

- (9) Angle of flooding (θ_f): means an angle of heel at which openings in the hull, superstructures or deckhouses, which cannot be closed weathertight, immerse. In applying this definition, small openings through which progressive flooding cannot take place need not be considered as open.
- (10) Stowage factor: means the volume per unit weight of the cargo.

3.3 Document of authorization

- 3.3.1 A document of authorization should be issued for every vessel loaded in accordance with provisions of 3 of this Section either by Marine Department or authorized surveyor or authorized organization as evidence that the vessel is capable of complying with the requirements of 3 of this Section.
- 3.3.2 A copy of document of authorization, grain loading stability data and instrument of ratification for grain loading should be placed on board in order that the master, if so required, should produce them for the inspection of the competent authorities of the port of loading.
- 3.3.3 A vessel without such a document of authorization should not load grain until the master demonstrates to the satisfaction of the competent authorities of the port of loading that the vessel in its loaded condition for the intended voyage complies with the requirements of 3 of this Section.

3.4 Information regarding vessel's stability and grain loading

- 3.4.1 Information regarding vessel's stability and grain loading should be provided to enable the master to ensure that the vessel complies with 3 of this Section when carrying grain in bulk on voyage. This information should include the following:
- (1) The approved information should included:
- (i) curves or tables of volumes, vertical centres of volumes and assumed volumetric heeling moments for every compartment, filled or partly filled, or loaded in combination thereof;
 - (ii) tables of maximum permissible heeling moments or other information sufficient to allow the master to demonstrate compliance with the requirements of 3.5 of this Section;
 - (iii) typical loaded service departure and arrival conditions^① and where necessary, the intermediate worst service conditions;
 - (iv) a worked example for the guidance of the master;
 - (v) loading instructions in the form of notes summarizing the requirements of 3 of this Section.
- (2) Information should be submitted for approval including:
- (i) vessel's principal dimensions and particulars;

^① It is recommended that loading conditions be provided for 4 representative stowage factors, e.g. 1.17, 1.25, 1.50 and 1.75 m³/t.

- (ii) lightship displacement and the vertical distance from the intersection of the moulded base line and midship section to the centre of gravity (KG);
- (iii) table for correction free surface effects of liquids;
- (iv) tank capacity and the position of its centroid;
- (v) curve or table of flooding angles corresponding to the range of operating drafts (or displacement);
- (vi) curves or tables of hydrostatic properties suitable for the range of operating drafts;
- (vii) cross curves of stability, including curves at 12° and 40° .

3.5 Stability requirements

3.5.1 The vessels carrying bulk grain should be in compliance with the requirements of intact stability of Section 7 of this Chapter for dry cargo vessels.

3.5.2 The intact stability characteristics of any vessel carrying bulk grain should be shown to meet, throughout the voyage, at least the following criteria after taking into account in the manner described in 3.7 of this Section, the heeling moments due to grain (See Figure 3.5.2):

- (1) the angle of heel due to the shift of grain should not be greater than 12° , or in the case of vessels constructed on or after 1 January 1994 the angle at which the deck edge is immersed, whichever is the lesser;
- (2) in the righting arm curve, the residual stability area (A) between the heeling arm curve and the righting arm curve up to the angle of heel of maximum difference between the ordinates of the two curves, θ_m or 40° or the angle of flooding θ_f , whichever is the least, should in all conditions of loading be not less than $0.075 \text{ m} \cdot \text{rad}$;
- (3) the initial metacentric height, after correction for the free surface effects of liquids in tanks, should be not less than 0.3 m .

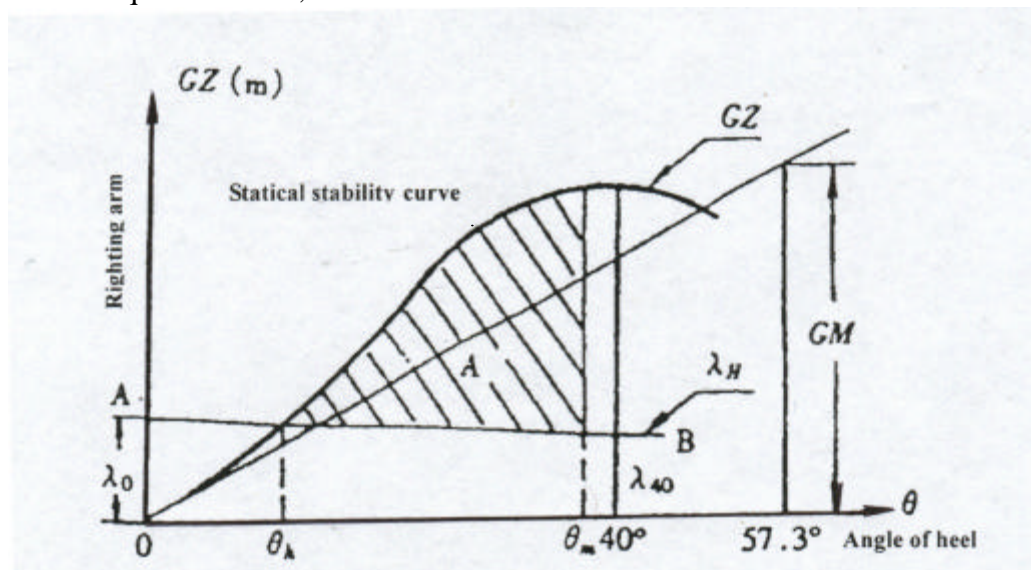


Figure 3.5.2 Intact stability characteristics of vessels carrying bulk grain

- (i) In Figure: GZ – righting arm curve
 H assumed heeling arm curve due to transverse grain shift (may be represented by horizontal straight line);
 GM metacentric height, m;
 θ_h angle of heel due to grain transverse shift, ($^\circ$);
 θ_m angle of heel at the maximum difference of the ordinates between the curves of GZ and H , ($^\circ$);
 A the area of residual stability between the ordinates of the curves GZ and H at θ_m or 40° or angle of flooding θ_f , (whichever is the least angle), (m·rad);
 θ_0 assumed heeling arm due to transverse grain shift at 0° , m;

$$\theta_0 = \frac{M_H}{SF \cdot \Delta}$$

- where: M_H assumed volumetric heeling moment due to grain transverse shift m^4 ;
 SF grain stowage factor, m^3/t ;
 Δ loaded displacement (tonnes), t;
 $\theta_{40} = 0.8 \theta_0$
 θ_{40} assumed heeling arm due to transverse grain shift at 40° , m;

- (ii) The righting arm curve should be derived from the vessel's stability cross curves. The cross curves should be sufficient in number to accurately define the curve for the purpose of these requirements and should include cross curves for 12° and 40° .

3.5.3 Before loading bulk grain the master should demonstrate the ability of the vessel at all stages of any voyage to comply with the stability criteria required by 3 of this Section.

3.5.4 After loading, the master should ensure that the vessel is upright before proceeding to sea.

3.6 Stowage of bulk grain

3.6.1 All necessary and reasonable trimming should be performed to level all free grain surfaces and to minimize the effect of grain shifting.

3.6.2 In any filled compartment, trimmed, the bulk grain should be trimmed so as to fill all spaces under the decks and hatch covers to the maximum extent possible.

3.6.3 In any filled compartment, untrimmed, the bulk grain should be filled to the maximum extent possible in way of the hatch opening but may be at its natural angle of repose outside the periphery of the hatch opening. One of the following filled compartment may qualify for being classified as such compartment provided meeting the:

- (1) dispensation granted from trimming in respect of the compartment or in cases where the under-deck void geometry resulting from free flowing grain into a compartment, which may be provided with feeder ducts, perforated decks or other similar means, is taken into account when calculating the void depths;
- (2) dispensation granted from trimming the ends of the compartment in cases where the compartment is a specially suitable compartment defined in 3.2.1(6) of this section.

- 3.6.4 If there is no bulk grain or other cargo above a lower cargo space containing grain, the hatch covers should be secured in an approved manner having regard to the mass and permanent arrangements provided for securing such covers.
- 3.6.5 When bulk grain is stowed on top of closed tween-deck hatch covers which are not grain-tight, such covers should be made grain-tight by taping the joints, covering the entire hatchway with tarpaulins or separation cloths, or other suitable means.
- 3.6.6 After loading, all free grain surfaces in partly filled compartments should be level.
- 3.6.7 Lower cargo spaces and tween-deck spaces in way thereof may be loaded as one compartment provided that, in calculating transverse heeling moments, proper account is taken of the flow of grain into the lower spaces.
- 3.6.8 In filled compartments, trimmed, filled compartments, untrimmed; and partly filled compartments, longitudinal divisions may be installed as a device to reduce the adverse heeling effect of grain shift provided that:
- (1) the division is grain-tight and the construction subject to agreement; the construction subject to agreement;
 - (2) in tween-decks the division extends from deck to deck;
 - (3) in a fully filled compartment, trimmed the division extends downwards from the lower edge of the deck or hatch covers to 0.6 m below the lowest point of main deck girder;
 - (4) in a partly filled compartment, a longitudinal division, if fitted, should extend from 1/8 of the breadth of the maximum compartment above the level of the grain surface and to the same distance below the grain surface.

