ACS (Asia Classification Society)

Rules for

Classification of Vessels

(2014)

Part 1

Classification and Surveys

Rules for Classification of Vessels

Contents

Part 1 Classification and Surveys

Chapter 1 Scope and Conditions of Classification

Introduction Notices and General Information

1 Asia Classification Society

1.1 Asia Classification Society (hereinafter referred to as "ACS") was incorporated in 2005 as a private corporation registered in Kish Free Zone, for: non-profit making statutory service and certifications; faithful and accurate classification of mercantile vessels, design approval, survey and issuing reports on mercantile and non mercantile vessels, hovercrafts, hydrofoils etc; all within the scope of the classification described in the Rules.

This Section contains General Regulations which have been adopted by ACS for its governance.

1.2 The management of the affairs of ACS are carried out under the direction and control of the Board of the Directors (hereinafter referred to as the 'Board'), in accordance with the provisions of its Memorandum and Articles of Association.

1.3 The Board of the Directors shall consist of representatives of the interests of various members of the company and those concerned with classification in general as under:

- One Director representing IBS (Iransafineh Bureau of Shipping)
- One Director representing IGS (Iran Group of Surveyors)
- One Director representing PMO (Ports and Maritime Organization) pension funds

1.3.1 The composition of the Board as above is to be in accordance with the articles of association of ACS (as may be amended from time to time)

1.4 The Board shall elect one of its members to be Chairman of the Board.

1.5 The employees of ACS are to be appointed by managing director.

2 Technical committee

2.1 The Board is to appoint a Technical Committee whose function will be to consider:

a) Important technical issues concerning survey and certification of new buildings and ships in service, development of checklists and procedures

b) Formulation of Technical Rules for Classification Surveys, building of ships, their machinery and equipment.

c) Important alterations of Rules once framed as may be required from time to time.

2.2 All decisions of the Technical Committee including amendments and/ or additions to the Rules and procedures for classification surveys and building of ships' hull, their machinery and equipment to be reported to the Board.

2.3 The Technical Committee to be constituted of members of ACS including Managing Director, Deputy Director, Advisor to Managing Director, Marine Manager, Plan Control

and Technical Division Manager, Classification Division Manager, Industrial and Conformity Assessment Division Manager and Training Department Manager.

2.4 In addition to the foregoing, the Technical committee may co-opt to the main body, other members of high managerial positions in Ship Building and Engineering, Naval Architecture, Marine Insurance, Steel Making, etc. as appointed by the Managing Director, i.e. the full authorized representative of PMO, NITC, IRISL, ISOICO, IOEC, SADRA Ship Building Industries, Defense Marine Industrial Division and Iran National Ship Owners Association.

2.5 Nomination of all members to the Technical Committee to be subjected to confirmation by the MD.

2.6 The Technical Committee can appoint panels from amongst its body to which representatives of any organization or industry or individuals specialized in relevant disciplines could be co-opted for the purpose of considering any particular Technical problem or area of Rules.

2.7 The Managing Director is the Chairman of the Technical Committee.

2.8 The members desiring to propose alterations in, or additions to the Rules for the classification, survey or building of ship (hull and machinery) shall give notice of such proposals to the Secretary. Every such meeting to be convened by notice from the Secretary, if possible one month before the date of the meeting and the Secretary to send to each member an Agenda paper as soon as possible thereafter.

2.9 The Board reserves to themselves the right of altering, adding to or rescinding any/ or all of the above terms of reference including the dissolution of the Technical Committee.

3 Survey Report

3.1 All reports of survey are to be made by the Surveyors according to the from prescribed and submitted for consideration of the Board or the Sub-Committee of Classification, but the character assigned by the latter is to be reported to the Board. The Board may, in specified instances, vest in the Managing Director discretionary power to act on its behalf, and all such actions being reported to the Board at its subsequent meeting.

3.2 The reports of the Surveyors shall, subject to the approval of the Managing Director, be open to inspection of the Owner and any other person authorized in writing by the Owner. Copies of the reports will, subject to the approval of the Managing Director, be supplied to Owners or their representatives.

4 Register of Ships

4.1 A Register of Ships to be prepared annually for the use of subscribers containing the names of ships, character of class notations assigned together with other relevant useful information for ships classed with ACS or registered in Iran.

5 Access of Surveyors to Ships, Shipyards or Works

5.1 The Surveyors are to be given free access to ships classed with ACS as well to shipyards, works, etc. so as to perform their duties, and are to receive adequate assistance for this purpose.

6 Requirements for service suppliers

6.1 Firms providing following services on behalf of the owner, the result of which are used by Surveyors in making decision affecting classification and/ or affecting statutory certification, are to be approved by ACS in accordance with the laid down procedures.

a) Class Services

- Firms engaged in thickness measurements on ship
- Firms engaged in tightness testing of hatches with ultrasonic equipment
- Firms carrying out in-water survey of ships and mobile offshore units.
- Firms engaged in Non-Destructive Testing

b) Statutory Services (Non profit making)

- Firms engaged in surveys and maintenance of fire extinguishing equipment and systems
- Firms engaged in service on inflatable life rafts, inflatable lifejackets, hydrostatic release units, etc.
- irms engaged in the servicing and testing of radio communication equipment
- Firms engaged in surveys and maintenance of self contained breathing apparatus.
- Firms engaged in calculation, certification and approval of equipments for NOx emission measurement

6.2 For statutory services, approvals done by the Flag Administration itself or duly authorized organizations acting on behalf of the Flag Administration or by other organization that are acceptable to the Flag Administration (e.g. other governments, etc.) may be accepted.

7 Responding to Port State Control

7.1 When requested by Port State and upon concurrence by the vessel's owner/ master ACS Surveyors would attend onboard a vessel in order to assist in the rectification of reported deficiencies or other discrepancies that affect or may affect classification or the statutory certificates issued by ACS. The owner and the vessel's flag state will be notified of such attendance and survey. ACS Surveyors will also cooperate with Port state by providing inspectors with background information.

8 Definitions

Builder: Signifies the party contracted to build a vessel in compliance with the Society’s rules.

Certificate: A document confirming compliance with the Society's rules or with other rules and regulations for which the Society has been authorized to act.

Certification: A service confirming compliance with applicable requirements on the date that the survey was completed.

Class: Class is assigned to and will be retained by vessels complying with applicable requirements of the Society's rules.

Classification: A service which comprises the development of independent technical standards for vessels - the rules, and to verify compliance with the rules throughout the vessels' life.

Condition of Class (CC): Constitutes a requirement that specific measures, repairs or surveys shall be carried out within a specific time limit in order to retain class.

Convention vessel: A vessel which due to its tonnage, usage or dimensions would, if trading in international waters or on international voyages, fall within the requirements of any, or any part, of the IMO Conventions.

Customer: Signifies the party who has requested the Society's service.

Designer: Signifies a party who creates documentation submitted to the Society for approval or information.

Flag administration: The maritime administration of a vessel's country of registry.

Guidance notes: Contain advice which is not mandatory for the assignment or retention of class, but with which the Society, in light of general experience, advises compliance.

IACS: The International Association of Classification Societies.

IMO: Signifies the International Maritime Organization.

ISO: Signifies the International Organization for Standardization.

Lay-up: A terminology used for vessels that are out of commission. In this state the vessel may be at anchorage or permanently moored in a safe harbour.

Manufacturer: Signifies the entity that manufactures the material or product, or carries out part production that determines the quality of the material or product, or does the final assembly of the product.

Non-convention vessel: A vessel other than a convention vessel.

Owner: Signifies the registered owner or manager of the vessel or any other organization or person who has assumed the responsibility for operation of the vessel and who on assuming such responsibility has agreed to take over all the duties and responsibilities.

Plan approval: Signifies a systematic and independent examination of drawings, design documents or records in order to verify compliance with the rules or statutory requirements. Plan approval will be carried out at the discretion of the Society, which also decides the extent and method of examination.

Port state authority: The maritime authority in the country of the vessel's port of call.

Quality system: Signifies both the quality management system and established production and control procedures.

Reliability: The ability of a component or a system to perform its required function under given conditions for a given time interval.

Retroactive Requirement (RR): Constitutes a class or statutory requirement that will enter into force for certain ships in operation and under construction at a given date or an upcoming survey.

Review: Signifies a systematic examination of drawings, design documents or records in order to evaluate their ability to meet requirements, to identify any problems and to propose necessary actions.

Rules: All requirements adopted as the basis for classification.

Statement of compliance: A document confirming compliance with specified requirements. Such documents may be issued by the Society in cases where it has not been authorized to certify compliance.

Survey: Signifies a systematic and independent examination of a vessel, materials, components or systems in order to verify compliance with the rules and/or statutory requirements. Surveys will be carried out on the vessel, at the construction or repair site as well as at sub-suppliers and other locations at the discretion of the Society, which also decides the extent and method of control.

Suspension of Class: Temporary discontinuance of class.

Verification: A service that signifies a confirmation through the provision of objective evidence (analysis, observation, measurement, test, records or other evidence) that specified requirements have been met.

Vessel: In the context of the rules mean either:

- a ship
- a craft, e.g. high speed, light craft
- a barge, e.g. a vessel without sufficient means of self propulsion for their service area
- a vessel, e.g. naval support vessel, or
- a unit, e.g. Mobile Offshore Unit (MOU).

Withdrawal of Class: Permanent discontinuance of class.

Witnessing: Signifies attending tests or measurements where the surveyor verifies compliance with agreed test or measurement procedures.

Section 1 Classification

1 Process

The Classification process consists of

a) The development of Rules, Guides, standards and other criteria for the design and construction of marine vessels and structures, for materials, equipment and machinery,

b) The review of design and survey during and after construction to verify compliance with such Rules, Guides, standards or other criteria,

c) The assignment and registration of class when such compliance has been verified, and

d) The issuance of a renewable Classification certificate with annual endorsements valid for five years.

1.1 The Rules and standards are developed by ACS staff and passed upon by committees made up of naval architects, marine engineers, shipbuilders, engine builders, steel makers and by other technical, operating and scientific personnel associated with the worldwide maritime industry.

1.2 The Rules are framed on the understanding that ships will be properly loaded and handled; they do not, unless stated in the class notation, provided for special distributions or concentrations of loading and that ships will not be operated in environmental conditions more severe than those agreed for design basis and approval.

1.3 Surveyors apply normally accepted examination and testing standards to those items specified for each survey by the Rules; construction procedures, safety procedures and construction supervision remain the responsibility of the shipyard, ship repairer, manufacturer, owner or other client. Classification covers ship's hull, appendages and machinery including electrical systems to the extent as specified these Rules and Regulations.

1.4 Compliance with International Conventions and Codes such as the followings, as applicable, is a prerequisite of classification:

- International Convention for the Safety of Life at Sea (SOLAS),
- International Convention for the Prevention of Pollution from Ships (MARPOL),
- International Convention on Load lines (ILLC),
- International Convention on Tonnage Measurement of Ships (TONNAGE),
- International Regulations for Preventing Collisions at Sea (COLREGS),
- International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk.
- International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk.
- Maritime Labour Convention (MLC)
- Related International codes and Resolution of the IMO Assembly, the Maritime Safety Committee (MSC) and the Marine Environment Protection Committee (MEPC) of IMO.

2 Certificates and Reports

2.1 Plan review, and surveys during and after construction are conducted by the main office to verify to itself and its committees that a vessels, structure, item of material, equipment or machinery is in compliance with the Rules, standards or other criteria of the ACS and to the satisfaction of the attending Surveyor. All reports and certificates are issued solely for the use of the main office, its committees, its clients and other authorized entities.

2.2 Certificates of Class will be issued to Builders or Owners when the required reports on completion of Special Surveys of new ships or of existing ships submitted for classification have been received from the Surveyors and approved by ACS.

2.3 Certificates of class maintenance in respect of completed periodical special surveys of hull and machinery will also be issued to Owners.

2.4 The Surveyors are permitted to issue Interim Certificates to enable a ship, classed with ACS, to proceed on her voyage provided that, in their opinion, she is in a fit and efficient condition. Such Certificates will contain Surveyors' recommendations for continuance of Class, but in all cases are subject to confirmation by ACS.

2.5 Individual Certificates can also be issued for propelling machinery, boilers, equipments and fittings which have been manufactured under ACS Survey and in accordance with these Regulations.

3 Representations as to Classification

3.1 Classification is a representation by the ACS as to the structural and mechanical fitness for a particular use or service in accordance with its Rules and standards. The Rules of the ASIA Classification Society are not meant as a substitute for the independent judgment of professional designers, naval architects, marine engineers, owners, operators, masters and crew, nor as a substitute for the quality control procedures of shipbuilders, engine builders, steel makers, suppliers, manufacturers and sellers of marine vessels, materials, machinery or equipment. The ACS, being a technical society, can only act through Surveyors or others who are believed by it to be skilled and competent.

The ACS represents solely to the vessel Owner or other client of the ACS that when assigning class it will use due diligence in the development of Rules, Guides and standards, and in using normally applied testing standards, procedures and techniques as called for by the Rules, Guides, standards or other criteria of the ACS for the purpose of assigning and maintaining class. The ACS further represents to the vessel Owner or other client of the ACS that its certificates and reports evidence compliance only with one or more of the Rules, Guides, standards or other criteria of the ACS in accordance with the terms of such certificate or report. Under no circumstances whatsoever are these representations to be deemed to relate to any third party.

The user of this document is responsible for ensuring compliance with all applicable laws, regulations and other governmental directives and orders related to a vessel, its machinery and equipment, or their operation. Nothing contained in any Rule, Guide, standard, certificate or report issued by the ACS shall be deemed to relieve any other entity of its duty or responsibility to comply with all applicable laws, including those related to the environment.

3.2 When a ship is assigned a specific Character of Class by ACS, it implies that ACS has been satisfied that the said ship meets, for this particular class, with these Rules and Regulations ACS so long as she is found, upon examination at the prescribed annual and periodical surveys, to be maintained in a fit and efficient condition and in accordance with the Periodical Survey requirements of these Rules. Classification will be conditional upon compliance with ACS requirements for both hull and machinery.

4 Scope of Classification

Nothing contained in any certificate or report is to be deemed to relive any designer, builder, Owner, manufacturer, seller, supplier, repairer, operator, insurer or other entity or person of any duty to inspect or any other duty or warranty express or implied. Any certificate or report evidences only that at the time of survey the vessel, structure, item of material, equipment or machinery or any other item covered by a certificate or report complied with one or more of the Rules, Guides, standards or other criteria of the ACS and is issued solely for the use of the ACS, its committees, its clients or other authorized entities. Nothing contained in any certificate, report, plan or document review or approval is to be deemed to be in any way a representation or statement beyond those contained. The ACS is an insurer or guarantor of the integrity or safety of a vessel or of any of its equipment or machinery. The validity, applicability and interpretation of any certificate, report, plan or document review or approval are governed by the Rules and standards of the ACS who shall remain the sole judge thereof. The ACS is not responsible for the consequences from the use by other parties of the Rules, Guides, standards or other criteria of the ACS, without review, plan approval and survey by the ACS.

The term "approved" shall be interpreted to mean that the plans, reports or documents have been reviewed for compliance with one or more of the Rules, Guides. standards, or other criteria acceptable to the ACS.

The Rules are published with the understanding that responsibility for stability and trim, for reasonable handling and loading, as well as for avoidance of distributions of weight which are likely to set up abnormally severe stresses in vessels does not rest upon the Committee.

5 Classification of Ships not Built under the Survey of Asia Classification Society

5.1 General

5.1.1 When an Owner applies to the Society for a ship already in service to be admitted to class, the application will be processed differently depending on whether the ship is:

- classed with an IACS Society, or
- built under an IACS Society but presently not with an IACS Society.
- not classed with an IACS Society.

5.2 Ships classed with an IACS Society

5.2.1 In this case, ships will be admitted to the Society’s class upon satisfactory surveys and verification of documentation.

For the extent and scope of the surveys to be carried out and the list of documentation to be submitted by the Interested Party, reference is to be made to 5.2.2 and 5.2.3.

Note 1: For transfer of class at ship's delivery, specific procedures apply.

5.2.2 Surveys

Surveys to be carried out are based on the age of the ship and the updated current class status as provided by the previous IACS Member Society. The extent of these surveys is to be at least the following.

a) Surveys of hull, ships without notation ESP:

- for ships of age less than 5 years, the survey is to have the scope of an annual survey
- for ships which are 5 years of age and above but less than 10 years of age, in addition, the survey is to include the inspection of a representative number of ballast spaces
- for ships which are 10 years of age and above but less than 20 years of age, in addition, the survey is to include the inspection of a representative number of cargo holds and/or cargo tanks, as applicable
- for ships which are 20 years of age and above, a class renewal survey is to be carried out (this requirement is also applicable to ships having their hull under continuous survey)
- in the latter case, if a bottom survey in dry condition is not due at the time of transfer, consideration can be given to carrying out a bottom in-water survey in lieu of bottom survey in dry condition.

b) Surveys of hull, ships with notation ESP:

- for ships of age less than 5 years, the survey is to have the scope of an annual survey
- for ships between 5 and 10 years of age, in addition, the survey is to include the inspection of a representative number of ballast spaces
- for ships which are 10 years of age and above but less than 15 years of age, in addition, the survey is to include the inspection of a representative number of cargo holds and/or cargo tanks, as applicable
- for ships which are 15 years of age and above, but less than 20 years of age, the survey is to have the scope of a class renewal survey or of an intermediate survey, whichever is due next
- for ships which are 20 years of age and above, the survey is to have the scope of a class renewal survey
- in the two latter cases, if a bottom survey in dry condition is not due at the time of transfer, consideration can be given to carrying out a bottom in-water survey in lieu of bottom survey in dry condition.

c) Survey of machinery. A general examination of all essential machinery is to be held including at least the following:

- Examination under working condition of oil fuel burning equipment, boilers, economizers and steam/steam generators. The adjustment of safety valves of this equipment is to be verified by checking the records on board ship
- All pressure vessels are to be examined
- Insulation resistance, generator circuit breakers, preference tripping relays and generator prime mover governors are to be tested and paralleling and load sharing to be proved
- In all cases, navigating lights and indicators are to be examined and their working and alternative sources of power verified
- Bilge pumps, emergency fire pumps and remote controls for oil valves, oil fuel pumps, lubricating oil pumps and forced draught fans are to be examined under working condition
- Recirculating and ice clearing arrangements, if any
- The main and all auxiliary machinery necessary for operation of the ship at sea together with essential controls and steering gear is to be tested under working conditions. Alternative means of steering are to be tested
- A short sea trial is to be held, at the Surveyor's discretion, if the ship has been laid up for a long period
- Initial start arrangements are to be verified
- In the case of oil tankers, the cargo oil system and electrical installations in way of hazardous spaces are to be checked for compliance with rule requirements.

Where intrinsically safe equipment is installed, the Surveyors are to satisfy themselves that such equipment has been approved by a recognized authority. The safety devices, alarms and essential instruments of the inert gas system are to be verified and the plant generally examined to ensure that it does not constitute a hazard to the ship.

5.2.3 Documentation

As a rule, the documentation to be supplied is the following.

a) Main plans:

- General arrangement
- Capacity plan
- Hydrostatic curves
- Loading manual, where required
- Stability documents, if applicable.

b) Hull structure plans:

- Midship section
- Scantling plan

- Profile and Deck plans
- Shell expansion
- Watertight bulkheads
- Rudder and rudder stock
- Hatch covers.

c) Machinery plans:

- Machinery arrangement
- Intermediate, thrust and screw shafts
- Propeller
- Main engines, propulsion gears and clutch systems (or Manufacturer's make, model and rating information)
- For steam turbine ships, main boilers, superheaters and economisers (or Manufacturer's make, model and rating information) and steam piping
- Diagram of fuel, bilge, ballast, lubricating oil, cooling, ballast, steam and starting compressed air piping systems
- Drawings of boilers and air receivers
- Steering gear system piping and arrangements
- Torsion vibration calculations, for ships less than two years old
- Plans for flexible couplings and/or torque limiting shafting devices in the propulsion line shafting (or Manufacturer's make, model and rating information), for ships assigned with one of the ice class additional class notations
- Pumping arrangements at the forward and after ends, drainage of cofferdams and pump rooms and general arrangements of cargo piping in tanks and on decks, for oil tankers.

d) Electric installation plans:

- Master plan of power distribution, lighting and emergency power circuits
- Single line diagram of networks and switchboards
- Location and arrangement of electrical equipment in hazardous areas.

e) Plans required for ships assigned one of the additional class notations for Automated Machinery Systems:

- Instrument list
- Fire alarm system
- Plans for systematic maintenance and functioning tests.

Documents concerning exemptions issued by the previous flag / administration should be submitted for review and verification of compliance with the requirements of the new flag.

Alternative technical data may be accepted by the Society in lieu of specific items of the listed documentation not available at the time of the transfer of class.

For installations or equipment covered by additional service and/or class notations, the Society will determine the documentation to be submitted.

In addition, the Society may base its judgment upon documentation such as certificates issued or accepted by the former Classification Society, if any, and statutory certificates issued by the flag Administration or by a recognized organization on its behalf; moreover, other documents and/or plans may be specifically required to be supplied to the Society in individual cases.

5.2.4 For ships of less than 100 gross tonnage, special consideration will be given to the scope of surveys and documentation to be supplied.

5.3 Ships built under an IACS Society but presently not with an IACS Society.

5.3.1 In this case, the class of the ship will be assigned upon a verification of the documentation listed in 5.2.3 and subsequent satisfactory completion of the surveys, the extent and scope of which are given below.

5.3.2 Surveys

The extent and scope of the admission to class survey are to be not less than those required at the class renewal survey of a ship of the same age and type; in addition all other periodical surveys should be performed together with those inspections which are linked to specific service notations and/or additional class notations and/or special installations the ship is provided with.

5.3.3 Special consideration will be given to ships of recent construction.

5.4 Ships not classed with an IACS Society.

5.4.1 In this case, the class of the ship will be assigned upon a preliminary review of the documentation listed in 5.2.3 and subsequent satisfactory completion of the surveys, the extent and scope of which are given in 5.3.2.

5.4.2 Special consideration will be given to ships of recent construction.

6 Classification of new constructions

6.1 The request for classification of new constructions is to be submitted to ACS by the shipyard or shipowner in the form provided by ACS. The request is to include complete details regarding class notation and statutory certificates required, where applicable.

6.2 Where orders for major machinery and equipment are placed on manufacturer or suppliers, ACS will have to be informed. Responsibility for compliance with ACS Rules and Regulations shall be with the manufactures/ suppliers.

6.3 plans and particulars as specified in the Rules will have to be submitted to ACS in triplicate sufficiently in advance of commencement of construction. One copy with stamp of approval

will be returned. Any deviation from approved drawings will require to be approved by ACS prior to execution of work.

ACS reserves the right to request for additional plans, information or particulars to be submitted.

Approval of plans and calculations by ACS does not relieve the Builders of their responsibility for the design, construction and installation of the various parts, nor does it absolve the Builders from their duty of carrying out any alterations to the various parts on board deemed necessary by ACS during construction or installation on board or trials.

6.4 ACS will assess the production facilities and procedures of the shipyard and other manufacturers as to whether they meet the requirements of the construction Rules.

6.5 During construction of a vessel, ACS will ensure by surveys that parts of hull and machinery requiring approval have been constructed in compliance with approved drawings, all required tests and trials are performed satisfactorily, workmanship is in compliance with current engineering practices and welded parts are produced by qualified welders.

6.6 All hull, machinery and electrical installations will be subjected to operational trials in the presence of ACS Surveyor.

6.7 On completion of the ship copies of as fitted plans showing the ship as built, essential certificates and records, loading manual etc. are to be submitted by the Builder generally prior to issuance of the interim Certificate of Class.

Section 2 Suspension and Cancellation of Classification

1 General

The continuance of the Classification of any vessel is conditional upon the Rule requirements for periodical, damage and other surveys being duly carried out. The Committee reserves the right to reconsider, withhold, suspend, or cancel the class of any vessel or any part of the machinery for noncompliance with the Rules, for defects or damages which are not reported to ACS, for defects reported by the Surveyors which have not been rectified in accordance with recommendations, or for nonpayment of fees which are due on account of Classification, Statutory or Cargo Gear Surveys. Suspension or cancellation of class may take effect immediately or after a specified period of time.

1.1 ACS reserves the right to perform unscheduled surveys of the hull, equipment or machinery when ACS has reasonable cause to believe that the Rule requirements for periodical, damage and other surveys are not being complied with.

1.2 Failure to permit the unscheduled surveys referred above shall result in the suspension or cancellation of class.

2 Notice of Surveys

It is the responsibility of the Owner to ensure that all surveys necessary for the maintenance of class are carried out at the proper time. The ACS will notify the Owner of upcoming surveys and outstanding recommendations. This may be done by means of a letter, a quarterly vessel status or other communication. The non-receipt of such notice, however, does not absolve the Owner from his responsibility to comply with survey requirements for maintenance of class.

3 Special Notations

If the survey requirements related to maintenance of special notations are not carried out as required, the suspension or cancellation may be limited to those special notations only.

4 Suspension of Class

4.1 Suspension of classification is a withdrawal of all representations by the ACS as to a vessel or structure.

4.2 Class will be suspended and the Certificate of Classification will become invalid from the date of any use, operation, loading condition or other application of any vessel for which it has not been approved and which affects or may affect classification or the structural integrity, quality or fitness for a particular use or service.

4.3 Class will be suspended and the Certificate of Classification will become invalid in any of the following circumstances:

i. If recommendations issued by the Surveyor are not carried out by their due dates and no extension has been granted,

ii. If Continuous Survey items which are due or overdue at the time of Annual Survey are not completed and no extension has been granted,

iii. If the other surveys required for maintenance of class, other than Annual, Intermediate

or Special Periodical Surveys, are not carried out by the due date and no Rule allowed extension has been granted, or

iv. If any damage, failure, deterioration or repair has not been completed as recommended.

4.4 Classification may be suspended, in which case the Certificate of Classification will become invalid, upon failure to submit any damage, failure, deterioration or repairs for examination upon the first opportunity or, if proposed repairs, as referred by ACS Rules for Survey After Construction, have not been submitted to the ACS and agreed upon prior to commencement.

4.5 Class is automatically suspended and the Certificate of Classification is invalid in any of the following circumstances:

i) If the Annual Survey is not completed by the date which is three (3) months after the due date, unless the vessel is under attendance for completion of the Annual Survey, or

ii) If the Intermediate Survey is not completed by the date which is three (3) months after the due date of the third Annual Survey of the five (5) year periodic survey cycle, unless the vessel is under attendance for completion of the Intermediate Survey, or

iii) If the Special Periodical Survey is not completed by the due date, unless the vessel is under attendance for completion prior to resuming trading.

Under "exceptional circumstances" (limited to such cases as unavailability of drydocking facilities; unavailability of repair facilities; unavailability of essential materials, equipment or spare parts; or delays incurred by action taken to avoid severe weather conditions), consideration may be given for an extension of the Special Periodical Survey not exceeding three (3) months, provided the vessel is attended and the attending Surveyor(s) so recommend(s) after the following has been carried out:

- Annual Survey; and
- Re-examination of recommendations; and
- Progression of the Special Periodical Survey as far as practicable; and
- In the case where drydocking is due prior to the end of the class extension, an underwater examination is to be carried out by an approved diving company. An underwater examination by an approved company may be dispensed with in the case of extension of Drydocking Survey not exceeding 36 months interval provided the vessel is without outstanding recommendation regarding underwater parts.

If the vessel is at sea on the Special Periodical Survey due date, consideration may be given for an extension of the Special Periodical Survey provided there is documented agreement to an extension prior to the due date, positive arrangements have been made for a Surveyor to attend the vessel at the first port of call, and the ACS is satisfied there is technical justification for an extension; such an extension shall be granted only until arrival at the first port of call after the due date. However, if owing to "exceptional circumstances" the Special Periodical Survey cannot be completed at the first port of call, the Rule above for an extension of the Special Periodical Survey may be followed, but the total period of extension shall in no case be longer than three (3) months after the original due date of the Special Periodical Survey.

4.6 When a vessel is intended for a docking or demolition voyage with any periodical survey overdue, the vessel's class suspension may be held in abeyance and consideration may be

given to allow the vessel to proceed on a single direct ballast voyage from the lay up or final discharge port to dock or to the demolition yard. In such cases a short term Class (one voyage permission Certificate) with conditions for the voyage noted may be issued provided the attending Surveyor finds the vessel in satisfactory condition to proceed for the intended voyage.

4.7 If due to circumstances reasonably beyond the Owner's or the ACS's control (limited to such cases as damage to the vessel, unforeseen inability of the ACS to attend the vessel due to the governmental restrictions on right of access or movement of personnel, unforeseeable delays in port or inability to discharge cargo due to unusually lengthy periods of severe weather, strikes, civil strife, acts of war or other cases of force majeure) the ship is not in a port where the overdue surveys can be completed at the expiry of the periods allowed above, the ACS may allow the vessel to sail, in class, directly to an agreed discharge port and, if necessary, hence, in ballast, to an agreed port at which the survey will be completed, provided that the ACS:

i) Examines the vessel's records; and

ii) Carries out the due and/or overdue surveys and examination of recommendations at the firstport of call when there is an unforeseen inability of the ACS to attend the vessel in the present port, and

iii) Has satisfied itself that the vessel is in a condition to sail for one trip to a discharge port and subsequent ballast voyage to a repair facility if necessary. (Where there is unforeseen inability of the ACS to attend the vessel in the present port, the master is to confirm that his ship is in condition to sail to the nearest port of call.)

If class has already been automatically suspended in such cases, it may be reinstated subject to the conditions presented in this paragraph.

