Tasneef®
Life Environmentally Optimized

Rules for the Classification of Inland Waterway Ships and for Conformity to Directive 2016/1629/EU

Effective from 1 March 2019

Part E

Service Notations

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GENERAL CONDITIONS

Definitions:

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

"IACS" means the International Association of Classification Societies.

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

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

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

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

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

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

"*Society*" or *"TASNEEF"* means Tasneef and/or all the companies in the Tasneef Group which provide the Services.

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

Article 1

1.1. The purpose of the Society is, among others, the classification and certification of ships and the certification of their parts and components. In particular, the Society:
(i) sets forth and develops Rules;
(ii) publishes the Register of Ships;
(iii) issues certificates, statements and reports based on its survey activities.

1.2. The Society also takes part in the implementation of national and international rules and standards as delegated by various G overnments.

1.3. The Society carries out technical assistance activities on request and provides special services outside the scope of classification, which are regulated by these general conditions, unless expressly excluded in the particular contract.

Article 2

2.1. The Rules developed by the Society reflect the level of its technical knowledge at the time they are published. Therefore, the Society, although committed also through its research and development services to continuous updating of the Rules, does not guarantee the Rules meet state-of-the-art science and technology at the time of publication or that they meet the Society's or others' subsequent technical developments.

2.2. The Interested Party is required to know the Rules on the basis of which the Services are provided. With particular reference to Classification Services, special attention is to be given to the Rules concerning class suspension, withdrawal and reinstatemen t. In case of doubt or inaccuracy, the Interested Party is to promptly contact the Society for clarification.
The Rules for Classification of Ships are published on the Society's website: www.tasneef.ae.

2.3. The Society exercises due care and skill:
(i) in the selection of its Surveyors
(ii) in the performance of its Services, taking into account the level of its technical knowledge at the time the Services are performed.

2.4. Surveys conducted by the Society include, but are not limited to, visual inspection and non-destructive testing. Unless otherwise required, surveys are conducted through sampling techniques and do not consist of comprehensive verification or monitoring of the Ship or of the items subject to certification. The surveys and checks made by the Society on board ship do not necessarily require the constant and continuous presence of the Surveyor. The Society may also commission laboratory testing, underwater inspection and other checks carried out by and under the responsibility of qualified service suppliers. Survey practices and procedures are selected by the Society based on its experience and knowledge and according to generally accepted technical standards in the sector.

Article 3

3.1. The class assigned to a Ship, like the reports, statements, certificates or any other document or information issued by the Society, reflects the opinion of the Society concerning compliance, at the time the Service is provided, of the Ship or product subject to certification, with the applicable Rules (given the intended use and within the relevant time frame).
The Society is under no obligation to make statements or provide information about elements or facts which are not part of th e specific scope of the Service requested by the Interested Party or on its behalf.

3.2. No report, statement, notation on a plan, review, Certificate of Classification, document or information issued or given as p art of the Services provided by the Society shall have any legal effect or implication other than a representation that, on the basis of the checks made by the Society, the Ship, structure, materials, equipment, machinery or any other item covered by such document or information meet the Rules. Any such document is issued solely for the use of the Society, its committees and clients or other duly authorised bodies and for no other purpose. Therefore, the Society cannot be held liable for any act made or document issued by other parties on the basis of the statements or information given by the Society. The validity, application, meaning and interpretation of a Certificate of Classification, or any other document or information issued by the Society in connection with its Services, is governed by the Rules of the Society, which is the sole subject entitled to make such interpretation. Any disagreement on technical matters between the Interested Party and the Surveyor in the carrying out of his functions shall be raised in writing as soon as possible with the Society, which will settle any divergence of opinion or dispute.

3.3. The classification of a Ship, or the issuance of a certificate or other document connected with classification or certificati on and in general with the performance of Services by the Society shall have the validity conferred upon it by the Rules of the Society at the time of the assignment of class or issuance of the certificate; in no case shall it amount to a statement or warranty of seaw orthiness,

structural integrity, quality or fitness for a particular purpose or service of any Ship, structur e, material, equipment or machinery inspected or tested by the Society.

3.4. Any document issued by the Society in relation to its activities reflects the condition of the Ship or the subject of certifi cation or other activity at the time of the check.

3.5. The Rules, surveys and activities performed by the Society, reports, certificates and other documents issued by the Society are in no way intended to replace the duties and responsibilities of other parties such as Governments, designers, ship builders, manufacturers, repairers, suppliers, contractors or sub-contractors, Owners, operators, charterers, underwriters, sellers or intended buyers of a Ship or other product or system surveyed.

These documents and activities do not relieve such parties from any fulfilment, warranty, responsibility, duty or obligation (also of a contractual nature) expressed or implied or in any case incumbent on them, nor do they confer on such parties any right, claim or cause of action against the Society. With particular regard to the duties of the ship Owner, the Services undertaken by the Society do not relieve the Owner of his duty to ensure proper maintenance of the Ship and ensure seaworthiness at all times. Likewise, t he Rules, surveys performed, reports, certificates and other documents issued by the Society are intended neither to guarantee the buyers of the Ship, its components or any other surveyed or certified item, nor to relieve the seller of the duties arising out of the law or the contract, regarding the quality, commercial value or characteristics of the item which is the subject of transaction.

In no case, therefore, shall the Society assume the obligations incumbent upon the above-mentioned parties, even when it is consulted in connection with matters not covered by its Rules or other documents.

In consideration of the above, the Interested Party undertakes to relieve and hold harmless the Society from any third party claim, as well as from any liability in relation to the latter concerning the Services rendered.

Insofar as they are not expressly provided for in these General Conditions, the duties and responsibilities of the Owner and Interested Parties with respect to the services rendered by the Society are described in the Rules applicable to the specific Service rendered.

Article 4

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

4.2. In consideration of the Services rendered by the Society, the Interested Party and the person requesting the service shall be jointly liable for the payment of the relevant fees, even if the service is not concluded for any cause not pertaining to the Society. In the latter case, the Society shall not be held liable for non-fulfilment or partial fulfilment of the Services requested. In the event of late payment, interest at the legal current rate increased by 1.5% may be demanded.

4.3. The contract for the classification of a Ship or for other Services may be terminated and any certificates revoked at the request of one of the parties, subject to at least 30 days' notice to be given in writing. Failure to pay, even in part, the fees due for Services carried out by the Society will entitle the Society to immediately terminate the contract and suspend the Services.

For every termination of the contract, the fees for the activities performed until the time of the termination shall be owed to the Society as well as the expenses incurred in view of activities already programmed; this is without prejudice to the right to compensation due to the Society as a consequence of the termination.

With particular reference to Ship classification and certification, unless decided otherwise by the Society, termination of the contract implies that the assignment of class to a Ship is withheld or, if already assigned, that it is suspended or withdrawn; any st atutory certificates issued by the Society will be withdrawn in those cases where provided for by agreements between the Society and the flag State.

Article 5

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

Therefore, except as provided for in paragraph 5.2 below, and also in the case of activities carried out by delegation of Governments, neither the Society nor any of its Surveyors will be liable for any loss, damage or expense of whatever nature sustained by any person, in tort or in contract, derived from carrying out the Services.

5.2. Notwithstanding the provisions in paragraph 5.1 above, should any user of the Society's Services prove that he has suffered a loss or damage due to any negligent act or omission of the Society, its Surveyors, servants or agents, then the Society will pay compensation to such person for his proved loss, up to, but not exceeding, five times the amount of the fees charged for the specific services, information or opinions from which the loss or damage derives or, if no fee has been charged, a maximum of AED5,000 (Arab Emirates Dirhams Five Thousand only). Where the fees charged are related to a number of Services, the amount of the fees will be apportioned for the purpose of the calculation of the maximum compensation, by reference to the estimated time involved in the performance of the Service from which the damage or loss derives. Any liability for indirect or consequential loss, damage or expense is specifically excluded. In any case, irrespective of the amount of the fees charged, the maximum damages payable by the Society will not be more than AED5,000,000 (Arab Emirates Dirhams Five Millions only). Payment of compensation under this paragraph will not entail any admission of responsibility and/or liability by the Society and will be made without prejudice to the disclaimer clause contained in paragraph 5.1 above.

5.3. Any claim for loss or damage of whatever nature by virtue of the provisions set forth herein shall be made to the Society in writing, within the shorter of the following periods: (i) THREE (3) MONTHS from the date on which the Services were performed, or (ii) THREE (3) MONTHS from the date on which the damage was discovered. Failure to comply with the above deadline will constitute an absolute bar to the pursuit of such a claim against the Society.

Article 6

6.1. These General Conditions shall be governed by and construed in accordance with United Arab Emirates (UAE) law, and any dispute arising from or in connection with the Rules or with the Services of the Society, including any issues concerning responsibility, liability or limitations of liability of the Society, shall be determined in accordance with UAE law. The courts of the Dubai International Financial Centre (DIFC) shall have exclusive jurisdiction in relation to any claim or dispute which may arise out of or in connection with the Rules or with the Services of the Society.

6.2. However,

(i) In cases where neither the claim nor any counterclaim exceeds the sum of AED300,000 (Arab Emirates Dirhams Three Hundred Thousand) the dispute shall be referred to the jurisdiction of the DIFC Small Claims Tribunal; and

(ii) for disputes concerning non-payment of the fees and/or expenses due to the Society for services, the Society shall have the

right to submit any claim to the jurisdiction of the Courts of the place where the registered or operating office of the Interested Party or of the applicant who requested the Service is located.

In the case of actions taken against the Society by a third party before a public Court, the Society shall also have the right to summon the Interested Party or the subject who requested the Service before that Court, in order to be relieved and held harmless according to art. 3.5 above.

Article 7

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

Information about the status and validity of other certificates and statements may also be published on the website or released by other means, without the prior consent of the Interested Party.

7.2. Notwithstanding the general duty of confidentiality owed by the Society to its clients in clause 7.1 above, the Society's clients hereby accept that the Society may participate in the IACS Early Warning System which requires each Classification Society to provide other involved Classification Societies with relevant technical information on serious hull structural and engineering systems failures, as defined in the IACS Early Warning System (but not including any drawings relating to the ship which may be the specific property of another party), to enable such useful information to be shared and used to facilitate the proper working of the IACS Early Warning System. The Society will provide its clients with written details of such information sent to the involved Classification Societies.

7.3. In the event of transfer of class, addition of a second class or withdrawal from a double/dual class, the Interested Party undertakes to provide or to permit the Society to provide the other Classification Society with all building plans and drawings, certificates, documents and information relevant to the classed unit, including its history file, as the other Classification Society may require for the purpose of classification in compliance with the applicable legislation and relative IACS Procedure. It is the Owner's duty to ensure that, whenever required, the consent of the builder is obtained with regard to the provision of plans and drawings to the new Society, either by way of appropriate stipulation in the building contract or by other agreement.

In the event that the ownership of the ship, product or system subject to certification is transferred to a new subject, the latter shall have the right to access all pertinent drawings, specifications, documents or information issued by the Society or which has come to the knowledge of the Society while carrying out its Services, even if related to a period prior to transfer of ownership.

Article 8

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

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RULES FOR THE CLASSIFICATION OF INLAND WATERWAY SHIPS AND FOR CONFORMITY TO DIRECTIVE 2016/1629/EU

Part E
Service Notations

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Part E
Service Notations

Chapter 1
PASSENGER AND CARGO SHIPS

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SECTION 1 PASSENGER SHIPS

1 General

1.1 Application

1.1.1 Ships complying with the requirements of this Chapter will be eligible for the class notation **Passenger ships**.

1.2 General characteristics and structural configuration

1.2.1 Buoyancy subdivision *(1/1/2017)*

Passenger ships are to have, in addition to the transverse watertight bulkheads required in Part B, Ch 1, the transverse watertight bulkheads necessary to comply with the stability requirements of [1.5].

The bulkheads are to be carried up, watertight, to the bulkhead deck.

Where there is no bulkhead deck, these bulkheads shall extend to a height at least 20 cm above the margin line.

The distance between the collision bulkhead and the forward perpendicular is to be not less than 0,04 Lwl and is to not exceed 0,04 L_{wl} + 2 m, where L_{wl} is the length of the waterline which corresponds to the greatest permissible draught.

Passenger spaces are to be separated from cargo, machinery and boiler spaces by watertight bulkheads.

1.2.2 Definition

Two type of ships may be considered:

- Day Trip Ships

  A day trip ship is a passenger ship without overnight passenger cabins

- Cabin Ship

  A cabin ship is a passenger ship with overnight passenger cabins.

1.2.3 Openings in the subdivision watertight bulkheads and in the side shell *(1/1/2017)*

The number of openings in watertight bulkheads is to be reduced to the minimum compatible with the design features and normal operation of the ship.

No watertight doors are to be permitted in the bulkheads separating the passenger spaces or crew spaces and shipboard accommodation personnel accommodation from the machinery spaces.

Indicators are to be provided on the navigating bridge, showing the "open" or "closed" position of watertight doors.

Doors which are normally open during navigation are to be capable of being controlled on the spot, from either side of the bulkhead, and also from an easily accessible place above the bulkhead deck, where a device is to be installed indicating whether the door is open or closed.

They are to be capable of being easily controlled on the spot even after having been closed by remote control.

Closure shall not be impeded by carpeting, foot rails or other obstructions.

Remote controls of bulkhead doors and shut-off devices above the bulkhead deck shall be clearly indicated as such.

The closing time is to be not less than 30 seconds but is not to exceed 60 seconds.

During the closing operation, an automatic acoustic alarm signal is to sound at the door.

The door control installation and the alarm installations are to be capable of functioning independently of the ship's main electricity supply.

Doors are to always be kept closed, and may be opened only momentarily to permit passage.

No access openings or doors are to be permitted in the collision bulkhead below the bulkhead deck or in the bulkheads separating machinery spaces from passenger spaces.

Doors in watertight bulkheads which are manually operated and not remote-controlled are to be permitted only at places to which passengers have no access. They may be opened momentarily only to permit passage. Suitable devices are to be provided to ensure that they are quickly and securely closed. Both sides of such doors are to bear a notice reading: "Door to be closed immediately after each use".

Doors in bulkheads referred to in [1.2.1], and their actuators shall be located in the safe area. There shall be a warning system in the wheelhouse to indicate which of the doors in bulkheads referred to in [1.2.1] are open.

The distance from bulkhead doors and their opening and closing devices to the shell plating is to be not less than one fifth of the ship's breadth, this distance being measured perpendicularly to the plane of the centreline of the vessel at the maximum draught level.

Pipes with open orifices and ventilation ducts are to be so arranged that in the event of a leak no water can enter other compartments or tanks. Safety is to be deemed to be assured in this respect if such pipes or ventilation ducts are at the distance from the shell plating defined above, or if their openings are above the waterline in the most unfavourable conditions of flooding.

If this arrangement is not carried out, pipes which have open orifices and which pass through several compartments are to be equipped with closures remote-controlled from above the bulkhead deck; this rule is to also apply if the height of such pipes above the base line of the vessel is less than 50 cm.

The passage of cables is to be so arranged as not to affect the watertightness of the bulkheads.

Notices are to be posted on board stipulating that, in the event of damage, all doors in watertight bulkheads are to be immediately closed.

1.3 Passenger rooms and areas

1.3.1 *(1/3/2019)*

Passenger rooms are to:

a) on all decks, be located aft of the level of the collision bulkhead and, as long as they are below the bulkhead deck, forward of the level of the after peak bulkhead, and

b) be separated from the engine and boiler rooms in a gas-tight manner.

1.3.2 Cupboards and rooms referred to and intended for the storage of flammable liquids are to be outside the passenger area.

1.3.3 The number and width of the exits of passenger rooms are to comply with the following requirements:

a) rooms or groups of rooms designed or arranged for 30 or more passengers or including berths for 12 or more passengers are to have at least two exits. On day trip vessels one of these two exits can be replaced by two emergency exits;

b) if rooms are located below the bulkhead deck, one of the exits can be a watertight bulkhead door, leading into an adjacent compartment from which the upper deck can be reached directly. The other exit is to lead directly or, if permitted in accordance with (1), as an emergency exit into the open air, or to the bulkhead deck. This requirement does not apply to individual cabins;

c) exits according to (a) and (b) are to be suitably arranged and are to have a clear width of at least 0,80 m and also a clear height of at least 2,00 m. For doors of passenger cabins and other small rooms, the clear width can be reduced to 0,70 m;

d) in the case of rooms or groups of rooms intended for more than 80 passengers, the sum of the widths of all exits intended for passengers and which are to be used by them in an emergency is to be at least 0,01 m per passenger;

e) if the total width of the exits is determined by the number of passengers, the width of each exit is to be at least 0,005 m per passenger;

1.3.4 Doors of passenger rooms

Doors of passenger rooms are to comply with the following requirements:

a) with the exception of doors leading to connecting corridors, they are to be capable of opening outwards or be constructed as sliding doors;

b) cabin doors are to be made in such a way that they can also be unlocked from the outside at any time;

c) powered doors are to open easily in the event of failure of the power supply to this mechanism;

d) for doors intended for use by persons with reduced mobility, there is to be from the direction from which the door opens, a minimum clearance of 0,60 m between the inner edge of the doorframe on the lock side and an adjacent perpendicular wall.

1.3.5 Escape routes

Connecting corridors are to comply with the following requirements:

a) they are to have a clear width of at least 0,80 m or, if they lead to rooms used by more than 80 passengers, at least 0,01 m per passenger;

b) their clear height is to be not less than 2,00 m;

c) connecting corridors intended for use by persons with reduced mobility are to have a clear width of 1,30 m. Connecting corridors more than 1,50 m wide are to have handrails on either side;

d) where a part of the vessel or a room intended for passengers is served by a single connecting corridor, the clear width thereof is to be at least 1,00 m;

e) connecting corridors are to be free of steps;

f) they are to lead only to open decks, rooms or staircases;

g) dead ends in connecting corridors are to be not longer than two metres.

In addition to the provisions of the above paragraphs, escape routes are to also comply with the following requirements:

a) stairways, exits and emergency exits are to be so disposed that, in the event of a fire in any given area, the other areas may be evacuated safely;

b) the escape routes are to lead by the shortest route to evacuation areas ;

c) escape routes are not to lead through engine rooms or galleys;

d) there are to be no rungs, ladders or the like installed at any point along the escape routes;

e) doors to escape routes are to be constructed in such a way as not to reduce the minimum width of the escape route referred to above;

f) escape routes and emergency exits are to be clearly signed. The signs are to be lit by the emergency lighting system;

g) escape routes and emergency exits are to have a suitable safety guidance system;

h) emergency exits are to have a shortest side at least 0,60 m long or a minimum diameter of 0,70 m. They are to

open in the direction of escape and be marked on both sides.

1.3.6 Bulwark and railing

Parts of the deck intended for passengers, and which are not enclosed, are to comply with the following requirements:

a) they are to be surrounded by a fixed bulwark or guard rail at least 1,00 m high or a railing according to European Standard EN 711: 1995, construction type PF, PG or PZ or equivalent;

b) openings and equipment for embarking or disembarking and also openings for loading or unloading are to be such that they can be secured and have a clear width of at least 1,00 m.

2 Scantlings

2.1 General

2.1.1 Arrangements and structural scantlings are to be checked applying the relevant requirements of Pt. B.

2.2 Stability

2.2.1 For intact stability of passenger ships reference to Pt B, Ch 6, Sec 1, [3.1] and [2.1], as applicable, is to be made.

3 Electrical installations

3.1 Application

3.1.1 The requirements of this Article apply to cabin ships and day trip ships having a length L_L equal to or greater than 24 m.

3.1.2 These requirements are to be applied in addition to the general requirements stated in Part C.

3.2 Lighting

3.2.1 Lighting circuits, including those for emergency lighting, are to be distributed through the space so that a total blackout cannot occur due to failure of a single protective device.

An emergency source of lighting is to be provided which is to be independent of the general lighting system. The lighting is to provide sufficient lighting for personnel to escape from the accommodation or working spaces to their muster stations, and launch and board survival craft.

The light fittings for the emergency lighting are to be marked as such.

4 Passenger sailing ships not navigating on the rhine (Zone R)

4.1 General

4.1.1 *(1/3/2019)*

For such ships in addition to the requirements of this Section, as applicable, reference is Ch.20 of ES-TRIN 2017/1.

SECTION 2 RO-RO PASSENGER SHIPS AND RO-RO CARGO SHIPS

1 General

1.1 Application

1.1.1 The requirements of this Section, alternative or additional to those of Section B and Section C, apply to cargo and/or passenger ferries and roll on-roll off ships, i.e. to ships specially designed and constructed for the carriage of vehicles which embark and disembark on their own wheels and/or goods in or on pallets or containers which are loaded and unloaded by means of wheeled vehicles with possible simultaneous carriage of more than 12 passengers.

Such ships are also to comply with any regulations and requirements for the carriage of motor vehicles with fuel in their tanks for their own propulsion issued by the Administration of the State whose flag the ship is entitled to fly.

1.2 Application

1.2.1 Ships complying with the requirements of this Section will be eligible for the following class notation:

- ro-ro passenger ship, or
- ro-ro cargo ship.

a) ro-ro passenger ships

A ro-ro passenger ship means a passenger ship with ro-ro spaces or special category spaces as defined in Pt F, Ch 3, Sec1,[3.37].

For these ships in addition to the requirements given in Part B, Part C and in this Section, the provisions given in Sec 1 for passenger vessels as applicable for the parts not covered in this Section are also to be complied with.

b) ro-ro cargo ships

A ro-ro cargo ship means a non-passenger ship with ro-ro spaces as defined in Pt F, Ch 3, Sec1,[3.40].

1.3 Stability

1.3.1 In general for ro-ro passenger vessels the requirements stated in Section 1 and those stated in Part B, Ch 6 relevant to passenger vessels are to be applied.

For ro-ro cargo ships the requirements stated in Part B, Ch 6 are to be applied as for cargo ships.

1.4 Drainage of ro-ro cargo spaces intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion

1.4.1 Scuppers from cargo spaces intended for the carriage of motor vehicles with fuel in their tanks for their propulsion are not to be led to machinery spaces or other places where sources of ignition may be present.

2 Structural configuration

2.1

2.1.1 In general, small ships are ships with a single deck (weather deck) used for vehicles.

Larger ships may have more than one deck intended for motor vehicles.

In this case, such decks are connected with each other by fixed or movable ramps, or by elevators.

In general, pillaring lines to support decks are not provided, in order not to hinder the manoeuvring of vehicles, which gives rise, as a consequence, to large spans of deck structures.

2.1.2 When the number of transverse bulkheads is less than specified in Part B, or when the spacing of such bulkheads is deemed excessive Tasneef ships are to be fitted with partial bulkheads, side transverses and deck transverses in order to assure adequate transverse strength.

2.1.3 For the strength deck and bottom, a longitudinal structure is generally to be adopted.

3 Scantlings

3.1

3.1.1 Structural scantlings and arrangements are to be checked applying the relevant requirements of Part B and taking into consideration the specific requirements of this Section.

In addition, the above check calculations are to be based on the most severe handling and stowage conditions of vehicles and/or pallets.

To this end, the plan of the arrangement of vehicles on board is to be submitted, including the maximum axle load, axle spacing, number of wheels per axle, and size of tyre print.

4 Decks

4.1

4.1.1 The structure of decks intended for the carriage of vehicles is to be calculated assuming the axle load and vehicle location provided by the Designer according to the requirements of Part B, Ch 1, Sec 8 and Sec 11.

Tasneef may accept vehicle arrangements other than those assumed by the Designer where the latter are considered excessively conservative in relation to the load distribution.

Where vehicle decks are also to be used for the carriage of general cargo, the relevant scantlings are also to be calculated on the basis of the loads stated in Part B, Sec 8 and Sec 11.

4.1.2 In the case of decks provided with ramp openings adjacent to the ship side, special consideration is to be given to the supports for the side framing.

5 Sides, ramps and doors

5.1

5.1.1 The scantlings of side structure are to comply with the applicable requirements of Part B, Ch 1, Sec 8 and Sec 10.

5.1.2 The arrangements and scantlings of doors and visors on the sides and at the ends of the ship are to comply with the requirements of Part B, Ch1, Sec 8.

5.1.3 The scantlings of the structures of inner and outer vehicle ramps and of elevators for cargo handling are to be calculated on the basis of the loads intended to be carried.

6 Double bottom

6.1 Additional strength checks

6.1.1 In ships where pillars are widely spaced and transmit very high loads to the double bottom, the double bottom structure will be specially considered by Tasneef and direct strength calculations will generally be required.

Additional reinforcements may be required if high shear and bending stresses are induced by the pillar concentrated loads in the double bottom structure.

In general, the reinforcements are to consist of additional floors and bottom girders.

7 Documentation and information to be submitted

7.1

7.1.1 In addition to the plans and information required in Part B, Ch 2, Sec 3, the following are to be submitted:

- plans of the stern and bow ramps and of elevators for cargo handling, if any;
- plans of bow doors, stern doors and side doors;
- plans of movable decks, if any, including the stowage arrangements of their detachable parts;
- characteristics of motor vehicles and/or other types of vehicles intended to be carried, including, in particular, axle spacing, axle load, number of wheels per axle and size of tyre print;
- plan of the arrangement of motor vehicles and/or other types of vehicles which are intended to be carried;
- plan of dangerous areas, in the case of ships intended for the carriage of motor vehicles provided with petrol engines.

8 Electrical installations

8.1

8.1.1 For ro-ro passengers ships in addition to the requirements given in Part C, and in Section 1 with reference to electrical installations in special category spaces, and other spaces different from special category spaces but in any case dedicated to the carriage of motor vehicles, the requirements given in this paragraph are to be applied.

8.1.2 For ro-ro cargo ships in addition to the requirements given in Part C, with reference to the electrical installations in ro-ro spaces, and other spaces different from ro-ro spaces but in any case dedicated to the carriage of motor vehicles, the requirements given in in this paragraph are to be applied.

8.2 Documentation to be submitted

8.2.1 In addition to the documentation requested in Pt C, Ch 2, Sec 1, Tab 1, the following is to be submitted for approval:

a) plan of hazardous areas

b) document giving details of types of cables and safety characteristics of the equipment installed in hazardous areas.

Table 1 : Electrical equipment permitted in closed ro-ro cargo spaces

Hazardous area	Spaces		Electrical equipment
	N°	Description	
Zone 1	1	Closed ro-ro cargo spaces except areas under item 3	a) any type that may be considered for zone 0 b) certified intrinsically safe apparatus Ex(ib) c) simple electrical apparatus and components (e.g. thermocouples, photocells, strain gauges, junction boxes, switching devices), included in intrinsically-safe circuits of category "ib" not capable of storing or generating electrical power or energy in excess of limits stated in the relevant rules d) certified flameproof Ex(d) e) certified pressurised Ex(p) f) certified increased safety Ex(e) g) certified encapsulated Ex(m) h) certified sand filled Ex(q) i) certified specially Ex(s) j) cables sheathed with at least one of the following: • a non-metallic impervious sheath in combination with braiding or other metallic covering • copper or stainless steel sheath (for mineral-insulated cables only)
Zone 1	2	Exhaust ventilation ducts	As stated under item 1
Zone 2	3	On condition that the ventilation system is so designed and operated as to provide continuous ventilation of the cargo spaces at the rate of at least 10 air changes per hour whenever vehicles are on board: • areas above a height of 450mm from the deck • areas above a height of 450mm from each platform for vehicles, if fitted, without openings of sufficient size permitting penetration of petrol gases downward • areas above platforms for vehicles, if fitted, with openings of sufficient size permitting penetration of petrol gases downward	a) any type that may be considered for zone 1 b) tested specially for zone 2 (e.g. type "n" protection) c) pressurised d) encapsulated e) the type which ensures the absence of sparks and arcs and of "hot spots" during its normal operation (minimum class of protection IP55) f) cables sheathed with at least a non -metallic external impervious sheath

8.3 Safety characteristics

8.3.1 The explosion group and temperature class of electrical equipment of a certified safe type for use with explosive petrol-air mixtures are to be at least IIA and T3.

8.4 Installations in closed ro-ro cargo spaces

8.4.1 Except as provided for in Sec 4, [2.1.2], electrical equipment is to be of a certified safe type as stated in Pt C, Ch 2, Sec 3, [10.1.5] and electrical cables are to be as stated in Pt C, Ch 2, Sec 3, [10.2.2].

8.4.2 Above a height of 450 mm from the deck and from each platform for vehicles, if fitted, except platforms with openings of sufficient size permitting penetration of petrol gases downwards, electrical equipment as stated in Pt C, Ch 2, Sec 3, [10.1.6] and electrical cables as stated in Pt C, Ch 2, Sec 3, [10.2.3]are permitted, on condition that the ventilation system is so designed and operated as to provide continuous ventilation of the cargo spaces at the rate of at least 10 air changes per hour whenever vehicles are on board.

8.4.3 Electrical equipment and cables in an exhaust ventilation duct are to be as stated in Sec 4, [2.1.1].

8.4.4 The requirements in this item are summarised in Sec 4, Tab 1.

8.5 Installations in cargo spaces other than ro-ro cargo spaces but intended for the carriage of motor vehicles

8.5.1 The provisions of Sec 4, [2.1] apply.

8.5.2 All electric circuits terminating in cargo holds are to be provided with multipole linked isolating switches located outside the holds. Provision is to be made for locking in the off position.

This requirement does not apply to safety installations such as fire, smoke or gas detection systems.

8.6 Type approved components

8.6.1 Alarm systems for closing devices of openings and water leakage detection systems if of electronic type, as well as television surveillance systems, are to be type approved or in accordance with Sec 4, [3.1.2].

8.6.2 Case-by-case approval based on submission of adequate documentation and execution of tests may also be granted at the discretion of the Society.

SECTION 3 TUGS AND PUSHERS

1 General

1.1

1.1.1 "Tugs" and "pushers" are taken to mean ships intended for towing service and fitted with the relevant arrangements.

Towing may be effected as stern towing, or as side towing, or by pushing; in the latter case the ship is referred to as a "pusher".

A ship constructed both for towing and pushing is designated as "tug-pusher".

Ships covered by this Chapter are eligible for the type notation **TUG**, TUG-PUSHER or PUSHER accordingly.

1.2 Stability

1.2.1 Reference to Pt B, Ch 2, Sec 2, [3.7] is to be made

2 General characteristics and structural configuration

2.1

2.1.1 Tugs are generally completely decked ships provided with an ample drift surface and adequate stability, as well as with a strong fender fitted in way of the stringer.

The propulsion machinery is to be controlled and monitored from the wheelhouse.

Pushers are to have at the bow a device, referred to as a "pushing platform", of a width not less than 2/3 B, to prevent the pusher's bow from moving sideways in relation to the stern of the craft to be pushed.

The above-mentioned platform is to be so designed as to allow the personnel in charge to pass easily and safely from pusher to pushed craft, even during coupling manoeuvres of the pusher with such craft.

2.1.2 Pushers are in addition to be designed and equipped in such a way as to:

a) enable crews easily and safely to cross over to the pushed craft with the coupling devices connected;

b) enable them to occupy a fixed position in relation to the coupled craft;

c) prevent relative movement between the craft themselves.