3.7 Assumed volumetric heeling moment and permissible heeling moment

- 3.7.1 Assumption of grain surface: for filled and partly filled compartments, it should be assumed that the angle of grain surface to the horizontal after shifting should be 12°.
- 3.7.2 Calculation of assumed volumetric heeling moment:
- (1) For the vessels having information of assumed volumetric heeling moment calculated in accordance with the requirements of Annex 1B, Chapter IV of the «Technical Regulation for the Statutory Surveys of Sea-going Ships engaged on International Voyages», the assumed volumetric heeling moment for vessels engaged on non-international voyages may be obtained by using volumetric heeling moment from this information multiplied by the following factors:
 - (i) the volumetric heeling moment of fully filled compartments untrimmed and partly filled compartments to be multiplied by 0.46;
 - (ii) the volumetric heeling moment of fully filled compartments trimmed to be multiplied by 0.8.

- (2) For vessels not having the above-mentioned information in 3.7.2(1) of this section:
- (i) the assumed volumetric heeling moment of partly filled compartments may be obtained from the following formula:

$$M_h = 0.0177lb^3 \quad (\text{m}^4)$$

where: l length of the partly filled compartment, m;

b grain of maximum surface breadth the partly filled compartment, m;

- (ii) In fully filled compartments, where the bulk grain is trimmed in accordance with the requirements of 3.6.2 of this Section, the volumetric heeling moment of these compartments may be neglected.

3.7.3 Permissible heeling moment:

- (1) For the vessels having the curves or tables of permissible heeling moment mentioned in Annex 1A6.3.2, chapter IV of the «Rules and regulations for the survey of sea-going ships engaged on international voyages», the permissible heeling moment in such curves or tables may be applied.
- (2) For the vessels not having the information mentioned in 3.7.2(1) of this section, the permissible heeling moment may be obtained from the following formula:

$$M_a = 0.228GM \cdot \Delta \quad (\text{tm})$$

where: GM initial metacentric height of calculated loading condition, m;

Δ displacement of calculated loading condition, t;

- (3) Where the stability calculation is carried out, it should be assumed that the centre of gravity of cargo in fully filled compartments (trimmed or untrimmed) is taken to be the volumetric centre of the whole cargo compartment; the weight of cargo in fully filled compartments trimmed should be taken as the volume of the cargo space divided by the stowage factor; the weight of cargo in fully filled compartments untrimmed should be taken as the volume of the cargo (deduction of any void outside the boundaries of cargo hatchways) divided by the stowage factor.

Section 7 Intact stability

(Refer to the provisions stipulated in paragraphs 2(2) and 2(3) “Structural Strength and Stability”, Part I “ships in general”, schedule 4 “Conditions of Assignment” of the 《Merchant Shipping (Safety) (Load Line) Regulations》 and its amendments).

Section 8 Lights, shapes and sound signal requirements

(Refer to the 《Merchant Shipping (Safety) (Signals of Distress and Prevention of Collisions) Regulations?)

NOTE: 《Merchant Shipping (Safety) (Signals of Distress and Prevention of Collisions) Regulations》 implements the 《International Regulations for Preventing Collisions at Sea 1972》, as amended, in accordance with the Resolution A. 464(XII) of Inter-governmental Maritime Consultative Organization and Resolutions A.626(15), A.678(16) and A.736(18) of International Maritime Organization.

Chapter 5 Construction and Equipment for Prevention of Pollution from Vessels

Refer to the 《Merchant Shipping (Prevention of Oil Pollution) Regulations》, 《Merchant Shipping (Control of Pollution by Noxious Liquid Substances in Bulk) Regulations》 and 《Merchant Shipping (Prevention of Pollution by Garbage) Regulation》 and their amendments are applicable to coastal trading vessels

NOTE: 《Merchant Shipping (Prevention of Oil Pollution) Regulations》 implements the provisions of the 《International Convention for the Prevention of Pollution from Ships, 1973》. 《Merchant Shipping (Prevention of Oil Pollution) Regulations》 should apply to all vessels, whether within or outside the waters of Hong Kong. Hong Kong vessels of 400 GRT and above, in addition to the requirements of annual survey and intermediate survey (Regulations 5 and 6), should have to be surveyed at intervals not exceeding five years (Regulation 4(1)). Every vessel of this type should carry on board an International Oil Pollution Prevention Certificate (Regulation 7(7)) and an Oil Record Book (Regulation 10). This Regulation stipulates also the technical provisions and requirements of the segregated oil cargo loading and water ballasting.

《Merchant Shipping (Control of Pollution by Noxious Liquid Substances in Bulk) Regulations》implements the provisions of the Annex 2, 1978 and 1985 amendments to the 《International Convention for the Prevention of Pollution from Ships, 1973》. This Regulation stipulates that the discharge of noxious liquid substances or mixture substances into sea is prohibited, and also controls of the discharge of residual of such substances (Regulations 3, 5, 6, 11, 12 and 13). Regulation 14 further stipulates the prohibition of the discharge into the sea of any un-assessed liquid substance carried in bulk, or of a residual mixture containing any such substance. This Regulation also stipulates that vessel cargo tank washings should be carried out in compliance with the relevant procedures (Regulations 4, 8 and 10). Every vessel should carry on board its Procedures and Arrangements Manual complying with the IMO Standards (Regulation 19), and should be provided with the equipment and arrangements identified in its Procedures and Arrangements Manual (Regulation 22). Every vessel should carry on board a Cargo Record Book to record down the operations in respect of any noxious liquid substance. Every vessel should be surveyed in accordance with the applicable provisions of the Regulation, and should carry on board an International Pollution Prevention Certificate for the Carriage of Noxious Liquid Substances in Bulk or an equivalent certificate issued by the Government of Hong Kong Special Administrative Region of the Peoples' Republic of China. In addition, the condition of the vessel and its equipment should be maintained so as to conform to the provisions of these Regulations (Regulations 23 to 25).

《Merchant Shipping (Prevention of Pollution by Garbage) Regulation》 implements the 1978 Protocol amendments to the 《International Convention for the Prevention of Pollution from Ships, 1973》 and the provisions of clauses 1 to 6 of its Annex V. This Regulation applies to Hong Kong vessels wherever they may be and to other vessels while they are within the waters of Hong Kong. This Regulation is for the control of garbage disposal from vessels including plastics, other than plastic, food wastes and all other refuse, within or outside a Special Area.

Chapter 6 Crew Accommodation Requirements

Section 1 General Principles

1 Application

- 1.1 Unless expressly provided otherwise, this Chapter should apply to coastal cargo vessels of 1000 gross tons and over. For the coastal cargo vessels of less than 1000 gross tons, the provisions of this Chapter are only for reference.
- 1.2 All vessels built before coming into force of this Chapter, which undergo major modifications or alterations, should comply with the requirements of this Chapter as much as practicable.
- 1.3 Where reasonable and practicable, this Chapter is also applicable to tugs and the accommodation of persons working on board the vessels engaged in usual operations at sea.
- 1.4 In addition, the crew accommodation equipment should comply with the applicable provisions of the Main Principles and Chapter 1 of this Code.

2 Definition

- 2.1 The definitions of this Chapter are as following:
 - (1) Crew accommodation: includes such sleeping rooms, mess rooms, sanitary accommodation, hospital accommodation and recreation accommodation as provided for the use of the crew.
 - (2) Officers: means the persons other than a master ranked as chief officer, second officer, third officer, chief engineer, second engineer, third officer, electrician, petty officer, radio officer, radio operator, medical doctor and pilot etc.;
 - (3) Ratings: means the crew members other than the master, chief engineer and other officers.

Section 2 Crew accommodation and facilities

1 Sleeping rooms

1.1 Sleeping rooms should be situated above the deepest load line amidship or aft.

In exceptional cases, if the size, type or intended service of the vessel render any other location unreasonable or impracticable, the location of the sleeping rooms in the fore part of the vessel may be permitted subject to agreement, but in no case forward the collision bulkhead.

The sleeping room of the radio operator should be situated as near as practicable to the radio station, but in no case situated within the station.

1.2 The number of ratings occupying sleeping room should in general be two persons per room

1.3 The number of officers occupying sleeping room should generally be one person per room.

1.4 Where practicable in vessels of 3000 gross tons or over, an adjoining sitting room or day room should be provided to the master, chief engineer and chief officer in addition to their sleeping room.