4.8 The Owner and the Flag State, where applicable, would be informed in writing, of the suspension and reinstatement of Classification.

4.8.1 The class of a vessel will be subject to a suspension procedure if an item of continuous survey is overdue at the time annual survey, unless the item is dealt with or postponed by agreement.

4.8.2 The class of the vessel will also be subject to a suspension if procedure, recommendations and/ or conditions of class are not dealt with by the due date or postponed by agreement, by the due date.

4.8.3 If the class of a vessel has been suspended for a period of 6 months due to overdue surveys, or recommendation and/ or conditions of class, the class shall be withdrawn. A longer suspension period may be granted when the vessel is not trading or in cases of lay up awaiting disposition in case of a casualty or attendance for reinstatement.

4.8.4 The class of a ship is liable to be withheld or, if already granted, may be withdrawn in case of any non-payment of fees or expenses chargeable for the service rendered. At the first step and within three months of the non-payment, a notice of suspension will be sent to the owner and after six months of the non-payment the second notice will be sent to the owner with automatic suspension of the class.

4.8.5 When any ship proceeds to sea with less freeboard than that approved by ACS or when the freeboard marks are placed higher on the ship's sides than the position assigned or

approved by ACS the ship's class will be liable to be withdrawn.

4.8.6 When it is found that a ship is being operated in a manner contrary to that agreed at the time of classification, or is being operated in conditions or in areas more onerous than those agreed, the class is liable to be suspended or withdrawn.

4.8.7 The class of a vessel which has maintained class would be deleted on receipt of information that it has been scrapped or ceases to exist, and an appropriate entry would be made in the Register of Ships.

4.8.8 In cases where the class has been suspended by ACS and it becomes apparent that the owners are not interested in maintaining ACS class, the notation will be amended to withdrawn status.

4.8.9 The withdrawal of a vessel will be confirmed by a letter to the Owner and the Flag State, where applicable.

5 Lifting of Suspension

5.1 Class will be reinstated after suspension for overdue surveys upon satisfactory completion of the overdue surveys. Such surveys will be credited as of the original due date. However, the vessel is disclassed from the date of suspension until the date class is reinstated.

5.2 Class will be reinstated after suspension for overdue recommendations upon satisfactory completion of the overdue recommendation. However, the vessel is disclassed from the date of suspension until the date class is reinstated.

5.3 Class will be reinstated after suspension for overdue Continuous Survey items upon satisfactory completion of the overdue items.

5.4 When Owners request for reclassification of a ship for which the class previously assigned has been withdrawn, ACS will require a Special Survey for Reclassification to be held by the Surveyors. The extent of the survey will depend upon the age of the ship and the circumstances of each case.

5.5 If the ship is found or placed in good and efficient condition in accordance with the requirements of the Rules and Regulations at the Special Survey for Reclassification, ACS may decide to reinstate her original class or assign such other class as considered appropriate.

5.6 The date of reclassification will appear in the supplement to the Register Of Ships and the subsequent issue of Register Of Ships.

6 Cancellation of Class

6.1 If the circumstances leading to suspension of class are not corrected within the time specified, the vessel’s class will be canceled.

6.2 A vessel’s class is canceled immediately when a vessel proceeds to sea without having completed recommendations which were required to be dealt with before leaving port.

6.3 When class has been suspended for a period of three (3) months due to overdue Annual, Intermediate, Special Periodical or other surveys required for maintenance of class; overdue Continuous Survey items; or overdue outstanding recommendations, class will be canceled.

A longer suspension period may be granted for vessels which are either laid up, awaiting disposition of a casualty or under attendance for reinstatement.

7 Alternative Procedures for Certain Types of Vessels

Alternatives to procedures for automatic suspension of class and procedures for cancellation of class may be applied to military vessels; commercial vessels owned or chartered by governments which are utilized in support of military operations or service; or laid-up vessels or fishing vessels.

Section 3 Classification Symbols and Notations

1 General

1.1 Purpose of the classification notations

The classification notations give the scope according to which the class of the ship has been based and refer to the specific rule requirements which are to be complied with for their assignment. In particular, the classification notations are assigned according to the type, service and navigation of the ship and other criteria which have been provided by the Interested Party, when applying for classification.

The Society may change the classification notations at any time, when the information available shows that the requested or already assigned notations are not suitable for the intended service, navigation and any other criteria taken into account for classification.

1.2 The classification notations assigned to a ship are indicated on the Certificate of Classification, as well as in the Register of Ships published by the Society.

1.3 The classification notations applicable to existing ships conform to the Rules of the Society in force at the date of assignment of class. However, the classification notations of existing ships may be updated according to the current Rules, as far as applicable.

2 Types of notations assigned

2.1 The types of classification notations assigned to a ship include the class symbol, the construction marks, service notations, navigation notations, operating area notations (optional) and additional class notations (optional).

The different classification notations and their conditions of assignment are listed in the following sections of the rules, according to their types.

2.2 Vessels which have been built to the satisfaction of the Surveyors to the ACS to the requirements of the Rules, or to their equivalent, where approved by the Committee for unrestricted ocean service at the assigned freeboards, will be classed and distinguished in the Record by the symbols ☸ indicating compliance with the requirements of the Rules. Vessels which have not been built under survey to ACS, but which are submitted for classification, will be subjected to a special classification survey. Where found satisfactory and thereafter approved by the Committee, they will be classed and distinguished in the Record by the symbols and special notations as described. If the vessel has been built under survey according to the rules of any IACS member, the mark ☸ will be assigned, for other vessels no sign will be assigned.

2.3 The classification marks A or B will be assigned to movable vessels or Fixed installations, respectively. Vessels which have been built to the satisfaction of full requirements of the Rules, will be assigned numeral 1; otherwise if have not been built to the satisfaction of full requirements of the rules but are deemed acceptable, numeral 2 will be assigned.

2.4 Hull Material Symbol:

The symbol O placed inside with No. 1 (steel), 2 (aluminum), 3 (composite), 4 (wood) after the symbols of classification and type of vessel, thus; ☸ A1 ① will signify that the material of structure of the vessel is in compliance with the requirements of the Rules, or with

requirements corresponding to the service limitation noted in the vessel's classification, which have been specially approved for the particular service.

2.5 MC Notation

Machinery and boilers which have been constructed and installed to the satisfaction of the Surveyors to the ACS to the full requirements of the Rules, when found satisfactory after trial and approved by the Committee, will be classed and distinguished in the Record by the notation ☸ MC.

Machinery and boilers which have not been constructed and installed under survey to the ACS, but which are submitted for classification, will be subjected to a special classification survey. Where found satisfactory and thereafter approved by the Committee, they will be classed and distinguished in the Record by the notation MC.

If Machinery and boilers of the vessel have been built under survey according to the rules of any IACS member, the mark ☸ will be assigned, for other vessels no sign will be assigned.

2.6 Special Rules

Vessels which have been built to the satisfaction of the Surveyors to the ACS to the requirements as contained in the Rules for special types of vessels and which are approved by the Committee for unrestricted international service at the assigned freeboards will be classed and distinguished in the Record by the symbols as appropriate followed by the appropriate notation, such as Oil Carrier, Ore Carrier, Bulk Carrier, Passenger Vessel, Container Carrier, Towing Vessel, Refrigerated Cargo Carrier.

2.7 Special Purpose Vessels

Vessels of special design, intended primarily for ferry service, for dredging, etc., which have been built to the satisfaction of the Surveyors to the ACS to arrangements and scantlings approved for the particular purpose, where approved by the Committee for restricted international service at the assigned freeboards, will be classed and distinguished in the Record by the symbols as appropriate followed by a designation of the trade for which special modifications to the Rules have been approved.

2.8 Service Limitations

Vessels which have been built to the satisfaction of the Surveyors to the ACS to special modified requirements for a limited service, where approved by the Committee for that particular service, will be classed and distinguished in the Record by the symbols and notations described but the symbols and notations will either be followed by or have included in them the appropriate service limitation.

3 Service notations

3.1 General

3.1.1 The service notations define the type and/or service of the ship which have been considered for its classification, according to the request for classification signed by the Interested Party. At least one service notation is to be assigned to every classed ship.

3.1.2 The assignment of any service notation to a new ship is subject to compliance with general and additional rule requirements laid down in different Parts of the Rule, as

appropriate.

3.1.3 A ship may be assigned several different service notations. In such case, the specific rule requirements applicable to each service notation are to be complied with.

However, if there is any conflict in the application of the requirements applicable to different service notations, the Society reserves the right to apply the most appropriate requirements or to refuse the assignment of one of the requested service notations.

3.1.4 A service notation may be completed by one or more additional service features, giving further precision regarding the type of service of the ship, for which specific rule Requirements are applied.

3.1.5 The different service notations which may be assigned to a ship are listed in 3.2 to 3.12, according to the category to which they belong. As a rule, all notations in 3.2, 3.3, 3.4 and 3.5 are only to be assigned to self-propelled units.

Table 1: List of service notations

Service Notation	Ref no.
Asphalt carrier	3.4.3
Barge	3.8.1
Bulk carrier ESP	3.3.2
Bulk carrier BC-A ESP	3.3.2
Bulk carrier BC-B ESP	3.3.2
Bulk carrier BC-C ESP	3.3.2
Cable laying ship	3.7.6
Chemical tanker ESP	3.4.4
Combination carrier/OBO ESP	3.3.4
Combination carrier/OOC ESP	3.3.5
Compressed natural gas carrier	3.11.5
Container ship	3.2.5
Crew boat	3.11.4
Deck ship	3.2.7
Dredger	3.6.2 a
Escort tug	3.7.2 c
Fire-fighting ship	3.7.4
Fishing vessel	3.9
Floating dock	3.7.7
FLS tanker	3.4.6
General cargo ship	3.2.2
Hopper dredger	3.6.2 b
Hopper unit	3.6.2 c
HSC, HSC-CAT A, HSC-CAT B	3.10.1
Dohw Lenj	3.11.2
Light ship	3.10.2
Liquefied gas carrier	3.4.5
Livestock carrier	3.2.6
Oil recovery ship	3.7.5
Oil tanker ESP	3.4.2
Ore carrier ESP	3.3.3
Passenger ship	3.5.2
Pontoon, Pontoon – crane	3.8.2
Refrigerated cargo ship	3.2.4
Ro-ro cargo ship	3.2.3
Ro-ro passenger ship	3.5.3
Salvage tug	3.7.2 b
Special service	3.11.1
Split hopper dredger	3.6.2 e
Split hopper unit	3.6.2 d
Supply vessel	3.7.3
Tanker	3.4.7
Tug	3.7.2 a
Yacht, Charter yacht	3.11.3

3.2 Cargo ships

3.2.1 The service notations related to self-propelled ships intended for the carriage of cargo are listed in 3.2.2 to 3.2.7.

3.2.2 **General cargo ship**, for ships intended to carry general cargo.

The service notation may be completed by the following additional service feature, as applicable:

- **equipped for carriage of containers**, where the ship's fixed arrangements comply with the applicable rule requirements.
- **heavycargo [AREA1, X1 kN/m^2 - AREA2, X2 kN/m^2 - ...]**, when the double bottom and/or hatch covers and/or other cargo areas designed to support heavy cargoes fulfill the appropriate rule requirements. The values Xi indicate the maximum allowable local pressures on the various zones AREAi where the cargo is intended to be stowed.
- **nonhomload**, when the ship has been designed in such a way that the cargo spaces may be loaded non-homogeneously, including cases where some holds may be empty, at a draught up to the scantling draught and fulfill the appropriate rule requirements for general strength, and when the corresponding loading conditions are listed in the reviewed loading manual. This notation can be completed with the indication of the different maximum loads allowed in each hold and which holds may be empty, if appropriate.

3.2.3 **Ro-ro cargo ship**, for ships specially intended to carry vehicles, trains or loads on wheeled beds. The service notation may be completed by the additional service feature equipped for carriage of containers, where the ship's fixed arrangements comply with the applicable rule requirements.

3.2.4 **Refrigerated cargo ship**, for ships specially intended to carry refrigerated cargo.

The service notation may be completed by the additional service feature equipped for carriage of containers, where the ship's fixed arrangements comply with the applicable rule requirements.

3.2.5 **Container ship**, for ships specially intended to carry containers in holds or on decks.

3.2.6 **Livestock carrier**, for ships specially intended to carry livestock.

3.2.7 **Deck ship**, for ships specially intended to carry cargo exclusively on the deck.

A ship with the service notation deck ship is usually but not necessarily a self-propelled unit intended for unrestricted navigation.

3.3 Bulk, ore and combination carriers

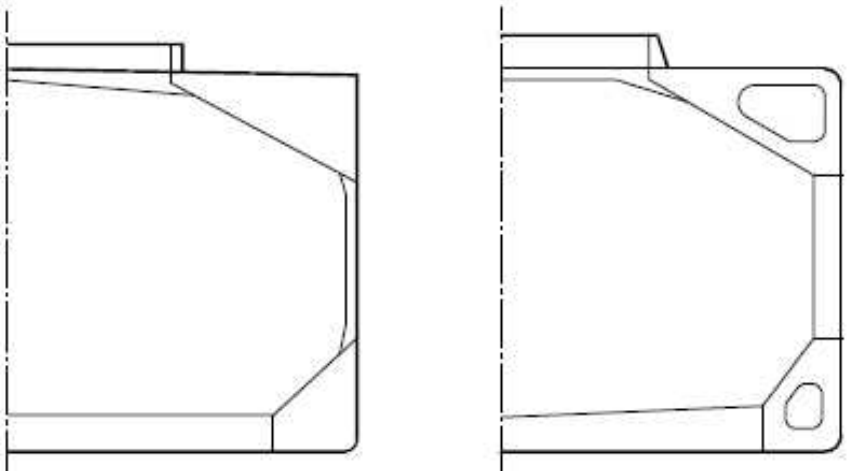
3.3.1 The service notations related to self-propelled ships specially intended for the carriage of dry cargo in bulk are those listed in 3.3.2 to 3.3.5 or bulk carrier when the ship does not meet the forthcoming conditions.

The service notations described in 3.3.2 to 3.3.5are always completed by the additional service feature **ESP**, which means that these ships are submitted to the Enhanced Survey Program.

Note 1: Self-propelled ships are ships with mechanical means of propulsion not requiring assistance from another ship during normal operation.

3.3.2 **Bulk carrier ESP**, for sea going self-propelled ships which are constructed generally with single deck, double bottom, hopper side tanks and topside tanks and with single or double side skin construction in cargo length area and intended primarily to carry dry cargoes in bulk. Typical midship sections are illustrated in Fig 3.1, or a midship section deemed equivalent by the Society.

Figure 3.1: Typical midship sections of ships with service notation bulk carrier ESP



Single side skin construction Double side skin construction.

Single skin bulk carriers are in general designed with full breadth cargo holds with top side and lower side (hopper) spaces (for water ballast, or void spaces).

Double skin bulk carriers are in general designed with cargo holds between double sides or separate longitudinal bulkheads, with the side spaces for water ballast or void spaces.

The service notation bulk carrier ESP is always completed by one of the following additional service features, for bulk carriers of length greater than or equal to 150 m contracted for new construction on or after 1 July 2003:

- **BC-A**, for bulk carriers designed to carry dry bulk cargoes of density 1.0 t/m^3 and above with specified holds empty at maximum draught in addition to BC-B conditions
- **BC-B**, for bulk carriers designed to carry dry bulk cargoes of density 1.0 t/m^3 and above with all cargo holds loaded in addition to BC-C conditions
- **BC-C**, for bulk carriers designed to carry dry bulk cargoes of density less than 1.0 t/m^3.

The additional service feature BC-A is completed with the indication of the allowed combination of specified empty holds, as follows: (**holds a, b, .., ... may be empty**).

If limitations are to be observed during operation:

- The additional service features BC-A and BC-B are completed, when the maximum cargo density is less than 3.0 t/m^3, with the indication of the maximum density of cargo that the ship is allowed to carry, as follows: (**maximum cargo density …. t/m^3**)

- The additional service features BC-A, BC-B and BC-C are completed by the following indication when the vessel has not been designed for loading and unloading in multiple ports: (**no MP**).

Examples:

Bulk carrier BC-A (maximum cargo density 2.5 t/m^3; holds 2, 4, 6 may be empty)ESP

Bulk carrier BC-B (maximum cargo density 2.5 t/m^3; no MP) ESP

Bulk carrier BC-C (no MP) ESP

For ships contracted for new construction before 1 July 2003 or for ships contracted for new construction on or after 1 July 2003 but less than 150 m in length, the service notation bulk carrier ESP may be completed by the additional service features heavycargo or nonhomload.

The service notation bulk carrier ESP is always completed by the additional service feature CSR for bulk carriers of length greater than or equal to 90 m contracted for new construction on or after 1 April 2006. Bulk carriers assigned with the additional service feature CSR are to comply with the requirements of the Common Structural Rules for Bulk Carriers.

The additional class notation **GRAB [X]**, is assigned to bulk carriers granted with the additional service feature CSR, where X is the unladen grab weight in tons.

For bulk carriers assigned with the additional service feature CSR, and one of the additional service features BC-A or BCB , these additional service features are always completed by the additional service feature GRAB [X] .

Bulk carriers assigned with the additional service feature CSR are to comply with the requirements for maintenance of class, thickness measurements and acceptance criteria given in CSR for bulk carriers chapter 13.

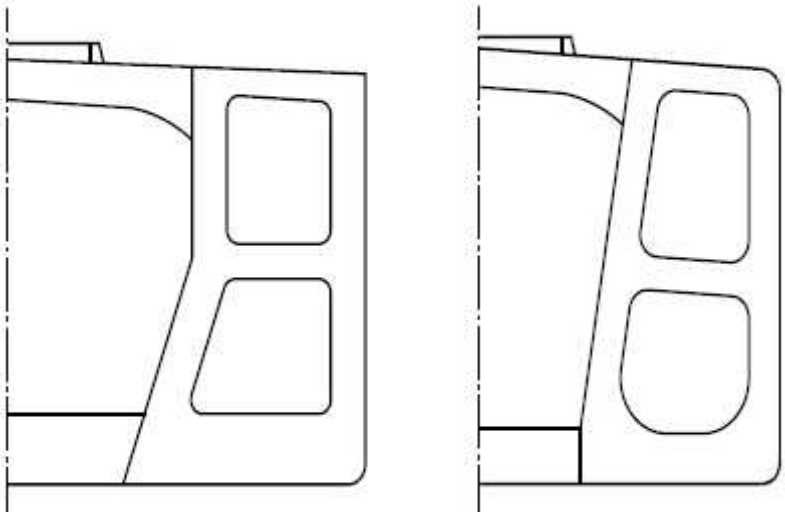
For bulk carriers assigned with the additional service feature CSR and contracted for construction on or after 8 December 2006, this additional service feature is always completed by the additional service feature **CPS (WBT)** for which the rule requirements of Coating Performance Standard, applicable to ships complying with the requirements of the Common Structural Rules for Bulk Carriers or the Common Structural Rules for Double Hull Oil Tankers and related to protective coatings in dedicated seawater ballast tanks of ships of not less than 500 gross tonnage and double-side skin spaces arranged in bulk carriers of length greater than or equal to 150 m, are applied.

Example:

Bulk carrier CSR CPS(WBT) BC-A (maximum cargo density 2.5 t/m^3; holds 2, 4, 6 may be empty) ESP GRAB [20]

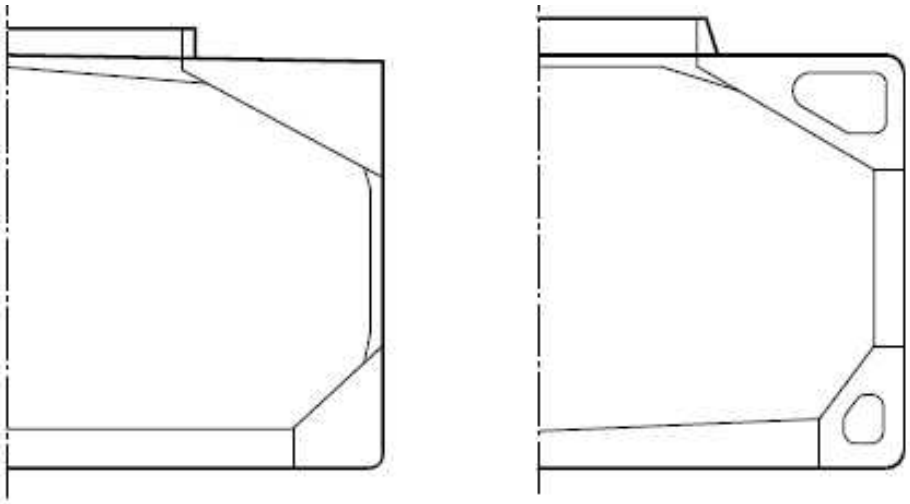
3.3.3 **Ore carrier ESP**, for sea going self-propelled ships which are constructed generally with single deck, two longitudinal bulkheads and a double bottom throughout the cargo length area and intended primarily to carry ore cargoes in the centre holds only. Typical midship sections are illustrated in Fig 3.2, or a midship section deemed equivalent by the Society.

Figure 3.2: Typical midship sections of ship with service notation ore carrier ESP



3.3.4 **Combination carrier/OBO ESP**, for sea going self propelled ships which are constructed generally with single deck, double bottom, hopper side tanks and topside tanks and with single or double side skin construction in the cargo length area, and intended primarily to carry oil or dry cargoes, including ore, in bulk. Typical midship sections are illustrated in Fig 3.3, or a midship section deemed equivalent by the Society.

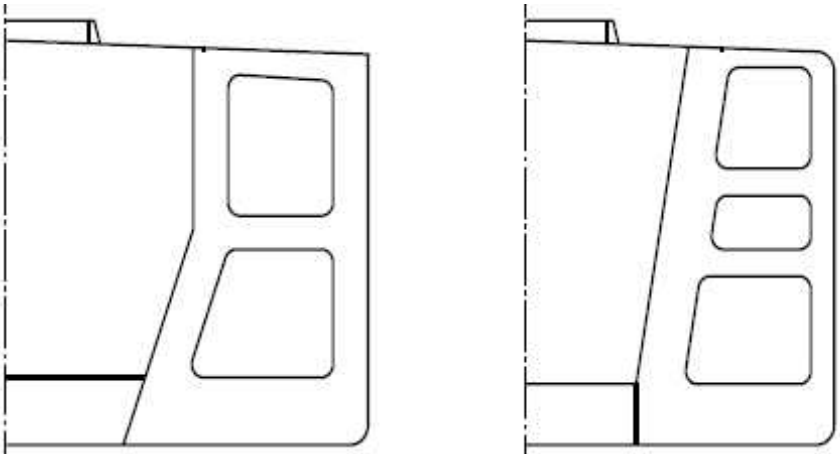
Figure 3.3: Typical midship sections of ship with service notation combination carrier /OBO ESP



Single side skin construction Double side skin construction.

3.3.5 **Combination carrier/OOC ESP**, for sea going self propelled ships which are constructed generally with single deck, two longitudinal bulkheads and a double bottom throughout the cargo length area and intended primarily to carry ore cargoes in the centre holds or oil cargoes in centre holds and wing tanks. Typical midship sections are illustrated in Fig 3.4, or a midship section deemed equivalent by the Society.

Figure 3.4: Typical midship sections of ships with service notation combination carrier/OOC ESP



3.4 Ships carrying liquid cargo in bulk

3.4.1 The service notations related to self-propelled ships intended for the carriage of liquid cargo in bulk are listed in 3.4.2 to 3.4.8.

3.4.2 **Oil tanker**, for sea going self-propelled ships which are constructed generally with integral tanks and intended primarily to carry in bulk crude oil, other oil products, or oil-like substances having any flash point, or liquid at atmospheric pressure and ambient temperature (or thus maintained by heating). This notation may be assigned to tankers of both single and double hull construction, as well as tankers with alternative structural arrangements, e.g. mid-deck designs. Typical midship sections are illustrated in Fig 3.5.

Single hull oil tankers are normally designed with cargo tanks immediately inside the bottom and side shell.

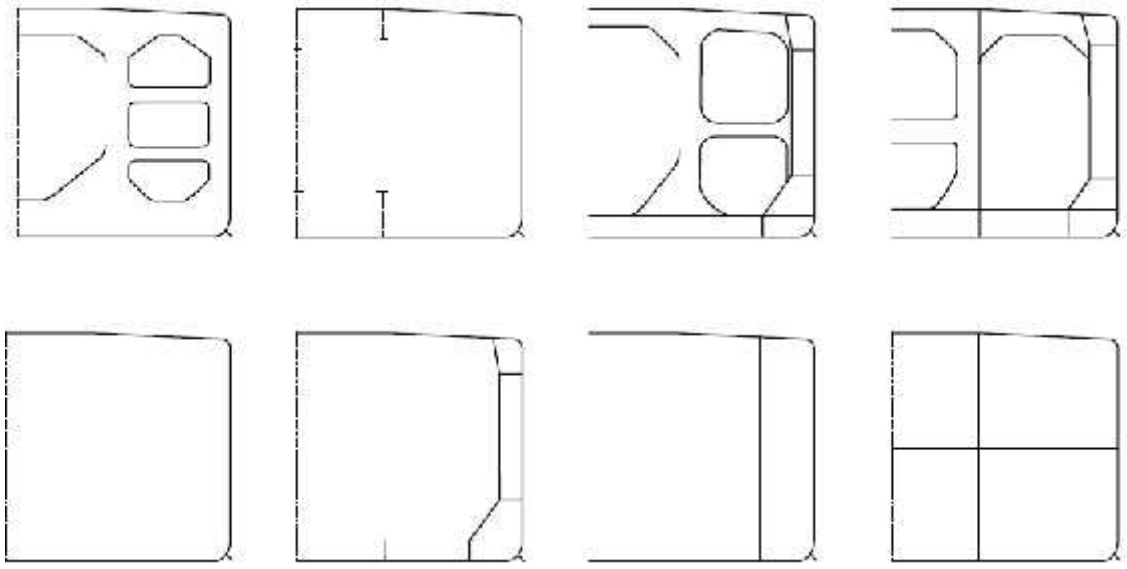
Double bottom or double side spaces (for water ballast, or void spaces) may occur.

Double hull oil tankers are designed with cargo tanks separated from the environment by double bottom/ double side spaces (for water ballast, or void spaces).

The service notation may be completed by the additional service feature flash point > 60°C, as applicable, where the ship is intended to carry only such type of products, under certain conditions.

The service notation may be completed by the additional service feature asphalt carrier, where the ship is intended to carry such type of products, under certain conditions. The maximum cargo temperature is to be indicated on the Certificate of Classification.

Figure 3.5: Typical midship sections of ships with service notation oil tanker ESP



For ships with integral cargo tanks, the service notation oil tanker is always completed by the additional service feature ESP (i.e. oil tanker ESP), which means that these ships are submitted to the Enhanced Survey Program.

The service notation oil tanker ESP is always completed by the additional service feature CSR for double hull oil tankers of length greater than or equal to 150 m and contracted for new construction on or after 1 April 2006. Oil tankers assigned with the additional service feature CSR are to comply with the requirements of the Common Structural Rules for Double Hull Oil Tankers.

The elements not dealt with in the Common Structural Rules for Double Hull Oil Tankers are to comply with the relevant requirements of the Rules for the Classification of Steel Ships.

Oil tankers assigned with the additional service feature CSR are to comply with the requirements for ship in operation renewal criteria given in CSR for Double Hull Oil Tankers, Section 12, related to the allowable thickness diminution for hull structure.

For oil tankers assigned with the additional service feature CSR and contracted for construction on or after 8 December 2006, this additional service feature is always completed by the additional service feature CPS(WBT) for which the rule requirements for Coating Performance Standard, applicable to ships complying with the requirements of the Common Structural Rules for Bulk Carriers or the Common Structural Rules for Double Hull Oil Tankers and related to protective coatings in dedicated seawater ballast tanks of ships of not less than 500 gross tonnage and double-side skin spaces arranged in bulk carriers of length greater than or equal to 150 m, are applied.

Example:

Oil tanker CSR CPS(WBT) ESP

3.4.3 **Asphalt carrier**, for sea going self-propelled ships which are constructed with independent (non-integral) cargo tanks, intended to carry only such type of products, under certain conditions. The maximum cargo temperature is to be indicated on the Certificate of Classification.

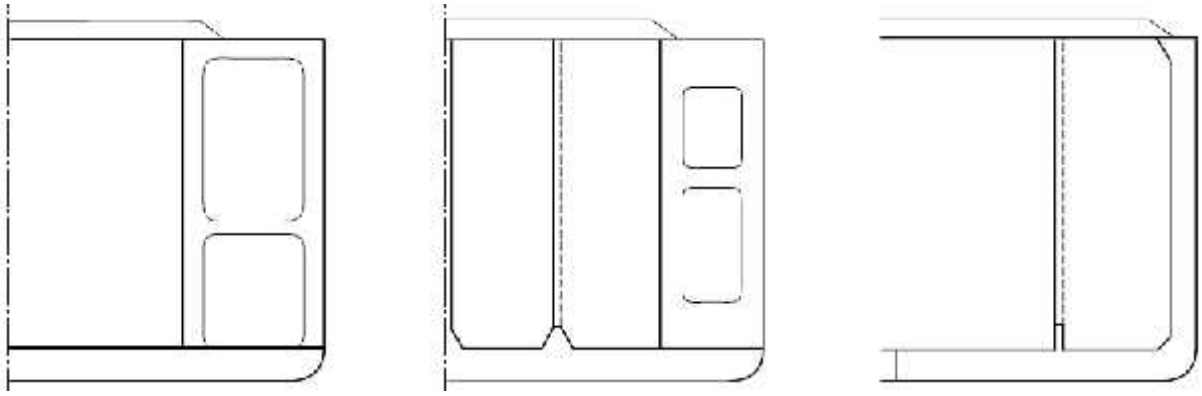
3.4.4 **Chemical tanker**, for sea going self-propelled ships which are constructed generally with integral tanks and intended primarily to carry chemicals in bulk. This notation may be assigned to tankers of both single or double hull construction, as well as tankers with alternative structural arrangements. Typical midship sections are illustrated in Fig 3.6, or a midship section deemed equivalent by the Society.