If the craft are joined together with cables, the pusher craft is to be equipped with at least two special winches or equivalent coupling devices for tensioning the cables.

The coupling devices are to enable a rigid assembly to be formed with the pushed craft.

Where convoys consist of a pusher craft and a single pushed craft, the coupling devices may permit controlled articulation.

The necessary drive units are to easily absorb the forces to be transmitted and are to be capable of being controlled easily and safely.

The collision bulkhead as required in Part B may be dispensed with for pushers.

3 Scantlings

3.1

3.1.1 Structural scantlings are to be checked applying the relevant requirements of Part B, taking account of the particular specifications given in this Section.

4 Transverse strength and strength of particular structures

4.1

4.1.1 In pushers, ship structures forward are to be adequately strengthened by means of thickness increase and local stiffeners, to the satisfaction of Tasneef

4.1.2 In ships equipped for side towing, the relevant bollards are to be effectively fixed on the deck in way of web frames and deck transverses or bulkheads.

Fenders fitted to the sides of such ships are to be supported by vertical stiffeners extending from the lightship waterline to the fenders themselves.

5 Means of escape from machinery space

5.1

5.1.1 So that they may be used even at extreme angles of heel, emergency exits from the machinery space to the upper deck are to be located as high as possible above the waterline and near the ship's centreline.

Covers of escape hatches are to have hinges arranged athwart ship and coamings of such hatches are to be at least 400 mm above the upper surface of the deck.

6 Towing arrangements

6.1 General

6.1.1 Ships licensed to tow are to be provided with towing devices appropriate to their type and size, and to the water-

ways on which they are allowed to tow. Attention is drawn to the fact that certain waterways may be subject to particular requirements issued by the relevant authority.

The towing hook and/or winch are, in general, to be arranged near the ship's centreline, in such a position as to minimise heeling moments in normal working conditions.

An unhooking device for the towline, operable from the wheelhouse, is to be provided.

Towing devices are to be so arranged that their use does not affect the safety of the crew.

6.2 Hooks

6.2.1

a) The constructional plans of the hook and of its remote control device for opening under load are to be submitted to Tasneef for approval, with details of its connection to the hull structures. The above quick-release device is to be capable of being operated while the hook is under load and is to be operable from the wheelhouse or as near as practicable. The anticipated maximum service load CL is to be specified in the constructional plans mentioned above; this load is to substantially correspond to the maximum towing load anticipated in normal working conditions.

b) The hook is to be built with tested material and to be subjected to a static test with testing load CP equal to twice the working load CL.

For hooks with CL 400 kN, the testing load is to be fixed by Tasneef

c) The under load-opening device is to be tested at the works both at service and testing loads. The force necessary to open the hook under load is generally not to exceed 147 N.

d) After installation on board, an unhooking trial under load is to be carried out by means of the remote control device. This trial may also be performed with a load less than the service load.

6.3 Winches

6.3.1 Tow winches are to comply with the provisions of the "Rules for the Classification of Ships" relevant to constructional plans to be submitted for approval, materials to be used and tests required.

The above-mentioned winches are to be equipped with a suitable slip device, operable by remote control, allowing the rope to unwind, when necessary.

The unhooking of the rope from the winch drum is to be enabled by means of a suitable device, or by using a rope whose terminal is not fixed to the drum.

Tow winches may be equipped with a device for automatic adjustment of the tow.

6.4 Bollard pull test

6.4.1 At the request of the Interested Parties, tugs may be subjected to bollard pull tests.

This test is to be carried out in the presence of a Tasneef Surveyor using suitable equipment (e.g. electric load cell equipment) capable of providing, at any time during the test, a readout and a record of the bollard pull developed by the tug and a record, in numerical or graphical form, of the values measured.

The test procedure, location and conditions (environmental conditions, tug trim etc) are to be to the satisfaction of Tasneef

Where such test is carried out, this is to be mentioned on the Certificate of Classification.

6.5 Attachments to the hull

6.5.1 The scantlings of the structures intended to connect the towing arrangements to the hull are to be determined on the basis of the maximum service load CL of such arrangements. The relevant constructional plan is to be submitted to Tasneef for approval.

7 Pushing arrangements

7.1 General

7.1.1 Pushers are to be equipped with the necessary coupling devices; if coupling is carried out by means of ropes, pushers are to be equipped with at least 2 special winches, or equivalent appliances.

In addition, pushers are to be equipped with power-driven winches for handling the stern anchors.

7.2 Coupling devices

7.2.1 Coupling devices are to comply with the following requirements:

- they are to be capable of withstanding the maximum operational stresses imposed under the severest conditions which may be encountered in the navigation zone for which the pusher is intended;
- they are to be capable of affording the units, at the different relative displacements, the necessary degree of freedom of relative movement when pitching and rolling;
- they are not to interfere with the operation of other deck machinery;
- they are not to project beyond the pusher's breadth over-all;
- they are to enable the pusher to couple the pusher with both loaded and empty barges.

In addition, coupling devices are to satisfy the following conditions:

- they are to ensure the rigidity of the convoy;
- they are to be kept under uniform load by means of suitable devices, preferably by means of special winches.

8 Trials

8.1

8.1.1 The suitability of towing or pushing arrangements and appliances is to be checked during navigation trials.

In particular, pushers are to be subjected to suitable trials with the most unfavourable formation(s) such as to ascertain that:

- the stability of course of the convoy is adequate;
- it is possible to effect a major change of course and, immediately after, restore the initial course quickly and easily;
- the convoy speed with respect to water is adequate;
- if necessary, astern power is adequate to enable the convoy to stop, facing downstream;
- during the formation and sailing of the convoy, coupling manoeuvres are easy and free from danger.

On the occasion of the above-mentioned trials, account may be taken of the favourable effect which could derive from special devices (rudders, propelling appliances etc) installed on barges, only if such barges always sail in the same convoy. In such case, the barges admitted are to be mentioned on the certificate of the ship which ensures the propulsion of the convoy.

SECTION 4 CRAFT SUITABLE FOR BEING PUSHED

1 General

1.1

1.1.1 In general the requirements as stated in Part G are to be applied.

SECTION 5 CRAFT SUITABLE FOR PROPELLING SIDE-BY-SIDE FORMATIONS

1 General

1.1

1.1.1 In order to ensure propulsion in side-by-side formation, the following requirements are to be satisfied:

a) the towing devices are to be arranged in such a way that their use does not compromise the safety of the craft, crew or cargo;

b) the steersman is to be able to manoeuvre the propulsion machinery himself, or to command this manoeuvre without moving from the steering position,

c) equipped with devices, which, thanks to their number and arrangement, allow a safe connection between the unit towed side-by-side, loaded empty, and the ship which ensures the propulsion of the formation.

SECTION 6 PUSHED CONVOYS

1 General

1.1

1.1.1 Pushed convoys are to satisfy the following requirements:

a) they are to have adequate stability of course;

b) they are to be able to effect a major change of course quickly and easily;

c) they are to be able to attain sufficient speed depending on the zone of service and according to the requirements of the authority with local jurisdiction;

d) they are to be able to stop, facing downstream, and remain manoeuvrable during and after the stop, and subsequently to turn upstream quickly and easily.

SECTION 7 BARGES AND PONTOONS

1 General

1.1

1.1.1 The requirements of this Section, alternative or additional to those of Part B and Part C, apply to manned or unmanned non-self-propelled craft intended for the carriage of cargoes in holds or on deck, defined as follows:

a) barges: if intended for the carriage of dry or liquid in cargo holds;

b) pontoons: if intended for the carriage of dry cargoes on deck;

Non-self-propelled craft, for which the service notation assisted propulsion is to be assigned, is taken to mean any craft intended for carriage of cargo, not having mechanical means of self-propulsion suitable for navigation and therefore provided with devices enabling it to be towed and/or specially equipped to be pushed:

- the provision of steering gear and wheelhouse is not required for such craft;
- for non-self-propelled craft without accommodation, machinery or boiler room, the arrangement of bilge systems is not required.

1.1.2 Manned or unmanned tank barges intended for the carriage in bulk of dangerous liquid chemicals or liquefied gases will be given special consideration by Tasneef on the basis of the requirements of Chapter 2.

1.1.3 Stability

Intact stability is to be assessed according to the requirements stated in Part B, Ch 6, Sec 2, [3.2] as applicable, for floating equipment.

2 General characteristics and structural configuration

2.1

2.1.1 The requirements of this paragraph are based on the assumption that the structural configuration and ratios of the main dimensions of barges and pontoons are similar to those of ships and that the cargo is homogeneously distributed.

The scantlings of units carrying cargoes which are not homogeneously distributed, such as containers or heavy loads concentrated in limited areas etc, and units with unusual shapes and dimensional proportions, will be considered by Tasneef on a case-by-case basis, also taking into account the results of any direct calculations.

2.1.2 Barges and pontoons intended for push towing or to form an integral pusher-barge system will be given special consideration by Tasneef Plans of the specific arrangements for the connection between pusher and barge are to be submitted for examination. The suitability of such arrangement is to be confirmed by navigation trials.

Decks, hatch covers and in general all walkable surfaces are to have an anti-slip surface; inclined surfaces are to be provided with foot-guards if necessary.

Transverse watertight bulkheads required in Part B, Ch 1, Sec 2 may be omitted if the front part of the self-propelled craft is capable of withstanding a load equal to 2,5 times the scantling load of the collision bulkhead of a ship having the same draught.

The outer edges of decks and stringers are to be provided with small comings not less than 30 mm in height, and with bulwarks, which may be removable, not less than 900 mm in height; such bulwarks may be omitted in the fore and aft front areas.

2.1.3 Barges and pontoons are to be provided with suitable arrangements for towing, with scantlings to be decided by the Designer on the basis of the anticipated service conditions.

Tasneef at the request of the Interested Parties, may examine plans relating to the above arrangements and to associated hull strengthening; to this end, the maximum pull for which the arrangements concerned are to be checked is to be indicated on the plan, which is to be sent in triplicate.

3 Longitudinal strength

3.1

3.1.1 Longitudinal strength calculations are to be carried out in accordance with the requirements of Part B, Sec 7.

Stresses resulting from these calculations are generally not to exceed the following values:

- Bending stress:150/K N/mm^2
- Shear stress:100/K N/mm^2.

4 Scantlings

4.1 Length

4.1.1 The length L, in m, to be taken for the check of structural scantlings, where no rudder is fitted, need not exceed 0,97 Lwl, where Lwl is the length at the maximum load waterline.

In the case of a tug/barge integral system with rigid connections, the scantling length L is to be taken equal to the combined length of tug and barge.

4.2 Structural scantlings

4.2.1 Unless expressly stated otherwise in the following subparagraphs, the structural scantlings are to be checked by applying the specific Rules of the relevant Sections of Part B.

4.2.2 The following formulae may be used for the calculation of the section modulus Z, in cm^3, of ordinary stiffeners and primary supporting members:

- Ordinary stiffeners: $Z = A \cdot s \cdot S^2 \cdot K$
- Primary supporting members: $Z = A \cdot b \cdot S^2 \cdot K$

where:

A : coefficient whose value is given in Table 8.1, depending on the type of unit and framing

b : width, in m, of bottom or deck plating strip carried by the bottom or deck girder, or spacing, in m, between the transverses, in the case of longitudinal framing

S : conventional scantling span, in m, of the ordinary stiffener or primary supporting member.

In any case, it is not required that the section modulus of the various stiffeners or primary supporting members is greater than that calculated by the relevant formulae in the Sections of Part B.

In the case of tank barges, the requirements concerning the minimum thicknesses stipulated in paragraph 4 above are to apply.

Table 1

Type of framing	Type of stiffeners		Value of coefficient A	
			Barges for the carriage of dry cargoes or pontoons	Tank barges
Longitudinal framing	Ordinary stiffeners	bottom	8,5 D	9 D
		side shell	6,5 h	6,5 (h + h'')
		deck	5,2 h'	5,2 h''
		bulkheads	4,4 h	5,2 (h + h'')
	Primary supporting members	floors	7,5 D	8,5 D
		side frames	6,5 h	6,5 (h + h'')
		beams	4,4 h'	5,5 h''
		vertical girders of bulkheads	4,4 h	5,5 (h + h'')
Transverse framing	Ordinary stiffeners	floors	7,5 D	8,5 D
		side frames	7,5 h	7,5 (h + h'')
		beams	5 h'	5,2 h''
		vertical girders of bulkheads	4,4 h	5,2 (h + h'')
	Primary supporting members	bottom girders	7,5 D	8,5 D
		deck girders	5 h'	5,5 h''

Note 1: D=moulded depth, in m, of the barge or pontoon

h=distance, in m, from the deck to the mid-point of the span of side frames or vertical girders, or distance, in m, from the deck to longitudinals. In the case of barges for the carriage of dry cargoes or pontoons, the value of h is to be taken not less than that calculated as follows: h = 0,01 L + 0,7

h' = value, in m, corresponding to the load per square metre carried by the deck, to be taken, in all cases, not less than that obtained as follows: h' = 0,01 L + 0,7

h''= value, in m, derived from the following formula: h'' = 1 + 0,05 (L 50), where L is to be taken in any case as follows: 50 m L 80 m.

Where the deck forms a tank top, the structure is also to be checked using the formulae applicable to tank barges.

4.2.3 In pontoons where truss arrangements, comprising top and bottom girders in association with pillars and diagonal bracing, are used as supports of the deck loads, the diagonal members are generally to have angles of inclination with the horizontal of 45° and cross-sectional area of approximately 50 per cent of the adjacent pillars, calculated for a deck cargo having mass density not less than 0,7 t/m^3.

4.2.4 Adequate support is to be provided on the longitudinal centreline for the loads imposed on the structure when the barges or pontoons are in dry dock.

5 Equipment

5.1

5.1.1 The equipment of anchors, chain cables and ropes to be fitted on board manned barges and pontoons is to comply with that specified in Part B, Ch 3, Sec 1, unless otherwise required by Tasneef in the case of special operations and/or services.

Chain cables for anchors may be replaced by steel ropes with the same breaking load as the former.

The ropes are to be connected to the anchors by approximately 10 metres of chain cable of Rule size.

5.1.2 In the case of unmanned barges or pontoons, the Rule equipment is not required and the anchors, chain cables and ropes to be fitted on board are left to the discretion of the Interested Parties.

SECTION 8 SHIPS FOR DREDGING ACTIVITES

1 General

1.1

1.1.1 The service notations related to ships specially intended for dredging activities are listed in [1.1.2].

1.1.2 The following notations are provided:

- Dredger, for ships specially equipped only for dredging activities (excluding carrying dredged material)
- Hopper dredger, for ships specially equipped only for dredging activities and carrying spoils and dredged material
- Hopper unit, for ships specially equipped for carrying spoils or dredged material
- Split hopper unit, for ships specially equipped for carrying spoils or dredged material and which open longitudinally, around hinges
- Split hopper dredger, for ships specially equipped only for dredging activities and for carrying spoils or dredged material and which open longitudinally, around hinges.

2 Stability

2.1

2.1.1 Intact stability is to be assessed according to the requirements stated in Part B, Ch 6, Sec 2, [3.2] as applicable.

3 Structure design principles

3.1 General

3.1.1 The attention of Designers is drawn to the fact that structural arrangement of ships for dredging activities involves discontinuities and that particular care is to be taken to avoid cracks or fractures.

3.1.2 Where dredgers are likely to work in association with hopper barges, the sheerstrake is to be protected, slightly below the deck, by a fender efficiently secured to the shell plating and extending over at least two thirds of the ship's length. Compensation is to be provided in way of the gangway port in raised deck, if fitted.

3.1.3 Where dredgers are likely to work in association with hopper barges, the shell plating is to be protected by a fender extending from the load waterline to the lowest waterline.

Additional structural reinforcements are to be provided in way of fenders and submitted to the Society for approval.

3.1.4 On bucket dredgers, in order to prevent dangerous flooding in the event of damage to the shell plating by metal debris (e.g. anchors), a watertight compartment is to be provided at the lower part of the caissons on either side of the bucket well in the area of the buckets. The compartment is to be of adequate size to allow surveys to be carried out.

3.1.5 Reinforcements are to be provided at locations where the hull is heavily stressed, such as:

- beneath the suction pipe gallows
- in way of the gallow frame on bucket dredgers
- points where tow ropes are secured
- connections of piles etc.

3.1.6 The strengthening of the flat bottom at ends is to be examined by the Society on a case-by-case basis.

3.1.7 Weirs are to be provided in the hopper spaces. Their sectional area is to be large enough, taking into account the density of the water-spoil mixture to be drained off. The disposition and location of the weirs are to be such that:

- they prevent the maximum authorised draught from being exceeded during loading
- trim and stability are always in accordance with the reviewed loading conditions
- draining off is made without any overflowing on the decks.

3.1.8 In trailing suction hoppers, where (B+D) is greater than 21 m, a double bottom is to be provided between the collision bulkhead and the fore bulkhead of the closest hopper space. The double bottom may, however, be interrupted in way of the dredging pump.

3.1.9 The corners of the cut-outs in the bottom plating are to be rounded and the radius is to be as large as possible, especially near the bottom doors.

3.1.10 Where hopper barges and suction dredgers are intended for deep sea navigation, it is recommended, as far as possible, that sidescuttles should not be fitted in the shell plating.

3.1.11 The brackets are generally to be of a swept shape. A flange is to be fitted on the free edge if the length of this edge exceeds 60 times the web thickness.

3.1.12 For ships with either of the service notations split hopper dredger or split hopper unit, where panting beams are provided, stringers and web frames are to be fitted on the centreline bulkheads of the two half-hulls to take up the reactions.

4 Longitudinal members in the area of the hopper well

4.1

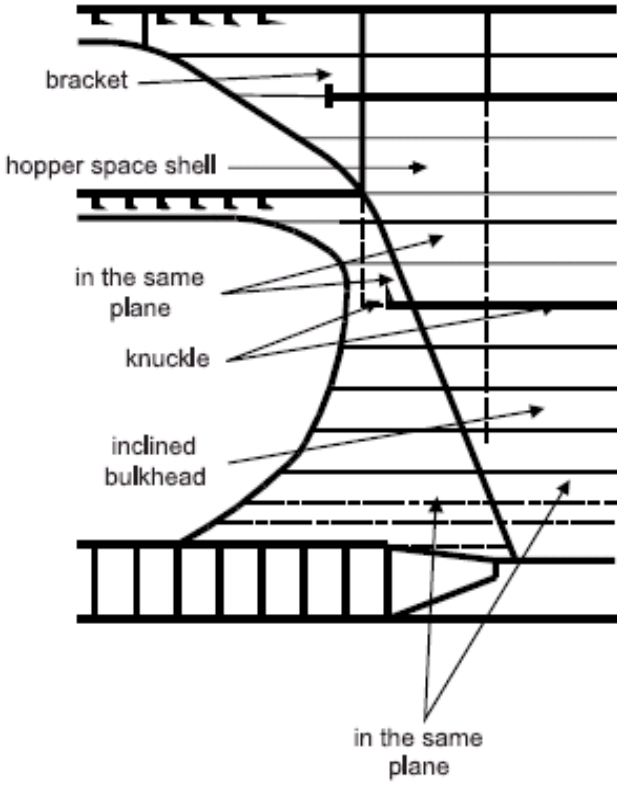
4.1.1 The scantlings of the midship region are generally to be kept over the full length of the hopper well.

4.1.2 Attention is to be paid to the structural continuity of longitudinal members, especially coaming and hopper well bulkheads.

4.1.3 The upper deck stringer plate is to extend to the longitudinal bulkhead over the full length of the hopper well.

4.1.4 The fore and aft ends of the longitudinal bulkheads of the hopper spaces are to be extended by large brackets generally having a length and a width equal to D/4. It is recommended that a swept shape should be provided for these brackets (see Fig 1).

Figure 1 : Brackets at fore and aft ends of longitudinal bulkheads of hopper spaces



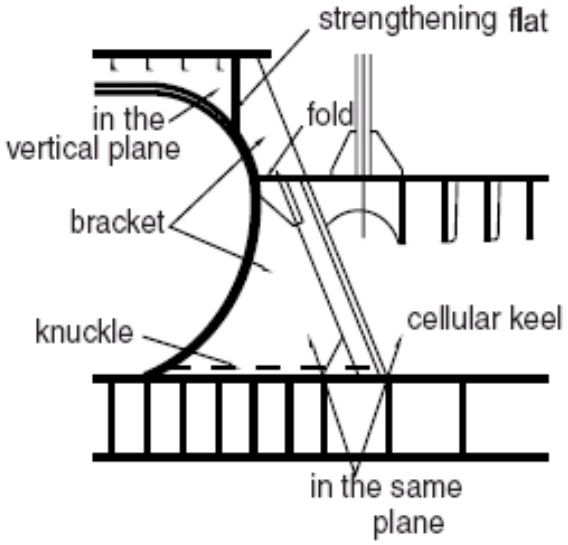
The upper bracket is to be welded to the deck and extended by a longitudinal deck girder.

The lower bracket, which is generally oblique, is to be welded to the bottom or to the tank top. In the latter case, the lower bracket is to be extended inside the double bottom by means of a solid keelson extending at least over three frame spaces beyond the end of the bracket.

4.1.5 The fore and aft ends of the centreline cellular keel are to be extended by means of brackets having a length at least equal to the depth of this keel.

In areas where a double bottom is provided, the brackets may be arranged in accordance with Fig 2.

Figure 2 : Brackets at fore and aft ends of cellular keel



4.1.6 The vertical sides of the trunks are to be extended beyond the end of the hopper spaces over a distance of at least 1,5 times their height.

4.1.7 The Society may, on a case-by-case basis, require that longitudinal members of the double bottom structure are extended, by means of brackets, inside the side compartments bounding the hopper spaces.

4.1.8 Arrangements other than those described in [4.1.4] to [4.1.7] will be considered by the Society on a case-by-case basis.

5 Transverse members in the area of the hopper well

5.1 Transverse primary supporting rings

5.1.1 Within the hopper well area, transverse primary supporting rings are to be provided and are to involve:

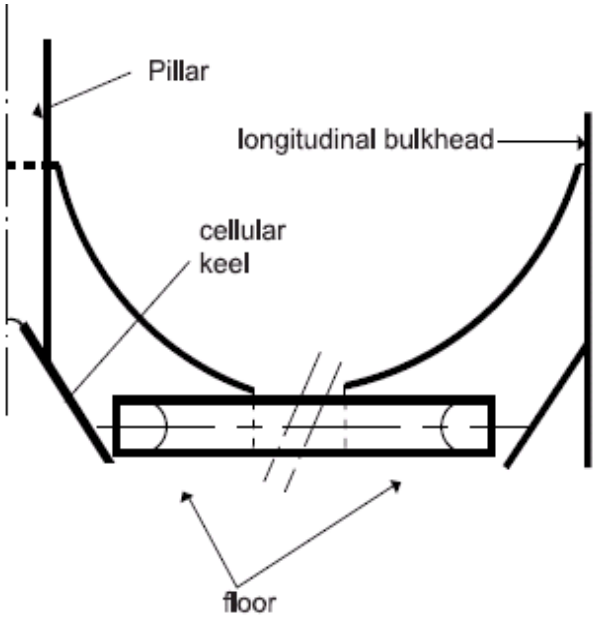
- deep floors inside hopper spaces
- side vertical primary supporting members
- hopper well vertical primary supporting members
- strong beams inside hopper spaces, at deck or trunk level
- where necessary, cross-ties connecting either the side vertical primary supporting members to the hopper well vertical primary supporting members or the floor to the hopper well vertical primary supporting members. The spacing of the transverse rings is generally to be taken not greater than five frame spaces.

5.1.2 The cellular keel is to be rigidly connected to the transverse rings required in [5.1.1].

5.1.3 The upper part of the cellular keel may be connected to the deck or trunk structure by means of axial or inclined pillars in association with strong beams, or by a centreline wash bulkhead.

5.1.4 The connection of hopper space floors with the longitudinal bulkheads and the cellular keel is to be arranged such that the continuity of the strength is ensured. Where the floor is made of a box with sloping sides, particular attention is to be paid to the continuity of the lower flange. Fig 3 shows an example of possible connection.

Figure 3 : Example of connection with floor made of box with sloping sides



5.1.5 The connection between the flanges of the strong beams and the adjacent structure is generally to be made by means of brackets having the thickness of these flanges and extending inside the adjacent structure.

6 Arrangements relating to suction pipes

6.1

6.1.1 Where a cut-out is necessary in the side shell plating to fit the suction pipe guides, continuity of members is to be restored, for example by means of knuckled plates as thick as the side shell plating and with a knuckle angle as small as possible.

The knuckles are to be stiffened by reinforced vertical primary supporting members and intercostal girders of the same web height (see Fig 4 and Fig 5).

The fillet welding between the web of vertical primary supporting members and the knuckled plates is not to be made

onto the knuckles, but about 50 mm apart.

Figure 4 : Transversely framed side - Cut-out reinforced by means of knuckled plate

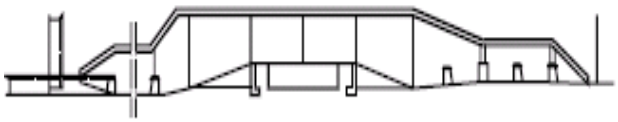
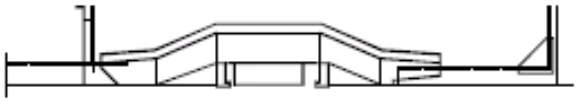


Figure 5 : Longitudinally framed side - Cut-out reinforced by means of knuckled plate



6.1.2 The suction pipe guides are to be fitted as far as possible from the hopper space ends or from any cut-out in the bottom or deck plating. A 60% reinforced deck plate, not exceeding 38 mm, is to be provided in way of the cut-out of the guides. This plate is to extend over at least one frame space forward and aft of the vertical primary supporting members provided for in [2.4.1].

6.1.3 In areas where, during suction pipe operations, the drag head and the joint may run against the hull, one or several of the following arrangements are generally to be provided:

- thickness plating in excess of thickness obtained according to Part B, as applicable, for bilge and side shell
- reinforcement of the structure by means of vertical primary supporting members, girders, intermediate frames or longitudinals, depending on the construction type
- fenders to be provided outside the hull; these fenders together with the bilge shape are not to impede the suction pipe operation
- cofferdam to be provided to limit the possible flooding of side compartments.

6.1.4 The suction pipes are generally to be fitted with:

- auxiliary devices able to lift the suction pipe, in addition to the suction pipe davits
- a sufficient number of attachment points on the suction pipe itself, to facilitate handling
- a load limiting device to avoid any overload, if the suction pipe is equipped with cutting teeth
- accessories fitted onto the suction pipe built in several parts to facilitate partial replacements in case of damage.

7 Chafing areas

7.1

7.1.1 Some parts of the structure subjected to heavy wear, such as longitudinal bulkheads of hopper spaces, may be protected or reinforced to avoid frequent replacement.

7.1.2 If protection is provided by means of removable plates, called chafing plates, attention is to be paid to avoid

corrosion between the facing sides of these plates and the hopper space plating.

7.1.3 If reinforcement is made by increasing the thickness, the section moduli may be determined taking into account the extra thickness, provided that the chafing limits, beyond which the plates are to be replaced, are determined according to the extra thickness values. If this extra thickness is disregarded in the section moduli calculation, this is to be clearly indicated on the midship section drawing.

8 Reinforcements for grounding

8.1

8.1.1 If grounding is considered for normal operation of the ship, the bottom plating and the bottom structure are to be reinforced as indicated in [9.8.2] to [9.8.5].

8.1.2 Along the full length of the ship, in the area of flat bottoms, the bottom net thickness obtained according to Part B, as applicable, is to be increased by 2,5 mm.

8.1.3 Where the ship has a transversely framed double bottom, floors are to be fitted at each frame space and associated with intercostal longitudinal girders, the mean spacing of which is to be not greater than 2,10 m.

Moreover, intercostal longitudinal ordinary stiffeners located at mid-spacing of bottom girders are to be provided.

8.1.4 Where the ship has a longitudinally framed double bottom, the floor spacing may not exceed three frame spaces and the bottom girder spacing may not exceed three longitudinal ordinary stiffener spaces. Intercostal transverse stiffeners are to be provided at mid-span of longitudinal ordinary stiffeners. Floors are to be stiffened by vertical stiffeners having the same spacing as the longitudinal ordinary stiffeners.

8.1.5 Where the ship is built with open hopper spaces (bottom doors provided on the bottom), reinforcements as required in [9.8.3] or [9.8.4] are to be provided within the side compartments, the cellular keel and, in general, within the limits of the flat bottom area.

9 Bolted structures

9.1

9.1.1 Where the dredger is made of several independent members connected by bolting, the connection is to be examined by the Society on a case-by-case basis.

10 Design Load

10.1 General

10.1.1 Design loads are to be determined for the various load cases in the following two situations:

- navigation situation, considering the draught T
- dredging situation, considering the dredging draught T_D.

10.1.2 For dredgers made of bolted structure, the Society may require the hull girder loads calculated with the maximum length of the unit when mounted to be applied to each individual element.

10.1.3 For the specific calculation, reference is to be made to Pt E, Ch 13, Sec 2 [3] of Tasneef Rules for the Classification of Ships.

11 Hull scantlings

11.1 General

11.1.1 Hull scantlings are to be checked according to the applicable requirements of Part B, for the following two situations:

- navigation situation, considering the draught T
- dredging situation, considering the dredging draught T_D.

11.2 Minimum net thicknesses of plating

11.2.1 The net thickness of plating is to be not less than the greater of the following values:

- 5 mm
- thickness, in mm, obtained from Tab 1.

11.2.2 When no protection is fitted on the deck areas where heavy items of dredging equipment may be stored for maintenance, the net thickness of the deck plating is to be not less than the value obtained, in mm, from the following formula:

$t = 5,1 + 0,040\ L\ k1/2 + 4,5\ s.$

12 Bottom plating

12.1 General

12.1.1 Where the bottom is longitudinally framed and the bilge is made of a transversely framed sloped plate, the bottom is to be assumed as being transversely framed when calculating the plating thickness.

12.1.2 The net thickness of the bottom strake, to which the longitudinal bulkheads of the hopper space are connected, is to be not less than the greater of the following thicknesses:

- bottom plating thickness increased by 15%
- keel thickness.

13 Well bulkhead and cellular keel plating

13.1

13.1.1 The net thickness of hopper well bulkhead plating and cellular keel plating is to be not less than the net thickness obtained:

- in the dredging situation, considering the internal pressures defined in [10];
- in the navigation situation, where the hopper well bulkheads limit tank compartments, considering the internal pressures defined in Part B, as applicable.

13.1.2 The net thickness of the longitudinal bulkhead above the deck or within 0,1D below the deck is to be not less than the net thickness of the strength deck abreast of the hatchways.

13.1.3 The net thickness of the transverse and longitudinal bulkhead of a dredge pipe well is to be determined as for the side shell net thickness.