1.5 The floor area per person of sleeping rooms should not less than the requirements of Table 1.5.

Table 1.5

Crew grade	Gross Tonnage	< 3000	≥3000 < 10000	≥10000
	Floor area (m ² /person)			
Ratings (1 person per room)		3.75	4.25	4.75
Ratings (2 persons per room)		2.75	3.25	3.75
Officers		6.5	7.5	

1.6 when sleeping room fitted with adjoining sitting room or day room, the floor area of these adjoining sitting room or day room should generally be the same as that required by Table 1.5 for the rating (one person per room).

1.7 The floor area of the sleeping rooms of the master and chief engineer should not be less than that as required by Table 1.5 for the officers' room.

1.8 Space occupied by berths and lockers, chests of drawers and seats should be included in the measurement of the floor area. Small or irregularly shaped spaces, which do not add effectively to the space available for free movement and cannot be used for installing furniture should be excluded. Measurement should be taken from the inner side of the panelling of the sleeping room.

- 1.9 In the case of vessels in which are employed such groups of ratings as necessitate the employment of a substantially larger number of ratings than would otherwise be employed, the minimum floor area of sleeping rooms per person may be reduced subject to agreement, but should generally subject to the following requirements:

Table 1.9

Gross tonnage	Floor area (m ² /person)
< 3000	1.67
≥ 3000	1.85

- 1.10 The berths in sleeping rooms should be made of hard, non warping, smooth material, and not likely to corrode.
- 1.11 Members of the crew should be provided with individual berths. The minimum inside dimensions of a berth should be 1980 mm x 800 mm. Berths should be arranged in the longitudinal direction of vessel and should avoid to place along the vessel's side. Berths should not be arranged in tiers of more than two and the lower berth in a double tier should be not less than 300 mm above the floor. The upper berth should be placed approximately midway between the bottom of the lower berth and the ceiling of the sleeping room.
- 1.12 If tubular frames are used for the construction of berths, they should be completely sealed and without perforations which would give access to vermin.
- 1.13 Each berth should be fitted with a spring bottom or a spring mattress and provided with quilts or blanket, pillows and warming gears. When one berth is placed over another a dust-proof bottom of wood, canvas or other suitable material should be fitted beneath the spring bottom of the upper berth.
- 1.14 Each berth should be provided with an unobstructed access to the berth side. When two single berths are arranged in a room the distance between any points of the bedsides of the two berths should not be less than the requirements of Table 1.14.

Table 1.14

Berth type	Minimum distance between berths (mm)
Single berth	750
Double tier berth	900

- 1.15 All sleeping berths should be fitted with bed curtains, which can be effectively enveloping the berths.
- 1.16 Each sleeping room should be provided with a table or desk, a mirror, a small cabinet for toilet requisites (may be exempted if separate toilet is fitted), a book rack, comfortable seating or sofa, and a sufficient number of coat hooks.

- 1.17 Each crew member should be provided with a lockable clothes locker. The clothes lockers should be at least 1.52 m in height and of a cross-section area not less than 0.2 m². In addition, a drawer or equivalent space not less than 0.056 m³ should be provided.
- 1.18 Side scuttles or windows of crew sleeping rooms should be fitted with curtains, light shades or fixed shutters.

2. Mess room

- 2.1 Mess room should be located apart from the sleeping rooms and as close as practicable to the galley.

Where the mess room and galley are not located on the same deck level, consideration should be given to provide as adequate food lift between the mess rooms and the galley.

- 2.2 Separate mess rooms should be normally provided for the following crew members:

- (1) master, chief engineer and officers;
- (2) ratings.

If it is impracticable to satisfy the above requirements, one communal mess room for all crew members may be accepted subject to agreement.

- 2.3 If practicable, a separated suitable mess room should be provided for the catering department. In vessels of 5000 gross tons and over, a separate small mess room should be provided for the persons on watch.

- 2.4 The floor area of mess rooms for officers and for ratings should not be less than 1 m² per person for the total number of persons likely to use it at any one time.

- 2.5 Mess rooms should be equipped with tables and seats sufficient for the number of persons likely to use them at any one time. The width of the table should not be less than 600 mm for occupants sitting opposite, and 400 mm for occupants sitting by sides. The length of the table for each person should not be less than 500 mm. The tables and seats should be constructed of damp resisting material, without cracks and capable of being easily cleaned.

- 2.6 Where available pantries are not accessible to mess rooms, adequate lockers for mess utensils and proper facilities for washing utensils should be provided.

3 Recreation accommodation and offices

- 3.1 Each vessel should provide recreation accommodation conveniently situated and appropriately furnished, for officers and for ratings. When mess room is used as recreation room, same appropriately furnished equipment should also be provided in the mess room.

- 3.2 Furnishings for recreation accommodation should, as a minimum, include a bookcase and facilities for reading, writing and, where practicable for games.

- 3.3 Each oil tanker or similar cargo vessel should install a smoking room. For vessels of 8000 gross tons or over, a smoking room or library room in which films or television may be shown and a hobby and games room should be provided.
- 3.4 Deck space permanently reserved for the use of the crew for recreational purposes should be provided on an open deck. The space should be adequate in area having regard to the number of seafarers in the crew and the size of the vessel. Such spaces should be provided with protection from wind, sea and exhaust gases. Awnings should be provided on top of such spaces.
- 3.5 In all vessels wherever practicable, one room for the deck department and one room for the engine department should be provided and equipped for use as an office.

4 Sanitary facilities

- 4.1 The sanitary accommodation should be so arranged and equipped to avoid any infiltration of odour into the adjacent accommodation rooms, public spaces, provision stores, food stores, hospital spaces, mess rooms and galleys. The sanitary accommodation should not be installed inside the galley, mess room, provision store and food store. The sanitary accommodation should have efficiently drained, ventilated and illuminated facilities.
- 4.2 In vessels of 5000 gross tons or over but less than 15000 gross tons, individual sleeping rooms for 5 officers should generally have attached to them a separate private bathroom fitted with a water closet as well as a tub or shower bath and a wash basin having hot and cold running fresh water.
- 4.3 In vessels of 10000 gross tons or over but less than 15000 gross tons, in addition to the comply with the requirements of 4.2 of this Section, the sleeping rooms of all other officers should have private a private bathroom similarly fitted as required by 4.2 of this Section, or an intercommunicating bathroom between adjoining sleeping rooms.
- 4.4 In vessels of 15000 gross tons or over, individual sleeping rooms for officers should have attached to them a separate private bathroom fitted as required by 4.2 of this Section.
- 4.5 In vessels of 25000 gross tons or over, a bathroom for every two ratings should be provided, either in an intercommunicating compartment between adjoining sleeping rooms or opposite the entrances of such rooms, which should be fitted with a water closet as well as a tub or shower bath and a wash basin having hot and cold running fresh water.
- 4.6 In all vessels, if sanitary facilities can not be provided as required by 4.2 and 4.5 of this Section, then the officers and ratings should be provided at a convenient location, a minimum of one water closet and one tub or shower bath for every six persons or less. However, the minimum number of separate water closets should be provided:
- (1) in vessels less than 3000 gross tons, 4 each;
 - (2) in vessels of 3000 gross tons or over, 6 each.

- 4.7 For vessels where all crew members have private or semi private washrooms, communal washrooms fitted with sufficient water closets should also be provided at suitable locations on board.
- 4.8 In vessels of 5000 gross tons or over, each sleeping room for crew members where no washroom is fitted, should be provided with a wash basin having hot and cold running fresh water.
- 4.9 Cold and hot fresh water or means of heating water should be available in all communal wash places.
- 4.10 Wash basins and tub baths should be constructed of material with a smooth surface impervious not liable to crack, flake or corrode.
- 4.11 All water closets should be provided with an ample flush of water, available at all times and independently controllable.
- 4.12 Soil and waste pipes should be of adequate dimensions and should be so constructed as to minimize the risk of obstruction and to facilitate cleaning
- 4.13 Sanitary accommodation intended for the use of more than one person should be situated at an easily accessible location, but separate from sleeping rooms and washrooms, and without direct access from the sleeping rooms. Where the water closet is located in an inter communicating compartment between two sleeping rooms having a total of not more than four persons, direct access to the water closet from sleeping rooms may be permitted.
- 4.14 Where there is more than one water closet in a compartment, they should be sufficiently separated and screened, and the floor area of each water closet should not be less than 0.8 m².
- 4.15 Where the sleeping room of radio operator is remotely located, sanitary facilities near or adjacent thereto should be provided.
- 4.16 In vessels of 1600 gross tons or over, a separate sanitary accommodation should generally be provided for the following positions:
- (1) within easy access of the navigating bridge deck primarily for those on duty in that area;
 - (2) within easy access of the machinery space for the engine department crew on duty.
- 4.17 In vessels of 1600 gross tons or over, other than private sleeping rooms fitted with private or semi-private bathrooms are provided for engine department personnel, a changing room should generally be provided outside the machinery space within easy access to it, and fitted with individual clothes lockers as well as with tubs or shower baths and wash basins having hot and cold running fresh water.
- 4.18 When women are employed in a vessel, separate sanitary facilities should be provided for them. The standard of facilities should be referred to the relevant requirements as specified above.