The list of products the ship is allowed to carry is attached to the Certificate of Classification or the Certificate of Fitness, where issued by the Society, including, where necessary, the maximum allowable specific gravity and/or temperature.

For ships intended to carry only one type of cargo, the service notation may be completed by the additional service feature indicating the type of product carried.

For ships with integral cargo tanks, the service notation chemical tanker is always completed by the additional service feature ESP (i.e. chemical tanker ESP), which means that these ships are submitted to the Enhanced Survey Programme.

Figure 3.6: Typical midship sections of ships with service notation chemical tanker ESP



3.4.5 **Liquefied gas carrier**, for ships specially intended to carry liquefied gases or other relevant substances. The list of products the ship is allowed to carry is attached to the Certificate of Classification or the Certificate of Fitness, where issued by the Society, including, where necessary, the conditions of transportation (pressure, temperature, filling limits).

The service notation may be completed by the following additional service feature, as applicable:

- **RV**, where the ship is fitted with an installation for revaporisation of the liquefied natural gas.
- **STL-SPM**, where the ship is used as re-gasification terminal and fitted forward with equipment for non permanent mooring or single buoy.

Example: Liquefied gas carrier RV STL-SPM

3.4.6 **FLS tanker**, for ships specially intended to carry in bulk flammable liquid products other than those covered by the service notations oil tanker, chemical tanker or liquefied gas carrier.

The list of products the ship is allowed to carry may be attached to the Certificate of Classification, including, where necessary, the maximum allowable specific gravity and/or temperature.

The service notation may be completed by the additional service feature flash point > 60°C, where the ship is intended to carry only such type of products, under certain conditions.

For ships intended to carry only one type of cargo, the service notation may be completed by the additional service feature indicating the type of product carried.

3.4.7 **Tanker**, for ships intended to carry non-flammable liquid cargoes in bulk other than those covered by the service notations in 3.4.2 to 3.4.6, such as water.

The list of cargoes the ship is allowed to carry may be attached to the Certificate of Classification.

For ships intended to carry only one type of cargo, the service notation may be completed by the additional service feature indicating the type of product carried, e.g. tanker water.

3.4.8 Refer also to 3.3.4 and 3.3.5 for combination carrier intended to carry alternatively oil products and dry cargo in bulk in cargo holds/tanks.

3.5 Ships carrying passengers

3.5.1 The service notations related to ships specially intended for the carriage of passengers are listed in 3.5.2 to 3.5.3.

3.5.2 **Passenger ship**, for ships intended to carry more than 12 passengers.

The service notation may be completed by the additional service feature < 36 passengers, where the ship is intended to carry only such a limited number of passengers.

3.5.3 **Ro-ro passenger ship**, for ships intended to carry more than 12 passengers and specially equipped to load trains or wheeled vehicles. The service notation may be completed by the additional service feature < 36 passengers, where the ship is intended to carry only such a limited number of passengers.

3.6 Ships for dredging activities

3.6.1 The service notations related to ships specially intended for dredging activities are listed in 3.6.2.

3.6.2 The following notations are provided:

a) **dredger**, for ships specially equipped only for dredging activities (excluding carrying dredged material)

b) **hopper dredger**, for ships specially equipped for dredging activities and carrying spoils or dredged material

c) **hopper unit**, for ships specially equipped for carrying spoils or dredged material

d) **split hopper unit**, for ships specially equipped for carrying spoils or dredged material and which open longitudinally, around hinges

e) **split hopper dredger**, for ships specially equipped for dredging and for carrying spoils or dredged material and which open longitudinally, around hinges.

3.6.3 These ships which are likely to operate at sea within specific limits may, under certain conditions, be granted an operating area notation.

3.7 Working ships

3.7.1 The service notations related to ships specially intended for different working services are listed in 3.7.2 to 3.7.7.

3.7.2 The service notations for ships intended to tow and/or push other ships or units are:

a) **tug**, for ships specially equipped for towing and/or pushing

b) **salvage tug**, for ships specially equipped for towing and/or pushing having specific equipment for salvage

c) **escort tug**, for ships specially equipped for towing and/or pushing having specific equipment for escorting ships or units during navigation.

These service notations may be completed by the additional service feature barge combined, when units are designed to be connected with barges and comply with the relevant requirements. The barges to which the tug can be connected are specified in an annex to the Certificate of Classification..

3.7.3 The service notation supply vessel is assigned to ships specially intended for the carriage and/or storage of special material and equipment and/or which are used to provide facilities and assistance for the performance of specified activities, such as offshore, research and underwater activities.

The service notation is to be completed by the additional service feature oil product, when the ship is also specially intended to carry oil products having any flash point and having a specified maximum cargo tank capacity.

The service notation is to be completed by the additional service feature LHNS, for ships, other than well stimulation vessels, carrying amounts of hazardous and noxious liquid substances in bulk not exceeding a specified maximum value.

The service notation is to be completed by the additional service feature WS for well stimulation vessels.

3.7.4 **Fire-fighting ship**, The service notation fire-fighting ship is assigned to ships specially intended and equipped for fighting fire.

The service notation may be completed by the additional service features, as applicable:

- **1** or **2** or **3**, when the ship complies with the applicable requirements.
- **E**, when the characteristics of the water fire-fighting system are not those required for the assignment of the additional service features 1, 2 or 3, and when the system is specially considered by the Society
- **water spraying**, when the ship is fitted with a waterspraying system complying with the applicable requirements.

3.7.5 The service notation oil recovery ship is assigned to ships specially equipped with fixed installations and/or mobile equipment for the removal of oil from the sea surface and its retention on board, carriage and subsequent unloading.

3.7.6 The service notation cable laying ship is assigned to ships specially equipped for the carriage and/or laying, hauling and repair of submarine cables.

3.7.7 The service notation floating dock is assigned to floating docks.

The navigation notation sheltered area is assigned to these units. When the dock is intended to be towed, the navigation notation temporary unrestricted navigation is also to be assigned.

3.8 **Non-propelled unit**, units with sail propulsion and other units

3.8.1 Barge, The service notation barge is assigned to non-propelled units intended to carry (dry or liquid) cargo inside holds or tanks. The type of cargo may be considered adding an additional service feature, e.g. barge - oil, barge - general cargo.

This service notation may be completed by the additional service feature tug combined when units are designed to be connected with tugs, and comply with the relevant requirements.

3.8.2 Pontoon, The service notation pontoon is assigned to non-propelled units intended to carry cargo and/or equipment on deck only. When a crane is permanently fitted on board, the crane is to be certified and the service notation pontoon - crane is granted.

3.8.3 Other units

Any non-propelled units other than those covered by the service notations listed above will be assigned the additional service feature no propulsion, to be added to their own service notation, e.g. dredger – no propulsion.

3.8.4 Assisted propulsion units

Any units having a propulsion system not enabling them to proceed at a speed greater than 7 knots, used for short transit voyages, will be assigned the additional service feature assisted propulsion to be added to their own service notation, e.g. dredger - assisted propulsion.

3.8.5 Units with a sail propulsion

Ships fitted with a wind propulsion plant meeting the requirements of the Rules may have their service notation completed by the following additional service feature:

- **WAP** for an auxiliary wind propulsion
- **EAWP** for a wind propulsion assisted by auxiliary engine propulsion.

3.9 **Fishing vessel**

3.9.1 The service notation fishing vessel is assigned to ships specially equipped for catching and storing fish or other living resources of the sea. The service notation may be completed by additional service feature, as applicable:

- **F**, when the ship complies with the requirements related to fire prevention, ventilation systems and means of escape

- **TORRE**, when the Society has verified the compliance with the requirements for construction and equipment of fishing vessels of the Torremolinos International Convention for the Safety of Fishing Vessels, as amended
- **ED**, when the Society has verified the compliance with the requirements for construction and equipment of fishing vessels of the European Directive 97/70/EC, as amended.
- **L**, local form and design of the hull such as Boom, Nako and Sambok

Note 1: Units solely dedicated to service in a fishing flotilla by means of cold storage and/or transformation of fish are not covered by the service notation fishing vessel. They will be considered with the service notation special service

3.10 High Speed Crafts (HSC)

3.10.1 The high speed crafts meeting the requirements of the Rules for the Construction and the Classification of High Speed Craft are assigned the following service notations:

- **HSC-C A** (or high speed craft-C A) for passenger ships defined as ‘’Category A craft’’ in respect of the IMO International Code of Safety for High Speed Craft
- **HSC-C B** (or high speed craft-C B) for passenger ships defined as ‘’Category B craft’’ in respect of the IMO International Code of Safety for High Speed Craft
- **HSC** (or high speed craft) for ships other than the above; in this case, the type of service may be specified after the notation, i.e. HSC/passenger carrier.

3.10.2 The service notation light ship is assigned to ships meeting the requirements of the Rules for the Construction and the Classification of High Speed Craft for the hull requirements and the requirements of the present Rules for the stability and for the machinery installation. The type of service may be specified after the notation, i.e. light ship/fast passenger vessel, light ship/fast cargo vessel.

3.11 Miscellaneous units

3.11.1 Special service

a) General

The service notation special service is assigned to ships which, due to the peculiar characteristics of their activity, are not covered by any of the notations mentioned above. The classification requirements of such units are considered by the Society on a case by case basis.

This service notation may apply, for instance, to ships engaged in research, expeditions and survey, ships for training of marine personnel, whale and fish factory ships not engaged in catching, ships processing other living resources of the sea, and other ships with design features and modes of operation which may be referred to the same group of ships.

An additional service feature may be specified after the notation (e.g. special service-training, special service fish factory, special service-standby rescue vessel) to identify the particular service in which the ship is intended to trade. The scope and criteria of classification of such units are indicated in an annex to the Certificate of Classification.

b) Special service - standby rescue vessel Ships complying with the requirements of Rule are eligible for the assignment of the service notation special service - standby rescue vessel.

This service notation may be completed by the number of survivors that the vessel is intended to carry. Depending on the vessel operation area, the Society may adapt the requirements regarding the survivors accommodation and/or the safety equipment. In such a case, this service notation is to be completed by the number of survivors that the vessel is intended to carry and by the vessel operation area, as for example: special service - standby rescue vessel (150 survivors, Persian Gulf).

3.11.2 **Dohw Lenj**

Small ships intended to carry general cargo the hull of which are made of steel, FRP or wood and have traditional forms of the hull namely Boom, Nako and sambok.

Such ships are nonconventional and the local administration requirements apply, e.g. P.M.O.

3.11.3 **Yacht** and **charter yacht**

The service notation charter yacht is assigned to ships intended for pleasure cruising, engaged in commercial sailing and complying with the applicable requirements.

The service notation yacht is assigned to ships intended for pleasure cruising other than charter yacht and complying with the applicable requirements.

The service notation yacht or charter yacht is always completed by one of the following additional service features, as applicable:

- **motor** for units propelled by propulsion engine
- **sailing** for units with a sail propulsion, including those assisted by auxiliary propulsion engine.

Examples:

yacht-motor

yacht-sailing

charter yacht-motor

charter yacht-sailing

Example:

Yacht-motor

When the hull is made of other material, additional service features are to be assigned in accordance with the requirements of the Rules.

The navigation notations summer zone and tropical zone are not assigned for ships with service notation yacht or charter yacht.

For high speed motor yachts meeting the requirements of the Rules, the following

applies:

- As a rule, the navigation notation assigned to such unit is corresponding to sea areas where the significant wave height H.S. is not to exceed for more then 10 percent of the year the following values:
  - sheltered area: 0,5 m
  - coastal area: 2,5 m
  - unrestricted navigation: no limitation.
- The table of the speed relative to the sea states, characterized by their significant wave height, is annexed to the Certificate of Classification.

3.11.4 **Crew boat**

The service notation crew boat is assigned to ships less than 500 grt, of length not greater than 45 m, dedicated to transport of offshore personnel from harbours to moored offshore installations or ships and meeting the requirements of the Rule.

Note 1: As a rule, the navigation notation assigned to such units is corresponding to sea areas where the significant wave height H.S. is not to exceed for more than 10 percent of the year the following values:
- sheltered area: 0,5 m
- coastal area: 2,5 m
- unrestricted navigation: no limitation.

The table of the speed relative to the sea states, characterized by their significant wave height, is annexed to the Certificate of Classification.

3.11.5 **Compressed natural gas carrier**

The service notation compressed natural gas carrier is assigned to ships intended to carry compressed natural gas (CNG) meeting the requirements of Classification of Compressed Natural Gas Carriers.

3.11.6 **Other units**

For ships or other floating units intended to be classed with other service notations, reference is to be made to the specific Rules of the Society.

3.11.7 **Inland navigation vessel**

For ships and units intended for navigation in inland waters, reference is to be made to the Rules and Regulations for the Construction and Classification of Inland Navigation Vessels.

3.12 **Ships with gas fuelled propulsion**

3.12.1 The service notation is completed by one of the following additional service features, when the ship complies with the requirements of Safety Rules for Gas- Fuelled Engine Installations in Ships, for internal combustion engines using gas as fuel, as applicable:

- **DUALFUEL** for engines using both gas and fuel oil as fuel
- **GASFUEL** for engines using only gas as fuel.

The gas may be either compressed natural gas or liquefied natural gas.

4 Navigation and operating area notations

4.1 Navigation notations

4.1.1 Every classed ship is to be assigned one navigation notation as listed in 4.2, except those with the service notations **launch** or **seagoing launch**.

4.1.2 The assignment of a navigation notation, including the reduction of scantlings or specific arrangements for restricted navigation notations, is subject to compliance with the requirements.

4.1.3 The assignment of a navigation notation does not absolve the Interested Party from compliance with any international and national regulations established by the Administrations for a ship operating in national waters, or a specific area, or a navigation zone.

4.2 List of navigation notations

4.2.1 The navigation notation **unrestricted navigation** is assigned to a ship intended to operate in any area and any period of the year.

4.2.2 The navigation notation **summer zone** is assigned to ships intended to operate only within the geographical limits as defined in ILLC 1966 for the Summer zones.

4.2.3 The navigation notation **tropical zone** is assigned to ships intended to operate only within the geographical limits as defined in ILLC 1966 for the Tropical zones.

4.2.4 The navigation notation coastal area is assigned to ships intended to operate only within 12 nautical miles from the shore and with a maximum sailing time of six hours from a port of refuge or safe sheltered anchorage.

4.2.5 The navigation notation **sheltered area** is assigned to ships intended to operate in sheltered waters, i.e. harbours, estuaries, roadsteads, bays, lagoons and generally calm stretches of water and when the wind force does not exceed 6 Beaufort scale.

4.2.6 In specific cases, the designation of the geographical area and/or the most unfavourable sea conditions considered may be added to the navigation notation.

4.2.7 The navigation notation temporary unrestricted navigation may be assigned, in addition to the navigation notations defined in 4.2.2, 4.2.3, 4.2.4 or 4.2.5 to service ships for which the period of unrestricted navigation may be chosen to satisfy the conditions defined in an annex to the Certificate of Classification.

When a favourable weather situation is included amongst these conditions, the voyages are to be such as the ship can be put in a port or a sheltered anchorage in about 12 hours from any point of its route.

Note 1: Before any voyage covered by the navigation notation temporary unrestricted navigation, the ship is to be submitted to an occasional survey, during which the Surveyor checks that the intended voyage and the ship's specific condition, if any, comply with the conditions defined in the annex to the Certificate of Classification.

4.2.8 For ships with service notation HSC-C A or HSC-C B or HSC, as a rule, the navigation notation assigned to such unit is corresponding to sea areas where the significant wave height H.S. is not to exceed for more than 10 percent of the year the following values:

• sheltered area: 0,5 m

• coastal area: 2,5 m

• unrestricted navigation: no limitation

The table of the speed relative to the sea states, characterized by their significant wave height, is annexed to the Certificate of Classification.

4.3 Operating area notations

4.3.1 The operating area notation expresses the specified area where some service units are likely to operate at sea within specific restrictions which are different from normal navigation conditions.

The operating area notation is indicated after the navigation notation.

Example: unrestricted navigation - “operating area notation”

For example the following operating area notations may be assigned for dredging activities:

• dredging within 8 miles from shore,

• dredging within 15 miles from shore or within 20 miles from port,

• dredging over 15 miles from shore.

The operating area of the first two categories may be extended respectively over 8 or 15 miles. In that case, the operating area notation is completed by the maximum significant wave height during service, as follows:

dredging over 8 (or 15) miles from shore with H.S. ≤ ... m.

For ships being assigned the service notation split hopper barge or split hopper dredger, the operating area notation may be completed by the maximum allowable significant height of waves during the service, being indicated between parenthesis, i.e. (H.S. ≤ ... m).

5 Additional class notations

5.1 General

5.1.1 An additional class notation expresses the classification of additional equipment or specific arrangement, which has been requested by the Interested Party.

5.1.2 The assignment of such an additional class notation is subject to the compliance with additional rule requirements.

5.2 **Automated machinery systems (AUT)**

5.2.1 General

The notations dealt with under this heading are relevant to automated machinery systems installed on board ships.

5.2.2 **Unattended machinery space (AUT-UMS)**

The additional class notation AUT-UMS is assigned to ships which are fitted with automated installations enabling machinery spaces to remain periodically unattended in all sailing conditions including maneuvering.

5.2.3 **Centralized control station (AUT-CCS)**

The additional class notation AUT-CCS is assigned to ships which are fitted with machinery installations operated and monitored from a centralized control station.

5.2.4 **Automated operation in port (AUT-PORT)**

The additional class notation AUT-PORT is assigned to ships which are fitted with automated installations enabling the ship's operation in port or at anchor without personnel specially assigned for the watch-keeping of the machinery in service.

5.2.5 **Integrated machinery system (AUT-IMS)**

The additional class notation AUT-IMS is assigned to ships which are fitted with automated installations enabling machinery spaces to remain periodically unattended in all sailing conditions including maneuvering, and additionally provided with integrated systems enabling to handle control, safety and monitoring of machinery.

5.3 Monitoring equipment (MON)

5.3.1 General

The notations dealt with under this heading are relevant to hull and tailshaft monitoring equipment installed on board ships.

The requirements for the assignment of these notations are given in Part E, Chapter 5.

5.3.2 **Hull stress monitoring (MON-HULL)**

The additional class notation MON-HULL is assigned to ships which are fitted with equipment continuously monitoring ship's dynamic loads through measurements of motions in waves and stresses/deformations in the hull structure.

5.3.3 **Tail shaft monitoring system (MON-SHAFT)**

The additional class notation MON-SHAFT is assigned to ships which are fitted with a temperature monitoring system for the tail shaft stern tube aft bearing. The assignment of this notation allows the ship to be granted a reduced scope for complete tail shaft surveys.

5.4 Comfort on board ships (COMF)

5.4.1 General

The notations dealt with under this heading are relevant to the assessment of comfort on board ships with regard to the noise and/or vibration.

The parameters which are taken into consideration for the evaluation of the comfort such as the level of noise, the level of vibration will be indicated in the relevant annex to the Certificate of Classification.

5.4.2 Comfort with regard to noise **(COMF-NOISE)**

The additional class notation COMF-NOISE is assigned to ships satisfying specific levels of noise.

The assessment of noise levels is carried out through measurements during harbour and sea trials. The notation is completed by a grade **1**, **2** or **3** which represents

the comfort level achieved for the assignment of the notation. The lower grade (1) orresponds to the higher class of comfort.

Example:

COMF-NOISE 2

5.4.3 Comfort with regard to vibration **(COMF-VIB)**

The additional class notation COMF-VIB is assigned to ships satisfying specific levels of vibration. The assessment of vibration is carried out through measurements during harbour and sea trials.

The notation is completed by a grade:

• **1**, **2** or **3** for an evaluation based on overall frequency criteria, or

• **1PK**, **2PK** or **3PK** for an evaluation based on single amplitude peak criteria.

The grade represents the comfort level achieved for the assignment of the notation. The lower grade (1 or 1PK) corresponds to the higher class of comfort.

Example:

COMF-VIB 1PK

5.4.4 High comfort level with regard to noise **(COMF+)**

The additional class notation COMF+ is assigned to yachts satisfying specific levels of noise.

The requirements of notations COMF-NOISE have to be fulfilled prior to assigning the notation COMF+.

This notation COMF+ deals with additional criteria in view to evaluate higher standard comfort level than COMFNOISE.

These additional criteria are to be selected among the following performance indexes:

• Sound insulation index

• Impact index

• Emergence

• Intermittent noise

• Intelligibility.

The additional class notation COMF+ is to be completed by the selected performance indexes. Example:

COMF + /Impact index /Intermittent noise /Intelligibility

This notation is assigned only to ships having the service notation yacht or charter yacht .

Note 1: The additional class notation COMF+ may also be applied to ships assigned with the service notation Passenger ship after special consideration.

5.4.5 Comfort for passenger and crew areas

The additional class notations **COMF-NOISE-Pax**, **COMFNOISE- Crew**, followed by grade 1, 2 or 3 and COMF-VIBPax and COMF-VIB-Crew, followed by grade 1, 2 or 3 or 1PK, 2PK or 3PK are assigned to ships satisfying levels of noise / vibration defined in Part E, Chapter 6, for passenger or crew area, as applicable.

Example: COMF-VIB-Crew 3

5.5 Pollution prevention

5.5.1 General

The notations dealt with under this heading are assigned to ships fitted with equipment and arrangements enabling them to control and limit the emission of polluting substances in the sea and the air.

5.5.2 Pollution prevention **(CLEANSHIP (C))**

The additional class notation CLEANSHIP (C) may be assigned to ships complying with the specific requirements.

5.5.3 Pollution prevention **(CLEANSHIP)**

The additional class notation CLEANSHIP is assigned to ships fitted with required equipment and arrangements.

5.5.4 Pollution prevention **(CLEANSHIP SUPER)**

The additional class notation CLEANSHIP SUPER is assigned to ships fitted with required equipment and arrangements.

5.5.5 Advanced Wastewater Treatment **(AWT)**

The additional class notations CLEANSHIP AWT and CLEANSHIP SUPER AWT are assigned when, in addition to the above, the ship is fitted with an Advanced Wastewater Treatment.

The additional class notations CLEANSHIP and CLEANSHIP SUPER are followed by the number of consecutive days the ship is able to operate with the full complement of on-board personnel, including crew and passengers, without the need for discharging any substances into the sea. This number cannot be less than one day (24 hours). If this period is longer than seven days, notation 7+ is appended to the additional class notations CLEANSHIP and CLEANSHIP SUPER.

Examples:
CLEANSHIP 1
CLEANSHIP SUPER 3
CLEANSHIP 7+ AWT
CLEANSHIP SUPER 7 AWT

5.6 Refrigerating installations

5.6.1 General

The notations dealt with under this heading are relevant to refrigerating installations fitted on board ships, including machinery and storing equipment or arrangements.

5.6.2 Refrigerating installations for cargo **(REF CARGO)**

The additional class notation REF-CARGO is assigned to ships fitted with refrigerating plants and holds intended to carry cargoes, with the condition that the number and the power of the refrigerating units are such that the specified temperatures can be maintained with one unit on standby.

5.6.3 Refrigerating installations for insulated containers **(REF-CONT)**

The additional class notation REF-CONT is assigned to ships fitted with refrigerating plants intended to supply refrigerated air to insulated containers carried in holds of container ships.

5.6.4 The above may also be completed by the following notations:

a) -**PRECOOLING** when the refrigerating plants are designed to cool down a complete cargo of fruit and/or vegetables to the required temperature of transportation

b) -**QUICKFREEZE** for the refrigerating plants of fishing vessels and fish factory ships where the design and equipment of such plants have been recognised suitable to permit quick-freezing of fish in specified conditions

c) -**AIRCONT** when the refrigerating plants are equipped with controlled atmosphere installations.

5.7 **Navigation in ice and polar waters**

5.7.1 The notations dealt with are relevant to ships strengthened for navigation in ice in accordance with the “Finnish-Swedish Ice Class Rules 1985 as amended”.

These requirements reproduce the provisions of the Finnish- Swedish Ice Class Rules.

5.7.2 The following additional class notations are assigned:

- **ICE CLASS IA SUPER** for ships with such structure, engine output and other properties that they are normally capable of navigating in difficult ice conditions without the assistance of icebreakers
- **ICE CLASS IA** for ships with such structure, engine output and other properties that they are capable of navigating in difficult ice conditions, with the assistance of icebreakers when necessary
- **ICE CLASS IB** for ships with such structure, engine output and other properties that they are capable of navigating in moderate ice conditions, with the assistance of icebreakers when necessary
- **ICE CLASS IC** for ships with such structure, engine output and other properties that they are capable of navigating in light ice conditions, with the assistance of icebreakers when necessary.

5.7.3 The additional class notation **ICE CLASS ID** is assigned to ships whose reinforcements for navigation in ice are different from those required for the assignment of the notations defined in 5.7.2.

5.7.4 The additional class notation ICE is assigned to ships whose reinforcements for navigation in ice are similar but not equivalent to those required for the assignment of the notations defined in 5.7.2 and 5.7.3, when this has been specially considered by the Society.

5.7.5 The notations dealt with are relevant to ships intended for navigation in ice-infested polar waters, except icebreakers.

The following additional class notations are assigned:

- **ICE CLASS 1** for year-round operations in all polar waters
- **ICE CLASS 2** for year-round operations in moderate multi-year ice conditions
- **ICE CLASS 3** for year-round operations in secondyear ice which may include multi-year ice conditions
- **ICE CLASS 4** for year-round operations in thick firstyear ice which may include old ice inclusions
- **ICE CLASS 5** for year-round operations in medium first-year ice which may include old ice inclusions
- **ICE CLASS 6** for summer/autumn operations in medium first-year ice which may include old ice inclusions
- **ICE CLASS 7** for summer/autumn operations in thin first-year ice which may include old ice inclusions.

5.8 Lifting appliances

5.8.1 Ships fitted with lifting appliances meeting the requirements of the Rules for the Classification and the Certification of Cranes onboard Ships and Offshore Units may be assigned the following additional class notations:

a) **ALP** for appliances intended to be used at harbour, for loading or unloading cargoes, equipments, spare parts or consumable

b) **ALM** for appliances intended to be used in offshore conditions for various lifting operations exclusive of the appliances mentioned in item a)

c) **ALS** for lifting appliances intended to be used at sea for launching and recovering diving devices.

Note 1: Ships fitted with lifting appliances used in harbour or in similar conditions for lifting operations other than ships loading or unloading may be assigned the additional service notation ALP.

5.8.2 The additional class notations (ALP), (ALM), (ALS) may be assigned by the Society in lieu of the notations ALP, ALM, ALS respectively, when the corresponding lifting appliances meet the requirements of specific National Regulations under the conditions defined in Rule.

5.8.3 The additional class notations ALP, ALM, ALS, (ALP), (ALM) or (ALS) are optional. However, the Society may require the compliance of lifting appliances with the assigning conditions of one of the above mentioned additional class notations for the classification of ships, when one or several lifting appliances are of a primary

importance for their operation, or when such appliances significantly influence their structure. As a rule, such is the case for the shear leg pontoons, crane pontoons, crane vessels, supporting ships for diving devices and when the lifting appliances concerned have special high capacities, for example in case of ships specially equipped for handling very heavy loads.

5.8.4 These notations are assigned a construction mark as defined in 2.

Note 1: Rules for the Classification and Certification of Lifting Appliances of ships and offshore units are applicable to derricks including union purchase use.

5.9 Other additional class notations

5.9.1 Strengthened bottom

The additional class notation **STRENGTHBOTTOM** may be assigned to ships built with specially strengthened bottom structures so as to be able to be loaded and/or unloaded when properly stranded.

5.9.2 Loading by grabs

The additional class notation **GRABLOADING** may be assigned to ships with hold tank tops specially reinforced for loading/unloading cargoes by means of grabs or buckets.

However, this does not preclude ships not assigned with this notation from being loaded / unloaded with grabs.

Note 1: This additional class notation may only be assigned to ships with the service notation general cargo ship (intended to carry dry bulk cargoes), bulk carrier , ore carrier, combination carrier/ OBO or combination carrier/OOC.

5.9.3 Loading by grabs for bulk carriers subject to the Common Structural Rules for Bulk Carriers

The additional class notation **GRAB [X]** is assigned to ships with holds designed for loading/unloading by grabs having a maximum specific weight up to [x] tons.

The additional class notation GRAB [X] is mandatory for ships having one of the additional service features BC-A or BC-B. For these ships, the requirements for the GRAB [X] notation are to be complied with for an unladen grab weight X equal to or greater than 20 tons.

For all other ships subject to the Common Structural Rules for Bulk Carriers, the additional class notation GRAB [X] is voluntary.

It is to be noted that this additional class notation does not negate the use of heavier grabs, but the owner and operators are to be made aware of the increased risk of local damage and possible early renewal of inner bottom plating if heavier grabs are used regularly or occasionally to discharge cargo.

5.9.4 In-water survey

The additional class notation **INWATERSURVEY** may be assigned to ships provided with suitable arrangements to facilitate the in-water surveys.

5.9.5 Single point mooring

The additional class notation **SPM** (Single Point Mooring) may be assigned to ships fitted with a specific mooring installation.