14 Transversely framed bottoms

14.1 Floors

14.1.1 The scantlings of floors located inside large compartments, such as pump rooms, are to be obtained from a direct calculation, according to Part B as applicable, and taking into account the following assumptions:

- floors are simply supported at ends
- local discontinuities in strength, due to the presence of wells, are to be considered.

15 Buckling check of plating and ordinary stiffeners for split hopper dredgers and split hopper units

15.1 Buckling

15.1.1 For ships with either of the service notations split hopper dredger or split hopper unit, the buckling check of plating and ordinary stiffeners subjected to compression stresses is to be carried out according to Part B, as applicable, considering the maximum compression stresses, in hogging and sagging conditions, for the navigation and dredging situations.

Table 1 : Ships for dredging activities - Minimum net thicknesses of plating

Plating	Minimum net thickness, in mm
Keel	5,1 + 0,040 L k1/2 + 4,5 s
Bottom • transverse framing • longitudinal framing	 4,3 + 0,036 L k1/2 + 4,5 s 3,4 + 0,036 L k1/2 + 4,5 s
Inner bottom outside hopper spaces	2,0 + 0,025 L k1/2 + 4,5 s
Side • below freeboard deck • between freeboard deck and strength deck	 2,5 + 0,031 L k1/2 + 4,5 s 2,5 + 0,013 L k1/2 + 4,5 s
Strength deck within 0,4L amidships • transverse framing • longitudinal framing	 2,5 + 0,040 L k1/2 + 4,5 s 2,5 + 0,032 L k1/2 + 4,5 s
Hopper well • transverse and longitudinal bulkheads • cellular keel plating	 2,7 + 0,034 L k1/2 + 4,5 s 2,7 + 0,034 L k1/2 + 4,5 s

SECTION 9 LAUNCHERS

1 General

1.1

1.1.1 The type and service notation launch is assigned to small craft, in general not more than 24 m in length, which are used to provide facilities and assistance for the performance of specified activities.

2 Stability

2.1

2.1.1 Intact stability is to be assessed according to the requirements stated in Part B, Ch 6, Sec 1, [2.1.2].

3 Scantlings

3.1

3.1.1 Hull scantlings are to be carried out according to the requirements stated in Part. B.

SECTION 10 CONTAINER SHIPS

1 General

1.1

1.1.1 The type and service notation Container is assigned, in accordance with Part A, Ch 1, Sec 2, [4.2.4] to ships intended to carry containers in molds or decks.

1.1.2 Ships dealt with in this Section are to comply with the requirements stated under Part A, Part B, Part C and Part D of these Rules, as applicable, and with the requirements of this Section, which are specific to container ships.

2 Stability

2.1

2.1.1 Intact stability is to be assessed on the basis of the requirements stated in Part B, Ch 6, Sec 1, [3.3] and [3.4].

3 Structure design principles

3.1 General

3.1.1 Local reinforcements of the hull structure are to be provided under container corners and in way of cell guides, if fitted.

3.1.2 Structural continuity

In double side skin ships, where the machinery space is located between two holds, the inner side is, in general, to be continuous within the machinery space. Where the machinery space is situated aft, the inner side is to extend as far abaft as possible and be tapered at the ends.

3.2 Bottom Structure

3.2.1 Floor and girder spacing

The floor spacing is to be such that floors are located in way of the container corners. Floors are also to be fitted in way of watertight bulkheads. Girders are generally to be fitted in way of the container corners.

3.2.2 Reinforcements in way of cell guides

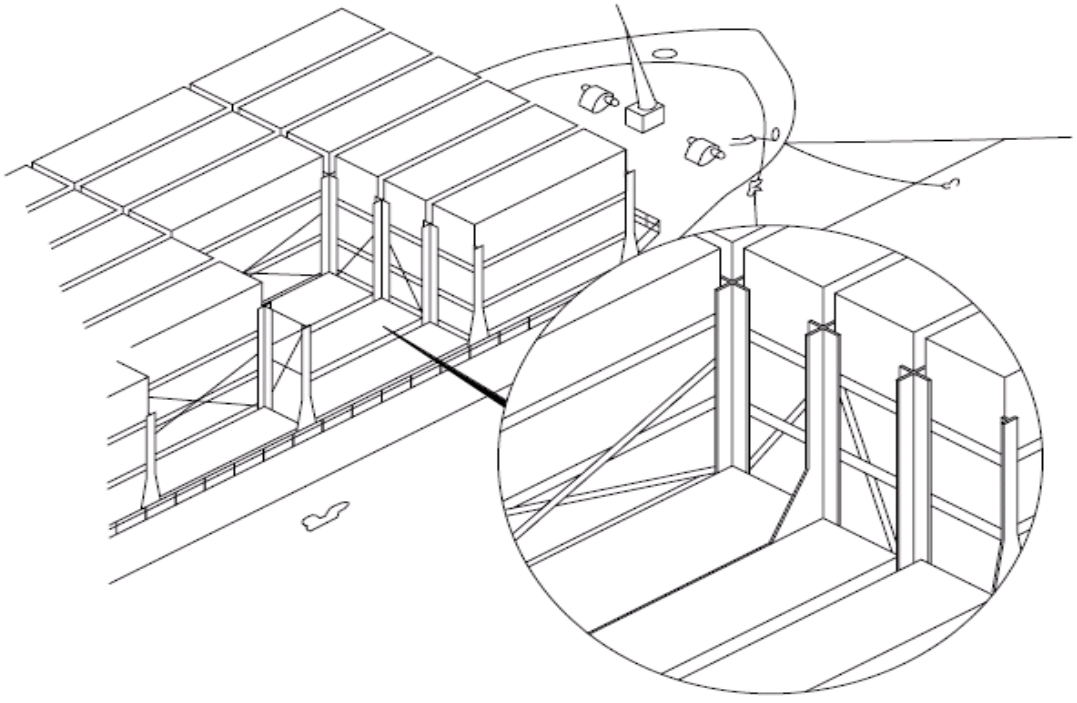
The structures of the bottom and inner bottom on which cell guides rest are to be adequately stiffened with doublers, brackets or other equivalent reinforcements.

3.2.3 Fixed cell guides

a) Containers may be secured within fixed cell guides, permanently connected by welding to the hull structure, which prevent horizontal sliding and tipping (see Fig 1)

b) When containers are secured by fixed cell guides, the scantlings of such cell guides and supports are to be approved and checked using the criteria in [3.3] and [3.4].

Figure 1 : Containers within fixed cell guides



3.3 Arrangement of fixed cell guides

3.3.1 Vertical guides generally consist of sections with equal sides, not less than 12 mm in thickness, extended for a height sufficient to give uniform support to containers.

3.3.2 Guides are to be connected to each other and to the supporting structures of the hull by means of cross-ties and longitudinal members such as to prevent deformation due to the action of forces transmitted by containers.

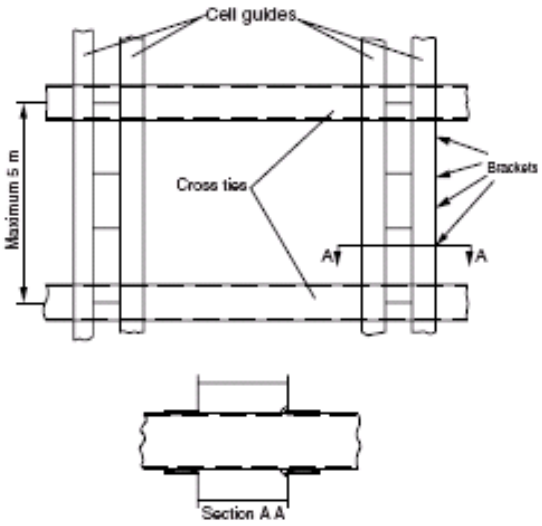
In general, the spacing between cross-ties connecting the guides may not exceed 5 metres, and their position is to coincide as nearly as possible with that of the container corners (see Fig 2).

Cross-ties are to be longitudinally restrained at one or more points so that their elastic deformation due to the action of the longitudinal thrust of containers does not exceed 20 mm at any point.

3.3.3 In stowing containers within the guides, the maximal clearance between container and guide is not to exceed 25 mm in the transverse direction and 38 mm in the longitudinal direction.

3.3.4 The upper end of the guides is to be fitted with a block to facilitate entry of the containers. Such appliance is to be of robust construction so as to withstand impact and chafing.

Figure 2 : Typical structure of cell guides



3.4 Strength criteria

3.4.1 The local stresses in the elements of cell guides, transverse and longitudinal cross-ties, and connections with the hull structure are to be less than the following values:

- normal stress: 150/k N/mm^2
- shear stress: 100/k N/mm^2
- von Mises equivalent stress: 175/k N/mm^2,

where k is the material factor, defined in Part B.

4 Design Loads

4.1

4.1.1 The design still water torsional torque induced by the non-uniform distribution of cargo, consumable liquids and ballast is to be considered. If no specific data are provided by the Designer, it is to be obtained at any hull transverse section, in kN. m, from the following formula:

$M_{SW,T} = 31 \cdot 4F_T$ STB

where:

F_T : Number of container stacks over the breadth B

ST : Number of container tiers in cargo hold amidships (including containers on hatch covers).

4.2 Forces containers

4.2.1 The still water and inertial forces applied to one container located at the level "i", as defined in Fig 3, are to be obtained, in kN, as specified in Tab 2.

Table 1 : Container at level "i" Still water and inertial forces

Ship condition	Load case	Still water force F_S and inertial force F_W, in kN
Still water		$F_{S,I} = M_I g$
Upright (positive heave motion)	"a"	No inertial force
	"b"	$F_{w,x,I} = M_{Iax1}$ in x diretction $F_{w,z,I} = -M_{Iaz1}$ in z diretction
Inclined (negative roll angle)	"c"	$F_{w,y,I} = M_I C_{FA} a_{y2}$ in x diretction
	"d"	$F_{w,z,I} = -M_I C_{FA} a_{z2}$ in z diretction

Note 1: g: gravity acceleration, in m/s^2:
g = 9,81 m/s^2

M_I : Mass, in t, of the container considered at the level "i"

C_{FA} : Combination factor, to be taken equal to:
- C_{FA} = 0,7 for load case "c"
- C_{FA} = 1,0 for load case "d"

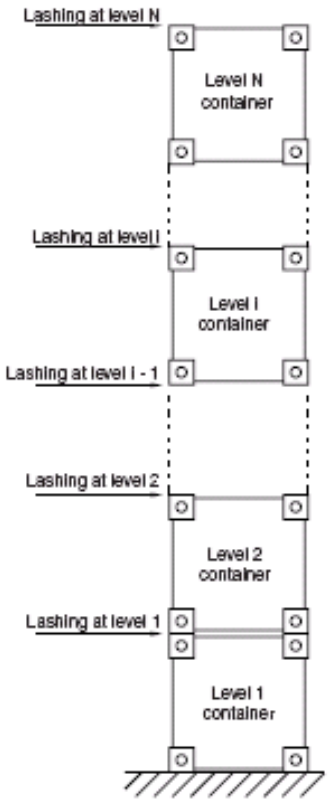
a_{X1}, a_{Z1} : Accelerations, in m/s^2, determined at the container's centre of gravity for the upright ship condition, and defined in Pt B, Ch 5, Sec 3, [3.4] of the "Rules for the Classification of Ships"

a_{Y2}, a_{Z2} : Accelerations, in m/s^2, determined at the container's centre of gravity for the upright ship condition, and defined in Pt B, Ch 5, Sec 3, [3.4] of the "Rules for the Classification of Ships"

Where empty containers are stowed at the top of a stack, the internal pressures and forces are to be calculated considering the mass of empty containers equal to:

- 0,14 times the mass of a loaded container, in the case of steel containers
- 0,08 times the mass of a loaded container, in the case of alluminium alloy containers

Figure 3 : Container level in a stack



4.3 Wind forces applied to one container

4.3.1 The forces due to the effect of the wind, applied to one container stowed above deck at the level "i", are to be obtained, in kN, from the following formulae:

- in x direction:

  $F_{x,wind,i} = 1,2\ h_C\ b_C$

- in y direction:

  $F_{y,wind,i} = 1,2\ h_C\ l_C$

where:

h_C : Height, in m, of a container

l_C, b_C : Dimension, in m, of the container stack in the ship longitudinal and transverse direction, respectively.

These forces are only acting on the stack exposed to wind. In the case of M juxtaposed and connected stacks of the same height, the wind forces are to be distributed over the M stacks. In the case of juxtaposed and connected stacks of different heights, the wind forces are to be distributed taking into account the number of stacks at the level considered (see example in Fig 4).

4.4 Stacks of containers

4.4.1 The still water, inertial and wind forces to be considered as being applied at the centre of gravity of the stack and those transmitted at the corners of such stack are to be obtained, in kN, as specified in Tab 2.

4.5 Hull scantlings

4.5.1 In general, the hull scantlings and arrangements are to be in compliance with Part B.

4.5.2 Scantlings of structural members subjected to concentrated loads are to be determined by direct calculation according to the requirements stated in Part B, Ch 7, App 1 of Tasneef Rules for the Classification of Ships.

Figure 4 : Distribution of wind forces in the case of stacks of different heights

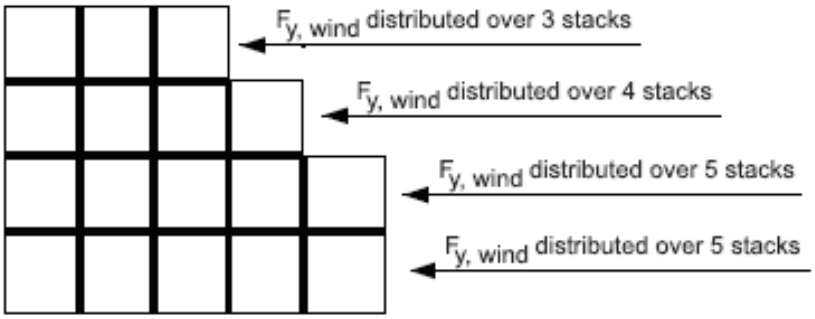


Table 2 : Containers - Still water, inertial and wind forces

Ship condition	Load case	Still water force F_S and inertial and wind force F_W, in kN, acting on each container stack	Vertical still water force R_S and inertial and wind force R_W, in kN, acting on each container stack
Still water condition		$F_S = \sum_{i=1} F_{s,i}$	$R_S = \frac{F_S}{4}$

SECTION 11 TANKERS

1 General

1.1

1.1.1 The requirements of this Chapter, alternative or additional to those of Part B, Part C and Part D, apply to tankers, i.e. to ships intended for the carriage in bulk in integral tanks, or in permanently installed independent tanks, of liquid products having any flashpoint.

Such Tankers are suitable for the carriage of oil or oil products.

Compliance with these requirements does not absolve ships from non-compliance with any State requirements concerning, in particular, safety and prevention of environmental pollution from ships.

In addition, according with the carried dangerous good, the requirements of Ch 2 are to be complied with.

Ships complying with the requirements of this Section will be eligible for the notation Tanker.

When carrying dangerous good the notation Tanker shall be integrated by the complementary notation Type C or Type N.

2 Types and general characteristics

2.1 Types of tankers

2.1.1 The tankers in question are generally single deck ships with machinery aft and, if fitted with integral tanks, with single bottom or double bottom throughout the cargo tank area, having one, two or three longitudinal bulkheads throughout the cargo tank area, with or without a trunk on the weather deck.

As far as the structural configuration is concerned, three different types can be discerned:

a) traditional single hull tankers where tanks are limited by the side shell and deck plating of the ship (see Fig 1)

b) double hull tankers with bottom and side spaces empty or intended for ballast, if any (see Fig 2)

c) tankers with permanently installed pressure tanks, independent of the hull, having rectangular or cylindrical form (see Fig 3).

2.2 General characteristics

2.2.1 If, in single hull ships, the length of the cargo area as defined in 4.4 below exceeds the value lt, in m, given by the following formula:

$l_t = 0,82\ L\ (1 - 7,5\ T/B^2)$

at least one centre longitudinal bulkhead is to be fitted throughout the tank area.

In general, depending on the ship's breadth B, in m, the following longitudinal bulkheads are to be fitted in the tank area:

- $B \geq 6$ m, one centre longitudinal bulkhead
- $B \geq 12$ m, two side longitudinal bulkheads

The distance between the two longitudinal bulkheads is generally not to exceed 0,7 B.

2.3 Stability

2.3.1 Tankers carrying dangerous goods

The requirements stated in Pt B, Ch 6, Sec 2, [3.6.1] for the intact stability are to be meet. With reference to the damage stability the requirements given in Pt F, Ch 4, Sec 2 are to be meet.

2.3.2 Other tankers

Where tank breadth exceeds 0,7 B, cargo tanks are normally to be provided with centre longitudinal bulkheads.

For the intact stability, the requirements stated in Part B, Ch 6, Sec 2, [3.6.1] apply.

3 Segregation of the cargo tank area

3.1

3.1.1 For tankers, cargo tanks, and slop tanks if any, are to be separated by vertical or horizontal cofferdams from machinery spaces, boiler spaces and any other space where sources of ignition of gas produced by the cargo carried are present.

The above-mentioned cofferdams are to have dimensions such as to be easily accessible for survey, in no case less than 500 mm in width, and they are to be adequately ventilated.

Pump rooms and ballast tanks may be considered as cofferdams.

In tankers with independent pressure tanks (see Fig 3 (b) and (c)), if the holds containing such tanks are of entirely welded construction, cofferdams are not required between the cargo area and areas located fore and aft.

Fuel oil tanks are not to have walls in common with cargo tanks, and are to be located outside the cargo area as defined in [4] below.

4 Cargo area

4.1

4.1.1 The cargo area includes cargo tanks, holds where independent tanks are installed, cofferdams and the pump room.

For oil tankers, the superstructures and wheelhouse are to be located outside the cargo area.

Parts of the wheelhouse located more than 1 metre above the wheelhouse floor may protrude within the cargo area.

Superstructure openings are not to face the cargo area.

5 Tank dimensions

5.1

5.1.1 The length l_C, in m, of cargo tanks in ìtankers with integral tanks is not to exceed the value given by the following formula:

$l_C = 5,5 + 0,13\ L$

The maximum capacity of one tank and the minimum number of tanks for the different structural configurations given in 4.2 are indicated in Table 4.1 depending on the product L.B.D.

In the case of ships with a trunk deck, the value D' is to be taken for D, given by:

$D' = D + H_t \cdot b_t / B \cdot l_t/L$

where:

h_t = trunk height, in m, measured on the trunk side for the section at L/2;

b_t = trunk width, in m;

l_t = trunk length, in m.

Figure 1 : Single hull tankers

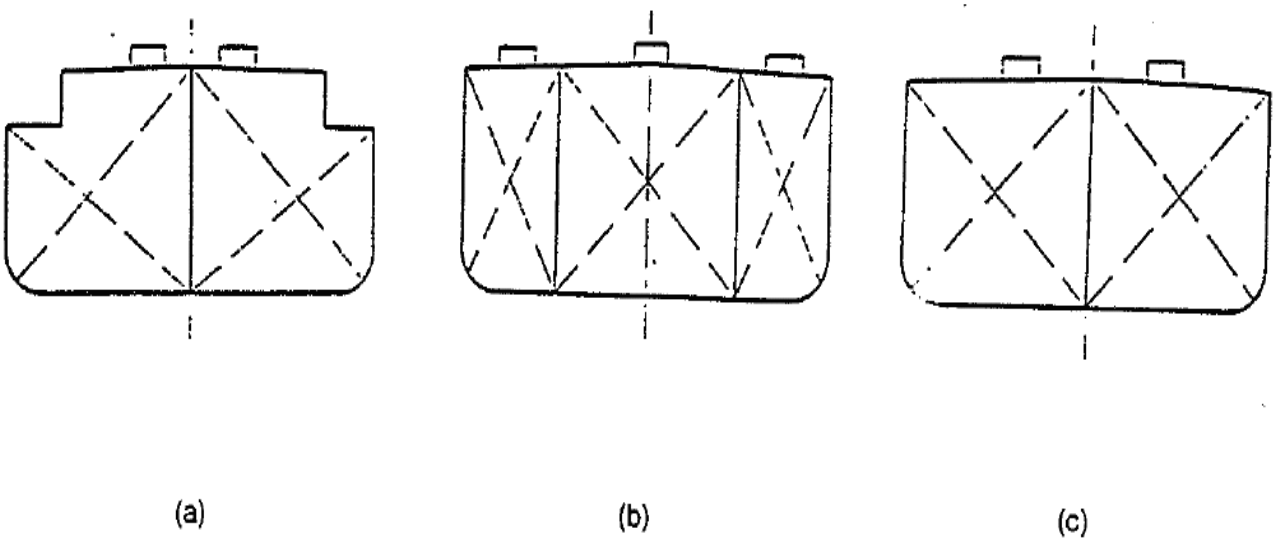


Figure 2 : Double hull tankers

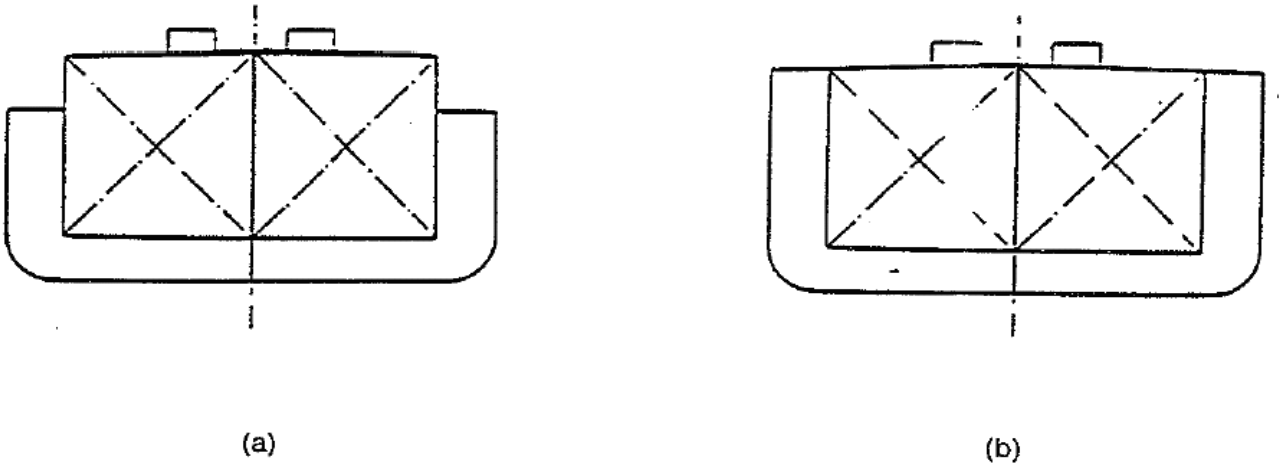


Figure 3 : Tankers with independent tanks

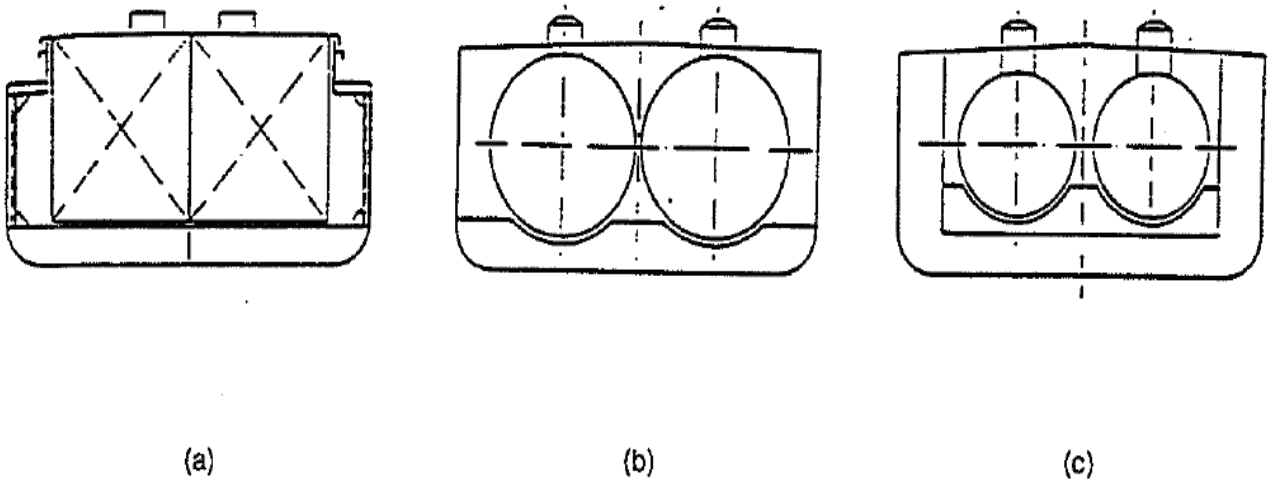


Table 1

LBD m³	Maximum permissible capacity for one tank m³	Minimum number of tanks on:			
		single hull ships		Double hull ships and ships with independent tanks	Ships without centre longitudinal bulkhead with independent tanks for which sufficient intact and damage stability has been demonstrated
		with one longitudinal bulkhead	with two longitudinal bulkhead		
> 150	LBD x 0,30	2	3	2	1
150 to 300	LBD x 0,30	4	3	2	2
300 to 450	90 + (LBD - 300) x 0,16	4	3	4	2
450 to 1000	114 + (LBD - 300) x 0,12	6	6	4	3
1000 to 1500	180 + (LBD - 1000) x 0,10	8	9	6	4
1500 to 2000	230 + (LBD - 1500) x 0,08	8	9	6	4
2000 to 3000	270 + (LBD - 2000) x 0,06	10	9	6	5
3000 to 4000	330 + (LBD - 3000) x 0,05	10	9	8	5
4000 to 5000	380	12	12	8	6

Tasneef may accept capacities exceeding those indicated in Table 12.1, provided this is not in contrast with any requirements issued on this subject by the flag Administration and/or by the Administration with jurisdiction for the service zone of the ship.

If the ship is fitted with two longitudinal bulkheads and the maximum width of the tanks bounded by these bulkheads does not exceed 3/5 of the breadth B, the maximum capacity of the above-mentioned tanks may be 125% of the value indicated in Tab 1.

The tank area is to be divided by one or more transverse bulkheads extending from side to side.

The total capacity of tanks in the largest compartment bounded by two transverse watertight bulkheads is not to exceed 65% of the total capacity of all the tanks on the ship.

6 Scantlings

6.1 General

6.1.1 The check of structural scantlings is to be performed in accordance with the applicable requirements of Part B, and taking into account the specific requirements of this Section.

In addition, when the transport of dangerous goods is stated, the requirements of Ch 2 are to be complied with.

Scantlings given in the following paragraphs is relevant to steel structures.

6.2 Minimum thicknesses

6.2.1 In the area of cargo tanks and associated cofferdams on ships with integral tanks, the thickness of deck, side, bottom, inner bottom and bulkhead plating and that of primary supporting members are to be not less than 5,5 mm.

The thickness of ordinary stiffeners and other structures of cargo tanks and associated cofferdams differing from those mentioned above is to be not less than 5 mm.

7 Scantlings of independent tanks

7.1 General

7.1.1 The scantlings of plane wall tanks not subject to pressure exceeding 0,7 bar may be determined by the formulae given below.

For cylindrical wall tanks and tanks subject to pressure exceeding 0,7 bar, scantlings are to be determined on the basis of standards accepted by Tasneef Such calculations are, in any case, to be based on generally accepted theories of pressure vessel design.

7.2 Plating

7.2.1 The thickness of plane wall tank plating is to be not less than the value t, in mm, given by the following formula:

$t = 3,4 \cdot s \cdot h_S^{0,5} + 1$

s = stiffener spacing, in m

h_S = design head, in m, defined in Pt B, Ch 1, Sec 5.

The thickness t is to be not less than 5,5 mm.

7.3 Stiffeners

7.3.1 The section modulus of vertical or horizontal stiffeners Z, in cm^3, is to be not less than the value given by the following formula:

$Z = 5\ s \cdot h_S \cdot S^2$

where:

S = stiffener span, in m.

For the application of the previous formula it is assumed that stiffeners are fitted with brackets at both ends.

7.4 Corrugated bulkheads

7.4.1 When a tank is constructed with corrugated bulkheads, the plating thickness t of the bulkheads is to be not less than that calculated by the formula in [7.2], assuming for s the larger side of the corrugation.

The section modulus Z, in cm^3, of the corrugation is to be determined by the following formulae depending on the value of the b/t ratio, where b is the straight side of the corrugation (see Pt B, Ch 1, Sec 6, Fig 1):

- if $b/t < 46$

  $Z = 7,5 \cdot p \cdot h_S \cdot S^2$

- if $b/t \geq 46$

  $Z = 9,81\ c_k \cdot p \cdot h_S \cdot S^2 \cdot (b/80t)^2$

where:

c_k = 1,2, when the upper and lower ends of the corrugated bulkhead may be considered as clamped

c_k = 1,8, when one or both ends may be considered as simply supported.

SECTION 12 TANKERS CARRYING CHEMICAL PRODUCTS

1 General

1.1 Application

1.1.1 The requirements of this Section, alternative or additional to those of Part B, Part C and Part D, apply to tankers carrying in bulk dangerous or noxious liquid chemicals, which are not oil products or similar flammable products.

In addition, for such ships, carrying dangerous goods, the requirements stated in Ch 2 are to be complied with.

For the purpose of the application of the additional requirements of Ch 2, products which may be carried are those listed in Chapter 2.

In any case ships carrying dangerous chemicals in bulk are to comply with the requirements of this Section, except for different provisions issued by the Administration of the State with jurisdiction for the service zone of the ship.

This does not preclude the possibility of carrying other products not considered by the above-mentioned Rules, if their carriage is permitted by the Administration of the State with jurisdiction for the service zone of the ship.

In such instances, the conditions for carriage and the requirements which the ship is to comply with will be established in each case, depending on the chemical-physical properties and the hazard level of the product carried.

All products permitted to be carried are to be listed in a special annex to the Certificate of Classification.

Compliance with these requirements does not absolve ships from non-compliance with any State requirements which may be applicable concerning, in particular, safety and prevention of environmental pollution from ships.

Ships complying with the requirements of this Section will be eligible for the notation **Tanker(chem.)**

When carrying dangerous good the notation **Tanker (chem.)** shall be integrated by the complementary notation Type C or Type N.

1.2 Stability

1.2.1 For such tankers the requirements stated in Sec 11 are generally to be applied.

2 Documentation and other information

2.1

2.1.1 In addition to the documentation required in Part B, the following documentation and information, as applicable, are to be submitted for examination:

- list of products intended to be carried and their characteristics (mass density, compatibility with the tank material, carriage temperature and pressure etc)
- structural plans of cargo tanks
- plans of supports and fastening arrangements of tanks.

3 Design characteristics

3.1

3.1.1 Tankers covered by this Section are generally single deck ships with machinery aft and, if fitted with integral tanks, with single bottom or double bottom throughout the cargo tank area, having one, two or three longitudinal bulkheads throughout the cargo tank area, with or without a trunk on the weather deck.

Cargo tanks may be integral or independent tanks.

As far as structural configuration is concerned, the same subdivision as per Section 11 can be applied.