4.19 Exclusive sanitary facilities should be provided in the hospital accommodation, fitted with water closets, wash tubs and wash basins.

4.20 In vessels, facilities for washing, drying and ironing clothes should be provided on a scale appropriate to the size of the crew and the normal duration of the voyage. These facilities should be located within easy access of their accommodation.

The facilities for washing clothes should include washing machines or suitable sinks. These facilities should be installed in separate clothes laundry room or washrooms, with adequate supply of hot and cold running fresh water or means of heating water. The facilities for drying clothes should include drying machine or adequately heated and ventilated drying room. Drying machine should be installed in the exclusive drying rooms. Drying rooms should be equipped with ropes or other equipment for hanging clothes

The facilities for ironing clothes should include with irons and ironing boards or other equivalents.

4.21 Sufficient and adequately ventilated compartments or lockers for the hanging of oilskins and other working clothes should be provided outside but convenient to the sleeping rooms.

5 Lighting equipment

5.1 All crew accommodations should be adequately lighted. If there are not two independent sources of electricity for lighting, additional lighting should be provided by properly constructed lamps or lighting apparatus for emergency use.

5.2 For crew accommodation provided with natural light, the minimum standard for natural lighting in living rooms should be such as to permit a person with a normal vision to read on a clear day an ordinary newspaper in any part of the space available for free movement. When it is not possible to provide adequate natural lighting, artificial lighting of the above minimum standard should be provided.

5.3 In sleeping rooms an electric reading lamp should be installed at the head of each berth.

6 Hospital accommodation

6.1 The hospital accommodation should be suitably situated and made up of a clinic and a ward. The arrangement of the entrance, berths, lighting, ventilation, heating and water supply should be designed to ensure the comfort and facilitate the treatment of the occupants.

6.2 In any vessel carrying a crew of 15 or more and engaged in a voyage of more than 3 days' duration, separate hospital accommodation should be provided.

6.3 At least one hospital berth should be provided in a ward, and the berth should be as far as practically separated from the clinic.

- 6.4 In vessels not carrying a doctor, the clinic may be exempted, however, a well ventilated medicine chest suitable for storing necessary medicaments and medical equipment with readily understandable instructions should be carried. The medicaments and medical equipment in the medicine chest should be provided by making reference to “Appendix 2 – Medical Stores”. The medicine chest should be situated in a dry and accessible position, and should be taken care of by a responsible crew member exclusively assigned for this duty.
- 6.5 Hospital accommodation should be provided with the necessary living facilities for use of the patients.
- 6.6 Hospital accommodation should not be used for other than medical purposes.

7 Heating, ventilation and noise

- 7.1 An adequate system of heating or air conditioning or mechanical means of ventilation or electric fans should generally be provided in the crew accommodation in accordance with the service area and climate conditions for vessels engaged on voyages.
- 7.2 The heating system should, when practicable, be in operation at all times when the crew is living or working on board and conditions require its use.
- 7.3 For a required heating system, the heating may be by means of steam, hot water, warm air or electricity.
- 7.4 The heating appliances should be so placed and, where necessary, shielded as to avoid risk of fire or danger or discomfort to the occupants.
- 7.5 Awnings or other efficient insulation materials should be provided for over exposed decks above crew accommodation, especially the sleeping rooms, equipped with air-conditioning or mechanical means of ventilation or electric fans.
- 7.6 In all vessels, the radio station and machinery central control room should generally be provided with air conditioning system.
- 7.7 Power for the operation of the means of air conditioning or mechanical means of ventilation or electric fans, where practicable, should be available at all times when the crew is living or working on board and conditions so required.
- 7.8 The installation of the means of ventilation should comply with the relevant requirements the recognized classification society or of other acceptable standard.

- 7.9 The number of air changes for the mechanical ventilation of the crew accommodation should not be less than that specified in Table 7.9.

Table 7.9

Compartments	Number of air changes per hour	
	Air supply	Air exhaust
Galley	20	40
Mess room	10	10
Pantry	10	20
Laundry room, drying room, bath room, toilet, vegetable store room, food store room	-	10
Sleeping room, clinic, sick room	10	10
Recreation room, meeting room, smoking room	10	10
Furniture room or other store room	-	5

- 7.10 Effectiveness of the heating system and air conditioning system on board should satisfy the provisions of Table 7.10. When re-circulation air conditioning is employed for the crew accommodation, 50% of the fresh air should be supplied.

Table 7.10

Facility	External temperature	External relative humidity	Internal temperature	Internal relative humidity
Air conditioning system	35°C	70%	28°C	50%
Heating system	-20°C	-	20°C	50%

- 7.11 The ventilation exhaust ducts for galleys, bathrooms, washrooms, lavatories, clinics and wards or other spaces that odour may be produced should be separated from the ventilation exhaust ducts of other compartments.

- 7.12 In all vessels, undue noise to crew accommodation and working spaces should generally comply with the recognized standards.

8 Structure and arrangement of accommodation, passageways and access openings

- 8.1 The location, means of access, structure and arrangement in relation to other spaces of crew accommodation should be such as to ensure adequate security, protection against weather and sea, and insulation from heat or cold, undue noise or effluvia from other spaces.

- 8.2 The passageways and means of access to the crew accommodation should be easily accessible for the crew to reach the open deck or lifeboat embarkation deck.

- 8.3 The minimum headroom in all crew accommodation where full and free movement is necessary should not generally be less than 1980 mm.
- 8.4 In spaces, other than the machinery spaces, which are accessible to or normally occupied by the crew members, means of escape should be provided. The means of escape should comply with the relevant provisions of Chapter 4 of this Code.
- 8.5 Unless expressly provided otherwise, there should be no direct openings into sleeping rooms from the following spaces:
Cargo spaces, machinery spaces, galleys, lamp rooms, paint rooms, engine stores, deck stores, drying room, communal wash places or water closets
- That part of the bulkhead separating such spaces from sleeping rooms and external bulkheads should be efficiently constructed of steel or other suitable material, and should be watertight and gastight.
- 8.6 All machinery casings and all boundary bulkheads of galleys and other spaces in which heat is produced should be adequately insulated where there is a possibility of resulting heat effects in adjoining accommodation or passageways.
- Protection against heat effects from steam and hot water service pipes should be provided.
- 8.7 Rooms and passageways in the crew accommodation space should be adequately insulated to prevent condensation or overheating.
- 8.8 Main steam and exhaust pipes for winches and similar gear should not pass through crew accommodation. When it must be required, such pipes should only be passing through the passageways leading to crew accommodation and should be adequately insulated and encased.
- 8.9 Inside panelling or sheeting of crew sleeping room ceiling should be of suitable material with surface easily kept clean. Tongued and grooved boarding or any other form of construction likely to harbour vermin should not be used.
- Bulkheads, ceilings and decks in spaces producing the noise should, in general, be provided with acoustic insulation and other suitable sound-absorbing materials. Machinery spaces should be installed with self-closing sound-proof doors.
- 8.10 Floors in the sanitary accommodation should be made of durable material, easily cleaned and impervious to damp and should be provided with means of slip protection. The bulkheads of sanitary accommodation should be of steel or other suitable material and should be watertight at least up to the top of door sills from the deck.
- 8.11 Galleys should be located as close as practicable to the mess rooms, and remotely from water closets, hospital accommodation and bathrooms.
- No passageways leading to other spaces are permitted to pass through the galley, and special attention should be paid to avoid the penetration of cooking odour into the crew accommodation and mess rooms. Galleys should not be situated above the spaces of high temperature, otherwise, special attention should be paid to heat insulation.
- 8.12 Floors in the galley should be made of durable material, easily cleaned and be provided with means of slip protection. Where a range is located close to the bulkhead,

the space between the range and the bulkhead should be at least 150 mm, and the bulkhead should be provided with insulation material, encased by galvanized iron sheet. The insulation should be projected 30 mm above the range. The exhaust smoke duct of the range should comply with the relevant requirements of Chapter 4 of this Code. The fuel oil tank supplying the range should be situated outside the galley in general and comply with the requirements of fire protection.