5.9.6 Container lashing equipment

The additional class notation **LASHING** may be assigned to ships initially fitted with mobile container lashing equipment which has been documented, tested and checked.

This notation is assigned only to ships having the service notation container ship or the additional service feature equipped for carriage of containers.

5.9.7 Dynamic positioning

The additional class notation **DYNAPOS** may be assigned to ships equipped with a dynamic positioning system.

5.9.8 Vapour control system

The additional class notation **VCS** (Vapour Control System) may be assigned to ships equipped with cargo vapour control systems. The notation -**TRANSFER** is added to the notation where, in addition, the ship is fitted with specific arrangements for transferring cargo vapours to another ship.

This notation is assigned only to ships having the service notation oil tanker, combination carrier/OBO, combination carrier/OOC, liquefied gas carrier, chemical tanker or FLS tanker.

5.9.9 Cofferdam ventilation

The additional class notation **COVENT** may be assigned to ships having cofferdams in the cargo area which can be used as ballast tanks and which may be ventilated through a fixed ventilation system.

This notation is assigned only to ships having the service notation bulk carrier, ore carrier, oil tanker, combination carrier/OBO, combination carrier/OOC, liquefied gas carrier, chemical tanker or **FLS tanker**.

5.9.10 Centralized cargo control

The additional class notation **CARGOCONTROL** may be assigned to ships (carrying liquid cargo in bulk) equipped with a centralized system for handling cargo and ballast liquids.

In principle, this notation is assigned only to ships having the service notation oil tanker, combination carrier/OBO, combination carrier/OOC, chemical tanker or FLS tanker.

5.9.11 Ship maneuverability

The additional class notation **MANOVR** may be assigned to ships complying with the requirements related to maneuvering capability.

Note 1: According to Resolution MSC.137 (76), these provisions are to be applied to ships of all rudder and propulsion types, of 100 m in length and over, and to chemical tankers and gas carriers regardless of the length, which were constructed on or after 1 January 2004.

5.9.12 Ship subdivision and damage stability

The additional class notation **SDS** may be assigned to ships for which a damage buoyancy, subdivision and stability file has been examined and found to satisfy the requirements given in Part 3, Ch. 3, Sec. 3.

An attestation of compliance may be issued to the Interested Party, specifying the rules and criteria considered for the examination of the file.

Note 1: As a rule, class assigned to a ship does not cover requirements applicable to the assignment of the notation SDS.

5.9.13 Ships operating in cold weather conditions

The additional class notation **COLD (H t_{DH} , E t_{DE})** may be assigned to ships intended to operate in cold weather conditions and fitted with arrangements for de-icing.

where t_{DH} and t_{DE} are defined, respectively for hull and equipment, by:

t_{DH} : Design temperature, in °C, to be considered for the hull, provided by the ship designer

t_{DE} : Design temperature, in ° C, to be considered for the equipment, provided by the ship designer.

5.9.14 Green passport for ship recycling

The additional class notation **GREEN PASSPORT** may be assigned to ships for which requirements intended to facilitate ship recycling have been applied, encompassing the identification, quantification and localization of materials which may cause harm to the environment and people when the fittings or equipment containing such materials are removed, or when the ship is recycled.

5.9.15 Efficient washing of cargo tanks

The additional class notation **EWCT** may be assigned to ships fitted with washing arrangements complying with the requirements.

5.9.16 Protected FO tank

The additional class notation **PROTECTED FO TANK** may be assigned to ships with an aggregate oil fuel capacity of less than 600 m^3, fitted with oil fuel tanks complying with the requirements.

5.9.17 Sealed liquefied natural gas carrier

The additional class notation **IATP** (increased admissible cargo tank pressure) may only be assigned to ships having the service notation liquefied gas carrier and intended to carry methane (LNG) whose maximum cargo tank design pressure does not exceed 70 kPa and that are designed and built so as to allow the pressure in the tanks to increase above 25 kPa.

5.9.18 Enhanced fire protection for cargo ships and tankers **(EFP-AMC)**

The additional class notation **EFP-A** or **EFP-M** or **EFP-C** or **EFP-AMC** may be assigned to ships fitted with enhanced fire safety protection in, respectively, accomodation spaces or machinery spaces or cargo areas or all these spaces and areas.

This notation is assigned only to ships having the service notations (Cargo ships), or (Bulk, ore and combination carriers), or (Ships carrying liquid cargo in bulk).

5.9.19 Ballast Water Management

The additional class notation **BWM** may be assigned to ships complying with the specific requirements of the International Convention for the Control and Management of Ships' Ballast Water and Sediments

5.10 Other notations

5.10.1 The Society may also define other notations by means of provisional requirements and guidelines, which may then be published in the form of tentative rules.

Section 4 Rules for Classification

1 Application of Rules

1.1 General

1.1.1 These Rules are applicable to self-propelled steel vessels intended for unrestricted ocean service, except where specifically mentioned otherwise. These requirements are applicable to those features that are permanent in nature and can be verified by plan review, calculation, physical survey or other appropriate means. Any statement in the Rules regarding other features is to be considered as guidance to the designer, builder, Owner, et al.

1.1.2 When a ship is assigned a specific Character of Class by ACS it implies that ACS has been satisfied that the said ship meets, for this particular class, with these Rules and Regulations or requirements equivalent thereto for both hull and machinery. The ship will continue to be classed with ACS so long as she is found, upon examination at the prescribed annual and periodical surveys, to be maintained in a fit and efficient condition and in accordance with the Periodical Survey requirements of these Rules. Classification will be conditional upon compliance with ACS requirements for both hull and machinery.

1.2 Application

The application of the Rules is, in general, based on the contract date for construction between the shipbuilder and the prospective owner.

2 Effective Date of Rule Change

2.1 Effective Date

Changes to the Rules are to become effective on the date specified by the ACS. In general, the effective date of the revised version of the rules is not less than six months from the date on which The Technical Committee approves them. However, the ACS may bring into force individual changes before that date if necessary or appropriate. The effective date of changes to the Rules can be found in the Introduction to the ACS publication, “Notices and General Information”, that is published with the Rules.

2.2 Implementation of Rule Changes

2.2.1 General

In general, until the effective date, plan approval for designs will follow prior practice unless review under the latest Rules is specifically requested by the party signatory to the application for classification.

2.2.2 Unless directed otherwise by ACS, no new Regulations or amendments to the Rules relating to the character of classification or class notation is to be applied to the existing vessels.

2.2.3 Unless directed otherwise by ACS, no new Rules and Regulations or amendments to the existing Rules & Regulations become applicable within 6 months after the date of issue nor after the approval of original midship section or equivalent structural plans. Where it is proposed to use existing previously approved plans for a new contract, written application is to be made to ACS.

2.2.4 Date of Contract for Construction

The date of "contract for construction" of a vessel is the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. The date is required to be indicated on the form, "Application of Request for Classification".

2.2.5 Sister Vessels and Optional Vessels

The date of "contract for construction", as defined of a series of sister vessels, including specified optional vessels for which the option is ultimately exercised, is the date on which the contract to build the series is signed between the prospective owner and the shipbuilder.

A "series of sister vessels" are vessels built to the same approved plans for classification purposes, however, sister vessels may have minor design alterations provided such alterations do not affect matters related to classification. The "optional vessels" will be considered part of the same series of sister vessels if the option is exercised not later than one year after the contract to build the series was signed.

2.2.6 Additional Optional Vessels

If a contract for construction is later amended to include additional vessels or additional options, the date of "contract for construction" for such vessels is the date on which the amendment to the contract is signed between the prospective owner and the shipbuilder. However, the date should not be one month sooner than the date of official request made by the shipbuilder to ACS. The amendment to the contract is to be considered as a "new contract".

2.3 Interpretations of the Rules

2.3.1 The correct interpretation of the requirements contained in the Rules and other Regulations is the sole responsibility and at the sole discretion of ACS.

3 Novel Features

Vessels which contain novel features of design in respect of the hull, machinery or equipment to which the provisions of these Rules are not directly applicable may be classed, when approved by the Technical Committee, on the basis that these Rules, insofar as applicable, have been complied with and that special consideration has been given to the novel features based on the best information available at the time.

4 Alternatives

4.1 General

The Committee is at all times ready to consider alternative arrangements and scantlings which can be shown, through either satisfactory service experience or a systematic analysis based on sound engineering principles, to meet the overall safety and strength standards of the Rules.

4.2 National Regulations

The Committee will consider special arrangements or details of hull, equipment or machinery which can be shown to comply with standards recognized in the country in which the vessel is registered or built, provided they are not less effective.

4.3 Other Rules

The Committee will consider hull, equipment or machinery built to the satisfaction of the Surveyors of the ACS in accordance with the plans that have been approved to the Rules of another recognized classification society with verification of compliance by the ACS. A notation will be entered in the Record indicating that classification has incorporated the provisions of this paragraph.

Alternatives to detailed requirements in the rules may be accepted when the overall safety and reliability level is found to be equivalent or better than that of the rules. Approval may be revoked if subsequent information indicates that the chosen alternative is not satisfactory.

If detailed requirements are not prescribed in the rules, the Society may consider the safety and reliability level of a proposed solution, or require clarification to resolve the issue.

The Society reserves the right to accept or reject proposed solutions without justification.

The Society reserves the exclusive right to interpret, decide equivalence or make exemptions to the rules.

5 Type Approval Program

5.1 General

The scope of classification requires that specified materials, components and systems intended for the vessel are certified according to the classification rules. The objective of certification shall ensure that materials, components and systems used in vessels to be classed by the Society comply with the rule requirements.

Certification normally includes both plan approval and survey during production and/or of the final product.

The applicable chapters of the rules define the extent of the certification that is required for classification.

Quality control of materials, components and systems, shall be traceable and documented in writing. Further, quality control shall be carried out by qualified personnel at facilities and with equipment suitable for that control.

Certification of materials, components and systems will be documented by the following types of documents:

1) ACS Certificate (ACC):

A document validated and signed by a surveyor of the Society stating:

- conformity with rule requirements
- that tests are carried out on the certified product itself and/or
- that tests are made on samples taken from the certified product itself
- that tests are performed in presence of the surveyor or in accordance with special agreements.

2) Works Certificate (ACW):

A document signed by the manufacturer stating:

- conformity with rule requirements
- that tests are carried out on the certified product itself and/or
- that tests are made on samples taken from the certified product itself
- that tests are witnessed and signed by a qualified department of the manufacturers.

3) Test Report (TR):

A document signed by the manufacturer stating:

- conformity with rule requirements
- that tests are carried out on samples from the current production.

The applicable chapters and sections of the rules specify which of the above mentioned documents are required.

Where the rules require works certificate or test report, the surveyor may at any time require the tests to be carried out in his presence and/or that the surveyor check elements of the production control.

For identification and traceability, certified products shall be marked in accordance with the description given in the product certificate and as specified by the applicable chapters of the rules.

For certain components and systems the certification will be based on defined internationally acceptable standards and certification schemes as defined in applicable chapters of the rules. Compliance with the requirements of the standard shall be documented as required by that standard.

To ensure an efficient, cost effective and correct certification process, a certification agreement shall normally be established between the Society and the manufacturer of ACS certified products. Such agreement may be part of a manufacturing survey arrangement and shall include information on the procedures for plan approval and survey and to specify information that shall be transferred between the customer and the Society.

5.2 Plan Approval / Type approval

The plan approval of materials, components and systems shall either be on a case by case basis or follow the procedure for type approval.

When the case by case procedure is used, documentation of the design shall be submitted for approval for each application as required in the applicable chapters of the rules.

A plan approval letter or design verification report will be issued by the Society when compliance with the requirements for the design has been confirmed.

Type approval is a procedure for plan approval. Type approval can be applied to:

- products
- groups of products
- systems
- retention survey.

This procedure should normally be used for approval of standard designs.

The type approval procedure may consist of the following elements:

- plan approval
- initial survey
- type testing
- issue of a type approval certificate.

When the type approval procedure is used, the following shall be submitted for approval as required in type approval programmes and the applicable chapters of the rules:

- documentation of the design
- results of type testing normally witnessed by a surveyor.

A type approval certificate will be issued by the Society when compliance with the design requirements is confirmed.

The type approval certificate has a validity of 1 year from the date of issue.

For certain products and systems as defined in applicable chapters of the rules, only type approval is required. For these products and systems no survey is required, i.e. no product certificate is required.

For certain products and systems as defined in the applicable chapters of the rules, type approval is a mandatory procedure for plan approval.

Products and systems manufactured for stock shall normally be type approved.

For type approved products, where the basis for approval is the rules of the Society, plans and technical descriptions of the product need not be submitted for approval for each vessel unless otherwise stated as a condition on the type approval certificate. In such cases only the arrangement or system plans, interface plans and those plans

mentioned on the type approval certificate shall be submitted for approval.

5.3 Survey

The survey of materials, components and systems shall either be on a case by case basis or on the basis of an established manufacturing survey arrangement (MSA).

When the case by case procedure is used, the survey shall be performed on the basis of approved design documentation for the actual application and as required in the applicable chapters of the rules. Compliance with the approved design documentation and applicable requirements will be documented by certificates as required in the applicable chapters of the rules.

When the survey is based on an MSA, the survey shall be performed on the basis of approved design documentation, applicable rule requirements and in accordance with requirements and procedures laid down in the MSA. Compliance with the approved design documentation and applicable requirements shall be documented by certificates as specified in the MSA and/or as required in the applicable chapters of the rules.

When the procedures and processes of a manufacturer's quality system meet the requirements of the rules, a manufacturing survey arrangement (MSA) may be established with the manufacturer as an alternative to the survey described in the applicable rule chapters.

The MSA shall be described in a document stating the requirements, scope, acceptance criteria, documentation and the roles of the Society and the manufacturer in connection with the survey.

When it is agreed through an MSA that the majority of the required surveys and test are completed without the presence of a surveyor, it required that the manufacturer has in operation a quality system certified by an accredited certification body to ISO 9001, or equivalent.

When establishing an MSA, an initial assessment of the manufacturer's ability to control product quality and to comply with the scope, requirements and criteria laid down in the MSA will be performed.

The extent and frequency of periodical assessments of the manufacturer will be included in the MSA.

A MSA is normally given a validity of 4 years. When the MSA is based on a certified quality system, the MSA automatically becomes invalid if the quality system certificate no longer is valid.

5.4 Suspension and Withdrawal of Certificates

A product certificate, type approval certificate or approval of manufacturer certificate may be suspended or withdrawn at any time if the Society finds it justified.

The decision to suspend or withdraw a certificate is made by the Society.

Suspension or withdrawal of a certificate may take effect immediately or after a specified period of time. In special cases, the withdrawal of a certificate may be made with retroactive effect.

When a certificate is suspended or withdrawn the Society will:

- notify the customer in writing
- make the information publicly available.

In the cases of suspension, a time limit will be given for when the certificate will be withdrawn.

Section 5 Other Regulations

1 General

While the Rules cover the requirements for the classification of new vessels, the attention of Owners, designers, and builders is directed to the regulations of international, governmental, canal, and other authorities dealing with those requirements in addition to or over and above the classification requirements.

2 International Conventions or Codes

Where authorized by the Administration of a country signatory thereto and upon request of the Owners of a classed vessel or one intended to be classed, the ACS will survey a new or existing vessel of the applicable size for compliance with the provisions of International Conventions or Codes as specified in Chapter 1, Section 1, 1.4.

3 Governmental Regulations

Where authorized by a government agency and upon request of the Owners of a classed vessel or one intended to be classed, the ACS will survey and certify a new or existing vessel for compliance with particular regulations of that government on their behalf.

All work performed on behalf of governments shall be governed by the terms and conditions of these Rules unless the government specifies otherwise.

Section 6 Submissions of Plans

1 Hull Plans

Plans showing the scantlings, arrangements and details of principal parts of the hull structure of each vessel to be built under survey are to be submitted and approved before the work of construction is commenced. These plans are to indicate clearly the scantlings details of welding, and they are to include such particulars as the design draft and design speed. Where provision is to be made for any special type of cargo or for any exceptional conditions of loading, whether in ballast or with cargo, particulars of the weights to be carried and of their distribution are also to be given. In general, the following plans are to be submitted for review or reference.

Vessel Specifications	Bow framing
General Arrangement	Stem
Midship section	Stern framing
Scantling profile and decks	Stern frame and rudder
Bottom construction, floors, girders, etc.	Shaft struts
Framing plan	Spectacle frames and bossing details
Inner bottom plating	Docking plan
Shell expansion	Hatches and hatch-closing arrangements
Deck plans	Ventilation system on weather decks
Pillars and girders	Capacity plan
Watertight and deep-tank bulkheads	Lines and body plan
Miscellaneous no tight bulkheads which are used as structural supports	Superstructures and deckhouses, and their closing arrangements
Shaft tunnels	Anchor handling arrangements
Machinery casings, boiler engine and main auxiliary foundations	

Plans should generally be submitted in triplicate, one copy to be returned to those making the submission, one copy for the use of the Surveyor where the vessel is being built, and one copy to be retained in the ACS Technical office for record. Additional copies may be required where the required attendance of the Surveyor is anticipated at more than one location.

2 Machinery Plans and Data

Plans showing the boilers, main propulsion engines, reduction gears, shafting and thrust bearing foundations, including holding-down bolts; also machinery general arrangement, installation and equipment plans, are to be submitted and approved before proceeding with the work.

3 Additional Plans

Where certification of some documents, plans, etc is requested, submission of additional plans and calculations may be required.

Section 7 Conditions for Surveys after Construction

1 Damage, Failure and Repair

1.1 Examination and Repair

1.1.1 Any repairs to the hull, machinery and equipment either as a result of damage or wear and tear which are required for the maintenance of ship's class are to be carried out under the inspection of and to the satisfaction of the Surveyors.

1.1.2 Where a vessel is damaged to an extent resulting in towage outside port limits, it shall be the Owners' responsibility to notify ACS at the first practicable opportunity.

1.1.3 Where such repairs are effected at a port where there is no Surveyor of ACS, the ship is to be surveyed by one of its Surveyors at the earliest opportunity.

1.1.4 Where repairs to hull, machinery or equipment, which affect or may affect classification, are to be carried out by a riding crew, they are to be planned in advance. A complete repair procedure including the extent of proposed repairs and the need for Surveyor's attendance during the voyage is to be submitted to and agreed upon by the Surveyor reasonably in advance. Failure to notify ACS, in advance of the repairs, may result in suspension of the vessel's class.

1.2 Alterations

1.2.1 Any alterations proposed to be carried out to approved scantlings and arrangements of the hull, machinery or equipment are to meet with the approval of ACS and for this purpose plans and technical particulars are to be submitted for approval in advance. Such approved alterations are to be carried out under the inspection of, and to the satisfaction of, the Surveyors.

1.3 Suspension of Classification

Failure to submit a damage, failure, deterioration or repair to a Surveyor for examination at first opportunity, or failure to notify the ACS in advance of the repairs contemplated may result in suspension of the vessel's classification from the date of arrival at the first port of call after the initial damage, failure, deterioration or repair until such time as the damage, failure or deterioration is repaired to the Surveyor's satisfaction, or the repair is redone or evidence submitted to satisfy the Surveyor that the repair was properly carried out.

1.4 Representation

Nothing contained in this section or in a rule or regulation of any government or other administration, or the issuance of any report or certificate pursuant to this section or such a rule or regulation is to be deemed to enlarge upon the representations expressed and the issuance and use of any such reports or certificates are to be governed in all respects by ACS.

2 Notification and Availability for Survey

The Surveyors are to have access to classed vessels at all reasonable times. For the purpose of Surveyor Monitoring, monitoring Surveyors shall also have access to classed vessels at all reasonable times. Such access may include attendance at the same time as the assigned Surveyor or during a subsequent visit without the assigned Surveyor. The Owners or their representatives are to notify the Surveyors on all occasions when a vessel can be examined in dry dock or on a slipway.

The Surveyors are to undertake, with adequate notification, all surveys on classed vessels upon request of the Owners or their representatives and are to report thereon to the Committee. Should the Surveyors find occasion during any survey to recommend repairs or further examination, notification is to be given immediately to the Owners or their representatives in order that appropriate action may be taken. The Surveyors are to avail themselves of every convenient opportunity for carrying out periodical surveys in conjunction with surveys of damages and repairs in order to avoid duplication of work.

The Owners or their representatives are responsible for establishing and maintaining safe working conditions in accordance with applicable safety standards and for providing Surveyors with safe access to sites and assistance during construction, repairs, testing and trials. Surveyors shall comply with Owner's safety procedures to the extent such procedures are communicated to them. If the Surveyors feel the proposed working conditions are unsafe, they may refuse to attend the work site.

3 Notification of Port State Detention

The Owners or their representatives are to notify ACS on all occasions when a vessel is being detained by a Port State Authority, or the Flag Administration has found deficiencies which affect the vessel's class or other Statutory Certificates issued by ACS. This notification shall be provided prior to the vessel's departure in order that a Surveyor may attend and carry out a survey for the purpose of assessing and insuring the correction, if necessary, of the reported deficiencies or other matters which affect or may affect classification or the validity of Statutory Certificates issued by ACS. If Surveyors are not able to attend for any reason, ACS will notify the Owner to arrange for attendance in the next port of call. Should an Owner not notify ACS of a detention, then ACS reserves the right to suspend or cancel classification of the vessel or invalidate the applicable Statutory Certificate.

4 Attendance at Port State Request

It is recognized that Port State authorities legally may have access to a vessel. In cooperation with Port States, ACS Surveyors will attend onboard a classed vessel when so requested by a Port State, and upon concurrence by the vessel's master will carry out a survey in order to facilitate the rectification of reported deficiencies or other discrepancies that affect or may affect classification. ACS Surveyors will also cooperate with Port States by providing inspectors with background information, if requested. Such information includes text of conditions of class, survey due dates and certificate expiration dates.

5 Attendance at ACS Request

As a result of Port State deficiencies, the ACS may request an unscheduled survey be carried out to confirm conditions onboard. Should an Owner not allow ACS onboard to conduct an unscheduled survey, then the ACS classification of the vessel will be suspended or cancelled.

6 Safety Management System

It is recognized that a Safety Management System is a positive mechanism for managing maintenance of compliance with classification requirements on vessels subject to compliance with the International Safety Management (ISM) Code, as defined in SOLAS IX/1.1. If during any survey the attending ACS Surveyor finds evidence that the required safety management system is not in operation or functioning as required by the Code, this will be communicated to the relevant flag administration or the organization which issued the safety management certificate on behalf of the flag administration for their consideration and action.

Section 8 Fees

Fees, in accordance with normal ACS practice, will be charged for all services rendered by the ACS. Expenses incurred by the Surveyors in connection with these services are normally charged in addition to the fees. However, in some special circumstances and at the discretion of the society these expenses may be included in the classification fees. Fees and expenses will be billed to the customer requesting that particular service.

Section 9 Disagreement

1 Rules

Any disagreement regarding either the proper interpretation of the Rules or translation of the Rules from the English language edition is to be referred to the ACS for resolution.

2 Surveyors

In case of disagreement between the Owners or builders and the Surveyors regarding the material, workmanship, extent of repairs or application of the Rules relating to any vessel classed or proposed to be classed by the ACS, an appeal may be made in writing to the Committee, who will order a special survey to be held. Should the opinion of the Surveyor be confirmed, the expense of this special survey is to be paid by the customer appealing.

Section 10 Limitation of Liability

1.1 Whilst ACS and its Board/ Committee use their best endeavors to ensure that the functions of ACS are properly carried out, in providing services, information or advice, neither ACS nor any of its servants or agents warrants the accuracy of any information or advice supplied. Except as set out herein, ACS nor any of its servants or agents (on behalf each of whom ACS has agreed this clause) shall be liable for any loss damage or expense whatever sustained by any person due to any act or omission or error of whatsoever nature and howsoever caused of ACS, its servants or agents or due to any inaccuracy of whatsoever nature and howsoever caused in any information or advice given in any way whatsoever by or on behalf of ACS, even if held to amount to a breach of warranty. Nevertheless, if any person uses services of ACS, or relies on any information or advice given by or on behalf of ACS and suffers loss, damage or expenses thereby which is proved to have been due to any negligent act omission or error of ACS, its servants or agents or any negligent inaccuracy in information or advice given by or on behalf of ACS, then ACS will pay compensation to such person for his proved loss up but not exceeding the amount of the fee charged by ACS for that particular services, information or advice.

1.2 Any notice of claim for loss, damage or expense as referred shall be made in writing to ACS Head Office within six months of the date when the service, information or advice was first provided, failing which all the rights to any such claim shall be forfeited and ACS shall be relieved and discharged from all liabilities.

Section 11 Hold Harmless

The party requesting services hereunder, or his assignee or successor in interest, agrees to release the ACS and to indemnify and hold harmless the ACS from and against any and all claims, demands, lawsuits or actions for damages, including legal fees, to persons and/ or property, tangible, intangible or otherwise which may be brought against the ACS incidental to, arising out of or in connection with this Agreement, the work to be done, services to be performed or material to be furnished hereunder, except for those claims caused solely and completely by the negligence of the ACS, its agents, employees, officers, directors or subcontractors. The parties agree that for the purposes of the Convention on Limitation for Maritime Claims, 1976, ACS is a person for whose acts the shipowner is responsible.

Any other individual, corporation, partnership or other entity who is a party hereto or who in any may participates in, is engaged in connection with or is a beneficiary of, any portion of the services described herein shall also release the ACS and shall indemnify and hold the ACS harmless from and against all claims, demands, lawsuits or actions for damages, including legal fees, to persons and/or property, tangible, intangible or otherwise, which may be brought against the ACS by any person or entity as a result of the services performed pursuant to this Agreement, except for those claims caused solely and completely by the negligence of the ACS, its agents, employees, officers, directors or subcontractors.

Section 12 Time Bar to Legal Action

Any statutes of limitation notwithstanding, Owner's right to bring or to assert against the ACS any and all claims, demands or proceedings whether in arbitration or otherwise shall be waived unless (a) notice is received by the ACS within ninety (90) days after Owner had notice of or should reasonably have been expected to have had notice of the basis for such claims; and (b) arbitration or legal proceedings, if any, based on such claims or demands of whatever nature are commenced within 6 months of the date of such notice to the ACS.

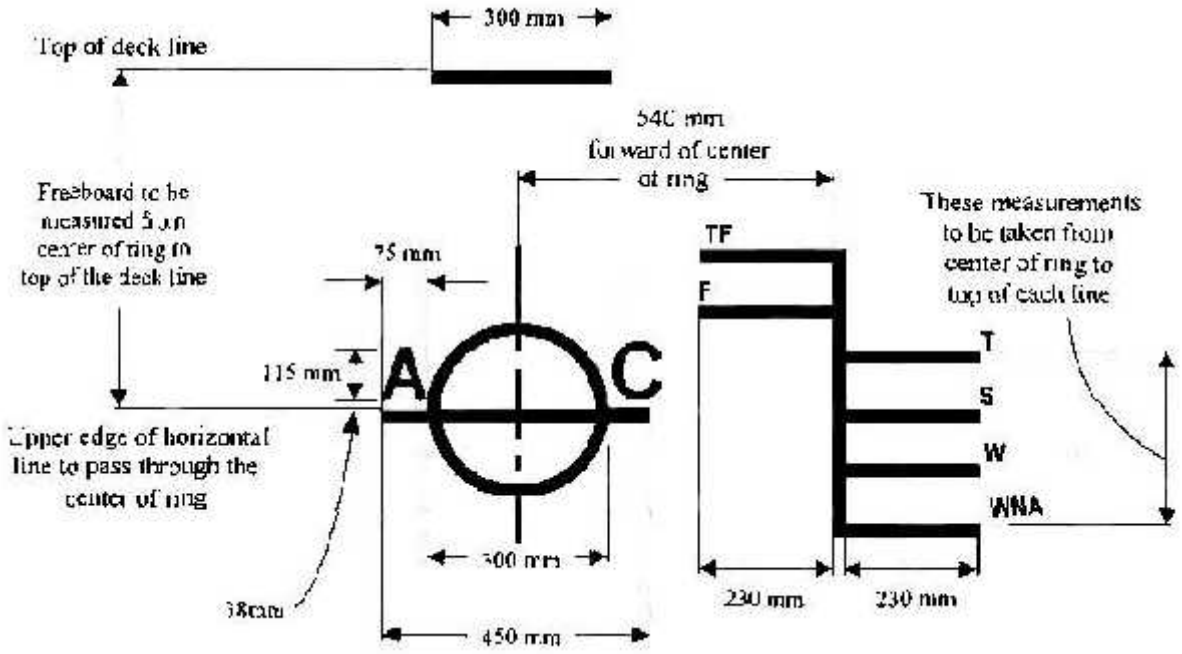
Section 13 Arbitration

Any and all differences and disputes of whatsoever nature arising out of services under these Rules shall be put to arbitration in Iran pursuant to the laws relating to arbitration there in force, before a board of there persons, consisting of one arbitrator to be appointed by the ACS, one by the Client, and one by the two so chosen. The decision of any two of the three on any point or points shall be final. Until such time as the arbitrators finally close the hearings either party shall have the right by written notice served on the arbitrators and on an officer of the other party to specify further disputes or differences under these Rules for hearing and determination. The arbitration is to be conducted in accordance with the rules of the Society of Maritime Arbitrators, Inc. in the English language. The governing law shall be the law of the Islamic Republic of Iran (I.R.I). The arbitrators may grant any relief other than punitive damages which they, or a majority of them, deem within the scope of the agreement of the parties, including, but not limited to, specific performance. Awards made in pursuance to this clause may include costs including a reasonable allowance for attorney's fees and judgment may be entered upon any award made hereunder in any court having jurisdiction.