4 Materials

4.1

4.1.1 As far as general requirements are concerned, materials of ship structures in the cargo tank area are to comply with the provisions of Part B, Ch 1.

In any case, tank materials are to have characteristics not lower than those of hull steels used in accordance with Part D.

As a rule, the above-mentioned materials are to be intrinsically resistant to the action of products to be carried.

Materials which are not intrinsically resistant but are protected with other resistant materials may be used, however, subject to the positive outcome of preliminary checks and tests carried out to the satisfaction of Tasneef

The use of special protective coatings is subject to the positive outcome of preliminary checks and tests, to thesatisfaction of Tasneef

5 Hull scantlings

5.1

5.1.1 The hull scantlings of ships with independent tanks are to comply with the provisions of Part B.

The hull scantlings of ships with integral tanks are to comply with the provisions of Part B.

If cargo heating up to a temperature $\geq$ 90°C is foreseen, the effect of temperature on the mechanical characteristics of material and the thermal stresses caused by the thermal gradient are to be taken into account in the determination of scantlings.

6 Scantlings of independent tanks

6.1

6.1.1 The scantlings of independent tanks may be determined in accordance with Section 13.

If cargo heating is foreseen, the effect of temperature on the mechanical characteristics of material and the thermal stresses caused by the existing thermal gradient are to be taken into account in the determination of scantlings.

SECTION 13 TANKERS CARRYING LIQUEFIED GAS

1 Application

1.1

1.1.1 The requirements of this Section, alternative or additional to those of Part B, Part C and Part D, apply to ships carrying liquefied gases. In addition, for such ships, carrying dangerous goods, the requirements stated in Ch 2 are to be complied with.

Liquefied gases may be carried at atmospheric pressure or at a higher pressure, at ambient temperature or at low temperature.

For the purpose of the application of the requirements of Chapter 2, liquefied gases which may be carried are those listed in Chapter 2, except for different provisions issued by the Administration of the State with jurisdiction for the service zone of the ship.

Gases permitted to be carried will be listed in a special annex to the Certificate of Classification.

The reference temperature, i.e. the lowest temperature at which the liquefied gas may be carried in the tanks, is also to be indicated on the Certificate of Classification.

It is necessary to ensure that, during the operation of the ship, the carriage temperature cannot become lower than the reference temperature.

This does not preclude the possibility of carrying other products not considered by the above-mentioned Rules, if their carriage is permitted by the Administration of the State with jurisdiction for the service zone of the ship.

In such case, the conditions for carriage and the requirements which the ship are to comply with will be established in each case, depending on the chemical-physical properties and the hazard level of the product carried.

Compliance with these requirements does not absolve ships from non-compliance with any State requirements which may be applicable concerning, in particular, safety and prevention of environmental pollution from ships.

Ships complying with the requirements of this Section will be eligible for the notation **Tanker(gas.)**

When carrying dangerous good the notation **Tanker (gas.)** shall be integrated by the complementary notation Type G.

1.2 Stability

1.2.1 Reference to Pt B, Ch 6, Sec 2 [3.6.3] is to be made for intact stability.

In addition for dangerous good, where also notation **DMS** is requested, reference to Pt F, Ch 4, Sec 2, [2.1.1] is to be made.

2 Documentation and other information

2.1

2.1.1 In addition to the documentation required in Part B, the following documentation and information, as applicable, are to be submitted for examination:

- capacity plan of tanks for liquefied gas indicating the nature of cargo
- structural plans of cargo tanks
- plan of supports and fastening arrangements of tanks
- insulation, and secondary barrier if required
- calculations of thermal gradients in the insulation for the normal service conditions and in the event of damage
- list of products intended to be carried and their characteristics (mass density, vapour pressure, carriage temperature etc).

3 Design characteristics

3.1

3.1.1 Ships covered by this Chapter are ships with machinery aft and suitable for carrying liquefied gases in independent tanks or integral tanks.

In the case of carriage in independent tanks, the tank installation is to be of the type indicated in Fig 3 of Section 11.

The dimensions and minimum number of tanks are to be in accordance with the provisions in Tab 1 of Section 11.

Where the cargo temperature at atmospheric pressure is below 10°C, a secondary barrier is to be provided for containment of any leakage of liquid cargo in the event of breakage of the primary barrier.

The secondary barrier is to remain effective even at an angle of heel of 15°.

When the type of cargo requires a secondary barrier, a double bottom is required to be fitted if products are intended to be carried at a temperature below 10°C.

If the carriage temperature is below 55°C, wing tanks are also required to be provided; the provision of wing tanks is also recommended, in general, for the purpose of damage stability.

When cargo is carried in independent pressure tanks, the provision of cofferdams afore and abaft the cargo area is not required, provided that the ship's structure is completely welded.

Such tanks may only be located below the deck in the cargo area.

No source of ignition is to be present in the cargo spaces; such cargo spaces are to be segregated from other spaces by gas-tight bulkheads.

4 Materials

4.1

4.1.1 Ship structure materials in the cargo tank area are not required to comply with special requirements in addition to those specified in Part B, Section 4, provided that tank insulation is such as to prevent the temperature of hull structures from dropping to lower than 5°C, assuming the air temperature to be 0°C.

For temperatures below the above-mentioned value, the steel types used for main structures (side shell and deck plating of the ship and all associated stiffeners) are to be in accordance with Table 5.1 Pt D, Ch 2, Sec 1, [5] depending on structure temperature and thickness.

The hull temperature calculation is to be carried out assuming air temperature of 0°C and water temperature of 5°C.

For special zones of operation of the ship, different reference temperatures may be assumed.

All materials of cargo tanks, associated piping, valves and supports are to be suitable for the lowest carriage temperatures as well as for the cargo carried.

5 Hull scantlings

5.1

5.1.1 The hull scantlings of ships with independent tanks are to comply with the provisions of Pt B.

If the ship configuration is of the type indicated in Sec 12, Fig 3 (c), and if the double bottom and double side are intended for ballast, the scantlings of bottom longitudinals, side shell longitudinals, or side shell transverse stiffeners, as applicable, are to be calculated according to the requirements of Section 12.

6 Cargo containment

6.1 General

6.1.1 Cargo may be carried in integral tanks or in membrane tanks if the design vapour pressure is 0,07 N/mm^2 (0,7 bar). Membrane tanks consist of a thin layer (membrane) supported, through insulation, by the adjacent hull structures. When the design vapour pressure is $\geq$ 0,07 N/mm^2 (0,7 bar), an independent self-supporting tank is to be used.

Independent tanks are self-supporting; they do not form part of the ship's hull and are not essential to the hull strength.

Where such tanks are primarily constructed of plane surfaces, the design vapour pressure is to be less than 0,07 N/mm^2 (0,7 bar).

Design vapour pressure is taken to mean the maximum gauge pressure at the top of the tank used in its design.

For cargo tanks where the pressure of the cargo is dictated only by the ambient temperature, the design vapour pressure is to be measured at the reference temperature of 40°C.

For special zones of operation of the ship, Tasneef may fix a different value for the reference temperature.

No cargo tanks are to be filled to more than 95 per cent of their volume at the maximum temperature permitted for carriage.

Suitable devices are to be provided to ensure that this limit is not exceeded.

Safety valves are to be positioned on the tanks at a sufficient height to ensure that, with the above-mentioned filling ratio, all free gases in the tanks may flow out without any liquid passing through such valves.

Safety valves are to be arranged in such a way that no over- or under-pressure greater than 0,025 N/mm^2 (0,25 bar) may arise in tanks, except when hull structures are adequately strengthened to withstand such pressure gradient.

As far as safety systems are concerned, reference is made to the Rules for Seagoing Ships Carrying Liquefied Gases.

6.2 Scantlings

6.2.1 Scantlings of independent pressure tanks are to be determined on the basis of standards accepted by Tasneef

Calculations are to be based on generally accepted theories of pressure vessel design.

The scantlings of independent and integral tanks are to be based on a value of the pressure p, in kN/m2, given by the following formula:

$p = 9,81 \cdot h + p \cdot 1000\ p_0$

where:

h = distance, in m, of the pdr of the element considered from the upper edge of the dome;

p = mass density, in t/m3, of the liquefied gas;

p_0 = design vapour pressure, in N/mm^2, to be assumed not less than 0,025 N/mm^2 (0,25 bar).

Scantlings of self-supporting independent tanks with plane walls and of integral tanks (plating and stiffeners) may be checked using the formulae in Pt B, Sec 11, assuming for h . r the value given by:

$h \cdot r = 0,1\ p$

7 Supports of self-supporting independent tanks

7.1 General

7.1.1 Self-supporting independent tanks are to be supported by the hull such as to prevent bodily movement of the tank under static and dynamic loads while allowing contraction and expansion of the tanks under temperature variations and hull deflections without undue stressing of the tank and the hull.

Anti-flotation arrangements are to be provided for the above-mentioned tanks.

Such arrangements are to be suitable to withstand an upward force caused by an empty tank in a hold space flooded to the maximum full load draught of the ship, without exceeding the yield stress in the material of all involved structures.

7.2 Supports

7.2.1 The scantlings of tank supports are to be determined on the basis of the following forces:

a) Vertical forces
   - the tank weight directed downwards
   - the buoyancy force of the empty tank, directed upwards, with the ship in damaged condition and the mass of full tanks in capsized ship condition.

b) Transverse forces and forces in capsized ship condition

   The tank supports in the transverse direction are to be designed for a total inclination amplitude down to the completely capsized ship condition.

c) Forces in the fore-and-aft direction

   The design of tank supports is to be checked assuming a force of 0,3 P, where P is the weight of full tanks.

   The stresses in supports and ties are not to exceed 0,5 R_s, where R_s is the yield stress of the material.

8 Insulation

8.1

8.1.1 The material used for the insulation of the tank is to be suitable for the application.

The chemical-physical properties of the insulation material are to be such as not to undergo any alteration by contact with gases carried.

The insulating capacity of such material is not to be impaired in the event of infiltration of liquid cargo.

The insulating capacity is to be such as to comply with the provisions in [4] regarding permissible values of material temperatures.

The characteristics and the fixing method of such material are to be such as to allow the free expansion of the material and absorb without any consequences any thermal stresses which may arise.

If the insulating material is to transmit load (membrane tanks), such material is to have mechanical characteristics adequate for this purpose.

The installation of insulating material is to be such as to allow both the inspection of the hull structures adjacent to the tank without having to remove the latter, and the inspection of at least one side of the tank structures.

SECTION 14 GENERAL CARGO SHIPS (SINGLE SIDE CARGO SHIPS)

1 Application

1.1

1.1.1 The requirements of this Section apply to ships carrying general cargo.

With reference to the hull construction, the requirements of this Section are to be applied to open deck ships of single side construction, with or without double bottom, carrying uniform cargoes.

For ships carrying dry bulk cargoes reference to Sec 16 shall be complied with.

With reference to single side cargo ships, the requirements of Part B, Part C and Part D are to be applied. In addition, for ships carrying dangerous goods, the requirements stated in Chapter 2 are to be complied with.

Ships covered by this Section are eligible for the type notation **general cargo ship**.

IFor such ships the features **single hull** will be added to the service notation.

1.2 Stability

1.2.1 Reference to Pt B, Ch 6, Sec 2 is to be made for intact stability as applicable according the carried cargoes.

In addition for dangerous good, where also notation **DMS** is requested, reference to Pt F, Ch 4, Sec 2, [3.0] is to be made Tasneef reserves the right to ask for additional checks depending on the type of cargo.

2 General arrangement design

2.1 General

2.1.1 The requirements of this Section are to be applied to open deck ships of single side construction, with or without double bottom, carrying uniform cargoes.

2.1.2 Access arrangement to double bottom

Adequate means of access to the double bottom are to be provided.

Manholes cut in the inner bottom are to be located at a minimum distance of one floor spacing from the lower stool, or transverse bulkhead if no stool is fitted.

The location and size of manholes in floors and girders are to be determined to facilitate the access to double bottom structures and their ventilation. However, they are to be avoided in the areas where high stress may occur.

2.2 Access arrangements to cargo holds

2.2.1 As far as practicable, permanent or movable means of access stored on board are to be provided to ensure proper survey and maintenance of cargo holds.

3 Hull scantlings

3.1

3.1.1 The hull scantlings are to comply with the provisions of Part B.

SECTION 15 GENERAL CARGO SHIPS (DOUBLE HULL CARGO SHIPS)

1 Application

1.1

1.1.1 The requirements of this Section apply to ships carrying uniform general cargo.

With reference to double hull cargo ships the requirements of Part B, Part C and Part D are to be applied. In addition, for ships carrying dangerous goods, the requirements stated in Chapter 2 are to be complied with.

Ships covered by this Section are eligible for the type notation general cargo ship.

For such ships the features double hull will be added to the service notation.

For ships carrying dry bulk cargoes reference to Sec 16 shall be complied with.

1.2 Stability

1.2.1 Intact stability is to be assessed according to the requirements stated in Pt B, Ch 6, Sec 2, as applicable according the carried products .

For ships carrying dry dangerous goods, when requested the notation DMS regarding the damage stability assessment, the requirements stated in Pt F, Ch 4, Sec 2, [3] are to be applied.

Tasneef reserves the right to ask for additional checks depending on the type of cargo.

2 General arrangement design

2.1 General

2.1.1 The requirements of this Section are to be applied to open deck ships of single side construction, carrying uniform cargoes.

2.2 Access arrangement to double bottom

2.2.1 Adequate means of access to the double bottom are to be provided.

Manholes cut in the inner bottom are to be located at a minimum distance of one floor spacing from the lower stool, or transverse bulkhead if no stool is fitted.

The location and size of manholes in floors and girders are to be determined to facilitate the access to double bottom structures and their ventilation. However, they are to be avoided in the areas where high stress may occur.

2.3 Access arrangements to cargo holds

2.3.1 As far as practicable, permanent or movable means of access stored on board are to be provided to ensure proper survey and maintenance of cargo holds.

2.4 Access to side tanks

2.4.1 Where openings allowing access to side tanks are cut in the stringer plate, they are to be arranged clear of the hatch corners and are to be even-deck design, without obstacles causing stumbling. In order to assure the continuity of the strength, they are to be cut smooth along a well rounded design and are to be strengthened by thick plates, by doubling plates or by other equivalent structure.

3 Hull scantlings

3.1

3.1.1 The hull scantlings are to comply with the provisions of Part B of the Rules for the Classification of Ships with reference to what not covered by the Part B of these Rules.

SECTION 16 BULK CARGO SHIPS

1 General

1.1

1.1.1 The requirements of this Chapter, alternative or additional to those of Section B, apply to ships intended primarily for the carriage of bulk dry cargoes (bulk carriers).

1.2

1.2.1 Ships complying with the requirements of this Chapter will be eligible for class notation:

- **bulk cargo**: for ships carrying bulk cargo.

On the basis of the requirements in 17.5, special notations heavy cargo [AREA1, X1 kN/m^2 - AREA2, X2 kN/m^2 - ....] and nonhomload are assigned.

2 General characteristics and structural configuration

2.1 General characteristics

2.1.1 In general, bulk carriers are single deck ships with single shell plating or double hull, double bottom and hopper side and top side tanks fitted in the cargo area (self-trimming). Special consideration will be given by the Head Office to other structural configurations.

2.2 Structural configuration

2.2.1 Longitudinal framing shall, in general, be adopted at the upper deck outside the line of openings. The arrangement of structure between hatches shall be such as to ensure continuity of the main deck structure to resist athwartship forces.

2.2.2 Transverse or longitudinal framing may be adopted for the side shell, but longitudinal framing shall be adopted, in general, for the sloped bulkheads of hopper and topside tanks.

3 Longitudinal and transverse strength

3.1

3.1.1 Longitudinal strength shall be calculated in accordance with the appropriate requirements of Part B, Chapter 1, Section 7.

3.1.2 Double bottom and hopper and topside tank strength may be checked by using the formulae given in Part B, Chapter 1, Section 9, completed where required by the Head Office with direct stress calculations, or by means of direct calculations only.

3.1.3 In general web frames shall be fitted spaced not more than 3,8 m apart when L ≤ 100 m, and not more than 0,006 L + 3,2 m when L > 100 m.

4 Scantlings

4.1 General

4.1.1 Structural scantlings shall be checked in accordance with the applicable requirements of Part B and taking into account the specific requirements of this Chapter.

4.2 Double bottom

4.2.1 General

The use of struts for the connection of longitudinals or transverse frames is generally not accepted when unloading by buckets or other similar fittings is expected, except where specially considered by the Head Office.

In general, solid floors shall be fitted at a maximum of three frame intervals; greater spacing may be accepted by the Head Office on the basis of the results of direct calculations for the check of double bottom scantlings.

Where transverse framing is adopted for double bottom ordinary stiffeners, solid floors are to be arranged at a maximum of two frame intervals.

4.2.2 Minimum load to be taken for check of structure scantlings

The mass density of cargo, in t/m^3, to be carried by the double bottom structures shall be taken not less than 0,86 t/m^3.

4.3 Minimum thicknesses

4.3.1 For bulk carrier ship configurations which incorporate hopper and topside tanks, the minimum thickness, in mm, of frame webs in cargo holds and ballast holds shall be not less than that given by the following formula:

5,5 + 0,025 L

The minimum thickness, in mm, of the frame lower brackets shall be not less than 2 mm greater than the minimum frame web plate thickness, calculated as above.

5 Requirements to be satisfied for the assignment of the special notations "heavycargo [AREA1, X1 kN/m^2 - AREA2, X2 kN/m^2 - ....]" AND "nonhomload"

5.1 General

5.1.1 For the purpose of the assignment of the special notation **heavycargo [AREA1, X1 kN/m^2 - AREA2, X2 kN/m^2 - ....]**, the double bottom structures shall be checked for a mass density, in t/m^3, of cargo to be carried by such structures not less than 1,30 t/m^3.

For the purpose of the assignment of the special notation nonhomload, the double bottom structures shall be checked for a mass density, in t/m^3, of cargo to be carried by such structures not less than:

- 1,30 t/m^3, for full holds;
- 0,86 t/m^3, for empty holds.

In addition, direct calculations shall be carried out for the assessment of the double bottom grillage strength, if deemed necessary by Tasneef

6 Corrosion protection coating for cargo hold spaces

6.1

6.1.1 In cargo holds, all surfaces of side shell, frames and transverse watertight bulkhead structures including associated stiffening members and their end brackets, where exposed to cargoes, shall, in generally be protected against corrosion by means of an efficient coating (epoxy or equivalent coating) applied in accordance with the manufacturer's recommendations. In the selection of coating, due consideration shall be given by the owner to the intended cargo and conditions expected in service.

Transverse watertight bulkhead in this context includes bottom stool, if any, within 300 mm from the top of the stool. Likewise, side shell includes that part of upper and lower wing tank plating from the side shell to a distance 300 mm beyond the toe of upper and lower frame brackets.

7 Stability

7.1

7.1.1 Intact stability is to be assessed according to the requirements stated in Part B, Ch 6, Sec 2, [3.5]

SECTION 17 GENERAL CARGO SHIPS EQUIPPED FOR THE TRANSPORT OF HEAVY CARGO

1 General

1.1 Application

1.1.1 The additional service features **heavy cargo [AREA1, X1 kN/m² - AREA2, X2 kN/m² -....]** is assigned when the double bottom and/or hatch covers and/or other cargo areas designed to support heavy cargoes fulfil the appropriate Rule requirements stated in this Section,. The values Xi indicate the maximum allowable local pressures on the various zones AREAi where the cargo is intended to be stowed.

1.1.2 The requirements given in this Section are in addition to those applicable given in Part B of the Rules for the Classification of Ships.

2 Dry cargoes

2.1 Dry uniform cargoes

2.1.1 The still water and inertial pressures are obtained, in kN/m², as specified in Tab 1.

In ships with two or more decks, the pressure transmitted to the deck structures by the dry uniform cargoes in cargo compartments is to be considered.

2.1.2 The values of p_S, in kN/m², are to be specified by the Designer for each AREAi, according to [2.1.1], and introduced as Xi values in the above service feature. The values of Xi, in kN/m² , are to be greater than10 kN/m² or 6,9 hTD, as applicable, where hTD is the compartment 'tweendeck height at side, in m.

2.2 Dry unit cargoes

2.2.1 The still water and inertial forces transmitted to the hull structures are to be determined on the basis of the forces obtained, in kN, as specified in Tab 2, taking into account the elastic characteristics of the lashing arrangement and/or the structure which contains the cargo.

Table 1 : Dry uniform cargoes - Still water and inertial pressures

Ship condition	Load Case	Still water pressure p_S and inertial pressure p_w , in kN/m²
Still water		The value of p_S is generally specified by the Designer; in any case, it may not be taken less than 10 kN/m². When the value of p_S is not specified by the Designer, it may be taken, in kN/m², equal to 6,9 h_{TD}, where h_{TD} is the compartment 'tweendeck height at side, in m.
Upright (positive heavi motion)	"a"	No intertial pressure
	"b"	$p_{w,z} = -p_s \frac{a_{z1}}{g}$ in z direction
Inclined (negative roll angle)	"c"	$p_{w,y} = p_s \frac{C_{FA} a_{y2}}{g}$ in y direction
	"d"	$p_{w,z} = p_s \frac{C_{FA} a_{z2}}{g}$ in z direction

Table 2 : Dry unit cargoes - Still water and inertial forces

Ship condition	Load Case	Still water force F_S and inertial force F_w , in kN
Still water		$F_S = M_g$
Upright (positive heavi motion)	"a"	No intertial pressure
	"b"	$F_{w,x} = Ma_{x1}$ in x direction $F_{w,z} = -Ma_{z1}$ in z direction
Inclined (negative roll angle)	"c"	$F_{w,y} = MC_{FA} a_{y2}$ in y direction
	"d"	$F_{w,z} = MC_{FA} a_{z2}$ in z direction

SECTION 18 GENERAL CARGO SHIPS EQUIPPED FOR THE TRANSPORT OF WHEELED VEHICLES

1 General

1.1 Application

1.1.1 Ships that are in conformity with the requirements given in this Section are eligible for the assignment of the additional service features **Equipped for the transport of wheeled vehicles**.

1.1.2 The requirements given in this Section are in addition to the applicable requirements given in Part B of the Rules for the Classification of Ships and for what is applicable to the Part B of this Rules.

2 Wheeled cargoes

2.1

2.1.1 Caterpillar trucks and unusual vehicles are considered by the Society on a case-by-case basis.

The load supported by the crutches of semi-trailers, handling machines and platforms is considered by the Society on a case-by-case basis.

2.1.2 Tyred vehicles

The forces transmitted through the tyres are comparable to pressure uniformly distributed on the tyre print, whose dimensions are to be indicated by the Designer together with information concerning the arrangement of wheels on axles, the load per axles and the tyre pressures.

With the exception of dimensioning of plating, such forces may be considered as concentrated in the tyre print centre.

The still water and inertial forces transmitted to the hull structures are to be determined on the basis of the forces obtained, in kN, as specified in Tab 1.

2.1.3 Non-tyred vehicles

The requirements of [2.1.2] also apply to tracked vehicles; in this case the print to be considered is that below each wheel or wheelwork.

For vehicles on rails, all the forces transmitted are to be considered as concentrated.

Table 1 : Wheeled cargoes - Still water and inertial forces

Ship condition	Load Case	Still water force F_S and inertial force F_w, in kN
Still water		$F_S = M_g$
Upright (positive heavi motion)	"a"	No intertial pressure
	"b"	$F_{w,z} = -Ma_{z1}$ in z direction
Inclined (negative roll angle)	"c"	$F_{w,y} = MC_{FA}a_{y2}$ in y direction
	"d"	$F_{w,z} = MC_{FA}a_{z2}$ in z direction

(1) This condition defines the force, applied by one wheel, to be considered for the determination of scantlings of plating, ordinaty stiffeners and primary supporting members, as defined in Chapter 7, with Mobtained, in t, form the following formula:

$M = Q_A / n_W$

where:

Q_A = Axle load, in t. For fork-lift trucks, the value of Q_A is to be taken equal to the total mass of the vehicle, including that of the cargo handled, applied to one axle only.

n_W = number of wheels for the axle considered.

(2) This condition is to be considered for the racking analysis of ships with the service notation ro-ro cargo ship or ro-ro passenger ship, as defined in Ch 7, App 1, with M taken equal to the mass, in t, of wheeled loads located on the structural member under consideration.

(3) For fork-lift trucks operating in harbour conditions, the inertial force may be reduced by 50%.

SECTION 19 GENERAL CARGO SHIPS EQUIPPED FOR THE TRANSPORT OF CONTAINERS

1 General

1.1 Application

1.1.1 Ships that are in conformity with the requirements given in this Section are eligible for the assignment of the additional service features **Equipped for the transport of containers**.

1.1.2 The requirements given in this Section are in addition to the applicable requirements given in Part B of the Rules for the Classification of Ships and for what is applicable to the Part B of this Rules.

2 Strength principles

2.1 General

2.1.1 Local reinforcements of the hull structure are to be provided under container corners and in way of cell guides, if fitted.

2.2 Structural continuity

2.2.1 In double side skin ships, where the machinery space is located between two holds, the inner side is, in general, to be continuous within the machinery space. Where the machinery space is situated aft, the inner side is to extend as far abaft as possible and be tapered at the ends.

2.3 Bottom structure

2.3.1 Floor and girder spacing

The floor spacing is to be such that floors are located in way of the container corners. Floors are also to be fitted in way of watertight bulkheads. Girders are generally to be fitted in way of the container corners.

2.3.2 Reinforcements in way of cell guides

The structures of the bottom and inner bottom on which cell guides rest are to be adequately stiffened with doublers, brackets or other equivalent reinforcements.

2.4 Side structure

2.4.1 Framing arrangement

The topside torsion box girders are to be longitudinally framed.

Where the side is longitudinally framed, side transverses are to be fitted in line with the double bottom floors.

2.5 Deck structure

2.5.1 Longitudinal girders between hatchways

The width of the longitudinal deck girders and hatch coaming flanges is to be such as to accommodate the hatch covers and their securing arrangements.

The connections of the longitudinal deck girders and hatch coamings with the machinery space structure and aft and fore part structures are to ensure proper transmission of stresses from the girders to the adjacent structures.

2.5.2 Cross decks

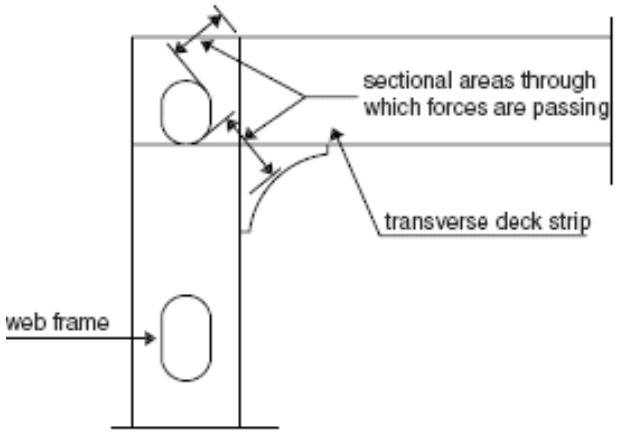
Side or centreline longitudinal deck girders transmit the following longitudinal forces to transverse deck strips: forces due to hull girder bending and forces due to local bending of the girders.

When the arrangement of hatches involves the interruption of girders (a ship with two side hatches in one hold and a centreline hatch in the adjacent one), the transverse strip between the two holds is to be able to bear the longitudinal force exerted by the interrupted girder. Calculation of the strength of these strips is to be performed. Transverse deck strips between hatches are also subjected to a shear force induced by the overall torsion of the ship.

The adequate strength of these strips is to be verified also taking account of this force.

Transverse deck strips between hatches are to be suitably overlapped at ends. It is necessary to ascertain that the forces induced by the strips may be transmitted to the web frame (see Fig 1).

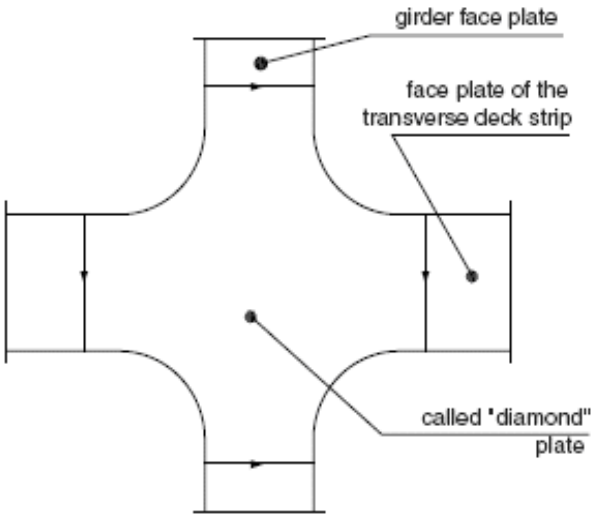
Figure 1 : Transverse deck strip between hatches



2.5.3 Connection of longitudinal deck girders between hatchways with face plate of cross decks

Where longitudinal deck girders between hatchways intersect cross decks, the connection between their face plates is generally to be as shown in Fig 2. If necessary, the girder height is to be gradually modified.

Figure 2 : Connection of longitudinal girders between hatchways with face plates of cross decks



2.5.4 Deck and hatch cover reinforcements

Deck or hatch cover structures are to be reinforced taking into account the loads transmitted by the corners of containers and cell guides.

3 Design loads

3.1

3.1.1 Still water torsional loads

The design still water torsional torque induced by the non-uniform distribution of cargo, consumable liquids and ballast is to be considered. If no specific data are provided by the Designer, it is to be obtained at any hull transverse section, in kNm, from the following formula:

$M_{SW,T} = 31,4\ F_T STB$

where:

F_T = Number of container stacks over the breadth B;

ST = Number of container tiers in cargo hold amidships (including containers on hatch cover).

3.2 Forces on containers

3.2.1 The still water and inertial forces applied to one container located at the level "i", as defined in Fig 3, are to be obtained, in kN, as specified in Tab 1.

Table 1 : Container at level "i" - Still water and inertial forces

Ship condition	Load Case	Still water force F_S and inertial force F_w, in kN
Still water		$F_{S,i} = M_g$
Upright (positive heavi motion)	"a"	No intertial force
	"b"	$F_{w,x,i} = M_i a_{x1}$ in x direction $F_{w,z,i} = -M_i a_{z1}$ in z direction
Inclined (negative roll angle)	"c"	$F_{w,y} = M_i C_{FA} a_{y2}$ in y direction
	"d"	$F_{w,z} = M_i C_{FA} a_{z2}$ in z direction

Note 1:

g = gravity acceleration, in m/s²

g = 9,81 m/s²

M_i = Mass, in t, of the container considered at the level "i"

C_{FA} = Combination factor, to be taken equal to:

- C_{FA} = 0,7 for load case "c"
- C_{FA} = 1,0 for load case "d"

a_{x1}, a_{z1} = Accelearions, in m/s², determined at the container's centre of gravity for the upright ship condition, and defined in Pt B, Ch 5, Sec 3, [3.4].

a_{y2}, a_{z2} = Accelearions, in m/s², determined at the container's centre of gravity for the inclined ship condition, and defined in Pt B, Ch 5, Sec 3, [3.4].