- 8.13 Within the crew accommodation areas, inter deck stairways should be fitted. The stairway should be made of steel, and its inclination to horizontal should not be more than 60°. The clear width of stairways should not be less than 800 mm, the vertical distance between steps should not be greater than 250 mm, and the horizontal depth of the steps should not be less than 173 mm. Stairway steps should be provided with means of slip protection. When the height of the stairway is more than 1000 mm, hand rails should be fitted.
- 8.14 The minimum width of various passageways should not be less than 800 mm.
- 8.15 Within the crew accommodation, storm rails of 32 mm outside diameter should be fitted along one side of the passageways as necessary. The storm rails should be made of non-combustible material.
- 8.16 Doors to the open deck should be appropriate to their positions. Doors exposed to weather and without overhung deck above, except watertight doors, should be provided with a rain shade. When the height of door sill is equal to 380 mm or over, it is recommended that a foot step be fitted. The width of all doorways and passageways or stairways should be suitable, and in no case less than 0.6m. The width of doorways for mess rooms and public spaces should not be less than 0.8m.
- 8.17 Doors of sleeping rooms should be opened inwards. Except that the sleeping room is provided with an approved emergency escape porthole, all the doors of sleeping rooms should be fitted with an emergency escape exit at the lower half of the door, having a size of not less than 350 mm x 450 mm.
- 8.18 The doors of mess rooms, conference rooms, recreation rooms, smoking rooms and other public spaces should be opened outwards or should be capable of being opened from both sides. Doors of refrigerated chambers should be opened outwards and should be capable of being operated from both sides. Sound and light alarms should be fitted outside the refrigerated chambers, which should be capable of being operated from inside.
- 8.19 If a radio station has no direct access to the open deck, two means of escape from or access to such station should be provided, one of which may be a porthole or window of sufficient size or another means subject to agreement.
- 8.20 Unless the crew accommodations are provided with air conditioning and the doors therein are of self closing type, provision should be made to protect the crew's quarters against the admission of mosquitoes by the fitting of suitable screens to side scuttles or windows, ventilators and doors to the open deck. The screen should be made of corrosion resistant metal wires or other suitable materials.
- 8.21 All doors of crew accommodation rooms should be fitted with a marking plate to clearly indicate the purpose of the rooms.

9 Drinking water and fresh water

- 9.1 In every vessel, fresh water should be supplied from tanks of suitable capacity taking account of the total number of the crew and the maximum number of days of voyages. Each member of crew should be supplied at least 20 litres of drinking water and 70 litres of washing water per day.
- 9.2 The drinking water and fresh water should have independent supply systems. The water supply systems should be so arranged and constructed as to prevent any possibility of contamination.
- 9.3 The piping for drinking water and fresh water is recommended to use copper or galvanized steel pipes, and the use of lead pipes is strictly prohibited.

Chapter 7 Lifting Appliances and Lifting Gear

The requirement of Rules and Regulations for the lifting appliances of cargo vessels engaged in coastal operation should be in accordance with the 《Code of Practice - Safety Standard of the Lifting Appliances on Coastal Cargo Vessels》 for survey and certification.

Chapter 8 Safety Management System

Section 1 General Provisions

1 Application

- 1.1 Every operator of coastal cargo vessels should develop, implement and maintain a Safety Management System (SMS) for the safe operation of the vessels and for pollution prevention.
- 1.2 The requirements of Safety Management System do not apply to operators of coastal cargo vessels if the operators have already complying with the requirements of the International Safety Management (ISM) Code.

2 Objectives

- 2.1 The purpose of developing a safety management system is to establish a common standard for the safe operation of cargo vessels employed in the coastal trade.
- 2.2 It is recognized that no two operations are the same, and that vessels vary in size and are employed under a wide range of different locations and conditions. For these reasons, this system is based on general principles and objectives, and expressed in such terms that it can be applied to a wide variety of vessels.
- 2.3 Safety management should be applied to every cargo vessel in coastal trade. The objectives of safety management are to ensure a simple and cost effective means of:
 - (1) ensuring safety on board;
 - (2) preventing human injury and loss of life; and
 - (3) complying with applicable regulations and codes.
- 2.4 Each operator should develop and implement safe practices, which include the following:
 - (1) a health and safety protection policy;
 - (2) procedures to ensure safe operation of vessels in compliance with relevant regulations or codes;
 - (3) lines of communication between personnel, ashore and afloat;
 - (4) procedures for reporting accidents; and
 - (5) procedures for responding to emergency situations.
- 2.5 The health and safety protection policy is required to include environmental protection issues only in so far as they relate to the safety of the vessel and the health and safety of persons onboard, and to the safety of other vessels and the health and safety of persons on those other vessels.

3 Health and Safety Protection Policy

- 3.1 The operator should ensure that the policy is implemented, and that responsibilities of all personnel are understood. There should be a designed link between the vessel and the shore base, to ensure that in the event of an emergency there is immediate communication with the emergency services.

4 Responsibilities

- 4.1 The master's responsibility should be laid down so that there is no misunderstanding. He has the authority to make decisions regarding the safety of the vessel and persons on board. Assistance should be available ashore from the company at all times.
- 4.2 The company should nominate an employee to be the Designated Person Ashore. The Designated Person Ashore should have access to the highest level of management of that company, and may fulfill the requirements in paragraph 2 of the Guidelines.

5 Personnel and Training

- 5.1 The operator should ensure that all persons employed in the operation of the vessels have received appropriate training for the duties they are required to fulfill and that they have an understanding of the relevant regulations and codes. Masters and crew should hold the appropriate qualifications.
- 5.2 Proper instruction in their duties should be received by personnel before the first occasion of sailing on the vessel as a designated crew member, and as necessary thereafter. This instruction should be recorded.

6 Onboard Procedures

- 6.1 There should be procedures in place for key shipboard operations with regard to safety. The tasks involved in these procedures should be assigned to designated personnel.

7 Preparation for Emergencies

- 7.1 Potential emergency situations should be identified, and exercises carried out to respond to these emergencies. Where appropriate, these exercises should involve the personnel ashore. The exercise should be recorded.

8 Reporting of Accidents

- 8.1 All accidents and hazardous situations should be recorded and reported to the operator, who should investigate, analysis and implement corrective action, with the aim of improving safety.

- 8.2 In addition, the Master should report to the Marine Accident Investigation Branch (MAIB) of Marine Department of all accidents, and should report to the local port Authority if the accident is occurred outside Hong Kong waters. The Local Vessels Safety Branch of Marine Department should also be reported, if the accident is such that the validity the Combined Vessel Safety and Vessel Safety Management Certificate might be affected.

9 Maintenance of the Vessel and Equipment

- 9.1 The operator should inspect each vessel at frequent intervals to ensure that it is properly maintained and operated in accordance with the relevant regulations and codes. Deficiencies should be corrected, and records of inspections are kept.

10 Certification

- 10.1 The initial audit, to assess compliance with the Safety Management System, should be carried out at the same time as each vessel is surveyed. On satisfactory completion of vessel safety and this audit, a Combined Vessel Safety and Vessel Safety Management Certificate for each vessel, should be issued.

11 Exemptions

- 11.1 Exemptions to these requirements should be considered on a case by case basis. Exemptions from the provisions of the System will be granted only on condition that an equivalent level of safety is achieved.

12 Guidelines

- 12.1 “Guidelines to operators in compliance with the Safety Management System” is given in Appendix 3.

Chapter 9 Minimum Safe Manning Standard

1. Minimum manning of Deck and Engine Officers

	Deck Department		Engine Department	
Voyage less than 12 hours (*Note)	Master	1	Chief Engineer	1
	Chief Officer / 2 nd Officer	1		
Voyage more than 12 hours	Master	1	Chief Engineer	1
	Chief Officer / 2 nd Officer	2	1 st Engineer / 2 nd Engineer	1

Note: Usually for the Pearl River Estuary and nearby waters

2. Minimum manning of ratings

Current Regulations do not stipulate the relevant qualification for the ratings (general purpose ratings). The Minimum Safe Manning Certificate may not specify the number of required ratings but may be clarified in the annexed page of the Minimum Safe Manning Certificate. Vessel owner should provide reasonable number of ratings on board. The proposed standard is listed in the below table. Marine Department may consider and accept the deviation to the number of ratings listed in the table based on the size of the vessel and the types of equipment etc. provided on board. Owner when applying for the Minimum Safe Manning Certificate from Marine Department with their proposed number of ratings should provide necessary information for assessment.

	Deck Department	Engine Department	Total
Voyage less than 12 hours	2	1 (*Note)	3
Voyage more than 12 hours	3	1	4

Note: Exemption may be granted depending on the type of machinery installations

3. Application for Minimum Safe Manning Certificate

Shipowner, or authorized surveyor, or authorized organization should complete the minimum safe manning application form (No.) and submit it with the following plans and documents to the Senior Surveyor of Local Vessel Section of Marine Department for assessment:

- (i) certificate of unmanned machinery space (UMS) engine room issued by an authorized surveyor or authorized organization (if any); and
- (ii) morning arrangement plan.

Appendix 1

Standard and acceptance of material and equipment

1. MD accepts materials and equipments complying with the test procedures/standards and performance specifications laid down by IMO. In general, materials and equipments approved by a maritime authority for use on its registered vessels are acceptable to be used on the cargo vessels registered in Hong Kong.