APPENDIX 1 Load Line Marks

Load Line Markings for Ocean-going Vessels

Requests for the assignment of Load Lines are to be made on forms which will be furnished by one of the offices of the ACS.



Thickness of all lines = 25 mm

The center of the ring is to be placed on each side of the vessel at the middle of the length, as defined in the Load Line Regulations. The ring and lines are to be permanently marked, as by center punch, chisel cut or bead of weld.

AC Asia Classification Society

TF Tropical Fresh Water Allowance

F Fresh Water Allowance

T Load Line Tropical Zones

Note: for vessels registered in restricted international water TF and WNA on Load Line mark to be omitted.

Chapter 2 Survey Requirements

Section 1 General Requirements

1 General

1.1 Definitions

1.1.1 Overall examination: Examination intended to report on the overall condition of the hull structure and determine the extent of additional close-up examinations.

1.1.2 Close-up examination: Examination where the details of structural components are within the close visual inspection range of the surveyor, i.e. normally within reach of hand.

1.1.3 Spaces: Separate compartments within the hull and superstructures, including independent cargo tanks in the cargo area, not including deckhouses.

1.1.4 Representative tanks: Those tanks which are expected to reflect the condition of other tanks of similar type and service and with similar corrosion prevention systems. When selecting representative tanks account shall be taken of the service and repair history on board and identifiable critical and/or suspect areas.

1.1.5 Ballast tank: Tank used primarily for salt water ballast.

For ships with class notation ESP a ballast tank is a tank used solely for salt water ballast.

For bulk carriers with class notation ESP a space used for both cargo and salt water ballast will be treated as a ballast tank if substantial corrosion has been found in that space.

For tankers with class notation ESP a combined cargo/ ballast tank used for carriage of cargo or salt water ballast as a routine part of the ship's operation shall be treated as a ballast tank. Cargo tanks in which water ballast might be carried only in exceptional cases per MARPOL 73/78 Annex I Reg.18(3) shall be treated as cargo tanks.

1.1.6 Integral tank: Integral tank form a part of the ship's hull and are influenced in the same manner and by the same loads which stress the adjacent hull structure.

1.1.7 Independent tank: Self-supporting tank which does not form part of the ship's hull. An independent tank is built and installed in such a way that the influence on the tank by the hull's deformation and stresses is minimised. An independent tank does not contribute to the hull strength.

Independent gravity tank is a tank with design vapour pressure not exceeding 0.7 bar.

Pressure vessel is a tank with design gas or vapour pressure exceeding 0.7 bar.

1.1.8 Transverse section: Section which includes all longitudinal members such as plating, longitudinals and girders at the deck, side, bottom, inner bottom and hopper side plating, longitudinal bulkhead and bottom plating in top wing tanks, as applicable.

For transversely framed ships and for the purpose of survey requirements, a transverse section includes adjacent frames and their end connections forward and aft of the transverse section.

1.1.9 Suspect areas: Areas showing substantial corrosion and/or are considered by the

surveyor to be prone to rapid wastage.

1.1.10 Critical structural areas: Areas that have been identified from calculations to require monitoring or from the service history of the subject ship or from similar or sister ships to be sensitive to cracking, buckling or corrosion which would impair the structural integrity of the ship.

1.1.11 Substantial corrosion: Extent of corrosion such that assessment of corrosion pattern indicates a wastage in excess of 75% of allowable margins, but within acceptable limits.

For oil tankers and bulk carriers built according to IACS Common Structural Rules, substantial corrosion is an extent of corrosion such that the assessment of the corrosion pattern indicates a measured thickness between the minimum acceptable limit + 0.5 mm and the minimum acceptable limit. (IACS UR Z7, Z7.1, 7.2, Z10.1, Z10.2, Z10.3, Z10.4, Z10.5)

1.1.12 Corrosion prevention system: Normally a full hard protective coating, usually to be epoxy coating or equivalent. Other coating systems, which are neither soft nor semi-hard coatings, may be accepted provided they are applied and maintained in compliance with the manufacturer's specification.

However, as for semi-hard coatings, these coatings, if already applied, will not be accepted from the next renewal or intermediate survey commenced on or after 1 July 2010, whichever comes first, with respect to waiving the annual internal examination of the ballast tanks. (IACS UR Z7, Z7.1, Z7.2, Z10.1, Z10.2, Z10.3, Z10.4, Z10.5)

1.1.13 Coating conditions:

"GOOD" Condition with only minor spot rusting.

"FAIR" Condition with local breakdown at edges of stiffeners and weld connections and/or light rusting over 20% or more of areas under consideration, but less than as defined for POOR condition.

"POOR" Condition with general breakdown of coating over 20% or more of areas or hard scale at 10% or more of areas under consideration.

1.1.14 Prompt and thorough repair:

A permanent repair completed at the time of survey to the satisfaction of the surveyor, therein removing the need for the imposition of any associated condition of class.

1.1.15 Cargo Area: Comprises the following parts of the ship:

- all cargo holds
- all cargo tanks, slop tanks and cargo/ ballast pump rooms
- fuel tanks, cofferdams, ballast tanks and void spaces adjacent to cargo holds, cargo tanks or slop tanks
- deck areas throughout the entire length and breadth of the part of the ship over the above mentioned spaces.

1.1.16 Machinery Area: Comprises the following parts of the ship:

- engine rooms with machinery for propulsion and electrical power generation, including adjacent rooms with visual contact with the machinery
- all spaces containing boilers, other oil fired units and oil fuel units
- all other spaces containing steam and internal combustion engines, generators and major electrical machinery, oil filling stations, refrigerating, stabilizing, ventilation and air conditioning machinery, and similar spaces
- trunks to the above spaces.

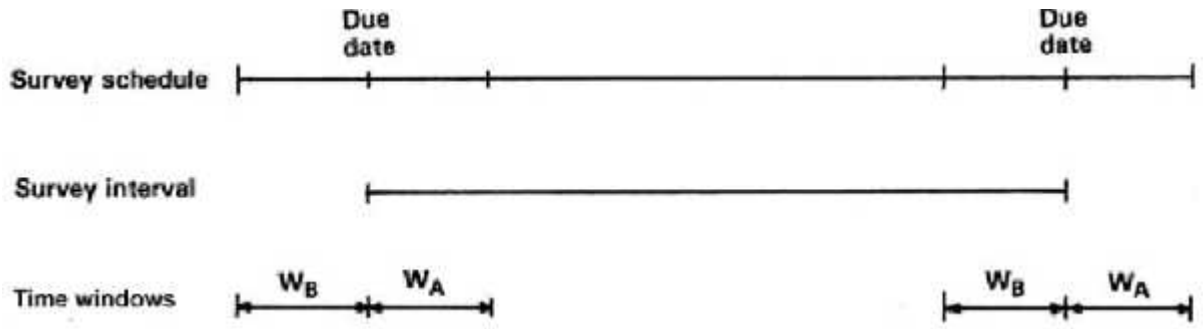
1.1.17 Concurrent surveys: Surveys required to be concurrently completed shall have the same date of completion.

A survey required to be carried out in conjunction with or carried out as part of another survey shall be completed on or before the completion of the other survey, however, within the time window for that survey.

1.1.18 Survey schedule terms:

- Survey interval
- Due date
- Time window (WB + WA)
  - WB = Time before due date
  - WA = Time after due date as illustrated in Fig. 1.1.

Fig. 1.1: Survey schedule



1.1.19 Sighting survey: A survey to confirm that the relevant construction or the equipment is in a satisfactory condition and, as far as can be judged, will remain so until the postponed survey has been carried out.

1.1.20 Significant repair: A repair where machinery is completely dismantled and re-assembled. Significant repairs will, furthermore, be cases of repairs after serious damage to machinery. For boilers, significant repair includes all work affecting the integrity of the pressurized parts (pressure envelope) of the boiler; i.e. any steel work and/or welding on boiler shells, furnaces, drums, headers, down comers, tubes and tube plates.

1.1.21 “Exceptional circumstances” means unavailability of dry-docking facilities;

unavailability of repair facilities; unavailability of essential materials, equipment or spare parts; or delays incurred by action taken to avoid severe weather conditions.

1.2 Periodical surveys

1.2.1 All ships shall be subjected to periodical surveys in accordance with requirements of this chapter in order to confirm that the hull, machinery, equipment and systems remain in satisfactory condition and in compliance with approval or accepted standards.

1.2.2 Special consideration may be given for commercial ships owned or chartered by governments, which are utilized in support of military operations or services.

1.2.3 Periodical surveys belong to one of the following categories according to the level of survey requirements:

- annual survey
- intermediate survey
- renewal survey.

The survey required in conjunction with issuance of a new class certificate is denoted:

- renewal survey.

The following specific surveys may be scheduled according to one or more of the above categories:

- bottom survey
- propeller shaft survey
- propeller connection survey
- propulsion thruster survey
- boiler survey (including steam generator survey)
- thermal oil heater survey
- survey of optional class notations.

1.2.4 Periodical surveys shall be carried out at prescribed intervals and within applicable time windows.

A survey may be split in different parts, commenced and progressed within the time window provided all the requirements of the survey are completed by the end of the time window.

Surveys for which Survey Windows (and thereby commencement) do not apply are:

- Boiler Survey
- Thermal Oil Heater Survey.

The main class intermediate survey can not serve as commencement of the next renewal survey.

For concurrent surveys, the time window may be limited by that of the other survey.

1.2.5 The due date of a periodical survey will be established depending upon the survey interval, measured from one of the following events, whichever is relevant:

- date of class assignment
- date of commissioning
- due date of the previous corresponding survey
- date of completion of the previous corresponding survey
- date of completion of a major conversion.

A survey may be commenced prior to the defined time window at owner's request. In such a case the due date of subsequent surveys will be adjusted accordingly.

1.2.6 For certain ships the survey intervals may be reduced, e.g. for ships with new or novel design or for systems or items exposed to abnormal rate of wear or failure.

1.2.7 The scope of survey may be extended when compliance with applicable rules can not be satisfactorily confirmed based on extent of surveys as given, or when the surveyor suspects that the ship is not maintained or handled in accordance with the basis for retention of class.

1.3 Survey of special equipment and systems installed

1.3.1 Ships built for a special service, with installed equipment or systems related to an optional class notation, may be subject to additional survey requirements irrespective of the optional class notation being assigned.

1.4 Postponement of periodical surveys

1.4.1 Except for annual and intermediate surveys for main class, the Society may accept to postpone periodical surveys upon special consideration in each separate case.

Postponement of main class renewal survey, boiler survey and bottom survey may be considered only in exceptional circumstances.

1.4.2 Postponement of main class renewal survey, boiler survey and bottom survey shall not exceed 3 months. Postponement of periodical surveys will not affect the survey’s next due date.

1.4.3 Postponement of the renewal survey may be granted only upon the owner's written request. Such a request shall be received by the Society well in advance of the expiry date of the classification certificate.

A postponement of the renewal survey shall normally be based on satisfactory result from a sighting survey.

1.5 Survey of ships out of commission

1.5.1 A ship put out of commission may be subject to specific requirements for maintenance of class, as specified below, provided that the Owner notifies the Society of the fact.

If the Owner does not notify the Society of the laying-up of the ship or does not implement the lay-up maintenance program, the ship’s class will be suspended and/or withdrawn when the due surveys are not carried out by their limit dates.

1.5.2 The lay-up maintenance program provides for a “laying- up survey” to be performed at the beginning of lay-up and subsequent “annual lay-up condition surveys” to be

performed in lieu of the normal annual surveys which are no longer required to be carried out as long as the ship remains laid-up. The other periodical surveys which become overdue during the lay-up period may be postponed until the re-commissioning of the ship.

1.5.3 Where the ship has an approved lay-up maintenance program and its period of class expires, the period of class is extended until it is re-commissioned, subject to the satisfactory completion of the annual lay-up condition surveys.

1.5.4 The periodical surveys carried out during the lay-up period may be credited, either wholly or in part, at the discretion of the Society, having particular regard to their extent and dates. These surveys will be taken into account for the determination of the extent of surveys required for the re-commissioning of the ship and/or the expiry dates of the next periodical surveys of the same type.

1.5.5 When a ship is re-commissioned, the Owner is to notify the Society and make provisions for the ship to be submitted to the following surveys:

- an occasional survey prior to re-commissioning, the scope of which depends on the duration of the lay-up period
- all periodical surveys which have been postponed in accordance with 1.5.2.

1.5.6 Where the previous period of class expired before the re-commissioning and was extended as stated in 1.5.3, in addition to the provisions of 1.5.5 a complete class

renewal survey is to be carried out prior to re-commissioning.

Those items which have been surveyed in compliance with the class renewal survey requirements during the 15 months preceding the re-commissioning may be credited. A new period of class is assigned from the completion of this class renewal survey.

1.6 Survey schedules

1.6.1 Annual survey schedule is as follows:

- The due date in general corresponds to the anniversary date of the class assignment or the expiry of the previous classification certificate if different.
- The survey shall normally be carried out within a time window of 3 months on either side of the due date.
- In case a main class annual survey is commenced prior to the defined time window, the survey must be completed not more than 6 months after the date of commencement. In such cases the anniversary dates for the subsequent annual surveys will be advanced, corresponding to a date not later than 3 months after the commencement of the annual survey just carried out.
- An additional main class annual survey may be required when the anniversary date has been advanced.

1.6.2 Intermediate survey schedule is as follows:

- The due date corresponds to the date 2.5 years before the expiry date of the classification certificate.

- The survey shall normally be carried out within a time window of 9 months on either side of the due date.
- The main class intermediate survey shall be completed concurrently with the second or third main class annual survey in each period of the classification certificate.
- The same surveys and thickness measurements of tanks or spaces can not be credited towards both intermediate and renewal survey. Ships that are re-commissioned after being laid-up may be specially considered.

1.6.3 Renewal survey schedule corresponds to 2.5 years, 5 years or 15 years interval as appropriate.

- The survey shall normally be carried out within a time window of 9 months before and 6 months after the due date.
- Survey required to be concurrent with the renewal survey shall be completed no later than at the completion of the renewal survey.

1.6.4 Renewal survey schedule is as follows:

- The due date is set at 5 years interval and corresponds to the expiry date of the classification certificate.
- The survey shall normally be completed within a time window of 3 months before the due date.
- The survey may be commenced at the fourth annual survey or between the fourth and fifth annual surveys.
- In case the survey is commenced more than 15 months before the expiry date of the classification certificate, the due date of the survey will be advanced to a date not later than 15 months after the commencement.
- The renewal survey shall be completed concurrently with the last main class annual survey in each period of the classification certificate.
- The same surveys and thickness measurements of tanks or spaces can not be credited towards both intermediate and renewal survey. Ships that are re-commissioned after being laid-up may be specially considered.

1.6.5 Bottom survey schedule is as follows:

a) The due date is set at intervals in accordance with the following:

- two bottom surveys are required during each five-year period of the classification certificate
- the interval between any two successive bottom surveys is in no case to exceed 36 months.

b) The survey shall be carried out on or before the due date. Time window is not applicable.

c) One bottom survey shall be carried out in conjunction with the renewal survey, i.e. not more than 15 months prior to the expiry date of the classification certificate.

d) One bottom survey shall be carried out in conjunction with the main class intermediate survey in the following cases:

- bulk carriers and tankers with class notation ESP when exceeding 10 years of age
- general cargo ships when exceeding 15 years of age.

For ships operating in fresh water and for certain harbour or non-self-propelled craft bottom survey intervals greater than that given above may be accepted.

Special consideration may be given in application of relevant bottom survey requirements for commercial vessels owned or chartered by Governments, which are utilized in support of military operations or service.

The Passenger Ship Safety Certificate, issued on behalf of (or by) a flag state, requires the bottom survey to be carried out annually.

1.6.6 Propeller shaft survey is scheduled according to renewal survey (5 years) for:

- propeller shaft with continuous corrosion resistant metallic liner or
- propeller shaft with specially approved protection arrangement or
- propeller shaft of corrosion resistant material or
- propeller shaft with approved oil sealing glands.

For propeller shaft arrangement not approved in accordance with the above, the propeller shaft survey is scheduled according to renewal survey (2.5 years).

Propeller shaft survey shall normally be carried out in conjunction with bottom survey in dry dock.

For ships with class notation MON-SHAFT the propeller shaft survey does not have a scheduled survey interval.

1.6.7 Propeller connection survey is scheduled according to renewal survey (5 years) for:

- keyed propeller connections.

Propeller connection survey is scheduled according to renewal survey (15 years) for:

- keyless propeller connections
- flanged propeller connections.

The propeller connection survey shall normally be carried out in conjunction with bottom survey in dry dock.

For ships with class notation MON-SHAFT the propeller connection survey is applicable.

1.6.8 Survey of geared and podded thrusters for propulsion, and all DYNAPOS class notations (hereafter simply collectively denoted DYNAPOS), are scheduled according to renewal survey (5 year). Podded thrusters shall also have an annual survey.

It is generally recommended that the propulsion thruster survey is carried out in conjunction with bottom survey. When the propulsion thruster survey requires the ship to be out of the water the survey shall be carried out in conjunction with bottom survey in dry dock.

1.6.9 Boiler and steam drum/steam separator survey schedule is as follows:

- The due date is set at intervals in accordance with the following:
- Two boiler surveys are required during each five-year period of the classification certificate.
- The interval between any two successive boiler surveys is in no case to exceed 36 months.

During each boiler internal survey, the adjustment of the safety valves will be assessed by an ACS surveyor.

- The survey shall be carried out on or before the due date. Time window is not applicable.
- One boiler survey shall be carried out in conjunction with the renewal survey, i.e. not more than 15 months prior to the expiry date of the classification certificate.

Ships more than 8 years old and retaining the original fitting of a single unit, the main boiler shall be surveyed annually (full scope) and within the annual survey schedule.

1.6.10 Thermal oil heater survey schedule is the same as the boiler survey schedule as stated in 1.6.9.

2 Hull and Equipment

2.1 Conditions for survey and access to structures

2.1.1 In preparation for survey and to allow for a thorough examination, all spaces and areas shall be cleaned including removal from surfaces of all loose accumulated corrosion scale. In tanks where soft coating has been applied, representative areas and those areas where it is obvious that further close-up examination is required shall be cleaned free of soft coating.

Spaces should be sufficiently clean and free from water, scale, dirt, oil residues etc. to reveal corrosion, deformation, fractures, damage, or other structural deterioration. However, those areas of structure whose renewal has already been decided need only be cleaned and descaled to the extent necessary to determine the limits of the renewed areas. For more detailed information with regard to a tank where soft coatings have been applied, see IACS Recommendation No. 44.

2.1.2 Casings, ceilings or linings, and loose insulation, where fitted, shall be removed, as required by the surveyor, for examination of plating and framing. Compositions on plating shall be examined and sounded, but need not be disturbed if found adhering satisfactorily to the plating.

In drydock or on a slipway, the ship shall be placed on blocks of sufficient height and with the necessary staging to permit the examination of elements such as shell plating including bottom and bow plating, stern frame and rudder, sea chests and valves, propeller, etc.

2.1.3 All spaces shall be made safe for access, i.e. gas freed, ventilated and illuminated, and prepared for the surveyor to examine the structure in a safe and practical way. One or more of the following means for access, acceptable to the surveyor, shall be provided:

- permanent staging and passages through structures
- temporary staging and passages through structures
- lifts and moveable platforms
- hydraulic arm vehicles such as conventional cherry pickers
- boats or rafts
- portable ladder
- other equivalent means.

For close-up examination of the cargo hold shell frames of bulk carriers, the following additional requirements apply:

a) boats or rafts may be accepted provided the structural capacity of the hold is sufficient to withstand static loads at all levels of water

b) for bulk carriers less than 100 000 dwt:

- portable ladder for examination of lower section of a shell frame including bracket may be accepted, provided the ladder is not more than 5 m in length

c) for bulk carriers 100 000 dwt and above:

- portable ladder is not accepted
- hydraulic arm vehicle such as conventional cherry picker is limited to examination of lower and middle parts of hold frames at renewal survey no. 2 and subsequent intermediate and renewal surveys.

Notwithstanding the above requirements, the use of portable ladder fitted with a mechanical device to secure the upper end of the ladder is acceptable for the close-up examination of lower section of a shell frame including bracket required at annual surveys.

2.1.4 Rafts or boats alone may be allowed for survey of the under deck areas for tanks or spaces, if the depth of the webs is 1.5 m or less.

If the depth of the webs is more than 1.5 m, rafts or boats alone may be allowed only:

a) when the coating of the under deck structure is in GOOD condition and there is no evidence of wastage or

b) if a permanent means of access is provided in each bay to allow safe entry and exit. This means:

- access direct from the deck via a vertical ladder and a small platform fitted approximately 2 m below the deck in each bay or
- access to deck from a longitudinal permanent platform having ladders to deck in each end of the tank.

The platform shall, for the full length of the tank, be arranged in level with, or above, the maximum water level needed for rafting of under deck structure. For this purpose, the ullage corresponding to the maximum water level shall be assumed not more than 3 m from the deck plate measured at the midspan of deck transverses and in the middle length of the tank.

If neither of the above conditions are met, then staging or “other equivalent means” of access shall be provided for the survey of the under deck areas.

The use of rafts or boats alone does not preclude the use of boats or rafts to move about within a tank during a survey.

Use of remote inspection technique methods to facilitate the required internal examinations, including close-up examinations and thickness measurements, may be specially considered by the Society. The methods applied shall provide the information normally obtained from a survey carried out by the surveyor.

In order to verify the results, confirmatory close-up examinations and thickness measurements at selected locations shall be carried out by the surveyor, not using the remote inspection technique method.

Proposals for use of remote inspection technique methods shall be submitted to the Society for acceptance in advance of the survey.

2.1.5 Prior to commencement of any part of the renewal and intermediate survey, a survey planning meeting shall be held between the attending surveyor(s), the master of the ship or an appropriately qualified representative appointed by the master or the owner, and, as applicable, the owner's representative in attendance and the thickness measurement company operator, so as to ensure the safe and efficient conduct of the survey work to be carried out and, where applicable, for the purpose to ascertain that all the arrangements envisaged in the survey programme are in place.

2.2 Survey extent

2.2.1 The survey consists of examination, measurements and testing as required for different survey categories with the aim to ensure that the hull structure, hull equipment and piping are in satisfactory condition with respect to corrosion, deformation, fractures, damage or other structural deterioration.

2.2.2 When examination or overall examination is required the structure or object is visually examined from a significant distance. In such cases the general maintenance, the condition of protective coating, rust deposits, leakages and structural detachments and damage may be observed and the surveyor may extend the survey as considered necessary.

2.2.3 When close-up examination is specified by the rules or required by the surveyor the structure or object is visually examined from a distance normally within reach of hand.

The surveyor may extend the close-up examination as deemed necessary taking into account the maintenance of the spaces under survey, the condition of the corrosion prevention system and where spaces have structural arrangements or details which have suffered defects in similar spaces or on similar ships according to available information.

Thickness measurements, for general assessment and recording of corrosion pattern, shall be taken of those structural members subject to close-up examination as specified by the requirements relevant for the survey or as given in 2.2.4.

2.2.4 The surveyor may require thickness measurements in any portion of the structure where signs of wastage are evident or in areas where wastage is normally found. The surveyor may extend the scope of the thickness measurements if considered necessary.

2.2.5 When thickness measurements are specified by the rules or required by the surveyor the measurements shall be carried out to an extent sufficient to determine both general and local corrosion levels.

Unless carried out by the surveyor himself, thickness measurements shall be carried out by a qualified company approved by the Society and witnessed by a surveyor. This requires the surveyor to be on board, while the measurements are taken, to the extent necessary to control the process.

Where it is required to carry out thickness measurements of structures subject to close-up examination, these measurements shall be carried out simultaneously with the close-up examination. Thickness measurements carried out afloat may be accepted provided they are accompanied by a diving report.

However, thickness measurements carried out from outside shall normally be limited to areas with restricted access from inside. The diver shall be qualified in thickness measurement and the procedure confirmed on-site, as decided by the surveyor.

For vessels which require dry docking as part of intermediate and/or renewal surveys, thickness measurements carried out afloat will require confirmatory thickness measurements at time of dry docking as decided by the surveyor.

The surveyor shall review the final thickness measurement report and countersign the cover page.

2.2.6 Where substantial corrosion is found, additional thickness measurements shall be taken to confirm the extent of substantial corrosion.

The additional measurements shall be taken in patterns corresponding to tables given in Sec.4.4, depending on ship type.

These additional thickness measurements shall be carried out before the survey is considered as completed.

2.2.7 The examination may be extended also in cases when:

- information is available of defects suffered on similar structure or details in similar tanks/holds or on similar ships
- the structure under survey has been approved with reduced scantlings due to an approved corrosion control system.

2.3 Special consideration

2.3.1 For areas in spaces where hard protective coatings are found to be in GOOD condition, the extent of close-up examination and thickness measurements may be specially considered.

Special consideration as used in this context is taken to mean, as a minimum, that sufficient close-up examination and thickness measurements are carried out to confirm the actual average condition of the structure under the protective coating.

2.4 Repair of structural damage or deterioration

2.4.1 A prompt and thorough repair, shall be carried out of any damage in association with wastage over the allowable limits (including buckling, grooving, detachment or fracture), or extensive areas of wastage over the allowable limits, which affects or, in the opinion of the surveyor, will affect the ship's structural, watertight or weathertight integrity. Areas to be considered include:

- bottom structure and bottom plating
- side structure and side plating
- deck structure and deck plating
- inner bottom structure and inner bottom plating
- watertight and oil tight bulkheads
- watertight doors
- windows and side scuttles
- inner side structure and inner side plating
- hatch covers and hatch coamings
- air pipes on the exposed decks including heads and weld connection between air pipes and deck plating
- vent piping systems including ventilators and closing devices
- bunker piping systems.

2.4.2 For locations where adequate repair facilities are not available, consideration may be given to allow the ship to proceed directly to a repair facility. This may require discharging the cargo and or temporary repairs for the intended voyage.

2.4.3 Additionally, when a survey results in the identification of corrosion or structural defects, either of which, in the opinion of the surveyor, will impair the ship's fitness for continued service, remedial measures shall be implemented before the ship continues in service.

2.5 Survey programme for ships subject to Enhanced Survey Programme (ESP)

2.5.1 The owner in co-operation with the Society shall work out a specific survey programme prior to the commencement of:

- any renewal survey
- any intermediate survey for ships over 10 years of age.

The survey programme shall be in a written format. The survey shall not commence until the survey programme has been agreed.

The survey programme at intermediate survey may consist of the survey programme at the previous renewal survey supplemented by the executive hull summary of that survey and later relevant survey reports.

The survey programme shall be worked out taking into account any amendments to the survey requirements implemented after the last renewal survey carried out.

2.5.2 The following documentation shall be collected and consulted with a view to selecting tanks, holds, areas and structural elements to be examined:

- survey status and basic ship information
- documentation on board as described in 2.6
- main structural plans, including information regarding use of high strength steel, stainless steel and clad steel
- inspections by the owner's personnel during the last 3 years with reference to structural deterioration in general, leakages in tank boundaries and piping and condition of the coating and corrosion protection system, relevant previous survey or inspection reports from the Society and the owner
- cargo and ballast history for the last 3 years, typical cargoes and carriage of cargo under heated conditions
- description and history of the coating and corrosion protection system, if any
- information regarding the relevant maintenance level during operation including port state control reports of inspection containing hull related deficiencies, Safety Management System nonconformities relating to hull maintenance, including the associated corrective action(s)
- information and other relevant data regarding conversion or modification of the ship's tanks and holds.

2.5.3 The submitted survey programme shall account for and comply with, as a minimum, the requirements for close-up examination, thickness measurements and tank testing as given for the relevant ship type.

2.5.4 The submitted survey programme is, in addition to the requirements given in 2.6.3, to include relevant information including at least:

- basic ship information and particulars
- main structural plans including information on the use of high strength steel, stainless steel and clad steel
- plan of tanks and holds
- list of tanks and holds with information on use, corrosion prevention and condition of corrosion prevention
- condition for survey such as cleaning of tanks and holds, gas freeing, ventilation, lighting, etc.
- provisions and methods for access to structures
- equipment for survey

- nomination of tanks, holds and areas for close-up examination
- nomination of sections for thickness measurements
- nomination of tanks to be tested
- damage experience related to the ship in question and, as applicable, for similar ships.

2.5.5 The extent of survey as described in the survey programme may be extended as found necessary by the Society based on the results of the survey.

2.6 Documentation on board ships subject to Enhanced Survey Programme (ESP)

2.6.1 The owner shall supply and maintain on board documentation as specified in 2.6.2 and 2.6.3. The documentation shall be kept on board for the lifetime of the ship and shall be readily available for the surveyor.

2.6.2 A survey report file consisting of:

- reports of structural surveys
- executive hull summary
- thickness measurements reports
- survey programme,

shall be available on board. The survey report file shall be available also in the owner's and the Society's offices.

2.6.3 The following additional documentation shall be available on board:

a) main structural plans of cargo and ballast holds or tanks

b) previous repair history

c) cargo and ballast history

d) extent of use of inert gas plant and tank cleaning procedures

e) records of inspections and actions by ship's personnel with reference to:

- structural deterioration in general
- leakage in bulkheads and piping
- condition of coating or corrosion prevention, if any
- any other information that will help to identify critical structural areas and/or suspect areas requiring inspection.

3 Machinery and Systems

3.1 Maintenance and preparation for survey

3.1.1 Every ship shall have implemented a maintenance system. The maintenance system shall ensure that:

- inspections and maintenance are carried out at defined intervals
- any non-conformity is reported with its possible cause, if known
- appropriate corrective action is taken

- records of these activities are maintained.