3.2.2 Where empty containers are stowed at the top of a stack, the internal pressures and forces are to be calculated considering the mass of empty containers equal to:

- 0,14 times the mass of a loaded container, in the case of steel containers
- 0,08 times the mass of a loaded container, in the case of aluminium containers.

3.2.3 Where the mass of loaded containers is not known, the following values may be used:

- For 40 foot containers m_c = 27 t
- For 20 foot containers m_c = 17 t

3.3 Stacks of containers

3.3.1 The still water, inertial and wind forces to be considered as being applied at the centre of gravity of the stack and those transmitted at the corners of such stack are to be obtained, in kN, as specified in Tab 2.

3.3.2 The scantling load of securing devices is to be determined assuming an angle of list of 12°.

Table 2 : Containers - Still water, inertial and wind forces

Ship condition	Load case	Still water force F_S and inertial and wind force F_w, in kN, acting on each container stack	Still water force F_S and inertial and wind force F_w, in kN, acting on each container stack
Still water condition		$F_s = \sum_{i=1}^{N} F_{s,i}$	$R_s = \frac{F_s}{4}$

where:

N : number of containers in a stack

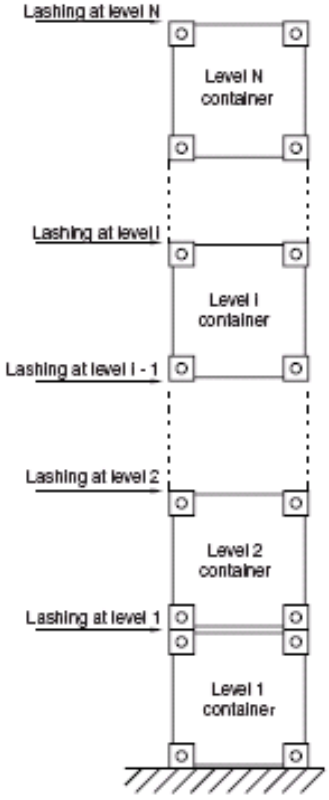
4 Hull scantling

4.1

4.1.1 Hull scantling is to be in conformity with the requirements given in Part B.

4.1.2 The scantlings of structural members subjected to concentrated loads are generally to be carried out on the base of direct calculations. For such calculations reference is to be made to Part B of Tasneef Rules for the Classification of Ships.

Figure 3 : Container level in a stack



SECTION 20 HIGH SPEED VESSELS

1 General

1.1

1.1.1 High speed vessels are motorized craft capable of reaching speeds over 40 km/h in relation to water.

1.1.2 *(1/3/2019)*

In general such ships are to be in compliance with Tasneef Rules applicable to high speed craft, taking into account the provisions in Ch.29 of ES-TRIN 2017/1.

Notwithstanding the fact that the fire protection requirements are not mandatory for the purpose of classification, when Tasneef is requested to verify such requirements the specific Rules for the classification of high speed craft apply taking into account the provisions of Ch.29 Art 29.10 of ES-TRIN 2017/1.

1.1.3 Ships complying with the requirements of this Chapter are eligible for the class notation **High- SPEED-VESSEL**.

Part E
Service Notations

Chapter 2
SHIPS CARRYING DANGEROUS GOODS

SECTION 1 **GENERAL REQUIREMENTS APPLICABLE TO ALL SHIPS**

SECTION 2 **LIQUID DANGEROUS GOODS**

SECTION 3 **DANGEROUS LIQUEFIED GASSES**

SECTION 4 **DRY CARGOES**

SECTION 1 GENERAL REQUIREMENTS APPLICABLE TO ALL SHIPS

1 Application

1.1

1.1.1 The requirements of this Section are to be applied to ships carrying dangerous goods.

Ships carrying dangerous goods are to comply with the specific requirements of Part B, Part C and, with reference to the type of goods, to:

a) Ch 1, Sec 11 and Sec 12 as applicable and Ch 2, Sec 2 for the transport of dangerous liquid cargoes;

b) Ch 1, Sec 13 and Ch 2, Sec 3 for the transport of liquefied gases;

c) Ch 1, Sec 14 or Sec 15 or Sec 16 as applicable and Ch 2, Sec 4 for the transport of dangerous dry cargoes.

1.1.2 The Rules contained in this Section as well as those contained in the other Sections of Chapter 2 are relevant to the ADN Regulations; where parts of the latter are reproduced in these Rules they are printed in italic type.

1.1.3

When the application of the ADN Regulations is referred to in these Rules, the relevant ADN Regulations in force at the time of classification are to be used. Upon request of the Interested Parties, for ships for which the application of the ADN Regulations is not required by the Flag Administration, Tasneef may accept, at its judgement, the application of equivalent criteria.

2 Classifications of dangerous goods

2.1

2.1.1

The classes of dangerous goods according to ADN are given in the following Tab 1.

Table 1 : Classification of dangerous goods

Class	Description
1	Explosive substances and articles
2	Gases
3	Flammable liquids
4.1	Flammable solids, self-reactive substances and solid desensitized explosives
4.2	Substances liable to spontaneous combustion
4.3	Substances which in contact with water, emit flammable gases
5.1	Oxidizing substances
5.2	Organic peroxides
6.1	Toxic substances
6.2	Infectious substances
7	Radioactive material
8	Corrosive substances
9	Miscellaneous dangerous substances and articles

2.1.2

With reference to Table 1 and the ADN regulations, the following goods may be carried in tankers depending on their construction:

- Class 2: Gases ;
- Class 3: Flammable liquids ;
- Class 6.1: Toxic substances ;
- Class 8 : Corrosive substances ;
- Class 9: Miscellaneous dangerous substances and articles

2.1.3

Products listed in Pt 3, Table C of the AND Regulations are authorized to be carried in tankers in conformity to the requirements of this Chapter.

The relevant conditions for the transport of the above dangerous goods are drafted in the above Table C contained in Pt 3 of the ADN Regulations.

3 Definitions and general provisions concerning the carriage of dangerous goods of all classes

3.1

3.1.1 *(1/1/2019)*

In this paragraph reference will be made to the ADN regulations.

3.1.2 Electrical equipment

IEC means the International Electrotechnical Commission.

Limited explosion risk electrical apparatus means:

- an electrical apparatus which, during normal operation, does not cause sparks or exhibits surface temperatures which are above the required temperature class, including.
- three-phase squirrel cage rotor motors;
- brushless generators with contactless excitation;
- fuses with an enclosed fuse element;
- contactless electronic apparatus;

or

- an electrical apparatus with an enclosure protected against water jets (degree of protection IP 55) which during normal operation does not exhibit surface temperatures which are above the required temperature class.

3.1.3 Certified safe type electrical apparatus

Means an electrical apparatus which has been tested and approved by the competent authority regarding its safety of operation in an explosive atmosphere, e.g.

- *intrinsically safe apparatus;*
- *flameproof enclosure apparatus;*
- *apparatus protected by pressurisation;*
- *powder filling apparatus;*
- *apparatus protected by encapsulation;*
- *increased safety apparatus.*

Note 1: Limited explosion risk" apparatus is not covered by this definition.

3.1.4 Explosion group (see IEC publication 79 and EN 50 014)

Means a grouping of flammable gases and vapours according to their maximum experimental safe gaps and minimum ignition currents, and of electrical apparatus which may be used in the corresponding potentially explosive atmospheres.

3.1.5 Electrical apparatus protected against water jets

Means an electrical apparatus so designed that water, projected by a nozzle on the enclosure from any direction, has no damaging effects. The test conditions are specified in IEC publication 529, minimum degree of protection IP 55.

3.1.6 Temperature class (see IEC publication 79 and EN 50 014)

Means a grouping of flammable gases and vapours of flammable liquids according to their ignition temperature, and of electrical apparatus which may be used in the corresponding potentially explosive atmosphere according to their maximum surface temperature.

3.1.7 Types of protection (see IEC Publication 79 and EN 50 014)

- *EEx (d) : flameproof enclosure (EN 50 018);*
- *EEx (e) : increased safety (EN 50 019);*
- *EEx (ia) and EEx (ib) : intrinsic safety (EN 50 020);*
- *EEx (m) : encapsulation (EN 50 028);*
- *EEx (p) : pressurised apparatus (EN 50 016);*
- *EEx (q) : powder filling (EN 50 017).*

3.1.8 Classification of zones (see IEC publication 79-10)

***Zone 0:** areas in which dangerous explosive atmospheres of gases, vapours or sprays exist permanently or during long periods;*

***Zone 1:** areas in which dangerous explosive atmospheres of gases, vapours or sprays are likely to occur occasionally;*

***Zone 2:** areas in which dangerous explosive atmospheres of gases, vapours or sprays are likely to occur rarely and if so for short periods only.*

3.1.9 Division of space

a) Accommodation

means spaces intended for the use of persons normally living on board, including galleys, food stores, lavatories, washrooms, bathrooms, laundries, halls, alleyways, etc, but excluding the wheelhouse.

b) Bulkhead

means a metal wall or partition , generally vertical, both sides of which are inside the vessel and which is bounded by the bottom, the side plating, a deck or another bulkhead.

c) Bulkhead (watertight)

A bulkhead shall be considered watertight if it has been constructed so that it can withstand water pressure with a head of 1,00 metre above the deck.

d) Cargo area

see Protected area as below defined .

e) Protected area

Protected area means:

1) the cargo hold or holds(when anti-explosion protection is required, comparable to Zone 1) of the vessel.

2) *the space situated above the deck (when anti-explosion protection is required, comparable to Zone 2), bounded:*
   - *athwaships, by vertical planes correspondingto the side plating*
   - *foremost and aftmost, by cargo hold bulkheads;and*
   - *upwards,by a horizontal palne 2 m above the upper level of the cargo, but at least by a horizontal plane 3 m above the deck*

f) *Cargo pump room (comparable to "zone 1")*

means a service space where the cargo pumps and stripping pumps are installed together with their operational equipment.

g) *Cargo tank (comparable to "zone 0")*

means a tank which is permanently attached to the vessel and the boundaries of which are either formed by the hull itself or by walls separate from the hull and which is intended for the carriage of dangerous goods.

h) *Cofferdam (comparable to "zone 1")*

means an athwartship compartment which is bounded by watertight bulkheads and which can be inspected. The cofferdam shall extend over the whole area of the end bulkheads of the cargo tanks. The bulkhead not facing the cargo area shall extend from one side of the vessel to the other and from the bottom to the deck in one frame plane.

i) *Hold space (comparable to "zone 1")*

means an enclosed part of the vessel which is bounded fore and aft by watertight bulkheads and which is intended only to carry cargo tanks independent of the vessel's hull.

j) *Independent cargo tank (comparable to "zone 0")*

means a cargo tank which is permanently built in, but which is independent of the vessel's structure.

k) *Service space*

means a space which is accessible during the operation of the vessel and which is neither part of the accommodation nor part of the cargo tanks, with the exception of the fore peak and after peak, provided no machinery has been installed in these latter spaces.

3.1.10 SOLAS Regulations

Means the International Convention for the Safety of Life at Sea, 1974, as amended.

3.1.11 Bilge water

Means oily water from the engine room bilges, the peak, the cofferdams and the double hull spaces.

3.1.12 Breathing apparatus (ambient air-dependent)

Means an apparatus which protects the person wearing it when working in a dangerous atmosphere by means of a suitable filter.

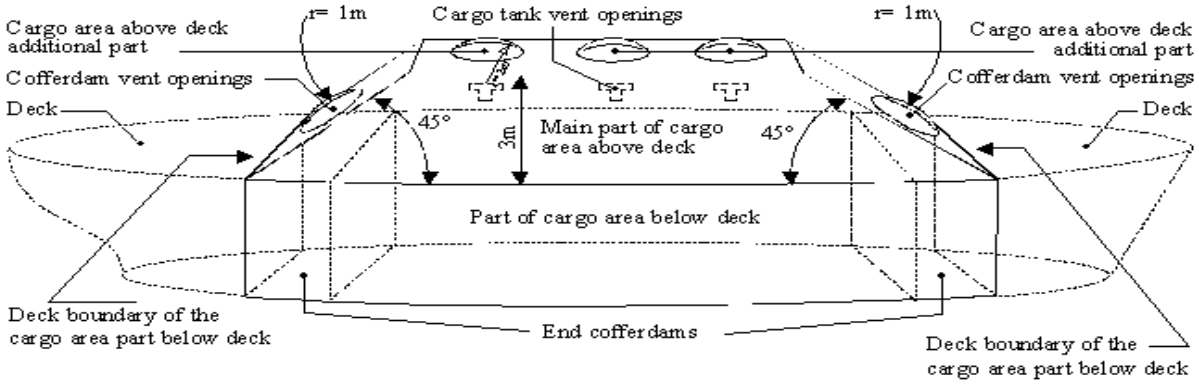
3.1.13 Breathing apparatus (self-contained)

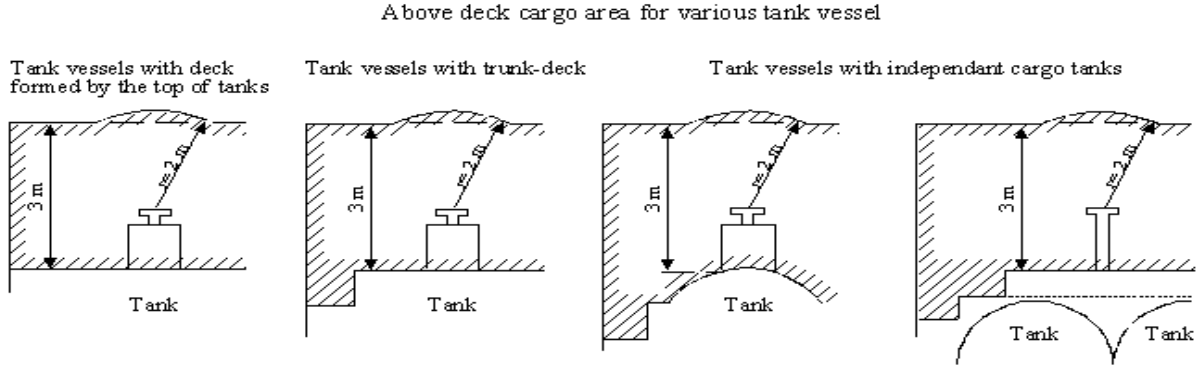
Means an apparatus which supplies the person wearing it when working in a dangerous atmosphere with breathing air by means of pressurised air carried with him or by means of a tube.

3.1.14 Cargo area

a) *Means the whole of the following spaces (see Fig 1).*

Figure 1





b) *Cargo area (part below deck)*

means the space between two vertical planes perpendicular to the centreline plane of the vessel, which comprises cargo tanks, hold spaces, cofferdams, double hull spaces and double bottoms; these planes normally coincide with the outer cofferdam bulkheads or hold end bulkheads. Their intersection line with the deck is referred to as the "boundary of the cargo area part below deck.

c) *Cargo area (main part above deck) (comparable to "zone 1")*

means the space which is bounded:

- *at the sides, by the shell plating extending upwards from the decks sides;*
- *fore and aft, by planes inclined at 45° towards the cargo area, starting at the boundary of the cargo area part below deck;*
- *vertically, 3,,00 m above the deck.*

d) *Cargo area (additional part above deck) (comparable to "zone 1")*

means the spaces not included in the main part of the cargo area above deck comprising 1,00 m radius spherical segments centreed over the ventilation openings of the cofferdams and the service spaces located in the cargo area part below the deck and 2,,00 m spherical segments centreed over the ventilation openings of the cargo tanks and the opening of the pump rooms.

3.1.15 Cargo piping

See "pipes for loading and unloading".

3.1.16 Cargo residues

Means liquid cargo which cannot be removed from the cargo tank or cargo piping by discharging, draining or stripping.

3.1.17 Cargo tank (condition)

- *discharged: empty, but containing residual cargo;*
- *empty: dry, but not gas-free;*
- *gas-free: not containing any measurable concentration of dangerous gases or vapours.*

3.1.18 Construction pressure

Means the pressure on the basis of which the cargo tank or the residual cargo tank has been designed and built. This pressure generally equals the maximum working pressure.

3.1.19 Damage control plan

The damage control plan shall indicate the boundaries of the watertight compartments serving as the basis for the stability calculations, the openings therein with the means of closure which are to be kept closed when the vessel is underway and the position of any controls thereof, and the arrangements for the correction of any list due to flooding.

3.1.20 Dangerous goods *(1/1/2019)*

Means the substances and materials themselves and articles containing dangerous substances, including wastes as defined in marginal 6000 (5), and which are covered by the relevant definitions (see lists of substances) for Classes 1 to 9 of ADR or which are listed as such in Part II of ADN.

3.1.21 Escape device (suitable)

Means a respiratory protection device, designed to cover the wearer's mouth, nose and eyes, which can be easily put on and which serves to escape from a danger area.

3.1.22 Filling ratio

Where a filling ratio is given for a cargo tank, it refers to a percentage of the volume at a temperature of the substance of 15°C, except where a different temperature is indicated.

3.1.23 Flammable gas detector

Means a device allowing measuring of any significant concentration of flammable gases below the lower explosive limit and which clearly indicates the presence of higher concentrations of such gases given off by the cargo. Flammable gas detectors may be designed for measuring flammable gas only, but also for measuring both flammable gas concentrations and oxygen content. This device shall be so designed that measurements are possible without the necessity of entering the spaces to be checked.

3.1.24 Gases

Means gases or vapours.

3.1.25 Gas detection system

Means a fixed system capable of detecting in time significant concentrations of flammable gases given off by the cargoes at concentrations below the lower explosion limit and capable of activating the alarms.

3.1.26 Identification number (UN No.)

Means the number for identifying a substance, material or article. These numbers are taken from the United Nations "Recommendations on the Transport of Dangerous Goods".

3.1.27 Maximum working pressure

Means the maximum pressure occurring in a cargo tank or a residual cargo tank during operation. This pressure equals the opening pressure of high velocity vent valves.

3.1.28 Naked light

Means light produced by a flame which is not enclosed in a flameproof enclosure.

3.1.29 Oil separator vessel (1/1/2019)

Means an open type N tank vessel with a deadweight of up to 300 tonnes, constructed and fitted t o accept and carry oily and greasy wastes from the operation of vessels. Vessels without cargo tanks are considered to be subject to Chapter 9.1 or 9.2 of ADN.

3.1.30 Oily and greasy wastes from the operation of the vessel

Means used oils, bilge water and other oily or greasy wastes, such as used grease, used filters, used rags, and receptacles and packaging for such wastes.

3.1.31 Opening pressure

Means the pressure referred to in a list of substances at which the high velocity vent valves open. For pressure tanks the opening pressure of the safety valve shall be established in accordance with the requirements of the competent authority or a recognised classification society.

3.1.32 Oxygen meter

Means a device allowing measuring of any significant reduction of the oxygen content of the air. Oxygen meters may be designed and constructed for measuring oxygen only but also for measuring flammable gases and oxygen. This device shall be so designed that such measurements are possible without the necessity of entering the spaces to be checked.

3.1.33 Pipes for loading or unloading (cargo piping)

Means all pipes which may contain liquid or gaseous cargo, including the connected pumps, filters and closure devices.

3.1.34 Pressures

For tanks, all kinds of pressures (e.g. working pressure, opening pressure of the high velocity vent valves, test pressure) shall be expressed as gauge pressures in kPa (bar); the vapour pressure of substances, however, shall be expressed as an absolute pressure in kPa (bar).

3.1.35 Pressure tank

Means a tank designated and approved for a working pressure $\geq$ 400 kPa (4 bar).

3.1.36 Rescue winch

Means a device for hoisting persons from spaces such as cargo tanks, cofferdams and double hull spaces. The device shall be operable by one person.

3.1.37 Residual cargo

Means liquid cargo remaining in the cargo tank or cargo piping after unloading without the use of the stripping system.

3.1.38 Slops (1/1/2019)

Means a mixture of cargo residues and e.g. washing water, rust etc, or sludge, which is either suitable or not suitable for pumping.

3.1.39 Master (1/1/2019)

Means a person as defined in Article 1.02 of the European Code for Inland Waterways (CEVNI).

3.1.40 Stripping system (efficient)

Means a system for draining the cargo tanks and stripping the cargo piping except for the cargo residues.

3.1.41 Supply installation (bunkering system)

Means an installation for the supply of vessels with liquid fuels.

3.1.42 Supply vessel

Means an open type N tank vessel with a deadweight of up to 300 tonnes, constructed and fitted for the carriage and delivery to other vessels of products intended for the operation of vessels.

3.1.43 Tank vessel

Means a vessel intended for the carriage of substances in cargo tanks.

3.1.44 Test pressure

Means the pressure at which a cargo tank, a residual cargo tank, a cofferdam or the loading and unloading pipes shall be tested prior to being brought into service for the first time and subsequently regularly within prescribed times.

3.1.45 Toximeter

Means a device allowing measuring of any significant concentration of toxic gases given off by the cargo.

This device shall be so designed that such measurements are possible without the necessity of entering the spaces to be checked.

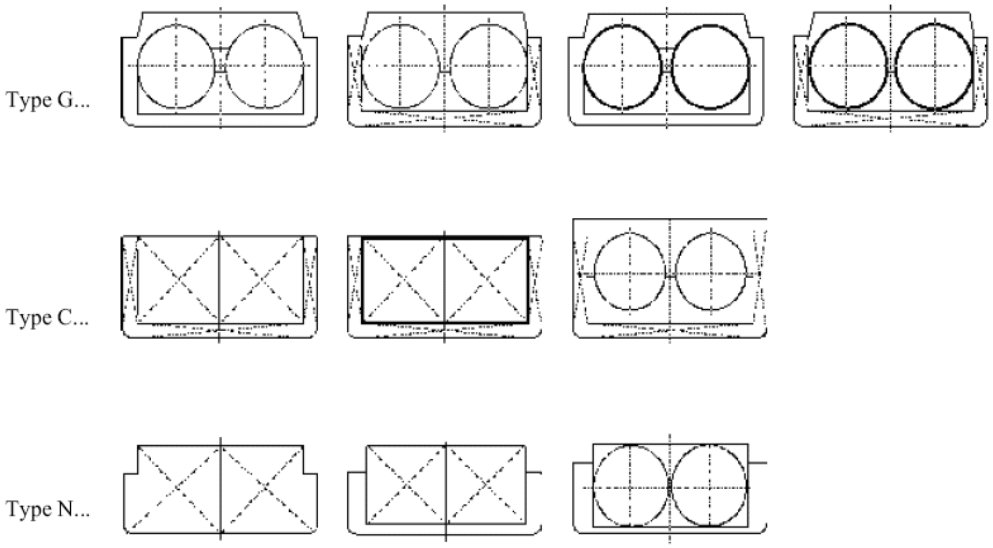
3.1.46 Type of vessel

a) *Type G ...: means a tank vessel intended for the carriage of gases. Carriage may be under pressure or in the liquid state under refrigeration.*

b) *Type C ...: means a tank vessel intended for the carriage of liquids. The vessel shall be of the flush-deck/double hull type with double hull spaces, double bottoms, but without trunk. The cargo tanks may be formed by the vessel's inner hull or may be installed in the hold spaces as independent tanks.*

c) *Type N ...: means a tank vessel intended for the carriage of liquids.*

Figure 2 *(1/1/2019)*



4 Mode of carriage of goods

4.1

4.1.1 *(1/1/2019)*

a) Substances, their assignment to the various types of tank vessels and the special conditions for their carriage in these tank vessels are listed in Tab C of Chapter 3.2 of ADN.

b) Substances which, according to the list of substances in Tab C of Chapter 3.2 of ADN, are to be carried in a type N open tank vessel may also be carried in a type N open tank vessel with flame arresters, type N closed, and types C or G provided that all conditions of carriage prescribed for type N open tank vessels as well as all other conditions of carriage prescribed in the list of substances in Tab C of Chapter 3.2 of ADN are met.

c) Substances which, according to the list of substances in Tab C of Chapter 3.2 of ADN, are to be carried in a type N open tank vessel with flame arresters may also be carried in tank type N closed vessels and types C or G provided that all conditions of carriage prescribed for type N open tank vessels with flame arresters as well as all other conditions of carriage prescribed in the list of substances in Tab C of Chapter 3.2 of ADN are met.

d) Substances which, according to the list of substances in Tab C of Chapter 3.2 of ADN, are to be carried in a type N closed tank vessel may also be carried in tank vessels of type C or G provided that all conditions of carriage prescribed for type N closed tank vessels as well as all other conditions of carriage prescribed in the list of substances in Tab C of Chapter 3.2 of ADN are met.

e) Substances which, according to the list of substances in Tab C of Chapter 3.2 of ADN, are to be carried in type C tank vessels may also be carried in type G tank vessels provided that all conditions of carriage prescribed for tank vessels of type C as well as all other conditions of carriage prescribed in the list of substances in Tab C of Chapter 3.2 of ADN are met.

f) Oily and greasy wastes resulting from the operation of the vessel may only be carried in fire-resistant receptacles, fitted with a lid, or in cargo tanks.

5 Hold spaces and cargo tanks

5.1

5.1.1 *The maximum permissible capacity of a cargo tank shall be determined in accordance with the Tab 2.*

Table 2

$L \cdot B \cdot H$ (m^3)	Maximum permissible capacity of a cargo tank (m^3)
Up to 600	$L \cdot B \cdot H \cdot 0,3$
600 to 3750	$180 + (L \cdot B \cdot H - 600) \cdot 0,0635$
> 3750	380
$L \cdot B \cdot H$ is the product of the main dimensions of the tank vessel in metres (according to the measurement certificate) , where: • L = overall length of the hull, in m; • B = extreme breadth of the hull, in m; • H = shortest vertical distance between the top of the keel and the lowest point of the deck at the side of the vessel (moulded depth) within the cargo area, in m;	

5.1.2 The relative density of the substances to be carried shall be taken into consideration in the design of the cargo tanks. The maximum relative density shall be indicated in the certificate of approval.

5.1.3 *When the vessel is provided with pressure cargo tanks, these tanks shall be designed for a working pressure of 400 kPa (4 bar).*

5.1.4 *For vessels with a length of not more than 50,00 m, the length of a cargo tank shall not exceed 10,00 m; for vessels with a length of more than 50,00 m, the length of a cargo tank shall not exceed 0,20 L.*

6 Protection against the penetration of gases

6.1

6.1.1 *The vessel shall be designed so as to prevent gases from penetrating into the accommodation and service spaces.*

6.1.2 *(1/1/2019)*

The sills of doors in the sidewalls of superstructures and the coamings of access hatches to under-deck spaces shall have a height of not less than 0,50 m above the deck.

This requirement need not be complied with if the wall of the superstructures facing the cargo area extends from one side of the ship to the other and has doors the sills of which have a height of not less than 0,50 m.

The wall shall have a height not less than 2,00 m.

In this case, the sills of doors in the sidewalls of superstructures and of coamings of engine room access hatches behind this wall shall have a height of not less than 0,10 m. The sills of engine room doors and access hatches shall, however, always have a height of not less than 0,50 m.

6.1.3 *(1/1/2019)*

The bulwarks, foot-rails etc shall be provided with sufficiently large openings which are located directly above the deck.

7 Accommodation and service spaces

7.1

7.1.1 *Accommodation spaces and the wheelhouse shall be located outside the cargo area forward of the fore vertical plane or abaft the aft vertical plane bounding the part of cargo area below deck. Windows of the wheelhouse which are located not less than 1,00 m above the wheelhouse flloor may tilt forward.*

7.1.2 *Entrances to spaces and openings of superstructures shall not face the cargo area. Doors opening outward and not located in a recess the depth of which is at least equal to the width of the doors shall have their hinges face the cargo area.*

7.1.3 *Entrances from the deck and openings of spaces facing the weather shall be capable of being closed. The following instruction are to be displayed at the entrance to such spaces:*

"DO NOT OPEN DURING LOADING, UNLOADING OR GAS FREEING WITHOUT PERMISSION FROM THE MASTER. CLOSE IMMEDIATELY".

7.1.4 *Entrances and windows of superstructures and accommodation spaces which can be opened as well as other openings of these spaces shall be located not less than 2,00 m from the cargo area. No wheelhouse doors and windows shall be located within 2,00 m from the cargo area, except where there is no direct connection between the wheelhouse and the accommodation.*

8 Arrangements of cofferdams

8.1

8.1.1 Cargo tanks installed on tankers arranged for the transport of dangerous goods must be separated from all other spaces below deck by cofferdams at least 0,60 m wide, but the passage is to be not less than 0,50 m.

Cofferdams or cofferdam compartments located next to a service space shall be accessible through an access hatch.

The access hatches and ventilation inlets shall be located not less than 0,50 m above the deck.

8.1.2 *Cofferdams shall be capable of being filled with water and emptied by means of a pump.*

Filling shall be effected within 30 minutes. The cofferdams shall not be fitted with inlet valves.

8.1.3 *No fixed pipe shall permit connection between a cofferdam and other piping of the vessel outside the cargo area.*

8.1.4 *(1/1/2019)*

When the list of substances on the vessel contains substances for which protection against explosion is required the ventilation openings of cofferdams shall be fitted with a flame arrester withstanding a deflagration.

8.1.5 *A cofferdam, the centre part of a cofferdam or another space below deck in the cargo area may be arranged as a service space, provided the bulkheads bounding the service space extend vertically to the bottom. This service space shall only be accessible from the deck. The service space shall be watertight with the exception of its access hatches and ventilation inlets.*

8.1.6 *No pipes for loading and unloading shall be fitted within the service space.*

8.1.7 *Pipes for loading and unloading may be fitted in the cargo pump rooms below deck only when they conform to the provisions of [9].*

8.1.8 *Cofferdam bulkheads not facing the cargo area are to be placed at right angles to the vessel's fore-and aft centre plane and are to extend up to the open deck in one-plane without any recess or knuckle. The corrugation of a corrugated bulkhead is not a recess or knuckle in the meaning of this requirement.*

8.1.9 *The cofferdam shall extend over the whole area of the end bulkheads of the cargo tanks. The bulkhead not facing the cargo area shall extend from one side of the vessel to the other and from the bottom to the deck in one frame plane.*

8.1.10 A cofferdam may be arranged as cargo pump room, provided the requirements in [9.1.3].

9 Cargo pumps and compressors

9.1

9.1.1 Cargo pumps and compressors may be installed on deck or in a room located below deck within the cargo area.

Drive motors are to be installed outside the cargo area. Tasneef reserve to accept hydraulic or explosion-proof electrical prime movers to be installed within the cargo area.

On tankers of Type N open internal combustion engines may be installed in the cargo area. Penetrations for drive shafts through pump room bulkheads are to be gastight design and are to be Tasneef approved.

9.1.2 Cargo pumps installed above the deck

Cargo pumps, compressors including cargo handling equipment shall be installed between the forward and aft cofferdam a horizontal distance of not less than of 6 meter from entrances or openings to accommodation and service spaces outside the cargo area.