Appendix 2

Medical Stores

Part I Cargo vessels trading in Coastal class A plying zone

(1) Medicines

	Name of medicine and ordering descriptions	Ordering size	Required quantities
1	ACTIVATED CHARCOAL - Activated charcoal effervescent granules	5g sachet	10
2	ADRENALINE - Adrenaline acid tartrate injection, 1.8mg in 1 mL (1 in 1000)	0.5mL ampoule	5
3	ALUMINIUM ACETATE - Aluminium acetate ear drops 13%	10mL bottle with dropper	3
4	AMITRIPTYLINE - Amitriptyline hydrochloride	50mg tablet	50
5	AMOXYCILLIN - Amoxicillin trihydrate	250mg capsule	100
6	ANAESTHETIC EYE DROPS - Amethocaine 0.5%	In a single dose applicator	20
7	ANTIBIOTIC EAR DROPS (a) - Ear drops containing in each mL neomycin 3400 units, polymixin B sulphate 10000 units, hydro-cortisone 10 mg	5mL bottle with dropper	3
8	ANTISEPTIC SOULTION - A solution containing 0.015% w/v chlorohexidine and 0.015% w/v cetrimide	100mL sachet	60
9	ARACHIS OIL - Arachis (Peanut) oil	10mL bottle with dropper	2
10	ASPIRIN - Dispersible aspirin	300mg dispersible tablet	500
11	ATROPINE - Atropine sulphate injection, 1mg in 1mL	1mL ampoule	5
12	BENZOIC ACID - Benzoic acid compound ointment (benzoic acid 6%; salicylic acid 3%, in emulsifying ointment)	50mg	10
13	BENZYL PENICILLIN - Benzyl penicillin sodium injection powder (L.N. 259 of 1997)	600mg vial	70
14	BISMUTH SUBGALLATE - Bismuth subgallate compound suppository (bismuth oxide 24 mg, balsam peru 49 mg, zinc oxide 296 mg, bismuth subgallate 59 mg)	2.8g suppository	24
15	BURN CREAM - Silver sulphadiazine cream 1% (w/w)	50g tube	4
16	CALAMINE LOTION - Calamine 15% lotion	100mL bottle	6
17	CHLORAMPHENICOL - Chloramphenicol eye ointment 1%	4g dispenser	10
18	CHLOROQUINE - Chloroquine sulphate 200 mg tablet (150mg of chloroquine base); or chloroquine phosphate 250mg tablet (155mg of chloroquine base)	200/250mg tablet	500

19	CHLORPHENIRAMINE - (1) Chlorpheniramine maleate - (2) Chlorpheniramine maleate injection, (10mg in 1mL)	4mg tablet 1mL ampoule	60 5
20	CHLORPROMAZINE - (1) Chlorpromazine hydrochloride - (2) Chlorpromazine hydrochloride injection (25mg in 1mL)	25mg tablet 1mL ampoule	200 20
21	CIMETIDINE (a) - Cimetidine	200mg tablet	50
22	CODEINE LINCTUS - Codeine phosphate (15mg in 5mL linctus)	200mL bottle	2
23	CO-TRIMOXAZOLE - Co-trimoxazole (sulphamethoxazole 400mg, trimethoprim 80mg)	480mg tablet	100
24	CYCLINE - (1) Cyclizine hydrochloride - (2) Cyclizine lactate, 50mg IN 1mL	50mg tablet 1mL ampoule	20 5
25	DIAZEPAM - Rectal dispenser, 4mg in 1mL	10mg rectal dispenser	5
26	DIHYDROCODEINE - Dihydrocodeine tartrate	30mg tablet	100
27	EPHEDRINE - Ephedrine hydrochloride 0.5% nasal drops (ephedrine hydrochloride 50mg, chlorbutol 50mg, sodium chloride 50mg, sterile water to 10mL)	10mL bottle with dropper	2
28	ERGOMETRINE - Ergometrine maleate injection, 0.5mg in 1mL	1mL ampoule	5
29	ERYTHROMYCIN - Erythromycin	250mg tablet	100
30	FRUSEMIDE - (1) Frusemide - (2) Frusemide injection, 10mg in 1mL	40mg tablet 2mL ampoule	20 5
31	GAMMA BENZENE HEXACHLORIDE - (1) Gamma benzene hexachloride body lotion - (2) Gamma benzene hexachloride hair application 1%	100mL bottle 100mL bottle	6 2
32	GLYCERIN - Thymol glycerin compound mouth wash (thymol 0.05% and glycerol 10% in water)	200mL bottle	4
33	GLYCERYL TRINITRATE - Glyceryl trinitrate	0.5mg tablet	100
34	HYDROCORTISONE OINTMENT - Hydrocortisone 1% ointment	15g container	10
35	HYDROGEN PEROXIDE - Hydrogen peroxide 6% solution	100mL bottle	2
36	HYOSCINE HYDROBROMIDE - Hyoscine hydrobromide	0.3mg tablet	100
37	INDOMETHACIN - Indomethacin	100mg suppository	10
38	LIGNOCAINE - (1) Lignocaine hydrochloride 1% (PLAIN), 20mg in 2mL - (2) Lignocaine hydrochloride 2% in a lubricant water miscible base (gel)	2mL ampoule 20g container	5 2

39	MAGNESIUM TRISILICATE - Magnesium trisilicate (magnesium trisilicate 250mg, dried aluminium hydroxide gel 120mg)	370g compound tablet	500
40	MENTHOL AND BENZOIN - Menthol and benzoïn inhalation (METHOL 1g and benzoïn inhalation to 50 mL)	50mL bottle	2
41	METRONIDAZOLE - Metronidazole	200mg tablet	60
42	MORPHINE - Morphine sulphate injection, 15mg in 1mL	1mL ampoule	20
43	NITRAZEPAM - Nitrazepam	5mg tablet	20
44	OIL OF CLOVES - Clove oil	10mL bottle	2
45	PARACETAMOL - Paracetamol	500mg tablet	500
46	PENICILLIN V - Phenoxymethyl penicillin	250mg tablet	200
47	PETROLEUM JELLY - Soft paraffin	50g container	4
48	PHENOBARBITONE - Phenobarbitone sodium, 200mg in 1mL	1mL ampoule	5
49	POTASSIUM PERMANGANTE - Potassium permanganate crystals	25g container	1
50	PREDNISOLONE (a) - Prednisolone	5mg tablet	60
51	PRIPSEN - Piperazine phosphate hydrate 4g and sennosides	10g SACHET	4
52	PROGUANIL - Proguanil hydrochloride	100mg tablet	1000
53	PYRIMETHAMINE - Pyrimethamine 25mg, sulphadoxine 500mg	525mg tablet	10
54	QUININE SULPHATE - Quinine sulphate	300mg tablet	50
55	SALBUTAMOL - Salbutamol aerosol inhaler unit, giving 100mg per metered inhalation	200 dose container	2
56	SALT TABLETS - Sodium chloride and glucose enteric coated (L.N. 259 of 1997)	650mg tablet	1000
57	SODIUM BICARBONATE - Sodium bicarbonate (L.N. 259 of 1997)	100g	1
58	SODIUM CHLORIDE AND DEXTROSE - Sodium chloride and dextrose oral powder compound (35mmol of Na ⁺ , 20mmol of K ⁺ , 37mmol of CL ⁻ , 18mmol of HCO ₃ ⁻ and 200 mmol of dextrose per litre when reconstituted) (L.N. 259 of 1997)	9g sachet	40
59	SURGICAL SPIRIT - Surgical spirit	250mL	1
60	TETANUS VACCINE - Tet vac formol toxoid, 0.5mL to be refrigerated	0.5mL ampoule	5
61	TETRACYCLINE - Tetracycline hydrochloride	250mg tablet	100
62	WATER FOR INJECTION - Water for injection	2mL ampoule	70
63	ZINC OINTMENT - Zinc oxide 15% in a simple ointment	25g container	2
64	ZINC OXIDE - Zinc oxide dental powder	25g container	2

(2) **Bandages, Cotton Wool and Dressing**

Note: the packaging for any item on these scales should, where practicable, include the information given in the ordering description for that item.