The machinery and systems subject to class shall be maintained in accordance with the maintenance system implemented.

3.1.2 In preparation for survey and to allow for a thorough examination, machinery components and related spaces shall be cleaned, including removal from surfaces of loose accumulated corrosion scale, mud and oil residues.

The spaces and components of attention shall have proper access including dismantling as necessary.

3.2 Shaft alignment

3.2.1 For propulsion systems where shaft alignment calculations have been required, the alignment shall be confirmed by suitable measurements when the system has been dismantled and or when external forces (e.g. grounding, welding work) may have influenced the alignment.

The measurements shall be carried out with the ship afloat and be presented to the surveyor.

3.3 Replacement of machinery components

3.3.1 When machinery components are renewed, such components should in general be delivered in accordance with requirements as per valid rules at the time of new building.

If the relevant rule requires an ACS certificate for the actual part, then the design and the survey, as relevant, should be in accordance with the applicable rule requirement.

Applicable for diesel engines: The actual part should be produced by a manufacturer authorised by the engine designer or the designer's licensee.

If the relevant rule requires a Work certificate for the actual part:

- when design approval is required, the certificate should confirm compliance with the relevant parts (e.g. NDT, material, dimensions, etc.) of the approved drawings and specifications
- when no design approval is required (i.e. drawings and specifications submitted for information only), the required certificate should confirm compliance with the applicable rule requirements (e.g. pressure testing, NDT, etc.).

Applicable for diesel engines: If the part is produced by a manufacturer not authorized by the engine designer or the designer's licensee, the Society may carry out required inspections and issue a report confirming this. However, this inspection report will not cover design approval and testing as a part of the engine. It is the operator's responsibility to evaluate and take the necessary precautions to see that the parts are fit for their intended use.

3.4 Machinery verification

3.4.1 If significant repairs are carried out to main or auxiliary machinery, or steering gear, a dock and/or sea trial shall be carried out as required by the attending surveyor.

3.5 Gas turbine installations

3.5.1 The society accepts that complete gas turbine units, or modules, are taken ashore for complete overhaul by original engine manufacturer (OEM) or OEM approved company. It is the responsibility of the owner to involve the Society in the overhaul work at the OEM or OEM approved company.

3.5.2 Complete replacement turbines shall be certified. The company performing the work shall be either the OEM, or OEM-approved. Attendance of surveyor during overhaul as considered necessary.

Sea trial/ installation test to be performed to the attending surveyor's satisfaction.

3.5.3 Documented history regarding maintenance scope, and it's relevance to running hours and preservation during storage for the unit installed shall be available for examination.

3.5.4 Maintenance of gas turbine rotating components, or components in the gas path, shall be carried out using only original spare parts, or spare parts accepted by the OEM.

3.5.5 Maintenance carried out in the form of module replacement (e.g. hot section change-out), shall utilize replacement modules that are of identical design and construction, and either possess the appropriate certification by the Society (i.e. originate in another engine certified by the Society used for a similar application), or are new and produced in accordance with type approved design and under a valid manufacturing survey arrangement (MSA). Modules with other origins will normally not be accepted.

3.6 Boiler installations

3.6.1 For all vessels with boilers, the boiler water quality shall be maintained to the standard required by the equipment manufacturer.

3.6.2 The boiler water shall be monitored/ tested at least once in every 24 hours daily for main boilers and at least every 48 hours for auxiliary boilers.

3.6.3 Records of boiler water management shall be available onboard containing the following parameters:

- water consumption
- chemicals consumption
- chloride content
- phosphate and oxygen measuring parameters
- pH value
- frequency and duration of "surface scumming" (if fitted) and bottom "blow downs"
- conductivity when included in the water treatment program utilized.

3.6.4 Procedures for boiler water management for boilers temporarily out of service shall be in place. The boiler shall be placed in either dry or wet condition when out of service for a prolonged period of time (Full voyage, ship idle in port, ship laid-up).

3.7 Survey of special components

3.7.1 Components or elements of the propulsion system, such as:

- vibration dampers
- elastic couplings
- speed governor or quick passing through device.

which may change characteristics during the lifetime and hence influence the torsional behaviour of the system, shall be maintained and inspected as approved by the Society or as recommended by the manufacturer.

As an alternative to opening up for inspection, measurements may be carried out to confirm the correct dynamic conditions. The torsional vibration measurements shall be carried out and reported to the Society. The results shall be compared with the approved limits (torsional vibration calculations).

If an elastic coupling is replaced by another type, new torsional vibration calculations shall be submitted for approval.

Section 2 Annual Surveys – Main Class

1 General Requirement

1.1 General

1.1.1 Annual survey is a general survey of the hull and equipment, machinery and systems to confirm that the ship complies with the relevant rule requirements and is in satisfactorily maintained condition.

1.1.2 For chemical tankers and liquefied gas tankers the annual survey of components and systems for cargo handling and cargo containment is preferably to be carried out during a loading or discharging operation. Access to cargo tanks or inerted hold spaces, necessitating gas-freeing/aerating will normally not be required.

1.2 Review of documentation, operational instruments, signboards and markings

1.2.1 If a loading instrument or loading computer system is available onboard it shall be verified that the system has a valid certificate.

It shall be documented that an annual check of the loading instrument/computer by running one of the test conditions has been carried out. If not, the surveyor shall verify the running of the test condition onboard.

1.2.2 Approved loading and stability information shall be verified available onboard.

This information shall be the same as required when the ship was assigned class with the Society or at a later conversion of the ship, in accordance with the rule requirements applicable in each case.

1.2.3 Manual with instructions for operation and/ or maintenance shall be verified for:

- doors in ship's bow (outer and inner), sides and stern
- combination ships
- inert gas system
- oil discharge monitoring system
- crude oil washing system
- vapour emission control system
- liquefied gas tankers
- gas fuelled engine installations, (including ships with class notation GASFUEL)

1.2.4 List of required signboards or notice plates shall be verified for:

- doors in ship's bow (outer and inner), sides and stern
- steering gear operating instruction posters, on the bridge and in the steering gear compartment
- combination ships
- liquefied gas tankers
- gas fuelled engine installations, (including ships with class notation GASFUEL)

1.2.5 It shall be verified that records of inspections and maintenance in accordance with the implemented maintenance system for machinery are kept available onboard.

1.2.6 For ships which have been granted alternative survey arrangement(s) the following apply:

For survey arrangement Hull Continuous or Machinery Continuous, satisfactory completion of survey items due in the previous period shall be verified.

For survey arrangement Hull PMS, Machinery PMS or Machinery CM the documentation of the approved system shall be reviewed and evaluated.

This implies that the following shall be verified:

- satisfactory performance
- continuation of the conditions and acceptance criteria for the approval
- assessment of handling onboard
- satisfactory completion of records of the required inspections and maintenance over the previous period, including description of corrective actions taken in response of occurred deficiencies.

If found necessary by the surveyor, examination and testing, including opening of machinery, may be required.

Based on a satisfactory result, the validity of the survey arrangement will be extended until the next annual survey.

1.2.7 For ships with class notation ESP, the surveyor shall examine the documentation onboard and its contents as a basis for the hull survey.

1.2.8 For liquefied gas tankers the survey shall include:

- examination of the log books with regard to the condition of the cargo containment and the correct functioning of the cargo handling systems. The running hours per day of the reliquefaction plants or the boil-off rate and the inert gas consumption shall be considered in order to check that no irregularities in performance have occurred
- verification of instruction and information material such as cargo handling plans, cargo instrumentation maintenance manual, filling limit information, cooling down procedures etc. as being onboard.

1.2.9 For ships that shall comply with SOLAS Reg. IX/2, irrespective of the issuing authority for the Safety Management Certificate (SMC), the surveyor will complete a list of evidence of possible safety management system failures recorded on the occasion of the annual survey. The list will be submitted with the annual survey report.

2 Hull and Equipment

2.1 General - all ships

2.1.1 The survey shall cover examination of:

a) weather decks and ship side plating above water line

b) anchoring equipment, see 2.1.2

c) openings and closing appliances for cargo holds or tanks:

- hatch covers and coamings on exposed weatherdecks, see 2.1.3
- cargo tank openings, see 2.1.5

d) other openings and closing appliances:

- doors in ship's bow, sides and stern, see 2.1.4
- ventilator and air pipes, see 2.1.5
- watertight doors and penetrations in watertight bulkheads
- exposed machinery casing and skylights
- ventilation ducts for engine and boiler rooms
- windows, deadlights and side scuttles.

e) scuppers, discharges and valves with hull attachments

f) freeing ports and shutters

g) fittings and hull supporting structures, as far as practicable, for stowage, securing and supporting of:

- timber deck cargoes
- containers
- movable car deck pontoons

h) piping arrangements on deck, see 2.1.5

i) means of protection of crew, such as guard rails, bulwark, gangways and lifelines

j) towing and mooring equipment, see 2.1.6

k) emergency towing arrangements, see 2.1.7

l) spaces:

- ballast tanks, see 2.1.8
- suspect areas, see 2.1.9
- thickness measurements taken or extended when substantial corrosion recorded or found, see 2.1.10
- fire doors and fire dampers in ventilation ducts
- means of escape, see 2.1.11

m) special installations:

- plants for refrigerated cargoes, see 2.1.12
- inert gas plants, see 2.1.5

n) verification of electrical bonding to the hull of pipelines and independent tanks, as applicable.

2.1.2 For the anchoring equipment the survey shall include examination of windlasses,

brakes, securing and chain stoppers, with special attention to condition and wear of brake linings.

Function test may be required if deemed necessary by the surveyor.

2.1.3 For hatch covers and coamings the survey shall include:

a) examination of mechanically operated steel covers

b) examination of portable steel pontoons, portable wooden covers and portable beams

c) examination of hatch coaming plating and their stiffeners

d) examination of closing, sealing and securing devices

e) testing at random of the operation of mechanically operated hatch covers including:

- stowage and securing in open condition
- proper fit and efficiency of sealing in closed condition
- hydraulic and power components, wires, chains and link drives.

Confirmation shall be obtained that no unapproved changes have been made to the hatch covers, hatch coamings and their securing and sealing devices since the last survey.

2.1.4 For doors in ship's bow (outer and inner), sides and stern, the survey shall include:

a) examination of:

- structural arrangement of doors, ramps and hinging arms
- shell structure surrounding door openings
- hinges with bearings, thrust bearings (side-hinged doors), sealing arrangement, drainage arrangement, electrical equipment and hydraulic system for opening and closing of doors and operation of cleats, supports and locking devices
- close-up examination of cleats, support and locking devices
- space between outer and inner bow doors.

b) testing of the operation of doors during a complete opening and closing operation.

Non-destructive testing and thickness measurements may be required. Clearances of hinges, closing devices, bearings and thrust bearings shall be measured, where no dismantling is required. Where the function test is not satisfactory, dismantling may be required to measure the clearances, in such cases examination of hinge pins and bearings together with NDT of the hinge pins shall be carried out.

c) testing of indicators and audible alarms including mode selection function “harbor /sea voyage”.

The indicator system shall show by visual indication if any of the doors are not fully closed and not fully locked, and by audible alarms if securing devices become open or locking devices become unsecured.

Verification of fail-to-safe performance for indicator and alarm systems on the navigation bridge.

Sensors shall be examined for proper condition and protection from water, ice formation and mechanical damage.

d) testing of television surveillance systems.

e) testing of water leakage detection system.

f) testing for effectiveness of sealing arrangement by hose testing or equivalent.

If the visual examination and function test have shown satisfactory results, testing of side and stern doors on cargo ships need not be carried out unless considered necessary by the surveyor.

g) testing of drainage system for the space between the bow door and ramp, or where no ramp is fitted, between the bow door and inner door.

In cases where the examination of doors has been carried out by a company approved by the Society, the extent of survey may be limited at the discretion of the surveyor. However, the survey shall, as a minimum, include:

- examination of structural arrangement of doors including surrounding structures and space between outer and inner bow doors
- testing of complete opening and closing operation.

2.1.5 All piping on deck shall be overall examined.

Special attention shall be paid to:

- ventilators and air pipes with coamings and closing appliances
- weld connection between air pipes and deck plating and to air pipe heads installed on the exposed deck
- flame screens on vents to all bunker tanks.

Pressure testing and thickness measurements of any piping system may be required if found necessary by the surveyor.

For tankers the survey shall include examination of:

- cargo tank openings with pressure/ vacuum valves
- venting/ gas freeing arrangements including masts and risers with flame screens/ flame arrestors
- provisions for drainage of cargo tank vent lines.

For gas tankers the survey shall include verification of:

- sealing of cargo tank relief valves. The certificate with relief valves' opening and closing pressures shall be confirmed to be onboard.

For ships with inert gas plant (including ships with class notation IG), the inert gas piping shall be examined with special attention to gas or effluent leakage.

For ships with gas detection system, the examination shall include verification of integrity of the suction lines between suction points and analyzing units.

2.1.6 The towing and mooring equipment shall be verified properly marked with any restriction associated with its safe operation. It is Applicable to ships of 500 GT and above, the keels of which are laid on or after 1 January 2007.

2.1.7 Emergency towing arrangements shall be examined as far as practicable. Aft towing arrangement shall be confirmed as pre-rigged and forward chafing gear shall be confirmed as stowed in such a way that it can be rapidly connected to the strongpoint. Where light is provided on pick-up gear marker buoy, proper functioning shall be confirmed.

Emergency towing arrangements are required on oil tankers, chemical tankers and gas carriers of 20 000 tonnes deadweight and above in accordance with IMO resolution MSC.35(63)

2.1.8 Ballast tanks recorded for annual examination at previous survey, shall be overall examined.

Close-up examination including thickness measurements shall be carried out for areas with general breakdown of the protective coating, where extensive corrosion exists, and otherwise as found necessary by the surveyor.

2.1.9 Suspect areas recorded for annual examination at previous survey shall be close-up examined.

2.1.10 Areas recorded for annual examination as a consequence of substantial corrosion found at previous survey, or where substantial corrosion is found at the survey being carried out, shall have thickness measurements taken or extended.

The following tables shall be used:

Sec.4 Table 4.1.2 in general as guidance,

Sec.4 Table 4.3.3 for single skin bulk carriers,

Sec.4 Table 4.4.3 for double skin bulk carriers,

Sec.4 Table 4.5.3 for single hull oil tankers and single hull chemical tankers,

Sec.4 Table 4.6.3 for double hull oil tankers and double hull chemical tankers.

Areas found with substantial corrosion, which are not repaired and have not been previously identified, shall be recorded for thickness measurements at subsequent annual surveys.

Note: This requirement is not applicable to cargo tanks of oil and chemical tankers.

2.1.11 Means of escape from passenger and crew spaces to lifeboat embarkation deck shall be verified in order and according to the as built plans.

Crew spaces include restricted spaces such as engine room, boiler room, shaft tunnel and Ro-Ro cargo spaces.

2.1.12 For ships with plant for refrigerated cargoes (including ships with class notation REF-CARGO, REF-STORE or REF-CONT), the survey shall include examination of:

- ducts, hatches and doors with regard to escape possibilities and prevention of personnel being trapped within chambers, air cooler rooms etc.

- the chambers with attention on internal lining and that the chambers are free from odour
- scuppers, bilges with rose boxes, and piping (suction, sounding and drain) together with drip pans.

2.2 General dry cargo ships

2.2.1 For hatch covers and coamings the survey shall include:

- close-up examination of hatch coaming plating and their stiffeners
- close-up examination of hatch cover plating where mechanically operated steel hatch covers are fitted

2.2.2 For ships 10 to 15 years of age the survey shall include overall examination of one forward and one aft cargo hold and their associated 'tween deck spaces.

2.2.3 For ships over 15 years of age the survey shall include:

- overall examination of all cargo holds and 'tween deck spaces
- close-up examination in a forward cargo hold and one other selected cargo hold, of approximately lower 1/ 3 length of the side frames, including the frame end attachment and the adjacent shell plating to a sufficient extent, minimum 25% of frames
- all piping and penetrations in cargo holds, including over-board piping.

Where the close-up examination reveals need for remedial measures, the survey shall be extended to include close-up examination of all side frames and adjacent shell plating of the relevant cargo holds and associated 'tween deck spaces, as well as close-up examination of sufficient extent of all remaining cargo holds and 'tween deck spaces.

2.3 Dry bulk cargo ships subject to Enhanced Survey Programme (ESP) – additional requirements

2.3.1 For hatch covers and coamings the survey shall include:

- close-up examination of hatch coaming plating with panel stiffeners and brackets
- close-up examination of hatch cover plating and stiffener attachments that may be accessible in the open position where mechanically operated steel hatch covers are fitted
- close-up examination of removable hatch cover steel pontoon plating.

2.3.2 For mechanically operated hatch covers, hatch cover sets which are wholly or partly within the forward 25% of the ship's length and at least one additional set shall be surveyed open, closed and in operation to the full extent on each direction, such that all sets on the ship are surveyed at least once in every 5-year period including:

- stowage and securing in open condition
- proper fit and efficiency of sealing in closed condition
- operational testing of hydraulic and power components, wires, chains and link drives

- examination of the fastening of all peripheral and cross joint cleats or other securing devices in closed condition.

If there are indications of difficulty in operating and securing hatch covers, additional sets shall be tested in operation as deemed necessary by the surveyor.

2.3.3 For single skin bulk carriers over 10 years of age the survey shall include:

- overall examination of all cargo holds
- close-up examination in the forward cargo hold, of approximately lower 1/3 length of the side frames, including the frame end attachment and the adjacent shell plating to a sufficient extent, minimum 25% of frames
- examination of all piping and penetrations in cargo holds, including overboard piping.

2.3.4 For single skin bulk carriers over 15 years of age, in addition to the requirements in 2.3.3, the survey shall include:

- close-up examination of one other selected cargo hold to the same extent as required for the forward cargo hold

2.3.5 Where the close-up examination required in 2.3.3 and 2.3.4 reveals need for remedial measures, the survey shall be extended to include close-up examination of all side frames and adjacent shell plating of the relevant cargo hold, as well as close-up examination of sufficient extent of all remaining cargo holds.

2.3.6 For double skin bulk carriers 10 to 15 years of age the survey shall include:

- overall examination of two selected cargo holds
- examination of all piping and penetrations in selected cargo holds, including overboard piping.

2.3.7 For double skin bulk carriers over 15 years of age the survey shall include:

- overall examination of all cargo holds
- examination of all piping and penetrations in cargo holds, including overboard piping.

2.3.8 For single skin bulk carriers built with an insufficient number of transverse watertight bulkheads to satisfy the requirements for damage stability, the survey in the forward cargo hold shall be extended as follows:

For ships exceeding 10 years of age:

- close-up examination of the side frames, including the frame upper and lower end attachments and the adjacent shell plating to a sufficient extent, minimum 25% of frames
- where the close-up examination reveals need for remedial measures, the survey shall be extended to include close-up examination of all side frames and adjacent shell plating

For ships exceeding 15 years of age the survey shall be extended to include close-up examination of all side frames and adjacent shell plating of the forward cargo hold.

Thickness measurements shall be carried out to an extent sufficient to determine both general and local corrosion levels at areas subject to close-up examination.

The thickness measurements may be dispensed with provided the surveyor is satisfied by the close-up examination that there is no structural diminution and the protective coating where fitted remains effective.

2.4 Oil and chemical tankers subject to Enhanced Survey Programme (ESP) – additional requirements

2.4.1 Wheelhouse doors and windows, side scuttles and windows in superstructure and deckhouse bulkheads facing the cargo area and possible bow or stern loading and unloading arrangements shall be examined for gas and vapour tightness.

2.4.2 Segregation between cargo and segregated ballast system shall be confirmed.

For chemical tankers, removable pipe lengths or other approved equipment necessary for cargo segregation shall be overall examined.

2.4.3 Pump rooms shall be examined with special attention to:

- piping with pumps
- bulkheads for signs of oil leakage or fractures and, in particular, the sealing arrangements of all penetrations of cargo pump room bulkheads
- access ladders.

2.4.4 For combination ships with protected slop tanks, the following shall be examined:

- closing arrangement for hatches and other slop tank openings
- blanking arrangement for slop tank pipes.

2.5 Liquefied gas tankers – additional requirements

2.5.1 The cargo handling piping and cargo process piping, shall be examined, with special attention to insulation on piping.

2.5.2 The sealing arrangements for tanks or tank domes penetrating decks or tank covers shall be examined.

2.5.3 Portable and or fixed drip trays or insulation for deck protection in the event of cargo leakage shall be examined.

2.5.4 Wheelhouse doors and windows, side scuttles and windows in superstructure and deckhouse bulkheads facing the cargo area and possible bow or stern loading and unloading arrangements shall be examined for gas and vapour tightness.

The closing devices for all air intakes and openings into accommodation spaces, service spaces, machinery area, control stations and approved openings in superstructures and deckhouses facing the cargo area or bow and stern loading / unloading arrangements, shall be examined.

2.5.5 Gastight bulkheads with possible shaft sealing shall be examined.

2.5.6 Correct functioning of any arrangements for heating of structural hull steel shall be verified. Access to the heated cofferdams etc. is normally not required.

3 Machinery and Systems

3.1 General - all ships

3.1.1 The survey shall cover:

a) examination of spaces, see 3.1.2

b) external examination of boilers steam drums and steam generators, see 3.1.7

c) external examination of pressure vessels

d) verification of integrity/ function of:

- jacketed high pressure fuel injection piping system
- shielding of flammable oil piping system
- insulation of hot surfaces exceeding 220ºC
- oil burning equipment on boilers, hot water heaters, incinerators and inert gas generators.

e) steering gear, see 3.1.3

f) fire extinguishing systems, see 3.1.4

g) electrical installations, see 3.1.5

h) gas fuelled engine and boiler installations, see 3.1.15

i) gas turbines, see 3.1.16

j) examination of remote operation for quick closing/stop of fuel-valves, fuel transfer pumps and ventilation fans. Spot testing of functions to be carried out

k) examination of bilge systems, bilge level alarms and remote operation

l) testing of communication systems from bridge to machinery and steering gear spaces

m) equipment and systems related to carriage of special cargoes:

- refrigerated cargo, see 3.1.11
- inert gas plants, see 3.1.12
- protected slop tanks, see 3.1.13
- volatile organic compound (VOC) recovery plants
- low flashpoint liquids, see 3.1.14
- motor vehicles with fuel in their tanks, see 3.1.17
- examination of cargo systems in ships intended for supply service to offshore installations
- examination and tightness testing of cement and dry mud cargo piping situated within the engine room

n) control and monitoring system of main and auxiliary machinery including boilers, thermal oil heaters, oil burning equipment and equipment for periodically unattended machinery space and machinery centralized operated, see 3.1.9

o) emergency systems for passenger ships, see 3.1.10.

p) water ingress detection system and their alarms, for ships with single cargo hold and for bulk carriers, see 3.1.18.

q) the control and means for draining and ballast pumping forward of the collision bulkhead, for bulk carriers, see 3.1.18.

3.1.2 Machinery area and spaces in the cargo area entered in connection with cargo handling shall be examined with respect to general cleanliness and maintenance and with special attention to the fire and explosion hazards in general.

3.1.3 For the main and auxiliary steering system the survey shall include:

- external examination of the steering gear arrangement and hydraulic piping and handrails, non-slip surfaces and oil storage tank with piping
- examination of oil filters (to be opened up for inspection)
- test of power units and rudder actuators, or actuating system for azimuth gears
- test of alarms
- test of all modes of local and remote steering control systems for main and auxiliary steering gears including rudder angle indicating systems communication between bridge and steering gear compartment
- test of emergency steering control
- verification of relaying heading information (compass readings)
- test of alternative power supply, if required for vessel.

3.1.4 For fire extinguishing systems the survey shall include:

- testing of the water fire fighting system i.e. fire pumps, fire mains, hydrants and hoses as deemed necessary
- verification of the international shore connection
- verification of the non-portable and portable fire extinguishers and portable foam applicators
- examination of the fireman's outfit
- examination of the fixed fire extinguishing systems.

For ships with valid SOLAS Passenger Ship Safety Certificate or Cargo Ship Safety Equipment Certificates, the above tests may be reduced or omitted.

3.1.5 For electrical installations the survey shall include:

- examination of main source of electrical power with respect to general condition, fire hazard and personnel safety, i.e. generators, main switchboards, distribution boards, control gear, consumers, chargers and battery/UPS systems

- test of automatic start and connection to the switchboard of the stand-by generator set by initiating shutdown of the running diesel generator causing black-out. During this test, the emergency generator shall be disabled and the emergency switchboard shall be disconnected.
- examination of cable installations with respect to general condition, support and physical protection
- examination of emergency source of electrical power with respect to general condition, fire hazard, personnel safety and function, i.e. generator, emergency switchboard, emergency distribution boards, control gear, chargers, emergency consumers and battery/ UPS systems
- check if any modifications are done in the electrical system
- test of emergency power system, i.e. manual and automatic connection of generator/batteries to emergency switchboards, alternative start methods
- examination of cables and equipment in gas dangerous spaces and zones with respect to general condition and spark/explosion hazard.

3.1.6 The following surveys shall be carried out in conjunction with the renewal survey:

- Boiler survey (boilers, superheaters, economizers and air Preheaters or steam heated steam generators).

3.1.7 Boilers, steam drums and steam generators are subject to an external examination, where the following will be assessed by an ACS surveyor:

- installation free of leakages (Steam/water/exhaust gases)
- operational test of safety valve by use of the relieving gear
- testing of safety and protective devices
- functioning of soot blowing arrangements (if fitted)
- monitoring / testing of the boiler water carried out at least once in every 24 hours daily for main boilers and at least every 48 hours for auxiliary boilers
- boiler water quality maintained to the standard required by the equipment manufacturer / the supplier of the boiler water treatment programme in use
- procedures for boiler water management for boilers temporarily out of service in place. Boiler to be placed in either dry or wet lay-up when out of service for a prolonged period of time (Full voyage, ship idle in port, ships laid-up).

For exhaust gas heated economizers, verification of function of the safety valves may be carried out by the Chief Engineer at sea. This test shall be recorded in the log book prior to survey for review by the attending surveyor.

3.1.8 Thermal oil installations are subject to an external examination, where the following will be assessed by an ACS surveyor:

- installation free of leakage
- functioning of temperature control arrangement
- integrity of mounted fire extinguishing system

- no blockage in fire extinguishing / drenching water drainage
- low flow alarm and emergency stop functions in order
- thermal oil analysis not older than 3 months available.

If the laboratory analysis reveals, either:

- chemical degrading of oil in circulation
- contamination by low flashpoint petrochemical products
- contamination by carbon particles, corrective measures shall be initiated by owner and subsequently assessed by an ACS surveyor.

3.1.9 The survey shall cover control and monitoring systems for main and auxiliary machinery including:

- propulsion machinery
- electric power generation and distribution
- steam generation
- thermal oil heating
- oil or gas burning equipment on incinerators, inert gas generators and hot water heaters.

The survey shall include

- emergency lighting in engine room
- communication systems
- fire alarm and fire protection systems.

For all systems, the survey shall include inspection of the installation with regard to electrical and mechanical condition, labels, signboards etc.

For control and monitoring systems, the survey shall include:

- alarm functions
- safety functions
- remote control functions
- automatic control functions
- control panels and local indicating instruments
- verification of change handling process for control and monitoring systems, see Table 3.2.

3.1.10 For passenger ships the arrangement for emergency and transitional source of power shall be tested.

3.1.11 For ships with reefer plant or controlled atmosphere installations (including ships with class notation REF-CARGO, REF-STORE or REF-CONT)), the survey shall include:

- examination of system for tightness

- examination of the safety measures such as:
- gas tight machinery room bulkheads
- separate ventilation system
- catastrophe ventilation or sprinkler arrangement
- escape arrangements for process areas and continuously manned cargo chambers
- protection of fans and other rotating machinery
- alarms and emergency stop buttons
- refrigerant leakage detectors
- tests of electrical installation's insulation resistance to the extent found necessary by the surveyor.

3.1.12 For ships with inert gas plant (including ships with class notation IG), the survey shall include:

- examination of blowers, scrubber, deck water seal, closed ullage system, pressure/ vacuum monitoring system, P/V breaker and non-return valves
- testing of remotely operated or automatically controlled valves, interlocking features of soot blowers, alarms and safety devices as deemed necessary
- examination/testing of oil burning equipment, automation, instrumentation and safety functions on inert gas generator.

3.1.13 For combination ships with protected slop tanks, the following shall be examined:

- gas detection arrangement in cofferdams
- oxygen control equipment.

3.1.14 For ships arranged for carriage of low flash point liquids, the survey shall include:

- examination of pumping and piping systems (cargo, heating, bilge)
- examination of ventilation system
- testing of emergency stop of pumps
- testing of quick release of transfer hose
- testing of tank high level alarms
- examination of portable hydrocarbon gas-measuring apparatus
- examination of portable oxygen-measuring apparatus, if applicable
- examination of gas detection system in cofferdams, if applicable.
- measurement of insulation resistance of electrical cables in the cargo area. The measurements may be omitted provided a record of testing is available showing that measurements have been taken during the last 12 months and that the results are satisfactory.

3.1.15 For ships with gas fuelled engine installations, (including ships with class notation GASFUEL), the survey shall include:

- external examination and function testing of remote operated valves in the gas piping system
- external examination of gas pipe ducts
- testing of instrumentation
- testing of emergency shutdown system, as a minimum by:
- releasing gas detectors and fire detectors
- checking safety functions in connection with the ventilation systems in gas engine rooms
- verification of the functioning of ventilation systems
- examination of drip trays in bunker station.