9.1.3 Cargo pumps installed below the deck

Cargo pumps, compressor including cargo handling equipment may be fitted below the deck provided that the following requirement are satisfied:

- *the pump/compressor room is separated from the engine room or from service spaces outside the cargo area by a cofferdam or a bulkhead with an "A-60" fire protection insulation according to SOLAS Chapter II-2, Regulation 3, or by a service space or a hold space;*
- *shaft penetrations through the "A-60" bulkhead are not allowed. Pipe or cable penetrations may be fitted provided that they have an equivalent fire resistance;*
- *all pipes for loading and unloading as well as those of stripping systems are provided with shut-off devices at the pump suction side in the cargo pump room immediately at the bulkhead. The necessary operation of the control devices in the pump room, starting of pumps and control of the liquid flow rate shall be effected from the deck;*
- *the bilge of the cargo pump room is equipped with a gauging device for measuring the filling level which activates a visual and audible alarm in the wheelhouse when liquid is accumulating in the cargo pump room bilge;*
- *the cargo pump/compressor room is provided with a permanent gas detection system which automatically indicates the presence of explosive gases or lack of oxygen by means of direct measuring sensors and which actuates a visual and audible alarm when the gas concentration has reached 20% of the lower explosive limit. The sensors of this system shall be placed at suitable positions at the bottom and directly below the deck.* Alarms shall be indicated in the wheelhouse and, if provided, in the cargo control station;
- a fixed extraction type ventilation system shall be provided with a system of forced ventilation with sufficient power for ensuring at least 30 changes of air per hour based on the volume of the space. The ventilator fan shall be designed so that no sparks may be emitted on contact of the impeller blades with the housing and no static electricity may be generated. The ventilation exhaust ducts shall extend down to 50 mm above the bottom of the service space. The air shall be supplied through a duct at the top of the service space. The air inlets shall be located not less than 2,00 m above the deck, at a distance of not less than 2,00 m from tank openings and 6,00 m from the outlets of safety valves. The extension pipes which may be necessary may be of the hinged type;
- *The following instruction shall be displayed at the entrance to the cargo/compressor pump room:*

  BEFORE ENTERING THE CARGO PUMP ROOM CHECK WHETHER IT IS FREE FROM GASES AND CONTAINS SUFFICIENT OXYGEN.

  DO NOT OPEN DOORS AND ENTRANCE OPENINGS WITHOUT THE PERMISSION OF THE MASTER. LEAVE IMMEDIATELY IN THE EVENT OF AN ALARM.

10 Engine rooms

10.1

10.1.1 *Internal combustion engines for the vessel's propulsion as well as internal combustion engines for auxiliary machinery shall be located out side the cargo area. Entrances and other openings of engine rooms shall be at a distance of not less than 2,00 m from the cargo area.*

10.1.2 *The engine rooms shall be accessible from the deck; the entrances shall not face the cargo area. Where the doors are not located in a recess whose depth is at least equal to the door width, the hinges shall face the cargo area.*

10.1.3 *Only internal combustion engines running on fuel with a flashpoint of more than 55°C are allowed.*

10.1.4 *Ventilation inlets of the engine room, and when the engines do not take in air directly from the engine room, air intakes of the engines shall be located not less than 2,00 m from the cargo area.*

10.1.5 *Sparking shall not be possible within the cargo area.*

10.1.6 *The surface temperature of the outer parts of engines used during loading or unloading operations, as well as that of their air inlets and exhaust ducts shall not exceed the allowable temperature according to the temperature class.*

10.1.7 *The ventilation in the closed engine room shall be designed so that, at an ambient temperature of 20°C, the average temperature in the engine room does not exceed 40°C.*

10.1.8 *Exhausts shall be evacuated from he vessel into the open air either upwards through an exhaust pipe or through the shell plating. The exhaust out let shall be located not less than 2,00 m from the cargo area. The exhaust pipes of engines shall be arranged so that the exhausts are led away*

from the vessel. The exhaust pipes shall not be located within the cargo area.

10.1.9 *Exhaust pipes shall be provided with a device preventing the escape of sparks, e.g. spark arresters.*

11 Cargo pump system

11.1

11.1.1 General

A complete system of pumps and piping is to be fitted for handling the cargo oil. Except where expressly permitted, and namely for the bow and stern cargo loading and unloading stations, this system is not to extend outside the cargo area and is to be independent of any other piping system on board. Cargo pipes are to be designed in a way such that all remaining cargo may be drained into the cargo tanks. Cargo pumps, filters and other components are to be provided with a suitable draining device.

11.1.2 Where necessary, cargo piping is to be fitted with expansion joints or bends.

Expansion joints including bellows are to be Tasneef type approved.

Expansion joints made of non-metallic material may be accepted only inside tanks and provided they are:

- of an approved type
- designed to withstand the maximum internal and external pressure
- electrically conductive.

11.1.3 Cargo pipes may be fitted inside the cargo tanks provided that a stop valve is fitted inside the tanks to which they lead .Such valve is to be operable from the deck. Pump room stop valves are to be fitted in the relevant pipelines.The distance between the cargo pipes and the bottom or double bottom is not to be less than 700 mm.

11.2 Cargo piping design

11.2.1 Unless otherwise specified, cargo piping is to be designed and constructed according to the requirements of Pt C.

11.2.2 Materials

a) Cargo piping is, in general, to be made of steel or cast iron.

b) Valves, couplings and other end fittings of cargo pipe lines for connection to hoses are to be of steel or other suitable ductile material.

c) Spheroidal graphite cast iron may be used for cargo oil piping.

d) Grey cast iron may be accepted for cargo oil lines:
   - within cargo tanks, and
   - on the weather deck for pressure up to 1,6 Mpa.

   It is not to be used for manifolds and their valves of fittings connected to cargo handling hoses.

e) Plastic pipes may be used in the conditions specified in Pt C.

   Arrangements are to be made to avoid the generation of static electricity.

11.2.3 Connection of cargo pipe lengths

Cargo pipe lengths may be connected either by means of welded joints or, unless otherwise specified, by means of flange connections.

11.2.4 Valves

a) Stop valves are to be provided to isolate each tank.

b) A stop valve is to be fitted at each end of the cargo manifold.

c) When a cargo pump in the cargo pump room serves more than one cargo tank, a stop valve is to be fitted in the cargo pump room on the line leading to each tank.

d) Main cargo oil valves located in the cargo pump room below the floor gratings are to be remote controlled from a position above the floor.

e) Valves with remote control are to comply with Pt C.

f) Submerged valves are to be remote controlled. In the case of a hydraulic remote control system, control boxes are to be provided outside the tank, in order to permit the emergency control of valves.

g) Valve actuators located inside cargo tanks are not to be operated by means of compressed air.

11.2.5 Cargo hoses

a) Cargo hoses are to be of a type approved by the Society for the intended conditions of use.

b) Hoses subject to tank pressure or pump discharge pressure are to be designed for a bursting pressure not less than 5 times the maximum pressure under cargo transfer conditions.

c) Unless bonding arrangements complying with Tasneef Rules are provided, the ohmic electrical resistance of cargo hoses is not to exceed 1kW .

11.3 Heating systems intended for cargo

11.3.1 General

a) Heating systems intended for cargo are to comply with the relevant requirements of Pt C.

b) The steam and heating media temperature within the cargo area is not to exceed 220° C.

c) Blind flanges or similar devices are to be provided on the heating circuits fitted to tanks carrying cargoes which are not to be heated.

d) Heating systems are to be so designed that the pressure maintained in the heating circuits is higher than that exerted by the cargo . This need not be applied to heating circuits which are not in service provided they are drained and blanked off.

e) Isolating valves are to be provided at the inlet and outlet connections of the tank heating circuits. Arrangements are to be made to allow manual adjustment of the flow.

f) Heating pipes and coils inside tanks are to be built of a material suitable for the heated fluid and of reinforced

thickness as per Pt C, They are to have welded connections only.

11.3.2 Steam heating

Heating systems intended for cargo are to comply with the relevant requirements of Pt C.

To reduce the risk of liquid or gaseous cargo returns inside the engine or boiler rooms, steam heating systems of cargo tanks are to satisfy either of the following provisions:

- they are to be independent of other ship services, except cargo heating or cooling systems, and are not to enter machinery spaces, or
- they are to be provided with an observation tank on the water return system located within the cargo area. However, this tank may be placed inside the engine room in a well-ventilated position remote from boilers and other sources of ignition. Its air pipe is to be led to the open and fitted with a flame arrester.

11.3.3 Hot water heating

Hot water systems serving cargo tanks are to be independent of other systems. They are not to enter machinery spaces unless the expansion tank is fitted with:

- means for detection of flammable vapours
- a vent pipe led to the open and provided with a flame arrester.

11.4 Bilge System

11.4.1 Bilge pumps serving spaces located within the cargo area are to be located within the cargo area and shall be independent of other vessel's bilge systems.

Bilge systems for engine room shall be not used for freeing spaces in the cargo area.

For bilge draining of spaces located outside the cargo area, refer to Pt C.

11.4.2 Draining of spaces located within the cargo area

Bilge systems for hold spaces in which independent tanks are installed, as well as for cofferdams and void spaces in the cargo area are to be in compliance with the following requirements.

Internal diameter of the bilge lines is to be not less than:

$$d = 2,0 \times \sqrt{(B + D) \times L_0} + 35$$

where:

L_0 : Length of the void space or space where the tank is located, in m

B : Breadth of the ship, in m

D : Moulded depth of the ship to the bulkhead deck, in m

The internal diameter is to be assumed in any case not less than 50 mm.

The capacity of the bilge pump is to be calculated according to Pt C.

Ejectors may be used in place of the required pumps. The water to feed the ejector may be supplied by a pump fitted inside the engine room.

11.4.3 Draining of pump rooms

a) Arrangements are to be provided to drain the pump rooms by means of separated power pumps or bilge ejectors.

Note 1: On tankers of less than 500 gross tonnage, the pump rooms may be drained by means of hand pumps with a suction diameter of not less than 50 mm.

b) Bilge pipe internal diameter is not to be less than 50 mm.

c) The bilge system of cargo pump rooms is to be capable of being controlled from outside.

d) High liquid level in the bilges is to activate an audible and visual alarm in the cargo control room and on the navigation bridge.

11.4.4 Drainage of other cofferdams and void spaces located within the cargo area

Other cofferdams and void spaces located within the cargo area and not intended to be filled with water ballast are to be fitted with suitable means of drainage.

For tankers to be in compliance with the ADN regulations, systems are to be provided in order to fill the relevant cofferdam in the cargo area within 30 minutes and ensure draining by means of a pump located inside the cargo area. Such requirement is to be not provided for vessels that are not be in compliance with ADN/ADNR Regulations.

11.5 Ballast system

11.5.1 Ballast systems serving tanks inside the cargo area are to independent of the ballast system serving the parts of the ship located forward and aft of the cofferdam and are to be located inside the cargo area. Ballast water intake shall be arranged through the cofferdam or a ballast side tank.

Ballast tanks may be drained by means ejectors and filled by means the fire main.

For ballasting of cargo tanks the intake pipe is to be arranged in the cofferdam and shall be fitted with a screw-down non return valve and may be connected to the cargo pumps.

11.6 Ventilation system

11.6.1 Pump room, cofferdams and ballast/hold/void spaces ventilation within the cargo area

a) Ventilation of the pump room is to be carried out in compliance with the requirements stated in [9.1.3].

For other compartments, portable installations may be considered.

The open ends of the air pipes of each fuel oil tank are to be fitted at not less than 500 mm above the weather deck.

b) Mechanical fans in the cargo area are to be in conformity with Pt C, Ch 3, Sec 1, [5].

Inlet and outlet ducts are to be provided with flame screens having a mesh size not more than 12 mm.

Ventilators used for gas freeing of tanks are to be designed so that no sparks may be emitted on contact of the impeller blades with the housing and no static electricity may be generated.. In this way adequate gap is to

be ensured between the impeller and the fan housing and, in addition, adequate material combination between impeller and fan housing is also to be ensured.The safety clearance between the fan housing and the impeller shall not be less than 1/10 of the inner impeller bearing diameter, limited to a minimum of 2 mm and is to be such as preclude any contact between the housing and the rotor. The maximum clearance need not to be more than 13 mm.

Electric motors are to be located outside the vent ducts and are to be in compliance with the requirements for electrical installations given in this Section.

11.6.2 Cargo tank ventilation

a) Cargo tank vent openings are to be fitted at not less than 500 mm above the weather deck.

All spaces in the cargo area are to be capable of being ventilated. Means for checking their gas-free condition are to be provided.

b) *The venting arrangements are to be so designed and operated as to ensure that neither pressure nor vacuum in cargo tanks exceeds design parameters and to be such as to provide for:*

1) the flow of the small volumes of vapour, air or inert gas mixtures caused by thermal variations in a cargo tank in all cases through pressure/vacuum valves, and

2) the passage of large volumes of vapour, air or inert gas mixtures during cargo loading and ballasting, or during discharging,

3) *a secondary means of allowing full flow relief of vapour, air or inert gas mixtures to prevent overpressure or under-pressure in the event of failure of the arrangements in b). Alternatively, pressure sensors may be fitted in each tank protected by the arrangement required in b), with a monitoring system in the ship's cargo control room or the position from which cargo operations are normally carried out. Such monitoring equipment is also to provide an alarm facility which is activated by detection of overpressure or under-pressure conditions within a tank.*

c)

1) The venting arrangements in each cargo tank may be independent or combined with other cargo tanks and may be incorporated into the inert gas piping.

2) Where the arrangements are combined with other cargo tanks, either stop valves or other acceptable means are to be provided to isolate each cargo tank. Where stop valves are fitted, they are to be provided with locking arrangements which are to be under the control of the responsible ship's officer. There is to be a clear visual indication of the operational status of the valves or other acceptable means. Where tanks have been isolated, it is to be ensured that relevant isolating valves are opened before cargo loading or ballasting or discharging of those tanks is commenced. Any isolation must continue to permit the flow caused by thermal variations in a cargo tank in accordance with [11.6.2] a).

3) *If cargo loading and ballasting or discharging of a cargo tank or cargo tank group is intended, which is isolated from a common venting system, that cargo tank or cargo tank group is to be fitted with a means for overpressure or under-pressure protection as required in [11.6.2] c).*

11.6.3 Prevention of the passage of flame into the tanks

a) Where required according to the list of products, cargo tank shall be provided with suitable flame arresters or equivalent devices to prevent the passage of flame into the cargo tanks. The design, testing and locating of these devices are to comply with Tasneef Rules or is to be in accordance to relevant national or international standards recognised by Tasneef

b) High velocity vents providing a discharge velocity of at least 30 m/s for the removal of vapour from the immediate vicinity of the vessel may be used as flame arresters provided that they have been accepted by Tasneef

11.7 Safety and control installations

11.7.1 Cargo tanks shall be provided with the following equipment:

a) Provision is to be made to guard against liquid rising in the venting system of cargo tanks to a height which would exceed the design head of the tanks. This is to be accomplished by high level alarms.

Such high level alarm is to met the following requirements:

1) High level alarms are to be type approved;

2) High level alarms are to give an audible and visual signal at the control station, where provided;

3) The high level alarm is to activate an audible and visual alarm at 90% filling on type N and C tankers and 86% on type G tankers;

b) Each cargo tank is to be fitted with a level gauging system indicating the liquid level along the entire height of the tank. Unless otherwise specified, the gauge may be portable or fixed with local reading.

Gauging devices and their remote reading systems are to be type approved.

Ullage openings and other gauging devices likely to release cargo vapour to the atmosphere are not to be arranged in enclosed spaces.

The type and design of the equipment depend on the tanker type and type of cargo (see Tab C of Chapter 3.2 of ADN). Such assignment is based on the following definitions :

1) A "restricted gauging device" means a device which penetrates the tank and which, when in use, permits a small quantity of vapour or liquid to be exposed to the atmosphere. When not in use, the device is completely closed. Examples are sounding pipes.

2) A "closed gauging device" means a device which is separated from the tank atmosphere and keeps tank contents from being released. It may:
   - penetrate the tank, such as float-type systems, electric probe, magnetic probe or protected sight glass,
   - not penetrate the tank, such as ultrasonic or radar devices.

3) An "open device" (ullage/observation port) means an opening in a deck tank, equipped with a self-closing cover, through which a portable gauging device can be introduced inside the tank.

c) a level alarm device which is activated at the latest when a degree of filling of 90% is reached;

d) a high level sensor for actuating the facility against overflowing at the latest when a degree of filling of 97,5% is reached;

e) an instrument for measuring the pressure of the vapour phase inside the cargo tank;

f) an instrument for measuring the t temperature of the cargo, when a system for heating the cargo is required in the list of substances in Tab C of Chapter 3.2 of ADN or a maximum temperature is indicated in column 20 of that list;

g) a sampling device of the closed type or of the partly closed type and/or a sampling opening as required in the list of substances in Tab C of Chapter 3.2 of ADN.

11.7.2 When the degree of filling in per cent is determined, an error of not more than 0,5% is permitted. It shall be calculated on the basis of the total cargo tank capacity including the expansion trunk.

11.7.3 The level gauge shall allow readings from the control position of the shut -off devices of the particular cargo tank.

11.7.4 The level alarm device shall give a visual and audible warning on board when actuated.

The level alarm device shall be independent of the level gauge.

11.7.5 *The high level sensor referred to in paragraph (1) (d) above shall give a visual and audible alarm on board and at the same time actuate an electrical contact which in the form of a binary signal interrupts the electric current loop provided and fed by the shore facility, thus initiating measures at the shore facility against overflowing during loading operations. The signal shall be transmitted to the shore facility via a watertight two-pin plug of a connector device in accordance with IEC Publication No. 309 for direct current of 40 to 50 volts, identification colour white, position of the nose 10 h.*

The plug shall be permanently fitted to the vessel close to the shore connections of the loading and unloading pipes.

The high level sensor shall also be capable of switching off the vessel's own discharging pump.

The high level sensor shall be independent of the level alarm device, but it may be connected to the level gauge.

11.7.6 *The visual and audible signals given by the level alarm device shall be clearly distinguishable from those of the high level sensor.*

The visual alarm shall be visible at each control position on deck of the cargo tank stop valves.

It shall be possible to easily check the functioning of the sensors and electric circuits or these shall be of the "fail-safe" design.

11.7.7 *When the pressure or temperature exceeds a set value, instruments for measuring the vacuum or overpressure of the gaseous phase in the cargo tank or the temperature of the cargo shall activate a visual and audible alarm in the wheelhouse and in the accommodation. When the pressure exceeds the set value during loading, the instrument for measuring the pressure shall, by means of the plug referred to in paragraph 11.7.5 above, initiate simultaneously an electrical contact which shall put into effect measures to interrupt the loading operation. If the vessel's own discharge pump is used, it shall be switched off automatically.*

The instrument for measuring the overpressure or vacuum shall activate the alarm when an overpressure equal to 1,15 times the opening pressure of the pressure valve, or a vacuum pressure of 1,1 times the opening pressure of the vacuum pressure valve is reached. The maximum allowable temperature is indicated in the list of substances inT ab C of Chapter 3.2 of ADN. The sensors for the alarms mentioned in this paragraph may be connected to the alarm device of the sensor.

When a manometer is used to measure the overpressure or the vacuum pressure, its indicator scale shall not be less than 0,14 m in diameter. The maximum permissible overpressure or vacuum values shall be indicated by a red mark. The manometers shall be capable of being read at all times from the location where it is possible to interrupt loading or unloading.

11.7.8 *Where the control elements of the shut-off devices of the cargo tanks are located in a control room, reading of the level gauges shall be possible in the control room and the visual and audible warning given by the level alarm device, i.e. the high level sensor referred to in (1)(d) and the instruments for measuring the pressure of the vapour phase and temperature of the cargo shall be noticeable in the control room and on deck.*

Satisfactory monitoring of the cargo area shall be ensured from the control room.

11.7.9 The closed-type sampling device penetrating through the boundary of the cargo tank but constituting a part of a closed system shall be designed so that during sampling no gas or liquid may escape from the cargo tank. The device shall be of a type approved by the competent authority for this purpose.

11.7.10 The partly closed sampling device penetrating through the boundary of the cargo tank shall be such that during sampling only a small quantity of gaseous or liquid cargo can escape into the open air. While the device is not used it shall be closed completely. The device shall be of a type approved by the competent authority for this purpose.

11.7.11 The sampling openings shall have a diameter of not more than 0,30 m. They shall be fitted with a flame arrester and shall be such that the period during which they remain open is as short as possible and that the flame arrester closes automatically.

11.7.12 The ullage openings shall be such that the filling level may be measured by means of adequate systems.

12 Water spray system

12.1

12.1.1 *When water-spraying is required in the list of substances in Tab C of Chapter 3.2 of ADN, a water-spraying system shall be installed in the cargo area on deck for the purpose of reducing vapours given off by the cargo, and of cooling the tops of cargo tanks.*

The system shall be fitted with a connection device for supply from the shore. The system shall be capable of being put into operation from the wheelhouse and from the deck. The capacity of the water-spraying system shall be such that when all the spray nozzles are in operation, the outflow is of 50 litres per square metre of cargo deck area per hour.

13 Inert gas system

13.1

13.1.1 When an inert gas system according to the requirements stated in App.1 is requested, it is to be in conformity with Tasneef Rules for the Classification of Ships as applicable for tankers.

14 Fuel oil tanks

14.1

14.1.1 *Double bottoms within the cargo area may be arranged as fuel oil tanks, provided their depth is not less than 0.60 m. Fuel oil pipes and openings of such tanks are not permitted in the hold space.*

14.1.2 *The air pipes of all fuel oil tanks shall extend to 0,5 m above the open deck. Their open ends and the open ends of overflow pipes leading onto the deck shall be fitted with a protective device consisting of a gauze diaphragm or a perforated plate.*

15 Residual cargo tanks and slop

15.1

15.1.1 *The vessel shall be provided with at least one residual cargo tank and with slop tanks for slops which are not suitable for pumping. These tanks shall be located only in the cargo area.*

Intermediate bulk containers or IBC tank containers may be used instead of a fixed residual cargo tank. During filling of these intermediate bulk containers or tank containers, means for collecting any leakage shall be placed under the filling connections.

15.1.2 *Slop tanks shall be fire-resistant and shall be capable of being closed with lids (e.g. drums with lever closing ring lids). The tanks shall be marked and easy to handle.*

15.1.3 *The maximum capacity of a residual cargo tank is 30 m^3.*

The residual cargo tank shall be equipped with:

a) A pressure/vacuum valve fitted with a flame arrester. The pressure valve and the flame arrester shall form a single appliance designed for the high speed ejection of gases. The eductor shall be so regulated that it does not open during the transport operation. This condition is complied with when the opening pressure of the valve meets the condition s required in the list of substances in Tab C of Chapter 3.2 of ADN for the substance to be carried;

b) an ullage opening capable of being closed;

c) *connections, with stop valves, for pipes and hoses;*

No connection between the residual cargo tanks and the vapour pipe of the cargo tanks is permitted.

The residual cargo tanks, and the intermediate bulk containers or tank containers placed on the deck shall be located at a minimum distance from the hull equal to a quarter of the vessel's breadth.

16 Electrical installations

16.1

16.1.1 *Only distribution systems without return connection to the hull are permitted:*

This provision does not apply to:

- *local installations outside the cargo area (e.g. connections of starters of diesel engines);*
- *the device for checking the insulation level referred to in [16.1.2] below.*

16.1.2 *Every insulated distribution network shall be fitted with an automatic device with a visual and audible alarm for checking the insulation level.*

16.1.3 *For the selection of electrical equipment to be used in zones presenting an explosion risk, the explosion groups and temperature classes assigned to the substances carried in the list of substances in Aab C of Chapter 3.2 of ADN 1 shall be taken into consideration.*

17 Pushed convoys and side-by-side formations

17.1

17.1.1 *(1/1/2019)*

When a pushed convoy or side-by-side formation comprises a tank vessel carrying dangerous substances, vessels

used for the propulsion are to conform to the requirements stated in [18].

Vessels not carrying dangerous goods are to comply with the provisions of [20].

18 Requirements applying to the vessel used for the propulsion of a pushed or side-by side convoy comprising a tank carrying dangerous substances

18.1

18.1.1 The requirements from [18.1.1] to [18.1.4] are not mandatory when Tasneef is not involved in the Fire protection survey

18.1.2 *The fire-extinguishing agent contained in fixed fire-extinguishing systems shall be suitable and sufficient in quantity for fighting fires.*

18.1.3 *The vessel's hull and the cargo tanks shall be constructed of shipbuilding steel or other at least equivalent metal.*

18.1.4 *All permanently fitted materials in the accommodation or wheelhouse, with the exception of furniture, shall not readily ignite. They shall not evolve fumes or toxic gases in dangerous quantities, if involved in a fire.*

18.1.5 *The use of plastic material for the vessel's boats is permitted only if the material does not readily ignite.*

18.1.6 *The vessel shall be designed so as to prevent gases from penetrating into the accommodation and service spaces.*

The sills of doors in the sidewalls of superstructures and the coamings of access hatches to under-deck spaces shall have a height of not less than 0,50 m.

18.1.7 *Ventilation of accommodation and service spaces shall be possible.*

Notice boards shall be fitted at the ventilation inlets indicating the conditions when they shall be closed. Any ventilation in lets of accommodation and service spaces leading outside shall be fitted with fire flaps.

Such ventilation inlets shall be located not less than 2,00 m from the cargo area.

18.1.8 *Internal combustion engines for the vessel's propulsion as well as internal combustion engines for auxiliary machinery shall be located out side the cargo area. Entrances and other openings of engine rooms shall be at a distance of not less than 2,00 m from the cargo area. The engine rooms shall be accessible from the deck; the entrances shall not face the cargo area. Where the doors are not located in a recess whose depth is at least equal to the door width, the hinges shall face the cargo area.*

18.1.9 *Accommodation spaces and the wheelhouse shall be located out side the cargo area forward of the fore vertical plane or abaft the aft vertical plane bounding the part of cargo area below deck. Windows of the wheelhouse which are located not less than 1,00 m above the wheelhouse floor may tilt forward.*

Entrances to spaces and openings of superstructures shall not face the cargo area. Doors opening outward and not located in a recess the depth of which is at least equal to the width of the doors shall have their hinges face the cargo area.

Entrances from the deck and openings of spaces facing the weather shall be capable of being closed. The following instruct ion shall be displayed at the entrance to such spaces:

"DO NOT OPEN DURING LOADING, UNLOADING OR GAS FREEING WITHOUT PERMISSION FROM THE MASTER. CLOSE IMMEDIATELY".

Entrances and windows of superstructures and accommodation spaces which can be opened as well as other openings of these spaces shall be located not less than 2,00 m from the cargo area. No wheelhouse doors and windows shall be located within 2,00 m from the cargo area, except where there is no direct connection between the wheelhouse and the accommodation.

18.1.10 *Only internal combustion engines running on fuel with a flashpoint of more than 55°C are allowed. Ventilation inlets of the engine room, and when the engines do not take in air directly from the engine room, air intakes of the engines shall be located not less than 2,00 m from the cargo area.*

Sparking shall not be possible within the cargo area.

The surface temperature of the outer parts of engines used during loading or unloading operations, as well as that of their air inlets and exhaust ducts shall not exceed the allowable temperature according to the temperature class.

The ventilation in the closed engine room shall be designed so that, at an ambient temperature of 20°C, the average temperature in the engine room does not exceed 40°C.

18.1.11 *The air pipes of all fuel oil tanks shall extend to 0,5 m above the open deck. Their open ends and the open ends of overflow pipes leading to the deck shall be fitted with a protective device consisting of a gauze diaphragm or a perforated plate.*

18.1.12 *Exhausts shall be evacuated from the vessel into the open air either upwards through an exhaust pipe or through the shell plating. The exhaust outlets shall be located not less than 2,00 m from the cargo area. The exhaust pipes of engines shall be arranged so that the exhausts are led away from t he vessel. The exhaust pipes shall not be located within the cargo area.*

Exhaust pipes shall be provided with a device preventing the escape of sparks, e.g. spark arresters.

18.1.13 *A fire-extinguishing system shall be installed on the vessel. This system shall comply with the following requirements:*

- *It shall be supplied by two independent fire or ballast pumps, one of which shall be ready for use at any time. These pumps shall not be installed in the same space;*
- *It shall be provided with a water main fitted with at least three hydrants in the cargo area above deck. Three suitable and sufficiently long hoses with spray nozzles hav-*

ing a diameter of not less than 12 mm shall be provided. It shall be possible to reach any point of the deck in the cargo area simultaneously with at least two jets of water which do not emanate from the same hydrant.

A spring-loaded non-return valve shall be fitted to ensure that no gases can escape through the fire-extinguishing system into the accommodation or service spaces outside the cargo area;

- *The capacity of the system shall be at least sufficient for a jet of water to have a minimum reach of not less than the vessel's breadth from any location on board with two spray nozzles being used at the same time.*

  In addition, the engine rooms, the cargo pump rooms and all spaces containing essential equipment under deck (diesel generators, switch boards, compressors etc) for the refrigeration equipment, if any, shall be provided with a fixed fire-extinguishing system which can be operated from the deck.

  The above requirements are not mandatory when Tasneef *is not involved in the Fire Protection Survey.*

18.1.14 *The outlets of funnels shall be located not less than 2,00 m from the cargo area. Arrangements shall be provided to prevent the escape of sparks and the entry of water. Heating, cooking and refrigerating appliances shall not be fuelled with liquid fuels, liquid gas or solid fuels. The installation in the engine room or in another separate space of heating appliances fuelled with liquid fuel having a flashpoint above 55°C is permitted, however. Cooking and refrigerating appliances are permitted only in the accommodation. Only electric lighting appliances are permitted.*

18.1.15 *Only distribution systems without return connection to the hull are permitted.*

This provision does not apply to:

- *local installations outside the cargo area (e.g. connections of starters of diesel engines);*
- *the device for checking the insulation level referred to below;*
- *the installations for cathodic protection,*

Every insulated distribution network shall be fitted with an automatic device with a visual and audible alarm for checking the insulation level.