Name of Item and Ordering Description	Quantities required
BANDAGES – Each bandage to be individually wrapped	
–(1) Crepe, BP, 7.5cm x 4.5m when stretched	4
–(2) Elastic adhesive, BP, 7.5cm x 4m	2
–(3) Triangular of calico, BP, with 2 sides of about 90cm and a base of about 127cm	4
–(4) Tubular gauze bandage, seamless, of a size suitable for finger dressings, a length of 20m, with applicator	1
–(5) Conforming bandage, 5cm x 3.5m BP	4
–(6) Conforming bandage, 7.5cm x 3.5m BP	6
BUTTERLY CLOSURES - Adhesive skin closures, length approximately 5cm, individually sealed sterile in a container	20
COTTON WOOL (Absorbent cotton and viscose wadding, BP, in a roll, in damp proof packaging	
- (1) Packaging containing 15g, sterile	20
- (2) Packaging containing 100g, unsterile	3
DRESSINGS – All dressings are to be individually wrapped and in a strong and suitable container	
- (1) Sterile paraffin gauze dressing, BP, size 10cm x 10cm, individually wrapped	50
- (2) Standard BPC dressings. The containers for these dressings should each bear a label with instructions covering the following points: “Open by pulling tab. Avoid touching wound and do not finger the face of the sterilised pad. Place pad over wound, retain hold of short end of bandage, wind remainder firmly and tie in a knot.”	
(i) Small plain wound dressing, standard no. 13 BPC	5
(ii) Medium plain wound dressing, standard no. 14 BPC	5
(iii) Large plain wound dressing, standard no. 15 BPC	5
DRESSING STRIP – Elastic adhesive medicated dressing strip BPC, 6cm x 1m in a packet	2
GAUZE – Packet containing one piece of sterile absorbent cotton gauze BP, size 30cm x 90cm	12
GAUZE, PADS – Packet containing 5 sterile gauze pads BP, size 7.5cm x 7.5cm	20
GAUZE RIBBON – Packet containing sterile absorbent cotton gauze ribbon BP 2.5cm x 5m	1
SWABS – A reclosable container, with 100 filmated gauze swabs BP 10cm x 10cm	2
SUSPENSORY BANDAGE – Large size	1
ZINC OXIDE TAPE – Zinc oxide plaster BP, 2.5cm x 5m, on a spool	1

NB: For notes see end of this Appendix

(3) SUNDRIES AND PUBLICATIONS

Note: the packaging for any item on these scales should, where practicable, include the information given in the ordering description for that item.

Name of Item and Ordering Description	Quantities required
BAG – ICE PACK (of strong soft rubber, or equivalent plastic material with wide, screw capped, opening)	2
BAG – PLASTIC AND CLOSURES (of strong black plastic): –(1) Bag of size approximately 15cm x 30cm (to hold specimen jars/containers) –(2) Bag of size approximately 30cm x 50cm (to hold medivac records, dirty bandages, and after-birth, etc.)	6 6
BED-PAN (of stainless steel or sterilisable plastic)	1
BUDS (of viscose or cotton wool, in a container)	100
CHLORINE COMPOUND – In reclosable air-tight containers, sufficient to chlorinate the potable water tanks and associated systems-compounds and quantities to comply with the procedures, etc. stated in the latest edition of “The Vessel Captain’s Medical Guide” or an advice issued by the Authority amending those procedures, etc. (L.N. 259 of 1997)	Yes
CONTAINERS – Air-tight, for the dispensing of tablets -20 tablet size	20
DISINFECTANT – Quantity in litres – To conform to the specification for disinfectants prescribed in the notes at the end of this Appendix.	10
EYE BATHS	2
EYE-SHADES – With elastic head band, robust quality throughout	2
FACE MASK – Paper, disposable	12
FINGER STALLS – With tapes, of robust material throughout 2 or more sizes	5
FIRST AID KIT (to be distributed around the vessel) The following to be in a damp proof strong canvas bag, satchel, or box, with a strap for carrying: –(1) 4 triangular bandages, with sides of about 90cm and a base of about 127cm –(2) 6 standard dressings no. 8 or 13 BPC –(3) 2 standard dressings no. 9 or 14 BPC –(4) 2 extra large sterile unmedicated dressings, 28cm x 17.5cm –(5) 6 medium size safety pins, rustless –(6) 20 assorted elastic adhesive dressing strips medicated BPC –(7) 2 sterile eye pads with attachment –(8) 2 packages containing 15g sterile cotton wool –(9) 5 pairs of large, disposable, polythene gloves	3

GLOVES – Large, of polythene, disposable	25
HOT WATER BOTTLE – Of rubber, with a fabric cover, size about 20cm x 30cm	2
INSECTICIDE – to conform to the specification for insecticides prescribed in the notes at the end of this Appendix:	
–(1) In liquid form - litres	10
–(2) In a hand aprayer-spray containers of the standard domestic size(c)	1
JARS, SPECIMEN – Of strong plastic or glass, supplied with a lid to make them air-tight, and with blank labels stuck on, size 50mL	5
LABELS:	
–(1) plain self-adhesive, about 5cm x 3cm	50
–(2) Tags for patients who have been given morphine	20
NAIL BRUSH – Of strong sterilisable plastic throughout	1
SPECTACLES, DARK – Of robust material throughout	1
SAFETY PINS – Rustless, size 5cm	12
SPUTUM CUPS – Cups, with covers, disposable	20
STRETCHER Neil Robertson type	1
TALC – A reclosable puffer pack or sprinkler containing 100g of talc dusting powder BP	1
TOWELS – Paper, disposable, hand size	100
URINE BOTTLE – Of sterilisable plastic, graduated in mL	1
WATERPROOF SHEETING – Of smooth, strong non-adhesive, rubber or plastic, rolled on a hard core, size 1m x 2m	2
PUBLICATIONS	
–(a) “The Vessel Captain’s Medical Guide” – 21 st or latest subsequent edition	1
–(b) Temperature, pulse and respiration, etc. chart	20
–(c) Liquid intake and output form	10
–(d) Visit to doctor form	10
–(e) A copy of the 《Merchant Shipping (Seafarers) (Medical Stores) Regulation》(Cap. 478, subsidiary legislation) and subsequent amendments	1
–(f) Controlled drugs register	1

NB: For notes see end of this Appendix.

Part II Cargo vessels trading in coastal class B plying zone - First Aid Kit

	Name of Items	Ordering Description	Quantities Required
1	Triangular gauze bandage	36 in x 36 in x 51 in	4 pieces
2	Elastic bandage	2 in x 6.5 ft	1 roll
3	Bandage	2 in x 18 ft	1 roll
4	Bandage	3 in x 18 ft	1 roll
5	Adhesive plaster	Assorted, sterilized, adhesive	10 pieces
6	Dressings	Paraffin dressings	5 pieces
7	Adhesive plaster	1 in x 16.5 ft	1 roll
8	Cotton wool	35 grams	1 pack
9	Safety pin	Rustless, size 5cm	6 pieces
10	Scissor	Stainless steel throughout	1 each
11	Disinfectant		0.1 litres
12	Burn cream	50 g	1 packet

Notes:

1. First aid items should be kept in a container with distinguishing markings and readily accessible.
2. Vessel owner/master may provide additional medical items with the operational needs.
3. Specification of Disinfectants:
 - (1) General description - The disinfectant should be a white fluid and should be a finely dispersed, stabilized emulsion containing coal-tar acids or other phenolic bodies, with or without hydrocarbons.
 - (2) Germicidal value and the method of its determination - The germicidal value should not be less than 1.7 when determined by the modified Chick-Martin method as laid down by the British Standards Specification No. 808, confirmed by PD 2627, 1960.
 - (3) Stability before dilution - On standing for 3 months at ordinary temperatures (5°C to 30°C) the disinfectant fluid should not precipitate nor show separation of more than traces of oil. A creamed fluid which can be rendered homogeneous by gentle mixing may be carried.
 - (4) Stability after dilution - The disinfectant fluid should be miscible with distilled water and artificial seawater (27 grams of sodium chloride and 5 grams of crystalline magnesium sulphate (MgSO₄·7H₂O) dissolved in and made up to 1000 mL with distilled water and filtered before use) in proportions of 1, 2, 3, 4 and 5% to give a stable emulsion which should not break nor show more than traces of separation of

either top or bottom oil, when maintained at 18°C to 22°C for 6 hours, the sample and diluent having each been brought to a temperature within that range before mixing by pouring the sample into the diluent from a cylinder.

- (5) Odour and corrosive action - The fluid should be free from objectionable smell, and when used as directed, should have no more corrosive action on metals than that occasioned by the water employed as a diluent.

4. Specification of Insecticides and Means of Application:

(1) Insecticide formulations-

- (a) when used in accordance with instructions for use which should be specified on the label affixed to the container of an insecticide spray solution or insecticide powder-
- (i) should be effective for the purpose specified in those instructions; and
 - (ii) should not be harmful to humans;
- (b) should be suitable for use in crew and passenger accommodation and in spaces used for the preparation of food; and
- (c) should be free from offensive odour and, so far as possible, should be non-staining.

(2) Insecticide formulations should be-

- (a) in the form of a spray solution not having a flash point lower than 48.9°C (120°F) when tested by the Abel method and containing an effective concentration of insecticide, when applied as a space spray or as a residual spray in accordance with instructions referred to (1)(a) by either-
- (i) a hand-operated, continuous-action sprayer fitted with a nozzle capable of reducing a fine mist without coarse droplets; or
 - (ii) a pre-packed press-button pressure canister; and
- (b) in the form of a powder packed in a dredger and effective when applied to the body or clothing of an infected person in accordance with the instructions referred to (1)(a).