3.1.16 For ships with gas turbines the survey shall include the extent and criteria specified in Table 3.1.

The survey items may be covered through inspection or overhaul at a service or maintenance centre adhering to the requirements.

Table 3.1 Gas turbine annual survey

Survey item	Extent	Acceptance criteria	Remarks
Survey of records	Maintenance record check with reference to running hours	Maintenance activities shall have been carried out in accordance with manufacturer recommendations	Review of maintenance reports
Survey of gas turbine	Visual inspection and boroscope inspections	No indications of wear or degradation, beyond manufacturers acceptance criteria	Boroscope inspection either performed in surveyor presence, or records [1)] of boroscope inspection performed within last month to be available
Monitoring, control and emergency shutdown system	System functionality testing	Software version(s) to be in accordance with certificate. No deviations in functionality	Spot-checks of functionality. May be performed in combination with machinery and safety systems survey

1) The report shall describe boroscope extent, findings (if any), and conclusions or evaluation. If inspection is performed in surveyor's presence, such a report shall be prepared subsequently, and submitted to the Society

Table 3.2 Change-handling process for control and monitoring systems – annual survey[1)]

Survey item	Acceptance criteria
Identification of changes	A change-log shall be available and used to keep track of changes since last survey. This applies to all control systems that are required to be provided with a product certificate. If no changes have been done to the control systems since the last survey,

	the remaining survey item in this table may be omitted. Major changes affecting functionality covered by the class rules shall be submitted to class for approval prior to implementation onboard. Major changes affecting functionality covered by class rules are changes which alter the functionality for which ACS rules has requirements. Such functionality is normally found in any control, monitoring, alarm or safety system which is required to be provided with ACS product certificate. Adjustments of parameters such as set points or alarm limits are not considered "major changes". Adding automatic load shedding in a power management system, adding a serial link to the fire central in wheelhouse or adding more causes to shutdown logic are examples of alterations which are considered "major changes".
Documentation of the change-handling process	Documentation shall be kept onboard to demonstrate traceability in the change-handling process. The documentation shall be presented for the attending surveyor, and shall contain information related to the following: — reason / motive for the change — specification of requirements (new requirements) — internal testing at manufacturer (e.g. reference to test records, simulation) — functional description of new or changed functionality — procedure for implementation — failure analysis, fall-back plan if relevant (effect of failures, how to restore original state) — verification and testing of implementation.

3.1.17 For ships carrying motor vehicles with fuel in their tanks in enclosed spaces, the survey shall include:

- examination of automatic fire alarm system in cargo holds
- examination of fixed fire extinguishing system in cargo holds
- examination of portable fire extinguishers in cargo holds and at cargo hold entrances
- examination of ventilation system in cargo holds including remote indicators on bridge.

3.1.18 For ships with a single cargo hold and for bulk carriers an examination and test at random of the water ingress detection system and of their alarms shall be carried out.

For bulk carriers an examination and test of the control and means for draining and ballast pumping forward of the collision bulkhead included bilges of dry spaces any part of which extends forward of the foremost cargo hold, shall be carried out.

3.2 Oil and chemical tankers – additional requirements

3.2.1 The survey shall include:

- examination of deck foam system with attention to physical and chemical condition of foam concentrate
- for alcohol resistant fluorine protein based foam concentrates the annual condition test carried out by service suppliers shall also include a chemical stability tests (with acetone or equivalent) according to IMO MSC.1/Circ. 1312. Foam concentrate approved according IMO MSC.1/Circ. 1312 shall use this standard for periodic testing

- examination of fixed and portable mechanical ventilation systems for cargo handling spaces and other spaces within the cargo area which are normally entered, including pipe tunnels
- examination of cargo, bilge, ballast and stripping pumps
- testing of remote operation and shut-down devices for the cargo system
- examination and testing of gas detection system in cargo pump rooms
- examination of temperature sensors in bulkhead shaft glands bearings for pumps installed in cargo pump rooms
- examination of the pressure/vacuum monitoring arrangement for cargo tanks and vapour return systems.

3.2.2 For oil tankers, the survey shall include testing of:

- pressure gauges on cargo/cow discharge lines
- temperature sensors for cargo, tank washing and ballast pumps
- oily water interface detector
- oil discharge monitoring system.

3.2.3 For chemical tankers, the survey shall include:

- examination and testing of cargo hoses
- examination and testing of system for cargo tank level gauging
- testing of system for cargo tank overflow control (high and high-high level alarm)
- examination of vapour detection instruments
- testing of system for cargo temperature indication
- testing of leakage alarm in spaces containing independent cargo tanks
- examination and testing of sampling arrangements for cargo heating/cooling system
- examination of arrangement for storage of cargo samples
- examination of arrangements for storage of padding gas, monitoring of ullage spaces and provisions of drying elements on air inlets to cargo tanks
- examination of decontamination showers and eye washes including any provisions to ensure operation under all ambient temperatures
- examination of pump discharge pressure gauges fitted outside the cargo pump rooms
- examination of cargo pump rooms with focus on remote operation of the bilge system, rescue arrangements and distinctive marking of pumps, valves and pipelines in pump room
- examination of installations and equipment required for special cargoes, if applicable
- verification of the arrangement for discharge of contaminated water.

3.2.4 For ships with bow loading arrangement, the survey shall include:

- opening up and pressure testing of valves and piping if found necessary by the surveyor
- verification that spray-shield and collecting tray in way of connector are in order
- examination and testing of instrumentation, automation and communication equipment in bow control station
- examination and testing as far as possible of the automatic and manual emergency disconnection systems
- examination of protective measures preventing structural elements initiating sparks
- examination of interlock functions for the mooring and loading systems.

3.2.5 For ships with vapour processing and recovery plant (including ships with class notation VCS) the following will be assessed:

- volatile organic compound (VOC) recovery plants. Gas tight bulkheads, piping systems, pressure vessels with mountings and equipment, regulating valves, deck tank safety relief valve sealing, electrical cables and equipment as applicable. Pressure testing and piping thickness measurements will be requested if deemed necessary by the surveyor
- functioning of the boiler and controls, see 3.1.6 and 3.1.8
- functioning of the hydrocarbon gas detection system
- functioning of the ventilation system
- functioning of air locks, if fitted
- calibration of fixed or portable instruments for measuring oxygen content in the recovered VOC
- confirming that an operation manual for the VOC recovery plant is on board, and updated if new equipment and/or software has been installed
- functioning of alarm and safety systems.

For survey of boiler and controls, see 3.1.6 and 3.1.8.

3.3 Liquefied gas tankers – additional requirements

3.3.1 The survey on deck shall include:

- examination of the venting systems for the cargo tanks, interbarrier spaces and hold spaces. The sealing of cargo tank relief valves shall be verified and the certificate with relief valves' opening and closing pressures shall be confirmed to be onboard
- testing of the emergency shut-down valves at shore connections and tanks, without flow in the pipe lines.

It shall be verified that operation of the emergency shut-down system will cause the cargo pumps and compressors to stop.

3.3.2 Ventilation systems for cargo handling spaces and other spaces within the cargo area which are normally entered, shall be examined and tested as necessary.

3.3.3 The survey of cargo compressor room and other spaces for cargo handling shall include:

- examination of cargo handling machinery, including cargo heat exchangers, vaporisers, pumps, compressors. To the extent possible the examination shall be carried out during operation
- testing of the gas detection equipment
- verification of dry air installations including the means for prevention of backflow of cargo vapour to gas safe spaces
- visual examination of the arrangements for burning methane boil-off as far as practicable.

3.3.4 The instrumentation of the following cargo installations shall be verified in good working order:

- automatic control, alarm and safety systems related to the pressure in cargo tanks, interbarrier spaces and hold spaces
- systems for cargo tank level gauging, including high level alarm and high level shut-off
- systems for temperature indication of the cargo, the cargo containment system, the hull and the cargo piping system
- systems for leakage detection of interbarrier spaces and hold spaces
- automatic control, alarm and safety systems in connection with cargo compressors and cargo pumps.

One or more of the following survey methods are applicable:

- visual external examination
- comparing of read-outs from different indicators
- consideration of read-outs with regard to the actual cargo and/or actual conditions
- examination of maintenance records with reference to the cargo plant instrumentation maintenance manual.

3.3.5 The following shall be surveyed and tested as applicable:

- cargo hoses
- decontamination showers and eyewashes.

3.3.6 For membrane containment systems normal operation of the nitrogen control system for insulation and interbarrier spaces shall be confirmed to the surveyor by the master.

Section 3 Intermediate Surveys Extent – Main Class

1 General Requirements

1.1 General

1.1.1 Intermediate survey is a survey including visual examinations, measurements and testing as applicable, of the hull and equipment, machinery and systems, in order to confirm that the ship complies with the relevant rule requirements and is in satisfactorily maintained condition.

The required examinations, measurements and testing shall be carried out before the intermediate survey is regarded as completed.

1.1.2 Intermediate surveys are required carried out for all seagoing self-propelled ships.

1.1.3 For liquefied gas tankers the intermediate survey of cargo handling installations with related automatic control, alarm and safety systems is preferably to be carried out with the ship in a gas-free condition. The extent of the testing required will normally be such that the survey cannot be carried out during a loading or discharging operation.

1.2 Review of documentation, operational instruments, signboards and markings

1.2.1 For ships with class notation ESP, the surveyor shall examine the documentation onboard as specified in Sec.1 2.6, and its contents as a basis for the hull survey.

2 Hull and Equipment

2.1 General - all ships

2.1.1 The survey shall cover:

- ballast tanks, see 2.1.2, 2.1.3, 2.1.4, 2.1.5 and 2.1.6
- cargo compartments, see 2.1.8
- extended thickness measurements when substantial corrosion has been found, see 2.1.10
- lower portions of the cargo and ballast tanks, see 2.1.10.

Suspect areas identified shall be recorded for examination at subsequent annual surveys.

Areas found with substantial corrosion, which are not repaired, shall also be recorded for thickness measurements at subsequent annual surveys.

Note: Annual surveys of suspect areas and areas found with substantial corrosion are not applicable to cargo tanks of oil and chemical tankers.

2.1.2 For ships 5 to 10 years of age, an overall examination of representative ballast tanks selected by the surveyor shall be carried out.

If there is no protective coating, soft or semi-hard coating, or POOR coating condition, the examination shall be extended to other ballast tanks of the same type.

2.1.3 For ships over 10 years of age, an overall examination of all ballast tanks and tanks used as bilge water holding tanks shall be carried out.

2.1.4 The survey extent of void spaces converted from ballast tanks shall be specially considered in relation to the requirements for ballast tanks.

For guidance, reference is made to Sec.4, 2.

2.1.5 For those tanks subjected to survey according to 2.1.2 and 2.1.3, including additional tanks specified in 2.2 to 2.4, special attention shall be given to:

- cargo piping passing through ballast tanks
- bilge and ballast piping passing through cargo and fuel oil tanks
- air and sounding piping passing through cargo and ballast tanks
- fuel pipes passing through ballast tanks.

2.1.6 For those ballast tanks subjected to survey according to 2.1.2 and 2.1.3, including additional tanks specified in 2.3 to 2.4, the survey shall include examination of the condition of corrosion prevention system, where provided.

A ballast tank, except bilge water holding tanks, shall be recorded for examination at subsequent annual surveys where:

- a hard protective coating was not applied from the time of construction, or
- a soft or semi-hard coating has been applied, or
- the hard protective coating is found in POOR condition and it is not renewed.

For double bottom ballast tanks, except for oil and chemical tankers with the notation ESP, such recording may be specially considered.

Initial hard protective coating applied later than at the time of construction may be accepted as equivalent to such coating being applied at the time of construction provided a surveyor has confirmed that the structure was in satisfactory condition when the coating was applied.

2.1.7 For ships over 10 years of age the survey of sewage (black water) tanks and wastewater (gray water) tanks shall include:

- for integral tanks internal examination.

Tanks with hard coating of internal structures recorded in GOOD condition at the previous renewal survey may be specially considered based on a satisfactory external examination.

The internal examination of tanks used in association with sewage treatment may be specially considered based on a satisfactory external examination and provided that an internal inspection has been carried out in accordance with onboard maintenance system during the last 12 months and relevant records are provided and confirmed.

- for independent tanks external examination including the tank supporting structures.
- thickness measurements shall be carried out as deemed necessary.

2.1.8 For ships over 10 years of age, other than ships engaged in the carriage of dry cargoes only or oil and chemical tankers with class notation ESP or liquefied gas tankers, the survey shall include overall examination of cargo compartments selected by the surveyor.

2.1.9 For dry cargo ships over 15 years of age the survey shall include an overall examination of cargo compartments selected by the surveyor.

2.1.10 Areas where substantial corrosion is found at the survey being carried out, shall have thickness measurements extended.

The following tables shall be used:

Sec.4 Table 4.1.2 in general as guidance,

Sec.4 Table 4.3.3 for single skin bulk carriers,

Sec.4 Table 4.4.3 for double skin bulk carriers, ore carriers,

Sec.4 Table 4.5.3 for single hull oil tankers, single hull chemical tankers and ore carriers,

Sec.4 Table 4.6.3 for double hull oil tankers and double hull chemical tankers.

2.1.11 For ships with class notation ESP overall and close-up examination including thickness measurements, as required for the lower portions of the cargo tanks/holds and ballast tanks, shall be carried out not later than concurrently with the bottom survey when required as part of the intermediate survey and the bottom survey is carried out in dry dock.

Note: Lower portions of the cargo and ballast tanks and cargo holds are considered to be the parts below light ballast water line.

2.2 General dry cargo ships, additional requirements

2.2.1 For ships 5 to 10 years of age the survey shall include overall examination of one forward and one aft cargo hold and their associated 'tween deck spaces.

2.2.2 For ships from 10 to 15 years of age the survey shall include overall examination of all cargo hold and 'tween deck spaces.

When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurement shall be carried out.

2.2.3 For ships over 15 years of age the survey shall include:

a) a thorough examination of hatch covers and coamings with closing, sealing and securing devices

b) testing for satisfactory operation of all mechanically operated hatch covers, including:

- stowage and securing in open condition
- proper fit and efficiency of sealing in closed condition
- operational testing of hydraulic and power components, wires, chains and link drives

c) testing for effectiveness of sealing arrangement of all hatch covers by hose testing or equivalent

d) overall examination of all cargo holds, 'tween deck spaces and ballast tanks and in way of all cofferdams, pipe tunnels and void spaces within the cargo area

e) examination and performance testing of all piping systems within all cargo holds and ballast tanks as well as cofferdams, pipe tunnels and void spaces within the cargo area;

f) close-up examination as for the previous renewal survey in accordance with Sec.4 Table 4.2.1

g) thickness measurement as for the previous renewal survey in accordance with Sec.4 Table 4.2.2 except main deck plates outside the cargo area (item 1 partly), bottom plates including keel plates outside the cargo area (item 4a partly), plating of sea chests and shell plating in way of overboard discharges (item 4b), superstructure deck plating (item 5), internals in peak tanks (item 6) and air pipes and ventilators (item 7)

h) a bottom survey in accordance with Sec.5, 1.

2.3 Dry bulk cargo ships subject to Enhanced Survey Programme (ESP) – additional requirements

2.3.1 For bulk carriers with hybrid cargo hold arrangements, the following shall be applied:

- full breadth cargo holds and associated topside tanks and hopper side tanks are subject to the single skin bulk carrier requirements
- cargo holds of double skin and associated side tanks are subject to the double skin bulk carrier requirements.

2.3.2 For ships 5 to 10 years of age the survey shall include:

a) overall examination of representative ballast tanks selected by the surveyor. The selection shall include fore and aft peak tanks and a number of other tanks, taking into account the total number and type of ballast tanks

b) overall examination of all cargo holds

c) close-up examination as follows:

- for single skin bulk carriers: in the forward cargo hold and one other selected cargo hold, of the transverse bulkheads at the shell plating and side frames, including their upper and lower end attachments and adjacent shell plating to a sufficient extent, minimum 25% of frames.

Where considered necessary by the surveyor as a result of the overall and close-up examination, the survey shall be extended to include close-up examination of all side frames and adjacent shell plating of the relevant cargo hold, as well as close-up examination of sufficient extent of all remaining cargo holds.

- for double skin bulk carriers: of those areas of structure considered necessary by the surveyor as a result of the overall examination.
- thickness measurements shall be carried out to an extent sufficient to determine both general and local corrosion levels at areas subject to close-up examination.

The extent of thickness measurement may be specially considered provided the surveyor is satisfied by the close-up examination that there is no structural diminution and the hard protective coatings are found to be in a GOOD condition.

2.3.3 For ships over 10 years of age the survey shall include:

a) a thorough examination of hatch covers and coamings with closing, sealing and securing devices

b) testing for satisfactory operation of all mechanically operated hatch covers, including:

- stowage and securing in open condition
- proper fit and efficiency of sealing in closed condition
- operational testing of hydraulic and power components, wires, chains and link drives

c) testing for effectiveness of sealing arrangement of all hatch covers by hose testing or equivalent.

d) overall examination of all cargo holds and ballast tanks and in way of all cofferdams, pipe tunnels and void spaces within the cargo area

e) examination and performance testing of all piping systems within all cargo holds and ballast tanks as well as cofferdams, pipe tunnels and void spaces within the cargo area

f) close-up examination as for the previous renewal survey in accordance with:

Sec.4 Table 4.3.1 for single skin bulk carriers

Sec.4 Table 4.4.1 for double skin bulk carriers

Sec.4 Table 4.4.1.1 for ore carriers

g) thickness measurement as for the previous renewal survey in accordance with:

Sec.4 Table 4.3.2 for single skin bulk carriers

Sec.4 Table 4.4.2 for double skin bulk carriers and ore carriers

Thickness measurements of following structures may be exempted:

- main deck plates outside the cargo area (item 1 partly),
- bottom plates including keel plates outside the cargo area (item 4a partly),
- plating of sea chests and shell plating in way of overboard discharges (item 4b),
- superstructure deck plating (item 5),
- internals in peak tanks (item 6) and
- air pipes and ventilators (item 7)

h) a bottom survey in accordance with Sec.5.1.

2.3.4 For single skin bulk carriers required to comply with the retroactive requirements, the survey of the side frames shall include:

- checking that representative thickness measurements in all holds and within each region of the frame, as specified, is documented
- examination to confirm that renewals or sandblasting, coating and reinforcements are carried out as required. Any coating shall be carried out in accordance with the requirements as far as applicable

The extent of renewals and sandblasting, coating and reinforcements will be recorded in a Memo to Owner for future reference.

- verification that side frames previously sandblasted, coated and reinforced based on the requirements have been maintained in 'as new' condition.

'As new' condition in this respect, means that the coating should be without any breakdown and rusting. (IACS UR S31)

2.4 Oil and chemical tankers subject to Enhanced Survey Programme (ESP) – additional requirements

2.4.1 For single hull oil tankers from 5 to 10 years of age overall examination of all ballast tanks shall be carried out.

2.4.2 For ships over 10 years of age the survey shall include:

- overall examination of all cargo tanks and ballast tanks and all pump rooms, cofferdams, pipe tunnels and void spaces within the cargo area
- examination and performance testing of all cargo piping on deck, including crude oil washing (COW) piping, cargo and ballast piping within all cargo tanks and ballast tanks as well as cofferdams, pipe tunnels and void spaces within the cargo area. Special attention shall be given to any ballast piping in cargo tanks and cargo piping in ballast tanks and void spaces. Thickness measurement shall be taken if deemed necessary by the surveyor
- close-up examination as for the previous renewal survey in accordance with:

  Sec.4 Table 4.5.1 for single hull oil tankers and single hull chemical tankers

  Sec.4 Table 4.6.1 for double hull oil tankers and double hull chemical tankers
- thickness measurement as for the previous renewal survey in accordance with:

  Sec.4 Table 4.5.2 for single hull oil tankers and single hull chemical tankers

  Sec.4 Table 4.6.2 for double hull oil tankers and double hull chemical tankers

Thickness measurements of following structures may be exempted:

- main deck plates outside the cargo area (item 1 partly),
- bottom plates including keel plates outside the cargo area (item 4a partly),
- plating of sea chests and shell plating in way of overboard discharges (item 4b),
- superstructure deck plating (item 5),
- internals in peak tanks (item 6) and
- air pipes and ventilators (item 7)
- a bottom survey in accordance with Sec.5.1.

2.4.3 A ballast tank shall be recorded for examination at subsequent annual surveys where, in addition to the conditions given in 2.1.1 and 2.1.6:

- the hard protective coating is found to be less than GOOD condition and is not repaired to the satisfaction of the surveyor.

2.5 Liquefied gas tankers - additional requirements

2.5.1 For ships over 10 years of age the survey shall include close-up examination of:

- all web frames and both transverse bulkheads in a representative ballast tank
- the upper part of one web frame in another representative ballast tank
- one transverse bulkhead in another representative ballast tank.

For ships over 15 years of age the survey shall include close-up examination of:

- all web frames and both transverse bulkheads in two representative ballast tanks.

Note: For ships having independent tanks, with a midship section similar to that of a general cargo ship, the extent of close-up surveys may be specially considered.

3 Machinery and Systems

3.1 General - All ships

3.1.1 The survey shall cover:

- electrical installations, see 3.1.2
- gas fuelled engine installation, see 3.1.3

3.1.2 Electrical equipment in gas-dangerous spaces and zones shall be examined with respect to:

- corrosion
- flameproof enclosure/ingress
- no unauthorised modification
- correct rating of lamps
- earthing (spot check)
- function testing of pressurised equipment and of associated alarms
- testing of insulation resistance of power circuits (Ex p, Ex e and Ex n). Where proper records of testing are maintained consideration may be given to accepting recent readings (maximum 12 months) by the ship's crew
- insulation monitors with alarms shall be function tested, if installed
- for rooms protected by air locks, interlocking with ventilation of electrical supply to non-explosion protected equipment and de-energising of such equipment in case of ventilation failure shall be examined and function tested as applicable.

Megger testing in gas dangerous spaces may involve risk of explosion due to sparks. Therefore appropriate procedures for such work should be followed as relevant e.g., “gas free certificate”.

Reference is made to IACS Rec. No.35 - Inspection and maintenance of electrical equipment installed in hazardous areas.

Sec.4 Table 4.6.2 for double hull oil tankers and double hull chemical tankers

3.1.3 For ships with gas fuelled engine installations, (including ships with class notation GASFUEL), the survey shall include:

a) testing of all alarm and shutdown functions for:

- gas compressor
- gas engine.

3. 2 Oil and chemical tankers – additional requirements

3.2.1 For chemical tankers the survey shall include:

- examination of systems for cargo heating and cooling
- checking of spare parts for the mechanical ventilation fans in the cargo area.

3.2.2 For chemical tankers over 10 years of age examination of fittings such as valves and instrumentation in way of the representative cargo tanks subject to survey shall be carried out.

3.2.3 For ships over 15 years of age heating coils, tank cleaning apparatus and other equipment in cargo tanks, cofferdams and pipe tunnels within the cargo area shall be examined. Heating coils are normally to be pressure tested. Attachments of sacrificial anodes in tanks shall be examined.

3.3 Liquefied gas tankers – additional requirements

3.3.1 Spares provided for cargo area mechanical ventilation fans shall be confirmed (not required if double fans provided).

3.3.2 The instrumentation of the different cargo installations shall be tested by changing the parameter as applicable and comparing with test instruments. Simulated testing may be accepted for sensors which are not accessible or for sensors located within cargo tanks or inerted hold spaces. The testing shall include testing of alarm and safety functions.

3.3.3 For ships having a gas fuel forwarding system, the safety and control equipment and alarm and shut down functions related to the following systems shall be tested:

- gas heating arrangement
- fuel gas compressor and forwarding system
- ventilation arrangement
- protection and flame screens
- gas freeing and purging systems
- manual and automatic shut-down system
- gas detection system
- pilot flame burner or "fuel floor" arrangement, if applicable
- governor stability switching from gas fuel to oil, or vice versa.

Section 4 Renewal Surveys Extent – Main Class

1 General Requirements

1.1 General

1.1.1 Renewal survey is a major survey including visual examinations, measurements and testing of the hull and equipment, machinery and systems, in order to confirm that the ship complies with the relevant rule requirements and is in satisfactorily maintained condition.

The required examinations, measurements and tests shall be carried out before the renewal survey is regarded as completed.

1.1.2 Possible deficiencies shall normally be rectified before the renewal survey is regarded as completed. The Society may accept that minor deficiencies, recorded as condition of class, are rectified within a specified time limit, normally not exceeding 3 months after the survey completion date.

1.1.3 For liquefied gas tankers the renewal survey of cargo handling installations with related automatic control, alarm and safety systems is preferably to be carried out with the ship in a gas-free condition. The extent of the testing required will normally be such that the survey cannot be carried out during a loading or discharging operation.

1.2 Review of documentation, operational instruments, signboards and markings

1.2.1 The draught marks shall be verified in order.

1.2.2 For ships with class notation ESP, the surveyor shall examine the documentation onboard as specified in Sec.1 2.6, and its contents as a basis for the hull survey.

1.2.3 For ships equipped for the carriage of containers (including ships with class notation Container Ship), instructions (container securing manual) shall be verified available on board. Instrument (computer program) for stowing and securing of containers, if furnished, shall be checked with verification of valid certificate and tested for functionality and accuracy.

2 Hull and Equipment

2.1 General - all ships

2.1.1 The survey shall cover:

a) thickness measurements of hull structure, see 2.1.5

- extended thickness measurements when substantial corrosion has been found, see 2.1.19

b) anchoring equipment, see 2.1.6

c) hatch covers and coamings, see 2.1.7

d) doors in ship's bow, sides and stern, see 2.1.8

e) air pipes and ventilators on deck, see 2.1.9 and 2.1.10

f) examination of spaces:

- all spaces, general, see 2.1.11
- watertight integrity of internal bulkheads and decks, see 2.1.15
- tightness of tank boundaries, see 2.1.16
- ballast tanks, see 2.1.17
- engine room structure, see 2.1.20
- piping on deck and in spaces outside the machinery area, see 2.1.21
- sea connections in machinery area, with pipes, valves and filters, see 2.1.23
- coating in tanks for potable water, see 2.1.30
- tanks for low flashpoint liquids, see 2.1.32.

g) ships equipped for the carriage of containers, see 2.1.27

h) ships with movable car decks, see 2.1.28

i) mooring and towing equipment, see 2.1.24 and 2.1.25

j) pushing arrangement, see 2.1.31

k) verification of required signboards

l) loading instrument or loading computer system, if available onboard, shall be tested by using the approved test conditions. Functionality and accuracy shall be verified with respect to strength and stability, whichever is applicable

m) examination of masts with standing rigging and foundations, see 2.1.26.

2.1.2 A bottom survey shall be carried out in accordance with Sec.5,1, as part of the renewal survey.

2.1.3 Internal examination of sea water cross-over tanks shall be carried out during the bottom survey in dry dock.

2.1.4 Suspect areas identified shall be recorded for examination at subsequent annual surveys.

Areas found with substantial corrosion, which are not upgraded, shall also be recorded for thickness measurements at subsequent annual surveys.

Note: Annual surveys of suspect areas and areas found with substantial corrosion are not applicable to cargo tanks of oil and chemical tankers.

2.1.5 Thickness measurements shall be carried out in accordance with Table 4.1.1. For passenger ships with superstructure extending over most of the ship length thickness measurements shall be carried out in accordance with Table 4.1.1.1.

2.1.6 Windlass, including piping system and foundations shall be examined.

The anchors and chain cables shall be ranged, examined and the required complement and condition verified.

The chain lockers, holdfasts, hawse pipes and chain stoppers shall be examined and drainage arrangement of the chain lockers tested.

At the second and subsequent renewal surveys, chain cables shall be gauged. Any length of chain cable shall be renewed if the mean diameter at any cross-section is worn beyond 12% of its original diameter.

The mean diameter of a cross-section may be taken as the average of the minimum diameter and the diameter measured perpendicular to this.

For vessels where a bottom survey in dry dock is not required as part of the renewal survey, the examination of anchors and chain cables, verification of required complement and gauging of chain cables may be carried out during the bottom survey in dry dock.

2.1.7 Hatch covers and coamings shall be thoroughly examined. The survey shall include, in addition to the annual survey items:

a) close-up examination of hatch cover plating and hatch coaming plating.

close-up examination of hatch cover stiffeners and hatch coaming stiffeners at the 3rd and subsequent renewal surveys.

b) testing for satisfactory operation of all mechanically operated hatch covers, including:

- stowage and securing in open condition
- proper fit and efficiency of sealing in closed condition
- operational testing of hydraulic and power components, wires, chains and link drives

c) testing for effectiveness of sealing arrangement of all hatch covers by hose testing or equivalent.

d) thickness measurements of members subject to close-up examination, for general assessment and recording of corrosion pattern are specified in Table 4.1.1.

Additional thickness measurements are also specified in:

- Table 4.2.2 for general dry cargo ships
- Table 4.3.2 for single skin bulk carriers
- Table 4.4.2 for double skin bulk carriers.

2.1.8 Doors in ship's bow (outer and inner), sides and stern shall be thoroughly examined. The survey shall include, in addition to the annual survey items:

a) close-up examination for cleats, support and locking devices as follows:

- cylinder securing pins, supporting brackets, back-up brackets (where fitted) and their welded connections
- hinge pins, supporting brackets, back-up brackets (where fitted) and their welded connections
- locking hooks, securing pins, supporting brackets, back-up brackets (where fitted) and their welded connections

- locking pins, supporting brackets, back-up brackets (where fitted) and their welded connections
- locating and stopper devices and their welded connections.

b) non-destructive testing and thickness measurements on securing, supporting and locking devices, including welding, to the extent considered necessary by the surveyor

c) clearances of hinges, bearings and thrust bearings shall be measured. The measurement of clearances for doors on Ro-Ro cargo ships may, where dismantling is needed in order to measure the clearances, normally be limited to representative bearings. If dismantling is carried out, a visual examination of hinge pins and bearings together with non-destructive testing of the hingen pin shall be carried out

d) all doors shall be tested for effectiveness of sealing arrangement by hose testing or equivalent

e) the non-return valves of the drainage system shall be dismantled and examined.