18.1.16 *Electrical equipment used during loading, unloading and gas-freeing during berthing and which are located outside the cargo area shall (comparable to zone 2) be at least of the "limited explosion risk" type.*

18.1.17 *This provision does not apply to:*

a) *Lighting installations in the accommodation, except for switches near entrance to accommodation;*

b) *Radiotelephone installations in the accommodation or the wheelhouse;*

c) *Electrical installations in the accommodation, the wheelhouse or the service spaces outside the cargo areas if:*

1) *These spaces are fitted with a ventilation system ensuring an overpressure of 0,1 kPa (0,001bar) and none of the windows is capable of being opened;*

   The air intakes of the ventilation system shall be located as far away as possible, however, not less than 6,00 meter from the cargo area and not less than 2,00 meter above the deck

2) *The spaces are fitted with a gas detection system with sensors:*
   - *at the suction inlets of the ventilation system;*
   - *directly at the top edge of the sill entrance;*
   - *doors of the accommodation and service spaces;*

3) *The gas concentration measurement is continuous;*

4) *When the gas concentration reaches 20% of the lower explosive limit, the ventilators are switched off. In such case and when the overpressure is not maintained or in the event of failure of the gas detection system, the electrical installations which do not comply with (1) above, shall be switch ed off. These operations shall be performed immediately and automatically and activate the emergency lighting in the accommodation, wheelhouse and service spaces, which shall comply at least with the "limited explosion risk" type. The switching off shall be indicated in the accommodation and wheelhouse by visual and audible signals;*

5) *The ventilation system, the gas detection system and the alarm of the switching off device shall fully comply with the requirements of (1) above;*

6) *The automatic switching off device is to be set so that no automatic switching off may occur while the vessel is underway.*

18.1.18 *The electrical equipment which does meet the requirements set out in [18.1.15] together with its switches shall be marked in red. The disconnection of such equipment shall be operated from a centralised location on board.*

18.1.19 *An electric generator which is permanently driven by an engine and which does not meet the requirements of [18.1.15], shall be fitted with a switch capable of shutting down the excitation of the generator. A notice board with the operating instructions shall be displayed near the switch.*

18.1.20 *Sockets for the connection of signal lights and gangway lighting shall be permanently fitted to the vessel close to the signal mast or gangway.connection and disconnecting shall not be possible except when the sockets are not live.*

18.1.21 *(1/1/2019)*

For the selection of electrical equipment to be used in zones presenting an explosion risk, the explosion groups and temperature classes assigned to the substances carried in the list of substances in Tab C of Chapter 3.2 of ADN shall be taken in to consideration.

a) Only the following equipment may be installed in cargo tanks, residual cargo tanks and pipes for loading and unloading (comparable to zone 0):

measuring, regulation and alarm devices of the EEx (ia) type of protection;

b) Only the following equipment may be installed in coffer-dams, double hull spaces, double bottoms and hold spaces (comparable to zone 1):

- *measuring, regulation and alarm devices of the "certified safe" type;*
- *lighting appliances of the "flameproof enclosure" or "pressurised enclosure" type of protection;*
- *hermetically sealed echo sounding devices the cables of which are led through thick-walled steel tubes with gas-tight connections up to the main deck;*
- *cables for the active cathodic protection of the shell plating in protective steel tubes such as those provided for echo sounding devices;*

The following equipment may be installed only in double hull spaces and double bottom if used for ballasting:

- *permanently fixed submerged pumps with temperature monitoring, of the certified safe type.*

18.1.22 *For movable cables intended for signal lights and gangway lighting, only sheathed cables of type H 07 RN-F in accordance with 245 IEC 66 or cables of at least equivalent design having conductors with a cross-section of not less than 1,5 mm² shall be used.*

These cables shall be as short as possible and installed so that damage is not likely to occur.

18.1.23 *Notice boards, clearly legible from either side of the vessel, displaying the prohibition of admittance on board and prohibition of smoking on board have to be installed*

19 Vessels not carrying dangerous goods on pushed convoys and side-by-side formations

19.1

19.1.1 *(1/1/2019)*

When a pushed convoy or side-by-side formation comprises a dry cargo vessel or a tank carrying dangerous substances, vessels not carrying dangerous goods shall conform to the requirements stated in [20].

20 Requirements applying to the vessel not carrying dangerous goods used on a pushed or side-by side convoy where at least one dry cargo vessel or a tank carries dangerous goods

20.1

20.1.1 The vessel's hull shall be constructed of shipbuilding steel or other metal, provided that this metal has at least equivalent mechanical properties and resistance to the effects of temperature and fire.

20.1.2 *Ventilation shall be provided for the accommodation and for service spaces.*

20.1.3 *Gas-tight closing appliances shall be provided for openings in the accommodation and wheelhouse facing the holds. No entrances or openings of the engine rooms and service spaces shall face the protected area.*

20.1.4 *Only internal combustion engines running on fuel having a flashpoint above 55°C are allowed.*
The air vents in the engine rooms and the air intakes of the engines which do not take air in directly from the engine room shall be located not less than 2,00 m from the protected area. Sparking shall not be possible in the protected area.

20.1.5 *Double bottoms within the hold area may be arranged as fuel oil tanks provided their depth is not less than 0,6 m. Fuel oil pipes and openings to such tanks are not permitted in the holds.*

The air pipes of all fuel oil tanks shall be led to 0,50 m above the open deck. Their open ends and the open ends of the overflow pipes leaking to the deck shall be fitted with a protective device consisting of a gauze grid or a perforated plate.

20.1.6 *Exhausts shall be evacuated from the vessel into the open air either upwards through an exhaust pipe or through the shell plating. The exhaust outlet shall be located not less than 2,00 m from the hatchway openings. The exhaust pipes of engines shall be arranged so that the exhausts are led away from the vessel. The exhaust pipes shall not be located within the protected area.*

Exhaust pipes shall be provided with a device preventing the escape of sparks, e.g. arresters.

20.1.7 *The outlets of funnels shall be located not less than 2 m from the hatchway openings.*

Arrangements shall be provided to prevent the escape of sparks and the entry of water.

Heating, cooking and refrigerating appliances shall not be fuelled with liquid fuels, liquid gas or solid fuels. The installation in the engine room or other separate space of heating appliances fuelled with liquid fuel having a flashpoint above 55°C is permitted, however.

Cooking and refrigerating appliances are permitted only in wheelhouses with metal floor and in the accommodation.

Electric lighting appliances only are permitted outside the accommodation and the wheelhouse or in the vicinity of the wheelhouse.

20.1.8 *Electric motors for hold ventilators which are arranged in the air flow shall be of t he "certified safe" type. Sockets for the connection of signal lights, gangway lighting and containers shall be fitted to the vessel close to the signal mast or the gangway or the containers. Sockets intended to supply the submerged pumps and hold ventilators shall be permanently fitted to the vessel in the vicinity of the hatches.*

20.1.9 *Cables and sockets in the protected area shall be protected against mechanical damage.*

20.1.10 *Movable cables are prohibited in the protected area, except for intrinsically safe electric circuits or for the supply of signal lights and gangway lighting, for containers, for submerged pumps, for hold ventilators and for electrically operated cover gantries.*

20.1.11 *For movable cables permitted in accordance with [20.1.10] above, only rubber-sheathed cables of type H07 RN-F in accordance with 245 IEC 66 or cables of at least equivalent design having conductors with a cross-section of not less than 1,5 mm^2, shall be used. These cables shall be as short as possible and installed so that accidental damage is not likely to occur.*

20.1.12 *Notice boards, clearly legible from either side of the vessel, displaying the prohibition of admittance on board and prohibition of smoking on board have to be installed*

SECTION 2 LIQUID DANGEROUS GOODS

1 General

1.1 Application

1.1.1 Ships complying with the requirements of this Section may be eligible for the assignment of the additional class notation type C or type N assigned as stated in Part A.

1.1.2 The requirements of this Section are to be applied in addition to those of Ch 1, Sec 11 and Sec 12.

2 Specific requirements applicable to type C tankers

2.1 Tanks design

2.1.1 Tankers carrying liquid cargoes may be of type C or type N.
Tanker of type C means a tank vessel intended for the carriage of liquids. The vessel shall be of the flush-deck/double hull type with double hull spaces, double bottoms, but without a trunk. The cargo tanks may be formed by the vessel's inner hull or installed in the hold spaces as independent tanks.

2.1.2 *For double hull construction with the cargo tanks integrated in the vessel's structure, the distance between the side wall of the vessel and the longitudinal bulkhead of the cargo tanks shall be not less than 1,00 m. A distance of 0,80 m may be permitted however, provided that the relevant hull scantling compared with the requirements specified in Ch 1, Sec 11 and Sec 12 is increased as indicated below:*

a) 25% increase in the thickness of the deck stringer plate;

b) 15% increase in the side plating thickness;

c) Arrangement of a longitudinal framing system at the vessel's side, where the depth of the longitudinals is to be not less than 0,15 m and the longitudinals shall have a face plate with the cross-sectional area of at least 7,0 cm^2.

d) The stringer or longitudinal framing systems shall be supported by web frames, and like bottom girders fitted with lightening holes, at a maximum spacing of 1,80 m.

These distances may be increased if the longitudinals are strengthened accordingly.

2.1.3 *When a vessel is built according to the transverse framing system, a longitudinal stringer system shall be arranged instead of (c) above. The distance between the longitudinal stringers shall not exceed 0,80 m and their depth shall be not less than 0,15 m, provided they are completely welded to the frames. The cross-sectional area of the face bar or faceplate shall be not less than 7,0 cm^2 as in (c) above. Where cut-outs are arranged in the stringer at the connection with the frames, the web depth of the stringer shall be increased with the depth of cut-outs.*

2.1.4 *The mean depth of the double bottoms shall be not less than 0,70 m. It shall, however, never be less than 0,60 m. The depth below the suction wells may be reduced to 0,50 m.*

2.1.5 *Cofferdams, double hull spaces, double bottoms, cargo tanks, hold spaces and other accessible spaces within the cargo area shall be arranged so that they may be completely inspected and cleaned in an appropriate manner. The dimensions of openings except for those of double hull spaces and double bottoms which do not have a wall adjoining the cargo tanks shall be sufficient to allow a person wearing breathing apparatus to enter or leave the space without difficulty. These openings shall have a minimum cross-sectional area of 0,36 m^2 and a minimum side length of 0,50 m. They shall be designed so as to allow injured or unconscious personnel to be removed from the bottom of such space without difficulty, if necessary by means of fixed equipment. In these spaces the distance between the reinforcements shall not be less than 0,50 m. In double bottoms this distance may be reduced to 0,45 m.*

Cargo tanks may have circular openings with a diameter of not less than 0,68 m.

2.2 Tank Equipment

2.2.1 *(1/1/2019)*

In addition to the requirements stated from [11.6.2] to [11.6.3] for cargo tank venting, where appropriate the following requirements are to be applied.

a) Each cargo tank or group of cargo tanks connected to a common vapour pipe is to be fitted with:

- *saferty devices for preventing unacceptable overpressures or vacuum. When anti-explosion protection is required the vaccum valve shall be fitted with a flame-arrester capable of withstanding a deflagration and the pressure relief valve with a high velocity vent valve capable of withstanding steady burning.*

  The gases shall be discharged upwards. The opening pressure of the high-velocity vent valve and the opening pressure of the vacuum valve shall be indelibly indicated on the valves;

- *a connection for the safe return ashore of gases expelled during loading;*

- *a device for the safe depressurization of the tanks.*

  When the list of substances on the vessel contains substances for which protection against explosion is required in column (17) of Table C of Chapter 3.2 of ADN this device shall include at least a flame

arrester capable of withstanding steady burning and a stop valve which clearly indicates whether it is open or shut.

b) The outlets of high velocity vent valves shall be located not less than 2,00 m above the deck and at a distance of not less than 6,00 m from the accommodation and from the service spaces outside the cargo area. This height may be reduced when. within a radius of 1,00 m round the outlet of the high velocity vent valve, there is no equipment, no work is being carried out and signs indicate the area.

The setting of the high velocity vent valves shall be such that during the transport operation they do not blow off until the maximum permissible working pressure of the cargo tanks is reached.

c) When a venting pipe connects two or more cargo tanks, a flame arrester capable of withstanding an explosion or detonation inside the pipe shall be fitted at the connection to each cargo tank. Only substances which do not mix and which do not react dangerously with each other may be carried simultaneously in cargo tanks connected to a common venting pipe;

or:

When a venting pipe connects two or more cargo tanks, a pressure/vacuum relief device provided with a flame arrester shall be fitted at the connection to each cargo tank; the gas expelled shall be discharged into the venting pipe. Several different substances may be carried simultaneously in a vessel if they do not react dangerously with each other in the gaseous phase;

or:

Each tank has its own venting pipe fitted with a vacuum relief valve incorporating a flame arrester and a high velocity vent valve with a flame-arresting effect.

Several different substances may be carried simultaneously on board.

2.3 Safety and control installations

2.3.1 Cargo tanks are to be provided with safety equipment consisting of:

- Cargo tank level indicators

  Each cargo tank is to be provided with a closed gauging device and is to be fitted with a filling mark at 95% of the total tank volume.

- Cargo tank pressure monitoring

  An adequate instrument for measuring the pressure of the vapour phase inside the cargo tank.

  Additional alarm and shutdown functions are required according to ADN/ADNR in relation to the products allowed to be carried.

- Cargo tank temperature monitoring

  An adequate instrument for measuring the temperature of the cargo, when a system for heating the cargo is required in the list of substances in Tab C of Chapter 3.2 of ADN or a maximum temperature is indicated in column 20 of that list;

  Additional alarm and shutdown functions are required according to ADN/ADNR in relation to the products allowed to be carried

- Cargo tank sampling equipment

  A sampling device of the closed type or of the partly closed type and/or a sampling opening as required in the list of substances in Tab C of Chapter 3.2 of ADN.

- Residual cargo tanks and slops

  Reference to Sec1, [20.] is to be made. A closing gauging devices shall be provided.

- Stripping system

  The vessel shall be equipped with a permanently installed stripping system.

  The stripping system shall be subjected to initial tests before being put into service or thereafter if any alteration has been made to it, using water as a test medium. The test and the determination of the residual quantities shall be carried out in accordance with the requirements of Tab C of Chapter 3.2 of ADN.

  In this test, the following residual quantities shall not be exceeded:

  - 5 l for each cargo tank;
  - 15 l for each pipe system.

3 Additional requirements applicable to type N tankers

3.1

3.1.1 Three different designs may be considered for type N tankers:

a) Type N, open venting

b) Type N, open venting, flame arresters

c) Type N, closed.

3.1.2 Tankers may be of single hull or double hull with or without inserted cargo tanks.

Hull structure is to be in conformity with the requirements given in Ch 1, Sec 11 and Sec 12.

3.1.3 Protection against the penetration of gases

a) The vessel shall be designed so as to prevent gases from penetrating into the accommodation and service spaces.

b) The sills of doors in the sidewalls of superstructures and the coamings of access hatches to under-deck spaces shall have a height of not less than 0,50 m.

This requirement need not be complied with if the wall of the superstructures facing the cargo area extends from one side of the ship to the other and has doors the sills of which have a height of not less than 0,50 m.

The wall shall have a height not less than 2,00 m.

In this case, the sills of doors in the sidewalls of superstructures and of access hatches behind this wall shall have a height of not less than 0,10 m. The sills of engine

room doors and the coaming access hatches shall, however, always have a height of not less than 0,50 m.

c) The bulwarks shall be provided with sufficiently large openings which are located directly above the deck.

d) *Paragraphs [3.1.3] a) to [3.1.3] c) above do not apply to open type N.*

3.2 Arrangement of cofferdam

3.2.1

a) Cofferdams or cofferdam compartments located next to a service space shall be accessible through an access hatch.

The access hatches and ventilation inlets shall be located not less than 0,50 m above the deck.

b) Cofferdams shall be capable of being filled with water and emptied by means of a pump.

Filling shall be effected within 30 minutes. The cofferdams shall not be fitted with inlet valves.

c) No fixed pipe shall permit connection between a cofferdam and other piping of the vessel outside the cargo area.

d) The ventilation openings of cofferdams shall be fitted with a flame arrester.

e) Paragraph (d) above does not apply to open type N.

Paragraph (b) above does not apply to oil separator and supply vessels.

3.3 Safety and control installations

3.3.1 *(1/1/2019)*

a) Cargo tanks shall be provided with the following equipment:

1) a mark inside the tank indicating the liquid level of 97%;

2) a level gauge;

3) a level alarm device which is activated at the latest when a degree of filling of 90% is reached) a high level sensor for actuating the facility against overflowing at the latest when a degree of filling of 97,5% is reachee) an instrument for measuring the pressure of the vapour phase inside the cargo tanf) an instrument for measuring the temperature of the cargo, when a system for heating the cargo is required in the list of substances in Tab C of Chapter 3.2 of ADNor a maximum temperature is indicated in column 20 of that list;

4) a sampling device of the closed type or of the partly closed type and/or a sampling opening as required in the list of substances in Tab C of Chapter 3.2 of ADN;

an ullage opening.

b) When the degree of filling in per cent is determined, an error of not more than 0,5% is permitted. It shall be calculated on the basis of the tot al cargo tan k capacity including the expansion trunk.

c) The level gauge shall allow readings from the control position of the shut-off devices of the particular cargo tank.

d) The level alarm device shall give a visual and audible warning on board when actuated.

The level alarm device shall be independent of the level gauge.

e)

1) *The high level sensor referred to in paragraph (a) (4) above shall give a visual and audible alarm on board and at the same time actuate an electrical contact which in the form of a binary signal interrupts the electric current loop provided and fed by the shore facility, thus initiating measures at the shore facility against overflowing during loading operations. The signal shall be transmitted to the shore facility via a watertight two-pin plug of a connector device in accordance with standard EN 60309-2 :1991 + A1: 2007+ A2: 2012 for direct current of 40 to 50 volts, identification colour white, position of the nose 10 h.*

The plug shall be permanently fitted to the vessel close to the shore connect ions of the loading and unloading pipes.

The high level sensor shall also be capable of switch in g off the vessels own discharging pump.

2) *The high level sensor shall be independent of the level alarm device, but it may be connected to the level gaugb) On board oil separator vessels the sensor referred to in paragraph (a) (4) shall activate a visual and audible alarm and switch off the pump used to evacuate bilge water.*

f) *The visual and audible signals given by the level alarm device shall be clearly distinguishable from those of the high level sensor.*

The visual alarm shall be visible at each control position on deck of the cargo tank stop valves.

It shall be possible to easily check the functioning of the sensors and electric circuits or these shall be of t"e "fails"fe" design.

g) *When the pressure or temperature exceeds a set value, instruments for measuring the vacuum or overpressure of the gaseous phase in the cargo tank or the temperature of the cargo shall activate a visual and audible alarm in the wheelhouse and in the accommodation. When the pressure exceeds the set value during loading, the instrument for measuring the pressure shall, by means of the plug referred to in paragraph (e) above, initiate simultaneously an electrical contact which shall put into effect measures to interrupt the loading operation. If the vessel's own discharge pump is used, it shall be switched off automatically.*

The instrument for measuring the overpressure or vacuum shall activate the alarm when an overpressure equal to 1,15 times the opening pressure of the pressure valve, or a vacuum pressure of 1,1 times the opening pressure of the vacuum pressure valve is reached. The

maximum allowable temperature is indicated in the list of substances in Tab C of Chapter 3.2 of ADN. The sensors for the alarms mentioned in this paragraph may be connected to the alarm device of the sensor.

When a manometer is used to measure the overpressure or the vacuum pressure, its indicator scale shall not be less than 0,14 m in diameter. The maximum permissible overpressure or vacuum values shall be indicated by a red mark. The manometers shall be capable of being read at all times from the location where it is possible to interrupt loading or unloading.

h) *Where the control elements of the shut-off devices of the cargo tanks are located in a control room, reading of the level gauges shall be possible in the control room and the visual and audible warning given by the level alarm device, i.e. the high level sensor referred to in (d) and the instruments for measuring the pressure of the vapour phase and temperature of the cargo shall be noticeable in the control room and on deck.*

Satisfactory monitoring of the cargo area shall be ensured from the control room.

i) The closed type sampling device penetrating through the boundary of the cargo tank but constituting a part of a closed system shall be designed so that during sampling no gas or liquid may escape from the cargo tan k. The device shall be of a type approved by the competent authority for this purpose.

j) The partly closed sampling device penetrating through the boundary of the cargo tank shall be such that during sampling only a small quantity of gaseous or liquid cargo can escape into the open air. While the device is not used it shall be closed completely. The device shall be of a type approved for this purpose.

k) The sampling openings shall have a diameter of not more than 0,30 m. They shall be fitted with a flame arrester and so designed that the period during which they remain open is as short as possible and the drip pan of the flame arrester does not remain open without external intervention.

Flame arresters are not required on board type N open tank vessels.

l) The ullage openings shall be such that the filling level may be measured by means of a gauging rod. The ullage openings shall be fitted with a self-closing lid.

m) Paragraph (h) does not apply to closed type N.

Paragraphs (e), (g) as regards measuring the pressure, (h) and (i) do not apply to open type N with flame arrester and to open type N.

Paragraphs (h) and (k) do not apply to open type N.

4 Electrical systems

4.1

4.1.1 In addition to the documents required by Part C, the following documents shall be submitted to Tasneef for examination:

a) a drawing indicating the boundaries of the cargo area and the location of the electrical equipment installed in this area;

b) a list of the electrical equipment referred to in (a) above including the following particulars:

machine or appliance, location, type of protection, type of protection against explosion, testing body and approval number;

c) a list of or general plan indicating the electrical equipment outside the cargo area which may be operated during loading, unloading or gas-freeing.

All other electrical equipment shall be marked in red.

4.2 Electrical installations

4.2.1 *Only distribution systems without return connection to the hull are permitted.*

This provision does not apply to:

- *local installations outside the cargo area (e.g. connect ions of starters of diesel engines);*
- *the device for checking the insulation level referred in the paragraph below;*
- *"the installation for cathodic protection.*

4.2.2 *Every insulated distribution network shall be fitted with an automatic device with a visual and audible alarm for checking the insulation level.*

4.2.3 *For the selection of electrical equipment to be used in zones presenting an explosion risk, the explosion groups and temperature classes assigned to the substances carried in the list of substances in Tab C of Chapter 3.2 of ADN shall be taken into consideration.*

4.3 Type and location of electrical equipment

4.3.1 *(1/1/2019)*

a) *Only the following equipment may be installed in cargo tanks, residual cargo tanks, and pipes for loading and unloading (comparable to zone 0):*

- *measuring, regulation and alarm devices of the EEx (ia) type of protection;*

b) Only the following equipment may be installed in coffer-dams, double hull spaces, double bottoms and hold spaces (comparable to zone 1):

- *measuring, regulation and alarm devices of the "certified safe" type;*
- *lighting appliances of the "flameproof enclosure" or "pressurised apparatus" type of protection;*
- *hermetically sealed echo sounding devices the cables of which are led through thick-walled steel*

tubes with gas-tight connections up to the main deck;

- *cables for the active cathodic protection of the shell plating in protective steel tubes such as those provided for echo sounding devices;*

The following equipment may be installed only in double hull spaces and double bottom if used for ballasting:

- *permanently fixed submerged pumps with temperature monitoring, of the certified safe type.*

c) *Only the following equipment may be installed in the service spaces in the cargo area below deck (comparable to zone 1):*

- *measuring, regulation and alarm devices of the "certified safe" type;*
- *lighting appliances of the "flameproof enclosure" or "pressurised apparatus" type of protection;*
- *motors driving essential equipmen twith temperature monitoring such as ballast pumps; they shall be of the "certified safe" type;*

d) *The control and protective equipment of the electrical apparatus referred to in paragraphs (a), (b) and (c) above shall be located outside the cargo area if it is not intrinsically safe;*

e) *The electrical equipment in the cargo area on deck (comparable to zone 1) shall be of the "certified safe" type.*

4.3.2 *Accumulators shall be located outside the cargo area.*

4.3.3 *(1/1/2019)*

a) *Electrical equipment used during loading, unloading and gas-freeing during berthing and which is located outside the cargo area shall (comparable to zone 2) be at least of the "limited explosion risk" type;*

b) *This provision does not apply to:*

1) *lighting installations in the accommodation, except for switches near entrances to accommodation;*

2) *radiotelephone installations in the accommodation or the wheelhouse;*

3) *electrical installations in the accommodation, the wheelhouse or the service spaces outside the cargo areas if:*

- *these spaces are fitted with a ventilation system ensuring an overpressure of 0,1 kPa (0,001 bar) and none of the windows is capable of being opened; the air intakes of the ventilation system shall be located as far away as possible, however, not less than 6,00 m from the cargo area and not less than 2,00 m above the deck;*
- *the spaces are fitted with a gas detection system with sensors:*
  - *at the suction inlets of the ventilation system;*
  - *directly at the top edge of the sill of the entrance doors of the accommodation and service spaces;*
- *the gas concentration measurement is continuous;*
- *when the gas concentration reaches 20% of the lower explosive limit, the ventilators are switched off. In such case and when the overpressure is not maintained or in the event of failure of the gas detection system, the electrical installations which do not comply with (a) above shall be switched off. These operations shall be performed immediately and automatically and activate the emergency lighting in the accommodation, wheelhouse and service spaces, which shall comply at least with the "limited explosion risk" type. The switching off shall be indicated in the accommodation and wheelhouse by visual and audible signals;*
- *the ventilation system, the gas detection system and the alarm of the switching off device fully comply with the requirements of (a) above;*
- *the automatic switching off device is set so that no automatic switching off may occur while the vessel is underway.*

4) *Inland AIS (automatic identification system) stations in the accommodation and in the wheelhouse if no part of an aerial for electronic apparatus is situated above the cargo area and if no part of a VHF antenna for AIS stations is situated within 2 meters from the cargo area.*

4.3.4 *The electrical equipment which does not meet the requirements set out in [4.3.3] above together with their switches shall be marked in red. The disconnection of such equipment shall be operated from a centralised location on board.*

4.3.5 *An electric generator which is permanently driven by an engine and which does not meet the requirements of paragraph [4.3.3] above shall be fitted with a switch capable of shutting down the excitation of the generator. A notice board with the operating instructions shall be displayed near the switch.*

4.3.6 *Sockets for the connection of signal lights and gangway lighting shall be permanently fitted to the vessel close to the signal mast or the gangway. Connecting and disconnecting shall not be possible except when the sockets are not live.*

4.3.7 *The failure of the power supply for the safety and control equipment shall be immediately indicated by visual and audible signals at the locations where the alarms are usually actuated.*

4.3.8 The installation of storage batteries inside dangerous areas is not allowed.

4.4 Earthing

4.4.1 *The metal parts of electrical appliances in the cargo area which are not live as well as protective metal tubes or metal sheaths of cables in normal service shall be earthed, unless they are so arranged that they are automatically earthed by bonding to the metal structure of the vessel.*

4.4.2 *The provisions of paragraph [4.4.1] above apply also to equipment having service voltages of less than 50 V.*

4.4.3 *Independent cargo tanks, metal intermediate bulk containers and tank containers shall be earthed.*

4.5 Electrical cables

4.5.1 *All cables in the cargo area shall have a metallic sheath.*

4.5.2 *Cables and sockets in the cargo area shall be protected against mechanical damage.*

4.5.3 *Movable cables are prohibited in the cargo area, except for intrinsically safe electric circuits or for the supply of signal lights, gangway lighting and submerged pumps on board oil separator vessels.*

4.5.4 *Cables of intrinsically safe circuits shall only be used for such circuits and shall be separated from other cables not intended for use in such circuits (e.g. they shall not be installed together in the same string of cables and they shall not be fixed by the same cable clamps).*

4.5.5 *For movable cables intended for signal lights, gangway lighting and submerged pumps on board oil separator vessels, only sheathed cables of type H 07 RN-F in accordance with 245 IEC 66 or cables of at least equivalent design having conductors with a cross-section of not less than 1,5 mm² shall be used.*

These cables shall be as short as possible and installed so that damage is not likely to occur.

SECTION 3 DANGEROUS LIQUEFIED GASSES

1 General

1.1 Application

1.1.1 Ships complying with the requirements of this Section may be eligible for the assignment of the additional class notation Type G assigned as stated in Part A.

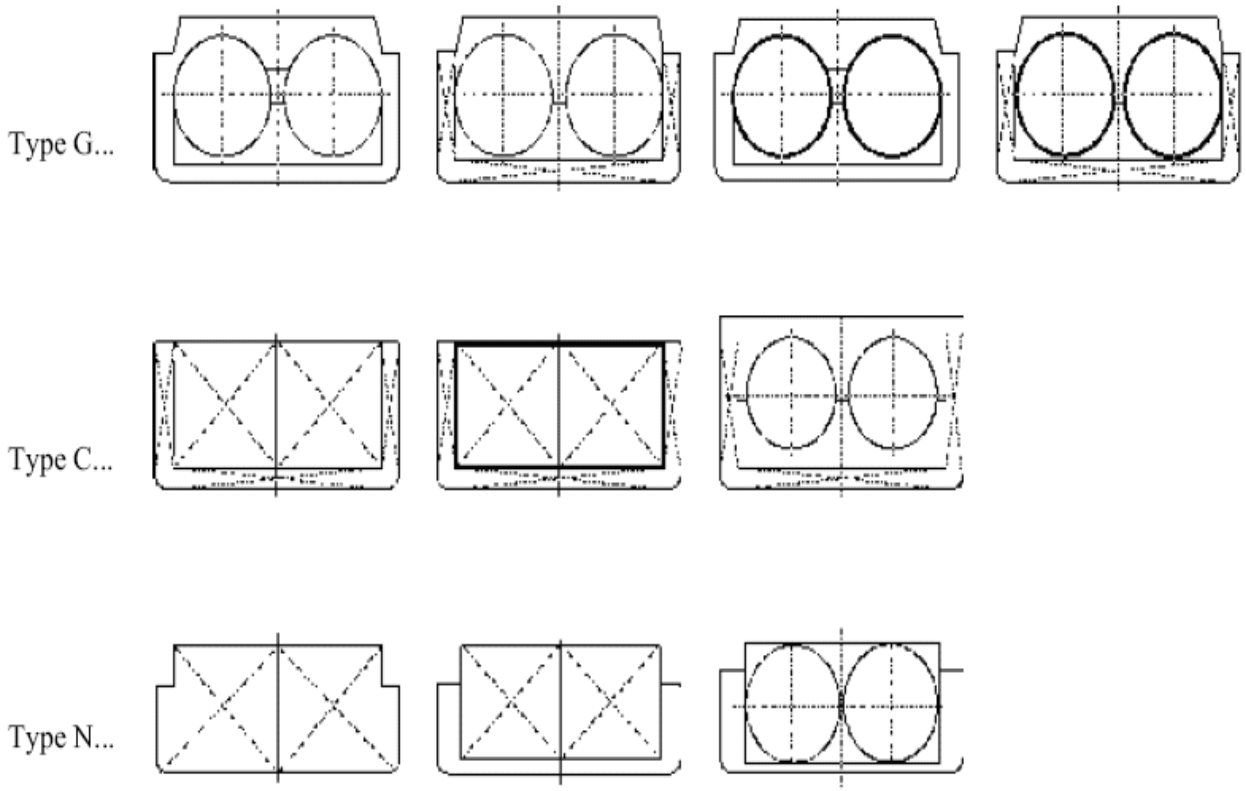
1.1.2 The requirements of this Section are to be applied in addition to those of Ch 1, Sec 13 and Ch 2, Sec 1.

1.1.3 The requirements contained in this paragraph are to be applied to tankers carrying gases under pressure.

1.1.4 Type G ...: means a tank vessel intended for the carriage of gases. Carriage may be under pressure or in the liquid state under refrigeration.

1.1.5 With reference to the hull design, three different designs may be accepted as indicated in Fig.1

Figure 1 : Schematic design for type G tankers



2 Definition

2.1

2.1.1 Design pressure

Means the pressure on the basis of which the cargo tank or the residual cargo tank has been designed and built. This pressure generally equals the maximum working pressure .In any case the design pressure is not to be less than MARVS.