Appendix 3

Guidelines to operators in compliance with the Safety Management System

1. General

1.0 To comply with the Safety Management System (SMS), each operator should create a safe working environment, which should include the following:

1.1 A health and safety protection policy

This must address the issues of health, safety and the environment as they affect the company and its staff, both ashore and afloat. Such a policy might read along the following lines:

“The policy of (name of Company) is to conduct its activities taking full account of the health and safety of its employees and of all persons using or connected with the Company. In implementing this policy, (name of Company) will ensure that the [vessel] is, at all times, properly maintained and operated by qualified personnel in full compliance with relevant legislation. In particular the [company] will carry out an assessment of the risks to the health and safety of workers and others affected by the [the undertaking], and will take the necessary measures to minimize the risks identified”

1.2 Procedures to ensure safe operation of vessels in compliance with the regulations and codes

- (1) The regulations and codes which apply to coastal cargo vessels include, but not limited to, as listed in the paragraphs 3.1 “Statutory Requirements” and 3.2 “Other standards” of Section 1, Chapter 1 of this Code of Practice.
- (2) The company should draw up simple procedures to ensure that safe working practices are carried out in the operation of the vessel. These may be in the form of checklists which can be followed by all personnel.
- (3) For some vessels, it might be appropriate to have permanently exhibited checklists, e.g. in the wheelhouse for navigational items. Alternatively, in a smaller vessel, the record could take any suitable form such as a diary as distinct from a specially printed logbook. Whatever form the record takes, such entries should be accepted as evidence of compliance with the “Onboard Procedures” requirements.

1.3 Lines of communication between personnel, ashore and afloat

Responsibility and authority of each employee should be clearly defined. This may be best illustrated in a simple diagram, showing who reports to whom.

1.4 Procedures for reporting accidents

The requirement for reporting accidents should be well understood by all personnel and in so doing improve the cultural safety practice on board.

1.5 Procedures for responding to emergency situations

- (1) There should be clearly stated procedures for responding to emergency situations. These may include but not limited to: fire; collision; grounding; violent act; main propulsion or steering failure; personal injury or death; and man overboard.
- (2) Checklists may be useful in this regard.

2 Health and Safety Protection Policy

2.1 It is required to appoint one or more designated persons ashore (DPA) for verification and monitoring of the Safety Management System. That person/persons should be identified. It is the responsibility of the owner/operator to ensure that the policy is complied with, and that the responsibilities are understood.

2.2 The responsibilities of DPA are as follows:

- (1) verification of degree of implementation and effectiveness of Safety Management;
- (2) reporting of deficiencies in the Safety Management System (SMS) to the concerned responsible level of management;
- (3) organizing internal safety inspections and annual vessel survey including the SMS on board and ensuring that corrective actions have been taken; and
- (4) ensuring that adequate resources and shore-based support is applied.

2.3 The company should consider developing a policy on prevention of alcohol and drug abuse.

2.4 All personnel both ashore and afloat have a duty to take care of themselves and other persons who may be affected by their acts or omissions.

2.5 It is essential that, in the event of an emergency, there is the ability to communicate with the emergency services via a shore base. The shore base may be the company office ashore, local port authorities, Police or Fire Station, or another office as may be agreed between the vessel and the shore base.

3 Responsibilities

3.1 The Master must have authority at all times, to make decisions with regard to the safety of the vessel and the persons on board. The Master should review the SMS and reports its deficiencies to the Company. To ensure that there is no ambiguity regarding the authority of the Master, there should be a simple written statement to this effect.

4 Personnel and Training

- 4.1 Each vessel is to be manned with qualified, certificated and medically fit seafarers in accordance with the relevant regulations and codes. All personnel should receive training appropriate to the tasks they undertake. It is the responsibility of the company to ensure that this training is given, and that the personnel have an understanding of the relevant regulations and codes.
- 4.2 Prior to the first occasion of working on the vessel, each employee must receive appropriate familiarization training and proper instruction in onboard procedures. This could include but not necessarily be limited to:
- (1) mooring and unmooring;
 - (2) launching and recovery of survival craft;
 - (3) evacuation from all areas of the vessel;
 - (4) donning of lifejackets; and
 - (5) use and handling of fire fighting equipment.
- 4.3 Familiarization may be accomplished for instance by:
allow a period of overlap between seafarers joining and leaving the vessel and make use of developed checklists;
- (1) provide induction familiarization on the vessel, its equipment upon joining, under the direction of an appropriate officer; and
 - (2) provide visual aids such as videos, manuals and operating instructions.
- 4.4 Relevant training should also be provided to casual staff - i.e. not regular “crew”.
- 4.5 The Company should have a system to provide all personnel involved in SMS with information on the Company’s SMS, mandatory requirements of the relevant Administrations.
- 4.6 The information may be communicated in the form of:
- (1) written procedures / instructions;
 - (2) described in the job responsibilities;
 - (3) fleet circulars; and
 - (4) formal discussions with Company’s representatives.
- 4.7 The Company should establish the working language(s) onboard. If the working language is mainly in Cantonese, the Company should ensure Master and senior officers with reasonable level to speak and understanding Putonghua.

5 Onboard Procedures

5.1 Simple procedures should be developed for the operation of the vessel. These should include, but not be limited to:

- (1) testing of equipment, including steering gear, prior to commencing a passage;
- (2) navigation and handling of the vessel;
- (3) maintenance routines;
- (4) bunkering operations;
- (5) bilge and ballast operations;
- (6) cargo loading and unloading operations;
- (7) sewage and garbage disposal;
- (8) watertight integrity; and
- (9) stability of the vessel.

6 Preparation for Emergencies

6.1 The potential emergencies likely to be encountered by the vessel should be considered. Exercise should then be carried out in the handling of these emergencies and evacuation from the vessel.

6.2 Where possible, all personnel should be involved in these exercises, both ashore and afloat.

6.3 The role and responsibilities of all personnel in an emergency situation should be developed in accordance with the principles of Safety Management System.

6.4 The exercises should be recorded. The names of those who participated should also be recorded.

7 Reporting of Accidents

7.1 The vessel Owner/Operator/Master has the duties to report all accidents to Marine Department including:

- (2) fire, collision, stranding, human injury or loss of life etc. accidents in accordance with the requirements stipulated under the Sections 57 and 58 of Merchant Shipping (Local Vessels) Ordinance (Cap. 548); and
- (3) any discharge of oil or mixture containing oil etc. in accordance with the requirements stipulated under the Section 49 of Merchant Shipping (Local Vessels) Ordinance (Cap. 548).

7.2 The above mentioned accidents should also be reported to the relevant port Authority in accordance with the local regulations if the accident is occurred outside Hong Kong waters.

7.3 The Company must have a procedure in place to report any accident to the Marine Accident Investigation Branch (MAIB) of Marine Department. Additionally, all accidents, hazardous situations and non-conformities should be recorded and reported to the Company as per the developed procedures, who should implement corrective action after investigation and analysis, with the aim of improving safety.

8 Maintenance of the Vessel and Equipment

8.1 Maintenance of the vessel and equipment is an essential ingredient of safety management. The equipment should be checked and tested daily when in use.

8.2 There should be procedures for a more detailed inspection and maintenance programme of the vessel and equipment.

8.3 The testing and maintenance of stand-by and frequently used equipment should be part of the Company's maintenance plan. The following are examples of items to be subjected to inspection and test:

- (1) alarms and emergency shutdowns;
- (2) fuel oil system integrity;
- (3) cargo system integrity;
- (4) emergency equipment (EPIRB, portable VHF radio installations, etc);
- (5) generators, emergency fire pumps, main engine telegraphs, etc;
- (6) fire-fighting and life-saving equipment.

8.4 The frequency of the inspections should be determined by the owner / operator, but every event should be recorded.

8.5 A checklist could be employed as an aid to memory for the inspection of equipment.

9 Review

9.1 Every company should undertake a review of the safety management system of all vessels regularly, but at least once every two years.

10 Certification

10.1 Visits to owners' offices might be necessary at the initial audit stage, but will be considered on a case by case basis should the need arise to check additional documentation which is not available. Owner / operator should ensure, therefore, that all necessary documentation is available on board the vessels.

10.2 Documents kept to demonstrate compliance with the company's maintenance procedures, and their effectiveness, may be divided into two broad categories:

- (1) Externally-generated records:

- (i) Third party survey reports and certificates;
 - (ii) Statutory certificates; and
 - (iii) Port State Control reports.
- (2) Internally-generated records:
- (i) Records of routine shipboard inspections;
 - (ii) Records of maintenance work carries out;
 - (iii) Records of the testing of stand-by and other critical equipment;
 - (iv) Records of the testing of alarm and emergency shut-downs;
 - (v) Superintendents' visit and inspection reports;
 - (vi) Reports of non-conformities, accidents and hazardous occurrences;
 - (vii) Records of the implementation and verification of corrective action;
and
 - (viii) Spare parts requests, acknowledgements, delivery notes etc.