2.1.2 MARVS

Means the maximum allowable relief valve setting of a cargo tank

2.1.3 Design temperature

The design temperature is the minimum temperature compatible with the hold material in order to assure the adequate characteristics for the transport of the products at the requested temperature. The relevant materials are to meet the requirements stated in Part D.

3 Specific requirements applicable to type G tankers

3.1

3.1.1 Double hull spaces

Double hull spaces and double bottoms in the cargo area shall be arranged for being filled with ballast water only. Double bottoms may, however, be used as fuel oil tanks, provided they comply with the requirements of Sec 1,[14].

3.1.2 Ventilation

a) Each hold space shall have two openings the dimensions and location of which shall be such as to permit effective ventilation of any part of the h old space. If there are no such openings, it shall be possible to fill the hold spaces with inert gas or dry air.

b) Double hull spaces and double bottoms within the cargo area which are not arranged for being filled with ballast water and cofferdams between engine rooms and pump rooms, if they exist, shall be provided with ventilation systems.

c) Any service spaces located in the cargo area below deck shall be provided with a system of forced ventilation with sufficient power for ensuring at least 20 changes of air per hour based on the volume of the space. The ventilator fan shall be designed so as that no spark may be emitted on contact of the impeller blades with the housing and no static electricity may be generated.

The ventilation exhaust ducts shall extend down to 50 mm above the bottom of the service space. The air shall be supplied through a duct at the top of the service space. The air inlets shall be located not less than 2,00 m above the deck, at a distance of not less than 2,00 m from tank openings and 6,00 m from the outlets of safety valves.

The extension pipes which may be necessary may be of the hinged type.

d) Ventilation of accommodation and service spaces shall be possible.

e) Ventilators used for gas-freeing of cargo tanks shall be designed so that no sparks may be emitted on cont act of the impeller blades with the housing and no static electricity may be generated.

f) Notice boards shall be fitted at the ventilation inlets indicating the conditions when they shall be closed. All ventilation in lets of accommodation and service spaces leading outside shall be fitted with fire flaps. Such ventilation inlets shall be located not less than 2,00 m from the cargo area.

Ventilation inlets of service spaces in the cargo area below deck may be located within such area.

3.1.3 Hold space location

The hold spaces shall be separated from the accommodation and service spaces outside the cargo area below deck by bulkheads provided with a class A-60 fire protection insulation according to SOLAS Chapter II-2, Regulation 3. A space of not less than 0,20 m shall be provided between the cargo tanks and the end bulkheads of the hold spaces. Where the cargo tanks have plane end bulkheads, this space shall be not less than 0,50 m.

3.1.4 Cargo tank design

a) Pressure tanks are to be provided with a dome.

The hold spaces and cargo tanks shall be capable of being inspected.

All spaces in the cargo area shall be capable of being ventilated. Means for checking their gas-free condition shall be provided.

b) Hold spaces and other accessible spaces within the cargo area shall be arranged so as to ensure that they may be completely inspected and cleaned in an appropriate manner.

The dimensions of openings, except for those of double hull spaces and double bottoms which do not have a wall adjoining the cargo tanks, shall be sufficient to allow a person wearing breathing apparatus to enter or leave the space without difficulty. These openings shall have a minimum cross-sectional area of 0,36 m² and a minimum side length of 0,50 m. They shall be designed so as to allow injured or unconscious personnel to be removed from the bottom of such spaces without difficulty, if necessary by means of fixed equipment.

In these spaces the distance between the reinforcements shall not be less than 0,50 m. In double bottoms this distance may be reduced to 0,45 m..

Cargo tanks may have circular openings with a diameter of not less than 0,68 m.

c) Refrigerated cargo tanks shall be installed only in hold spaces bounded by double hull spaces and double bottom.

3.1.5 Cargo tank fastenings

a) *Cargo tank fastenings shall meet the following requirements:*

- *as a single hull vessel with the side plates of the vessel between the gang board and the top of floor plates provided with side stringers at regular intervals of not more than 0,60 m which are supported by web frames spaced at intervals of not more than 2,00 m. The side stringers and the web frames shall have a height of not less than 10% of the depth, however, not less than 0,30 m.*

  The side stringers and web frames shall be fitted with a face plate made of flat steel and having a cross-section of not less that 7,5 cm² and 15 cm², respectively.

  The distance between the side plating of the vessel and the cargo tanks shall be not less than 0,80 m and between the bottom and the cargo tanks not less than 0,60 m. The depth below the suction wells may be reduced to 0,50 m.

  The lateral distance between the suction well of the cargo tanks and the bottom structure shall be not less than 0,10 m.

b) The cargo tank supports and fastenings shall be as follows:

- *the cargo tanks shall be supported by saddles extending between the tanks to not less than 10° below the horizontal centreline of the tanks; and*
- for adjacent cylindrical cargo tanks, a spacer of 500 mm x 450 mm shall be provided at the saddles, and a spacer of 2 000 mm x 450 mm shall be provided midway between the saddles.

c) The spacers shall fit the adjacent cargo tanks closely.

d) The spacers shall consist of an energy-absorbing material.

e) The cargo tanks shall be fixed so that they cannot float.

3.1.6 Pumps and Piping (1/1/2019)

a) Pumps, compressors and accessory loading and unloading piping shall be placed in the cargo area. Cargo pumps and compressors shall be capable of being shut down from the cargo area and, in addition, from a position outside the cargo area. Cargo pumps and compressors situated on deck shall be located not less than 6,00 m from entrances to, or openings of, the accommodation and service spaces outside the cargo area.

b) Pipes for loading and unloading shall be independent of an y other piping of the vessel. No cargo piping shall be located below deck, except that inside the cargo tanks and in the service spaces intended for the installation of the vessel's own gas discharging system.

c) Pipes for loading and unloading shall be clearly distinguishable from other piping, e.g. by means of colour marking.

d) The pipes for loading and unloading on deck, the venting pipes with the exception of the shore connections but including the safety valves, and the valves shall be located within the longitudinal line formed by the outer boundaries of the domes and not less than one quarter of the vessel's breadth from the outer shell. This requirement does not apply to the relief pipes situated behind the safety valves.

If there is, however, only one dome athwartships, these pipes and their valves shall be located at a distance not less than 2,70 m from the shell.

Where cargo tanks are placed side by side, all the connections to the domes shall be located on the inner side of the domes. The external connections may be located on the fore and aft centreline of the dome. The shut-off devices shall be located directly at the dome or as close as possible to it. The shut off devices of the loading and unloading piping shall be duplicated, one of the devices being constituted by a remote control quick-action stop device. When the inside diameter of a shut-off device is less than 50 mm, this device may be regarded as a safety device against bursts in the piping.

e) The shore connections shall be located not less than 6,00 m from the entrances to, or openings of, the accommodation and service spaces outside the cargo area.

f) Each shore connection of the vapour pipe and shore connections of the pipes for loading and unloading, through which the loading or unloading operation is carried out, shall be fitted with a shut-off device and a quick-action stop valve.

However, each shore connection shall be fitted with a blind flange when it is not in operation.

g) The distance referred to in a) and e) may be reduced to 3,00 m if a transverse bulkhead having a height of not less than 0,50 m is situated at the end of the cargo area.

h) The openings shall be provided with doors. The following notice shall be displayed on the doors:

DO NOT OPEN DURING LOADING AND UNLOADING WITHOUT THE PERMISSION OF THE MASTER.

CLOSE IMMEDIATELY.

i) Every component of the pipes for loading and unloading shall be electrically connected to the hull.

j) The stop valves or other shut-off devices of the pipes for loading and unloading shall indicate whether they are open or shut.

k) The pipes for loading and unloading shall have, at the test pressure, the required elasticity, leakproofness and resistance to pressure.

l) The pipes for loading and unloading shall be fitted with pressure gauges at the inlet and outlet of the vessel's own gas discharging system.

Where these pressure gauges are manometers, the indicator scale shall have a diameter of not less than 0,14 m.

Reading of the pressure gauges shall be possible from the control position of the vessel's own gas discharging system. The maximum permissible overpressure or vacuum shall be indicated by a red mark.

m) Use of the cargo piping for ballasting purposes shall not be possible.

n) Compressed air generated outside the cargo area or wheelhouse can be used in the cargo area subject to the installation of a spring-loaded non-return valve to ensure that no gases can escape from the cargo area through the compressed air system into accommodation or service spaces outside the cargo area.

3.1.7 Cargo refrigeration systems *(1/1/2019)*

a) When refrigeration is required in the list of substances in Tab C of Chapter 3.2 of ADN, the vessel shall be provided with two independent refrigeration systems:

1) The capacity of the cargo refrigeration systems shall be such that, in the event of the failure of one system, the remaining system may maintain the temperature of the cargo at such a value that gas cannot escape through safety devices;

2) If the systems are operated electrically, they shall be connected to two electric circuits which are independent of each other and which are supplied by at least two different sources of electrical power. In addition, there shall be a possibility for connection to a power source on shore; the necessary connecting cable shall be available on board;

3) Cargo tanks, piping and accessories shall be insulated so that, in the event of a failure of all cargo refrigeration systems, the entire cargo remains for at

least 52 hours in a condition not causing the safety valves to open.

This provision shall be satisfied in the following ambient temperature conditions:

air temperature: + 30 °C

water temperature:+ 20 °C;

4) The cargo refrigeration systems shall be arranged so that their function can be taken over by a third system independent of the vessel.

b) *The safety devices and the connecting lines from the refrigeration system shall be connected to the cargo tanks above the liquid phase of the cargo when the tanks are filled to their maximum permissible degree of filling. They shall remain within the gaseous phase, even if the vessel has a list up to 12 degrees.*

c) The cargo refrigeration system shall be installed in a separate service space provided with forced mechanical ventilation.

d) *For all cargo systems, the heat transmission coefficient used for the determination of the holding time shall be determined by calculation. Upon completion of the vessel, the correctness of the calculation shall be checked by means of a refrigeration test (heat balance test).*

3.1.8 Safety and control installations (1/1/2019)

a) Cargo tanks shall be provided with the following equipment:

1) a level gauge;

2) a level alarm device which is activated at the latest when a degree of filling of 86% is reached

3) a high level sensor for actuating the facility against overflowing at the latest when a degree of filling of 97,5% is reached

4) an instrument for measuring the pressure

5) an instrument for measuring the temperature of the cargo

6) a sampling device of the closed type

b) When the degree of filling in per cent is determined, an error of not more than 0,5% is permitted. It shall be calculated on the basis of the total cargo tank capacity including the expansion trunk.

c) The level gauge shall allow readings from the control position of the shut -off devices of the particular cargo tank.

d) The level alarm device shall give a visual and audible warning on board when actuated.

The level alarm device shall be independent of the level gauge.

e) The high level sensor referred to in this paragraph shall give a visual and audible alarm on board and at the same time actuate an electrical contact which in the form of a binary signal interrupts the electric current loop provided and fed by the shore facility, thus initiating measures at the shore facility against overflowing during loading operations.

The signal shall be transmitted to the shore facility via a watertight two-pin plug of a connector device in accordance with standard EN 60309-2 :1991 + A1: 2007+ A2: 2012 for direct current of 40 to 50 volts, identification colour white, position of the nose 10 h.

The plug shall be permanently fitted to the vessel close to the shore connections of the loading and unloading pipes.

The high level sensor shall also be capable of switching off the vessel's own discharging pump.

The high level sensor shall be independent of the level alarm device, but it may be connected to the level gauge.

f) The visual and audible signals given by the level alarm device shall be clearly distinguishable from those of the high level sensor.

The visual alarm shall be visible at each control position on deck of the cargo tank stop valves.

It shall be possible to easily check the functioning of the sensors and electric circuits or these shall be of the "fail-safe" design.

g) When the pressure or the temperature exceeds a set value, the instruments for measuring the pressure and the temperature of the cargo shall activate a visual and an audible alarm in the wheelhouse and in the accommodation. When the pressure exceeds a set value during loading or unloading, the instrument for measuring the pressure shall simultaneously initiate an electrical contact which, by means of the plug referred to in paragraph e) above, enables measures to be taken to interrupt the loading operation. When the vessel's own discharge pump is used, it shall be switched off automatically. The sensor for the alarms referred to above may be connected to the alarm installation. If the overpressure or the vacuum measurement is effected using a manometer, its indicator scale shall not be less than 0,14 m in diameter. The maximum permissible overpressure or vacuum values shall be indicated by a red mark. The manometers shall be capable of being read at all times from the location where it is possible to interrupt loading or unloading.

h) Where the control elements of the shut-off devices of the cargo tanks are located in a control room, reading of the level gauges shall be possible in the control room and the visual and audible warning given by the level alarm device, the high level sensor and the instruments for measuring the pressure and temperature of the cargo shall be noticeable in the control room and on deck.

Satisfactory monitoring of the cargo area shall be ensured from the control room.

i) The closed sampling device penetrating through the boundary of the cargo tank but constituting a part of a closed system shall be designed so that during sampling no gas or liquid may escape from the cargo tank. The device shall be of an approved type.

3.1.9 Safety valves

a) The highest part of the vapour space (tank dome) of pressure vessel with capacity of less than 20 m^3 is to be fitted with at least one, and pressure vessels with a capacity of more than 20 m3 two independent, spring loaded safety valves. Means be provided to prevent

accumulation of liquid cargo in the pipe upstream to the safety valves taking into account the vessel's trim and list.

b) The total discharge capacity of the safety valves shall be defined in conformity to a Tasneef recognised standard.

c) The setting of the pressure relief valves is not to be higher than the maximum pressure for which the cargo tank is designed.

d) The blow-off lines of pressure vessel safety valves may be arranged individual or with common headers. The outlets are to be arranged at least 2 meter above deck at a horizontal distance of 6 meter from accommodation or other safe space. The height may be reduced to less than 2 meter in case the area of 1 meter around the high velocity valve is designed as non accessible. The outlets to the atmosphere shall be fitted with protective wire gauze.

4 Electrical systems

4.1

4.1.1 In addition to the documents required by Part C, the following shall be submitted for examination by Tasneef

a) a drawing indicating the boundaries of the cargo area and the location of the electrical equipment installed in this area;

b) a list of the electrical equipment referred to in (a) above including the following particulars:

machine or appliance, location, type of protection, type of protection against explosion, testing body and approval number;

c) a list of or general plan indicating the electrical equipment outside the cargo area which may be operated during loading, unloading or gas-freeing.

All other electrical equipment shall be marked in red.

4.2 Electrical installations

4.2.1

a) Only distribution systems without return connection to the hull are permitted.

This provision does not apply to:

- *local installations outside the cargo area (e.g. connect ions of starters of diesel engines);*
- *the device for checking the insulation level referred to in [4.2.1.2] below.*

b) Every insulated distribution network shall be fitted with an automatic device with a visual and audible alarm for checking the insulation level.

c) For the selection of electrical equipment to be used in zones presenting an explosion risk, the explosion groups and temperature classes assigned to the substances carried in the list of substances in Tab C of Chapter 3.2 of ADN shall be taken into consideration

***4.2.2 Type and location of electrical equipment** (1/1/2019)*

a)

1) Only the following equipment may be installed in cargo tanks, residual cargo tanks, and pipes for loading and unloading (comparable to zone 0):

- *measuring, regulation and alarm devices of the EEx (ia) type of protection;*

2) Only the following equipment may be installed in he cofferdams, double hull spaces, double bottoms and hold spaces (comparable to zone 1):

- *measuring, regulation and alarm devices of the "certified safe" type;*
- *lighting appliances of the "flame-proof enclosure" or "pressurised apparatus" type of protection;*
- *hermetically sealed echo sounding devices the cables of which are led through thick-walled steel tubes with gas-tight connections up to the main deck;*
- *cables for the active cathodic protection of the shell plating in protective steel tubes such as those provided for echo sounding devices;*

3) Only the following equipment may be installed in the service spaces in the cargo area below deck (comparable to zone 1):

- *measuring, regulation and alarm devices of the "certified safe" type;*
- *lighting appliances of the "flame-proof enclosure" or "pressurised apparatus" type of protection;*
- *motors driving essential equipment with temperature monitoring such as ballast pumps; they shall be of the "certified safe" type;*

4) The control and protective equipment of the electrical apparatus referred to in paragraphs a) (1), (2) and (3) above shall be located outside the cargo area if it is not intrinsically safe;

5) The electrical equipment in the cargo area on deck (comparable to zone 1) shall be of the "certified safe" type.

The following equipment may be installed only in double hull spaces and double bottom if used for ballasting:

- *permanently fixed submerged pumps with temperature monitoring, of the certified safe type.*

b) Accumulators shall be located outside the cargo area.

c)

1) Electrical equipment used during loading, unloading and gas-freeing during berthing and which is located outside the cargo area shall (comparable to zone 2) be at least of the "limited explosion risk" type;

2) This provision does not apply to:

- *lighting installations in the accommodation, except for switches near entrances to accommodation;*
- *radiotelephone installations in the accommodation or the wheelhouse;*
- *electrical installations in the accommodation, the wheelhouse or the service spaces outside the cargo areas if:*

1. these spaces are fitted with a ventilation system ensuring an overpressure of 0,1 kPa (0,001 bar) and none of the windows is capable of being opened; the air intakes of the ventilation system shall be located as far away as possible, however, not less than 6,00 m from the cargo area and not less than 2,00 m above the deck;

2. the spaces are fitted with a gas detection system with sensors:

- *at the suction inlets of the ventilation system;*
- *directly at the top edge of the sill of the entrance doors of the accommodation and service spaces when the cargo in the gas phase is heavier than air; otherwise sensors shall be fitted close to the celing;*

3. the gas concentration measurement is continuous;

4. when the gas concentration reaches 20% of the lower explosive limit, the ventilators are switched off. In such case and when the overpressure is not maintained or in the event of failure of the gas detection system, the electrical installations which do not comply with c)(1) above shall be switched off. These operations shall be performed immediately and automatically and activate the emergency lighting in the accommodation, wheelhouse and service spaces, which shall comply at least with the "limited explosion risk" type. The switching off shall be indicated in the accommodation and wheelhouse by visual and audible signals;

5. the ventilation system, the gas detection system and the alarm of the switching off device fully comply with the requirements of c)(1) above;

6. the automatic switching off device is set so that no automatic switching off may occur while the vessel is underway.

d) The electrical equipment which does not meet the requirements set out in c) above together with their switches shall be marked in red. The disconnection of such equipment shall be operated from a centralised location on board.

e) An electric generator which is permanently driven by an engine and which does not meet the requirements of paragraph c) above shall be fitted with a switch capable of shutting down the excitation of the generator. A notice board with the operating instructions shall be displayed near the switch.

f) Sockets for the connection of signal lights and gangway lighting shall be permanently fitted to t he vessel close to the signal mast or the gangway. Connecting and disconnecting shall not be possible except when the sockets are not live.

g) The failure of the power supply for the safety and control equipment shall be immediately indicated by visual and audible signals at the locations where the alarms are usually actuated.

h) *The installation of storage batteries inside dangerous areas is not allowed*

4.3 Earthing

4.3.1 *The metal parts of electrical appliances in the cargo area which are not live as well as protective metal tubes or metal sheaths of cables in normal service shall be earthed, unless they are so arranged that they are automatically earthed by bonding to the metal structure of the vessel.*

4.3.2 *The provisions of paragraph [4.4.1] above apply also to equipment having service voltages of less than 50 V.*

4.3.3 *Independent cargo tanks, metal intermediate bulk containers and tank containers shall be earthed.*

4.4 Electrical cables

4.4.1 All cables in the cargo area shall have a metallic sheath.

4.4.2 Cables and sockets in the cargo area shall be protected against mechanical damage.

4.4.3 *(1/1/2019)*

Movable cables are prohibited in the cargo area, except for intrinsically safe electric circuits or for the supply of signal lights, gangway lighting.

4.4.4 *Cables of intrinsically safe circuits shall only be used for such circuits and shall be separated from other cables not intended for use in such circuits (e.g. they shall not be installed together in the same string of cables and they shall not be fixed by the same cable clamps).*

4.4.5 *(1/1/2019)*

For movable cables intended for signal lights, gangway lighting and submerged pumps on board oil separator vessels, only sheathed cables of type H 07 RN-F in accordance with standard IEC 60 245-4:1994 or cables of at least equivalent design having conductors with a cross-section of not less than 1,5 mm² shall be used.

These cables shall be as short as possible and installed so that damage is not likely to occur.

SECTION 4 DRY CARGOES

1 General

1.1 Application

1.1.1 Ships complying with the requirements of this Section may be eligible for the assignment of the additional class notation DG assigned as stated in Part A.

The requirements of this Section are to be applied in addition to those of Ch 1, Sec 14 and Sec 15.

2 Mode of carriage of goods

2.1

2.1.1 Carriage of packages

Unless otherwise specified, the masses given for packages shall be gross masses. Where packages are carried in containers or vehicles, the mass of the container or vehicle shall not be included in the gross mass of such packages.

2.1.2 Carriage in bulk

The carriage of dangerous goods in bulk is prohibited, except where this mode of carriage is explicitly authorised by the provisions of the ADN Regulations Annex B-1- Part II.

2.1.3 Containers and intermediate bulk containers (IBCs)

The carriage of containers, IBCs and tank containers (including multiple-element tank containers) shall be in accordance with the provisions applicable to the carriage of packages.

2.1.4 Road vehicles

The carriage of road vehicles (including battery- vehicles) shall be in accordance with the provisions applicable to the carriage of packages.

2.1.5 Carriage in cargo tanks

The carriage of dangerous goods in cargo tanks in dry cargo vessels is prohibited. Reference is to be made to the provisions for carriage in tank vessels.

3 Limitation of the quantities carried

3.1

3.1.1 The maximum admissible quantities of cargo to be carried are to be in conformity with the ADN Regulations Annex B.1.- Part I [10 401].

4 Hull design

4.1 Hull material

4.1.1 The vessel's hull shall be constructed of shipbuilding steel or other metal, provided that this metal has at least equivalent mechanical properties and resistance to the effects of temperature and fire.

5 Construction and arrangements

5.1 Holds

5.1.1 Each hold shall be bounded fore and aft by watertight metal bulkheads.

5.1.2 The holds shall have no common bulkhead with the fuel oil tanks.

5.1.3 The bottom of the holds shall be such as to permit them to be cleaned and dried.

5.1.4 The hatchway covers shall be spray-tight and weathertight or covered by waterproof tarpaulins.

5.1.5 Tarpaulins used to cover the holds shall not readily ignite.

5.1.6 No heating appliances shall be installed in the holds.

6 Ventilation

6.1

6.1.1 Ventilation of each hold shall be provided by means of two mutually independent extraction ventilators having a capacity of not less than 5 changes of air per hour based on the volume of the empty hold. The ventilator fan shall be designed so that no sparks may be emitted on contact of the impeller blades with the housing and no static electricity may be generated. The extraction ducts shall be positioned at the extreme ends of the hold and extend down to not more than 50 mm above the bottom. The extraction of gases and vapours through the duct shall also be ensured for carriage in bulk.

Ventilators are not required on vessels only carrying dangerous goods packed in containers.

If the extraction ducts are movable they shall be suitable for the ventilator assembly and capable of being firmly fixed. Protection shall be ensured against bad weather and spray. The air intake shall be ensured during ventilation.

6.1.2 The ventilation system of a hold shall be arranged so that dangerous gases cannot penetrate into the accommodation, wheelhouse or engine rooms.

6.1.3 Ventilation shall be provided for the accommodation and for service spaces.

7 Accommodation and services spaces

7.1

7.1.1 The accommodation shall be separated from the holds by metal bulkheads having no openings.

7.1.2 Gas-tight closing appliances shall be provided for openings in the accommodation and wheelhouse facing the holds.

7.1.3 No entrances or openings of the engine rooms and service spaces shall face the protected area.

8 Water ballast

8.1

8.1.1 The double -hull spaces and double bottoms may be arranged for being filled with water.

9 Engines

9.1

9.1.1 *Only internal combustion engines running on fuel having a flashpoint above 55°C are allowed.*

9.1.2 The air vents in the engine rooms and the air intakes of the engines which do not take air in directly from the engine room shall be located not less than 2,00 m from the protected area.

9.1.3 Sparking shall not be possible in the protected area.

10 Fuel oil tanks

10.1

10.1.1 Double bottoms within the cargo area may be arranged as fuel oil tanks, provided their depth is not less than 0,60 m.

Fuel oil pipes and openings of such tanks are not permitted in the hold space.

10.1.2 The air pipes of all fuel oil tanks shall extend to 0,5 m above the open deck. Their open ends and the open ends of overflow pipes leading onto the deck shall be fitted with a protective device consisting of a gauze diaphragm or a perforated plate.

11 Exhaust pipes

11.1

11.1.1 *Exhausts shall be evacuated from the vessel into the open air either upwards through an exhaust pipe or through the shell plating. The exhaust outlet shall be located not less than 2,00 m from the cargo area. The exhaust pipes of engines shall be arranged so that the exhausts are led away from t he vessel. The exhaust pipes shall not be located within the cargo area.*

11.1.2 *Exhaust pipes shall be provided with a device preventing the escape of sparks, e.g. spark arresters.*

12 Stripping system

12.1

12.1.1 *The stripping pumps intended for the holds shall be located in the protected area. This requirement shall not apply when stripping is effected by eductors.*

13 Fixed fire-extinguishing system

13.1

13.1.1 The requirements contained in this paragraph are to be applied when Tasneef is involved in Fire protection survey.

13.1.2 *(1/1/2019)*

A fire-extinguishing system shall be installed on the vessel. This system shall comply with the following requirements:

- *it shall be supplied by two independent fire or ballast pumps one of which shall be ready for use at any time. These pumps shall not be installed in the same space;*
- *it shall be provided with a water main fitted with at least three hydrants in the protected area above deck. Three suitable and sufficiently long hoses with spray nozzles having a diameter of not less than 12 mm shall be provided. It shall be possible to reach any point of the deck in t he protected area simultaneously with at least two jets of water which do not emanate from the same hydrant. A spring loaded non-return valve shall be fitted to ensure that no gases can escape through the fire-extinguishing system into the accommodation or service spaces outside the cargo area or wheelhouse;*
- *the capacity of the system shall be at least sufficient for a jet of water to reach a distance of not less than the vessel's breadth from any location on board with two spray nozzles being used at the same time.*

A single fire or ballast pump shall suffice on board pushed barges without their own means of propulsion.

13.1.3 The engine rooms shall be provided with a fixed fire-extinguishing system which can be operated from the deck.

13.1.4 The two hand fire extinguishers shall be located in the protected area.

14 Fire and naked light

14.1

14.1.1 *The outlets of funnels shall be located not less than 2 m from the hatchway openings.*

Arrangements shall be provided to prevent the escape of sparks and the entry of water.

14.1.2 *Heating, cooking and refrigerating appliances shall not be fuelled with liquid fuels, liquid gas or solid fuels. The installation in the engine room or other separate space of heating appliances fuelled with liquid fuel having a flash-point above 55°C is permitted, however cooking and refrigerating appliances are permitted only in wheelhouses with a metal floor and in the accommodation.*

14.1.3 *Electric lighting appliances only are permitted outside the accommodation and the wheelhouse on in itsvicinity.*

15 Type and location of electrical equipment

15.1

15.1.1 *It shall be possible to isolate the electrical equipment in the protected area by means of centrally located switches except where:*

- *the equipment in the holds is of a certified safe type corresponding at least to temperature class T4 and explosion group II B; and*
- *the equipment in the protected area is of the limited explosion risk type.*

The corresponding electrical circuits shall have control lamps to indicate whet her or not the circuits are live.

The switches shall be protected against unintended or unauthorised operation. The sockets used in this area shall be so designed as to prevent connections being made except when they are not live.

15.1.2 *Electric motors for hold ventilators which are arranged in the air flow shall be of the "certified safe" type.*

15.1.3 *Sockets for the connection of signal lights, gangway lighting and containers shall be fitted to the vessel close to the signal mast or the gangway or the containers. Sockets intended to supply the submerged pumps and hold ventilators shall be permanently fitted to the vessel in the vicinity of the hatches.*

16 Electrical cables

16.1

16.1.1 *Cables and sockets in the protected area shall be protected against mechanical damage.*

16.1.2 *Movable cables are prohibited in the protected area, except for intrinsically safe electric circuits or for the supply of signal lights and gangway lighting, for containers, for submerged pumps, for hold ventilators and for electrically operated cover gantries.*

16.1.3 *For movable cable s permitted in accordance with [16.1.2] above, only rubber-sheathed cables of type H07 RN-F in accordance with 245 IEC 66 or cables of at least equivalent design having conductors with a cross-section of not less than 1.5 mm^2, shall be used. These cables shall be as short as possible and installed so that accidental damage is not likely to occur.*

17 Metal wires, masts

17.1

17.1.1 *All metal wires passing over the holds and all masts shall be earthed, unless they are electrically bonded to the metal hull of the vessel through their installation.*

18 Additional requirements applicable to double hull vessels

18.1 Holds

18.1.1 *The vessel shall be built as a double hull vessel with double hull spaces and double bottom within the protected area.*

18.1.2 *The distance between the sides of the vessel and the longitudinal bulkheads of the hold shall be not less than 0,80 m. Regardless of the requirements relating to the width of walkways on deck, a reduction of this distance to 0,60 m is permitted provided that, the following reinforcements have been made:*

a) *Where the vessel's sides are constructed according to the longitudinal framing system, the frame spacing shall not exceed 0,60 m.The longitudinal shall be supported by web frames with lightening holes similar to the floors in the double bottom and spaced not more than 1,80 m apart.* The section modulus and the web height of the web frames have to be not lower than the section modulus and the web height of the double bottom floors.

b) *Where the vessel's sides are constructed according to the transverse framing system, either:*

   1) *two longitudinal side shell stringers shall be fitted. The distance between the two stringers and between the uppermost stringer and the gang board shall not exceed 0,80 m. The depth of the stringers shall be at least equal to that of the transverse frames and the cross-section of the face plate shall be not less than 15 cm^2.*

      The longitudinal stringers shall be supported by web frames with lightening holes similar to plate floors in the double bottom and spaced not more than 3,60 m apart. The section modulus and the web height of the web frames have to be not lower than the section modulus and the web height of the double bottom floors.

The transverse shell frames and the hold bulkhead vertical stiffeners shall be connected at the bilge by a bracket plate with a height of not less than 0,90 m and thickness equal to the thickness of the floors;

or

2) *web frames with lightening holes similar to the double bottom plate floors shall be arranged on each transverse frame.*

The section modulus and the web height of the web frames have to be not lower than the section modulus and the web height of the double bottom floors.

The depth of the double bottom shall be not less than 0,50 m. The depth below a suction well may, however, be locally reduced to 0,40 m, provided that the suction well has a capacity of not more than 0,03 m^3.

c) *the gang boards shall be supported by transverse bulkheads or cross-ties spaced not more than 32 m apart.*

18.1.3 *Emergency exit*

Spaces the entrances or exits of which are partly or fully immersed in damaged condition shall be provided with an emergency exit not less than 0,10 m above the waterline. This does not apply to fore peak and after peak.