2.1.9 Thickness measurements of air pipes and ventilators shall be carried out in accordance with Table 4.1.1, Table 4.2.2, Table 4.3.2, Table 4.4.2, Table 4.5.2, Table 4.6.2 or Table 4.7.2 as relevant.

The measurement report shall be verified and evaluated by the surveyor onboard. Thickness diminution of 25% compared to the thickness required is acceptable.

2.1.10 Automatic air pipe heads on exposed decks shall be externally and internally examined. For all ships except for passenger ships the following apply:

At 1st renewal survey, the examination shall comprise air pipe heads preferably serving ballast tanks as follows:

- one port and one starboard, on the exposed decks within 0.25 L from the forward end
- one port and one starboard, serving spaces aft of 0.25 L from the forward end.
- At 2nd renewal survey, the examination shall comprise air pipe heads as follows:
- all within 0.25 L from the forward end
- at least 20% of those serving spaces aft of 0.25 L from the forward end, preferably serving ballast tanks.

From 3rd renewal survey, the examination shall comprise all air pipe heads. Exemption may be considered for air pipe heads where there is substantiated evidence of replacement within the previous five years.

The air pipe heads to be examined according to the above specification, shall be selected by the surveyor when relevant.

The head shall be removed from the air pipe for designs where the inner parts cannot be properly inspected from outside.

Particular attention shall be paid to the condition of the zinc coating in heads constructed from galvanised steel.

According to the results of the examination, the surveyor may require examination of other air pipe heads.

For passenger ships air pipe heads shall be examined as deemed necessary by the surveyor. (IACS UR Z22)

2.1.11 All spaces shall be examined.

An internal overall examination of all spaces, except fuel oil, lube oil and fresh water tanks, shall include all structures, piping systems outside machinery area and sea connections in machinery area, i.e. plating and framing, bilges and drain wells, sounding, venting, pumping and drainage arrangements.

Independent cargo tanks shall be internally examined including mountings and equipment. As far as practicable the outer surface of non-insulated cargo tanks or the outer surface of cargo tank insulation shall be examined including the tank supports with foundations, chocks and keys. Special attention shall be given to the tank and insulation in way of chocks, supports and keys. Partial removal of insulation may be required in order to verify the condition of the tank or the insulation itself if found necessary by the surveyor.

Thickness measurements of the tanks may be required if deemed necessary by the surveyor.

The tightness of the tanks shall be verified with a head of liquid to the overflow or by an appropriate procedure.

Cement and dry mud pressure tanks shall be tested to 1.2 times the working pressure if found necessary by the surveyor.

Additional requirements applicable for ships arranged for carriage of low flash point liquids are given in 2.1.32, for chemical tankers and liquefied gas tankers in 2.4 and 2.5.

Where provided, the condition of the corrosion prevention system of cargo holds and tanks shall be examined.

In refrigerated cargo spaces the condition of the coating behind the insulation shall be examined at representative locations. The examination may be limited to verification that the protective coating remains effective and that there are no visible structural defects. Where POOR coating condition is found, the examination shall be extended as deemed necessary by the surveyor. If indents, scratches, etc., are detected during surveys of shell plating from the outside, insulations in way shall be removed as required by the surveyor, for further examination of the plating and adjacent frames.

2.1.12 Examination of fuel oil, lube oil and fresh water tanks shall be in accordance with Table 2.1.

Independent tanks in machinery spaces shall be externally examined including the tank supporting structures.

2.1.13 Tanks used as bilge water holding tanks shall be overall examined.

2.1.14 For sewage (black water) tanks and wastewater (gray water) tanks the survey shall include:

- For integral tanks internal examination.

For ships not exceeding 10 years of age the internal examination of tanks used in association with sewage treatment may be specially considered based on a satisfactory external examination and provided that an internal inspection has been carried out in accordance with onboard maintenance system during the last 12 months and relevant records are provided and confirmed.

- For independent tanks external examination including the tank supporting structures.

Thickness measurements shall be carried out as deemed necessary.

Table 2.1 Minimum requirements for internal examination of fuel oil, lube oil and fresh water tanks 1) 2) 3)

Tank	Age of ship, years			
	0 to 5	5 to 10	10 to 15	above 15
Fuel oil/ diesel oil				
engine room	None	None	One	One
cargo area	None	One	Two	Half, minimum two [4)]
Lube oil	None	None	None	One
Fresh water [5)]	None	One	All	All

1) Tanks of integral (structural) type.

2) If a selection of tanks are accepted to be examined, then different tanks shall, as far as practicable, be examined at each renewal survey, on a rotational basis.

3) Peak tanks (all uses) are subject to internal examination at each renewal survey.

4) One deep tank shall be included, if fitted.

5) Tanks for clean fresh water, i.e. potable water, boiler water and other holding tanks for cleans fresh water. Tanks for mainly contaminated fresh water as waste water (gray water) and sewage (black water) shall be subject to internal examination as given in 2.1.14. (IACS UR Z7)

2.1.15 The watertight integrity of internal bulkheads and decks shall be verified.

Special arrangements related to stability such as watertight closing appliances for openings in internal bulkheads and decks, cross-flooding, counter-flooding etc., shall be examined and tested if necessary.

Bulkhead shaft seals shall be verified. Dismantling shall be carried out where necessary to examine condition of the bulkhead seal.

Documented maintenance may be considered as a base for extent of dismantling.

2.1.16 Testing of structures forming boundaries of double bottom, deep, peak and other tanks, including holds adapted for the carriage of water ballast, shall be in accordance with Table 2.2. The surveyor may require further testing.

Testing of double bottoms and other spaces not designed for the carriage of liquid may be omitted, provided a satisfactory internal examination together with an examination of the tanktop is carried out.

Independent tanks in machinery spaces shall be tested as deemed necessary.

Table2.2 Minimum requirements for testing of tanks

Tanks 1) to be tested	Test head or pressure	Remark
Ballast tanks	Top of air pipe	
Cargo holds adapted for carriage of ballast	Near the top of cargo hold hatch coaming	3)
Bilge water holding tanks	Top of air pipe	
Fuel oil tanks	Head of liquid to the highest point that liquid will rise under service conditions	2), 3)
Lub. Oil tanks	Head of liquid to the highest point that liquid will rise under service conditions	2)
Fresh water tanks	Head of liquid to the highest point that liquid will rise under service conditions	2), 3)
Sewage (black and grey water) tanks	Top of air pipe	As deemed necessary by the surveyor
Tanks containing other liquids	Head of liquid to the highest point that liquid will rise under service conditions	As deemed necessary by the surveyor

Notes:

1) Gravity tanks of integral type

2) Tanks within machinery spaces may be specially considered based on external examination of the tank boundaries and a confirmation from the Master stating that no leakages or other defects have been observed during operation of the vessel.

3) Tanks within the cargo area may be specially considered based on a satisfactory external examination of the tank boundaries and a confirmation from the Master stating that the pressure testing has been carried out according to the requirements with satisfactory results.

2.1.17 For ballast tanks the survey shall include examination of the condition of corrosion prevention system, where provided.

A ballast tank, except bilge water holding tanks, shall be recorded for examination at subsequent annual surveys where:

- hard protective coating was not applied from the time of construction, or
- a soft or semi-hard coating has been applied, or
- the hard protective coating is found in POOR condition and it is not renewed.

For double bottom ballast tanks, except for oil and chemical tankers with the notation ESP, such recording may be specially considered.

Initial hard protective coating applied later than at the time of construction may be accepted as equivalent to such coating being applied at the time of construction provided a surveyor has confirmed that the structure was in satisfactory condition when the coating was applied.

2.1.18 The survey extent of void spaces converted from ballast tanks shall be specially considered in relation to the requirements for ballast tanks.

The intervals and type and extent of examination of void spaces converted from ballast tanks will be decided by the Society with due consideration of the condition of the corrosion prevention system.

For tanks/spaces where the hard protective coating is found in GOOD or FAIR condition and without substantial corrosion, examination may be accepted carried out at subsequent renewal surveys only.

For tanks/spaces where the hard protective coating is found in POOR condition or for tanks/spaces without corrosion prevention system as defined in Sec.1.1, examination at subsequent annual surveys in accordance with 2.1.17 should be recorded and maintained for a period of at least until the subsequent intermediate or renewal survey, whichever comes first. If the structural condition at this stage, based on a thorough examination including close-up and thickness measurements as deemed necessary, is found without structural deficiencies or substantial corrosion, examination may be accepted carried out at subsequent renewal surveys only.

2.1.19 Areas where substantial corrosion is found at the survey being carried out, shall have thickness measurements extended.

The following tables shall be used:

Sec.4 Table 4.1.2 in general as guidance,

Sec.4 Table 4.3.3 for single skin bulk carriers,

Sec.4 Table 4.4.3 for double skin bulk carriers,

Sec.4 Table 4.5.3 for single hull oil tankers and single hull chemical tankers,

Sec.4 Table 4.6.3 for double hull oil tankers and double hull chemical tankers.

2.1.20 The machinery area shall be examined with particular attention to

- tank tops,
- shell plating in way of tank tops,
- brackets connecting side shell frames and tank tops, and
- engine room bulkheads in way of tank top and bilge wells.

Where wastage is evident or suspect, thickness measurements shall be carried out.

2.1.21 All piping on deck and in spaces outside the machinery area shall be examined.

The examination may require opening up.

Pressure testing and thickness measurements of any piping may be required.

Last overhaul shall be verified for all piping systems.

For piping in spaces outside the machinery area special attention shall be given to:

- cargo piping passing through ballast tanks
- bilge and ballast piping passing through cargo and fuel oil tanks

- air and sounding piping to ballast tanks passing through cargo and ballast tanks
- fuel pipes passing through ballast tanks.

Performance testing shall be carried out for the following systems:

- bilge and ballast
- cargo handling, including crude oil washing (COW)
- steam with temperature below 450°C
- compressed air
- hydraulic, including steering power actuating
- fuel oil.

2.1.22 For chemical tankers over 10 years of age selected steel cargo pipes outside cargo tanks and ballast pipes passing through cargo tanks shall be:

- Thickness measured at random or selected pipe lengths to be opened for internal inspection.

For stainless steel cargo pipes, thickness measurements may be waived, however, selected pipe lengths shall be opened for internal examination.

- Pressure tested to the maximum working pressure.

Special attention shall be given to cargo/slop discharge piping through ballast tanks and void spaces.

2.1.23 For sea connections in the machinery area special attention shall be given to sea suctions, sea water cooling pipes and overboard discharge valves and their connections to shell plating.

2.1.24 Shipboard fittings used for mooring and normal towing of the ship and their supporting structures shall be examined.

Shipboard fittings mean bollards and bitts, fairleads, stand rollers, chocks used for the mooring of the ship and the similar components used for the normal towing of the ship. as well as equipment employed in the mooring of ships at single point moorings such as bow fairlead, bow chain stopper and possible pedestal rollers.

Towing and mooring arrangements plan shall be verified available on board.

Applicable to ships of 500 GT and above, contracted for construction from 1 January 2007.

2.1.25 For ships with emergency towing arrangements the pick-up gear, towing pennant and chafing gear shall be examined over the full length for deterioration.

Where pennant line is stored in a watertight condition confirmed maintained, consideration may be given to waiving the requirement to examine the pennant line over the full length.

Strongpoint, fairlead and pedestal roller shall be examined including attachment to the ship.

Emergency towing arrangements are required on oil tankers, chemical tankers and gas carriers of 20000 tonnes deadweight and above in accordance with IMO resolution MSC.35(63).

2.1.26 Crane pedestals and derrick masts shall be examined including connection to deck and supporting structures.

Where wastage is evident or suspect, thickness measurements shall be carried out.

2.1.27 For ships equipped for the carriage of containers (including ships with class notation Container Ship), the following shall be examined:

a) Container supporting structures with respect to cracks and deformations:

- cell guides including supports:
- container stanchions and racks on deck and in holds
- support fittings welded to inner bottom, container steps, stanchions etc.

b) Hatch covers:

- supports and stoppers with respect to condition and operability:
- guide rails and supporting frames including connection to hull with respect to cracks and deformations.

c) Removable (loose) container securing equipment:

- random examination for damage
- comparison with certificates kept in ship's files.

2.1.28 For ships with movable car decks, the survey shall include:

- examination of pontoon conditions
- examination of supporting fittings and suspension / pillars
- examination of lifting arrangement (wires, sheaves etc. if applicable)
- examination of stowing arrangements in cargo hold
- examination of pontoon racks on deck including lashing arrangements
- examination of drainage arrangements in pontoon stowage areas
- testing of movable car deck hoisting arrangement.

2.1.29 For examination of structures in passenger ships generally arranged with superstructure extending over most of the ship length, having structures with discontinuities and sides penetrated by many large openings, consisting of several decks and longitudinal bulkheads, special attention to be given to the integrity of main structural members in highly stressed areas including welded connections. Partial removal of ceiling/insulation may be required in order to verify the structural condition.

The following structural areas are, amongst others, considered to have highly stressed members:

- window openings in shipside in way of high hull girder shear forces

- shipside panels connecting the superstructure with the sideshell at the ends of the superstructure
- longitudinal bulkheads with large openings
- large doors in shipsides
- steps/ knuckles in upper decks
- transverse bulkheads with large openings, generally around quarter lengths of the ship.

2.1.30 For ships arranged for carriage of potable water, the coating in cargo tanks shall be examined.

2.1.31 For ships with arrangement for pushing or being pushed (including ships with class notation Tug), the following shall be examined:

- connecting points and contact areas with supporting structure
- connecting equipment including locking device if any.

2.1.32 For ships arranged for carriage of low flash point liquids, the survey shall include:

- pressure testing (hydrostatic, hydro-pneumatic or otherwise) of all cargo tanks to their MARVS (Maximum Allowable Relief Valve Setting)

2.1.33 For ships with gas fuelled engine installation (class notation GASFUEL), survey of gas fuel storage tanks shall include:

- tanks without access, vacuum isolated: verification that vacuum is maintained with review of voyage records and external examination for cold spots as found necessary
- tanks with access shall be surveyed as given for relevant tank types according to 2.5
- external examination including the tanks supports with foundations.

2.1.34 For ships with class notation ESP overall and close-up examination including thickness measurements, as required for the lower portions of the cargo tanks/holds and ballast tanks, shall be carried out not later than concurrently with the bottom survey required as part of the renewal survey.

For liquefied gas tankers requirements given above apply to ballast tanks.

Note: Lower portions of the cargo and ballast tanks and cargo holds are considered to be the parts below light ballast water line.

2.2 General dry cargo ships

2.2.1 Close-up examination shall be carried out in accordance with Table 4.2.1

2.2.2 Thickness measurement shall be carried out in accordance with Table 4.2.2.

Representative thickness measurement to determine both general and local levels of corrosion in the shell frames and their end attachments in all cargo holds and water ballast tanks shall be carried out. Thickness measurement shall also be carried out to determine the corrosion levels on the transverse bulkhead plating. The thickness measurements may be dispensed with provided the surveyor is satisfied by the close-

up examination, that there is no structural diminution, and the hard protective coating where applied remains efficient.

2.2.3 A bottom survey in dry dock shall be carried out in accordance with Sec.5.1, as part of the renewal survey.

2.3 Dry bulk cargo ships subject to Enhanced Survey Programme (ESP) – additional requirements

2.3.1 For bulk carriers with hybrid cargo hold arrangements, the following shall be applied:

- full breadth cargo holds and associated topside tanks and hopper side tanks are subject to the single skin bulk carrier requirements
- cargo holds of double skin and associated side tanks are subject to the double skin bulk carrier requirements.

2.3.2 Close-up examination shall be carried out in accordance with:

Sec.4 Table 4.3.1 for single skin bulk carriers,

Sec.4 Table 4.4.1 for double skin bulk carriers,

Sec.4 Table 4.4.1.1 for ore carriers.

2.3.3 Thickness measurements shall be carried out in accordance with:

Sec.4 Table 4.3.2 for single skin bulk carriers.

Representative thickness measurement to determine both general and local levels of corrosion in the shell frames and their end attachments in all cargo holds and in the transverse web frames in all water ballast tanks shall be carried out. Thickness measurement shall also be carried out to determine the corrosion levels on the transverse bulkhead plating. The extent of thickness measurements may be specially considered provided the surveyor is satisfied by the close-up survey, that there is no structural diminution, and the hard protective coating where applied remains efficient.

Sec.4 Table 4.4.2 for double skin bulk carriers.

Representative thickness measurement to determine both general and local levels of corrosion in the transverse web frames in all water ballast tanks shall be carried out.

Thickness measurement shall also be carried out to determine the corrosion levels on the transverse bulkhead plating. The extent of thickness measurements may be specially considered provided the surveyor is satisfied by the close-up survey, that there is no structural diminution, and the hard protective coating where applied remains efficient.

2.3.4 A bottom survey in dry dock shall be carried out in accordance with Sec.5.1, as part of the renewal survey.

2.3.5 For single skin bulk carriers subject to compliance with the requirements given sec. 9.1, additional thickness measurements shall be carried out of the vertically corrugated transverse watertight bulkhead between cargo holds Nos. 1 and 2, as applicable.

For ships built 1996-1998 the thickness measurements at the 2nd renewal survey may be required as part of the initial evaluation for compliance in order to determine the general condition of the structure and to establish the extent of possible steel renewal and or reinforcements of the bulkhead, in accordance with the requirements given in sec. 9.1.

The thickness measurements shall be carried out at the levels described below. To adequately assess the scantlings of each individual vertical corrugation, each corrugation flange, web, shedder plate and gusset plate within each of the levels given below shall be thickness measured:

- the mid-breadth of each corrugation flange and web at approximately 200 mm above the top of shedder plates and top of hopper plates
- the middle of each gusset plate, if fitted
- the middle of each shedder plate
- the mid-breadth of each corrugation flange and web at approximately 200 mm below upper stool, if fitted
- the mid-breadth of the corrugation flange and web at about the mid-height of the corrugation
- the mid-breadth of the corrugation flanges and webs below the upper stool, (see Fig. 2.2) if applicable, as deemed necessary by the surveyor.

Where the thickness changes, within the horizontal levels, the thinner plate shall be thickness measured. (IACS UR S19)

Fig. 2.1: Hold profile, ships without lower stool

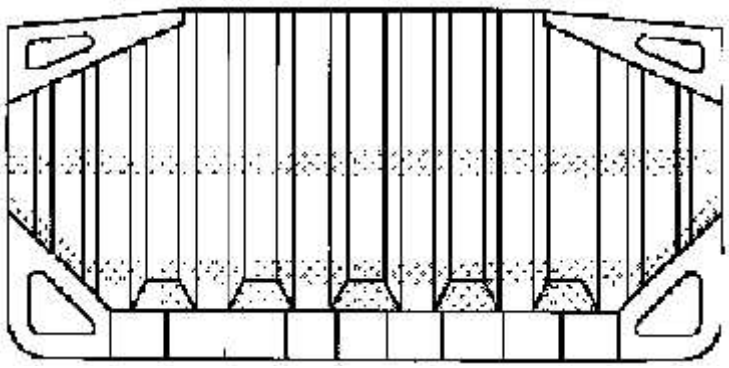
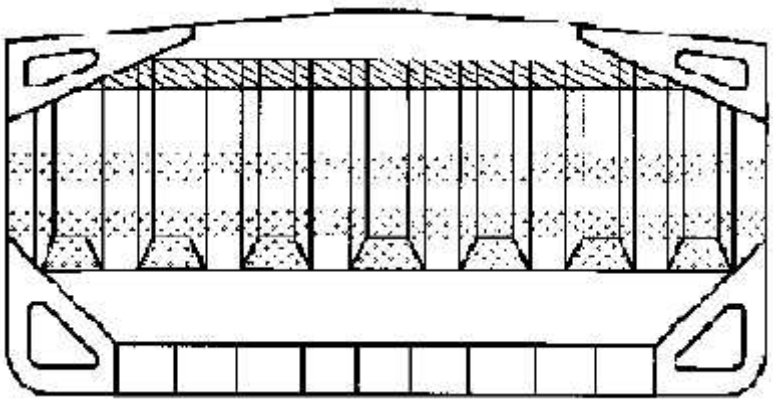


Fig. 2.2: Hold profile, ships with lower stool



2.3.6 For single skin bulk carriers required to comply with the rule requirements in sec. 9.6, the survey of the side frames shall include:

- checking that representative thickness measurements in all holds and within each region of the frame, as specified, is documented
- examination to confirm that renewals or sandblasting, coating and reinforcements are carried out as required.

The extent of renewals and sandblasting, coating and reinforcements will be recorded in a Memo to Owner (MO) for future reference.

- verification that side frames previously sandblasted, coated and reinforced, have been maintained in 'as new' condition 'As new' condition in this respect, means that the coating should be without any breakdown and rusting. (IACS UR S31)

2.4 Oil and chemical tankers subject to Enhanced Survey Programme (ESP) – additional requirements

2.4.1 For single hull oil tankers with double bottom or double side spaces (for water ballast, or void spaces), the survey requirements for double hull oil tankers shall be applied in way of the double bottom or the double sides.

2.4.2 Close-up examination shall be carried out in accordance with:

Sec.4 Table 4.5.1 for single hull oil tankers and single hull chemical tankers,

Sec.4 Table 4.6.1 for double hull oil tankers and double hull chemical tankers.

The survey of stainless steel tanks may be carried out as an overall examination supplemented by close-up examination as deemed necessary by the surveyor.

2.4.3 Thickness measurements shall be carried out in accordance with:

Sec.4 Table 4.5.2 for single hull oil tankers and single hull chemical tankers,

Sec.4 Table 4.6.2 for double hull oil tankers and double hull chemical tankers.

Thickness measurement of stainless steel hull structure and piping may be waived, except for clad steel plating.

2.4.4 A bottom survey in dry dock shall be carried out in accordance with Sec.5.1, as part of the renewal survey.

2.4.5 Cargo tank boundaries facing ballast tanks, void spaces, pipe tunnels, pump rooms or cofferdams shall be pressure tested.

All cargo tank bulkheads shall be pressure tested at the 2nd and subsequent renewal surveys.

The pressure shall, in general, correspond to a head of liquid to the highest point that liquid will rise under service conditions.

Pressure testing of cargo tanks may be accepted based on confirmation from the Master, stating that the pressure testing has been carried out according to the requirements, with a satisfactory result.

The testing of boundaries facing double bottom tanks and other spaces not designed for the carriage of liquid may be omitted, provided a satisfactory internal examination together with an examination of the tanktop is carried out.

The surveyor may extend the tank testing as deemed necessary.

2.4.6 A ballast tank shall be recorded for examination at subsequent annual surveys where, in addition to the conditions given in 2.1.4 and 2.1.18:

- the hard protective coating is found to be less than GOOD condition and is not repaired to the satisfaction of the surveyor.

2.4.7 For independent cargo tanks in chemical tankers the survey shall include:

- thickness measurement as found necessary by the surveyor
- hydraulically pressure testing of all tanks to their MARVS (Maximum Allowable Relief Valve Setting).

The testing of cargo tanks type a3 may be omitted if the tanks are found without corrosion and other damage and otherwise found acceptable by the surveyor.

2.5 Liquefied gas tankers – additional requirements

2.5.1 Close-up examination shall be carried out in accordance with Table 4.7.1.

2.5.2 Thickness measurement shall be carried out in accordance with Table 4.7.2.

2.5.3 A bottom survey in dry dock shall be carried out in accordance with Sec.5.1, as part of the renewal survey.

2.5.4 All cargo tanks are to be examined internally. Special attention shall be given to the cargo tank and insulation in way of chocks, supports and keys. Removal of insulation may be required in order to verify the condition of the tank or the insulation itself if found necessary by the Surveyor.

Where the insulation arrangement is such that it cannot be examined, the surrounding structures of wing tanks, double bottom tanks and cofferdams shall be examined for cold spots when the cargo tanks are in the cold condition (prior to the renewal survey) unless voyage records together with the instrumentation give sufficient evidence of the integrity of the insulation system.

2.5.5 Thickness measurements of the cargo tanks may be required if deemed necessary by the surveyor.

2.5.6 Non-destructive testing shall supplement cargo tank inspection, with special attention to be given to the integrity of the main structural members, tank shell and highly stressed parts, including welded connections as deemed necessary by the Surveyor. However, this does not mean that non-destructive testing can be dispensed with totally. The following items are, inter alia, considered as highly stressed parts:

- cargo tank supports and anti-rolling or anti-pitching devices
- web frames or stiffening rings

- swash bulkhead boundaries
- dome and sump connections to tank shell
- foundations for pumps, towers, ladders etc.
- pipe connections.

2.5.7 For independent tanks type B, the extent of non-destructive testing shall be as given in a programme specially prepared for the cargo tank design.

2.5.8 The tightness of all cargo tanks shall be verified by an appropriate procedure. Provided that the effectiveness of the ship's gas detection equipment has been confirmed, it will be acceptable to utilise this equipment for the tightness test of independent tanks below deck during the first loading of the cargo tanks subsequent to the renewal survey.

2.5.9 Where findings of 2.5.1 to 2.5.8 or an examination of the voyage records raise doubts as to the structural integrity of a cargo tank, a hydraulic or hydro-pneumatic test shall be carried out. For integral tanks and for independent tanks type A and B, the test pressure at top of the tank is not to be less than the MARVS (Maximum Allowable Relief Valve Setting). For cargo tanks type B with MARVS higher than 1.0 bar, a test pressure higher than MARVS will be specially considered. For independent tanks type C the test pressure is not to be less than 1.25 times the MARVS.

2.5.10 For membrane containment systems a tightness test of the secondary barrier shall be carried out in accordance with the system designers' procedures as approved by the Society

2.5.11 For membrane containment systems with glued secondary barriers the values obtained shall be compared with previous results or results obtained at new building stage. If significant differences are observed for each tank or between tanks, the surveyor shall require an evaluation and additional testing as necessary.

2.5.12 At every other special survey all independent cargo tanks type C shall be either:

- hydraulically or hydro-pneumatically tested to 1.25 times MARVS followed by non-destructive testing in accordance with 2.5.6, or
- subjected to a thorough, planned non-destructive testing.

This testing shall be carried out in accordance with a programme specially prepared for the tank design. If a special programme does not exist, the following areas shall be given special attention:

- cargo tank supports and anti-rolling/anti-pitching devices,
- stiffening rings,
- Y-connections between tank shell and a longitudinal bulkhead of bilobe tanks,
- swash bulkhead boundaries
- dome and sump connections to the tank shell,
- foundations for pumps, towers, ladders etc.,
- pipe connections.

At least 10% of the length of the welded connections in each of above mentioned areas shall be tested. This testing shall be carried out internally and externally as applicable.

Insulation shall be removed as necessary for the required non-destructive testing.

2.5.13 Secondary barriers shall be examined visually for their effectiveness. For containment systems where access is not possible, the effectiveness of the secondary barrier may be checked by means of pressure/vacuum tests or other relevant methods.

2.5.14 For membrane and semi-membrane tank systems inspection and testing shall be carried out in accordance with programmes specially prepared in accordance with an approved method for the actual tank system.

2.5.15 If installed, systems for heating of hull structures shall be surveyed and function tested.

2.5.16 All pressure relief valves for the cargo tanks shall be opened for examination, adjusted, function tested and sealed. The allowable tolerance on the set pressure is given in Table 2.2.

Table 2.2 Cargo tanks - tolerance on set pressure

Set pressure p(bar)	Tolerance (%)
$0.0 \leq p \leq 1.5$	± 10.0
$1.5 < p < 3.0$	± 6.0
$3.0 \leq p$	± 3.0

If the cargo tanks are equipped with relief valves with non-metallic membranes in the main or pilot valves, such non-metallic membranes shall be replaced with new ones.

2.5.17 Pressure/vacuum relief valves, pressure relief hatches and rupture discs on interbarrier spaces and hold spaces shall be examined, if necessary by opening, adjusted and tested depending on their design.

2.5.18 The cargo, liquid nitrogen and process piping systems, including valves, actuators, compensators etc. shall be opened for examination as deemed necessary. Insulation shall be removed as deemed necessary to ascertain the condition of the pipes. If the visual examination raises doubt as to the integrity of the pipelines, a pressure test at 1.25 times the MARVS for the pipeline shall be carried out. After reassembly the complete piping system shall be tightness-tested to MARVS.

If the maximum delivery pressure for the piping system is less than the design pressure for the piping system, testing to the pumps' delivery pressure may be accepted. In such cases expansion bellows, selected at random, may be required dismantled for internal survey and pressure tested to their design pressure.

2.5.19 The pressure relief valves in the cargo and process piping systems shall be opened, function tested and adjusted to the extent found necessary by the surveyor.

2.5.20 The watersides of seawater-cooled heat exchangers, including those for gas operation of propulsion machinery shall be opened for survey, and the heat exchangers shall be pressure tested as found necessary.

2.5.21 Cargo pumps, compressors and other machinery, including prime movers, used in connection with cargo handling and gas operation of propulsion machinery shall be surveyed.

2.5.22 The following portable equipment shall be surveyed:

- portable gas detectors, oxygen and humidity analysers
- hoses and spool pieces used for segregation of piping systems for cargo, ventilation, inert gas and bilge operation.

2.5.23 Water spray systems shall be surveyed and tested for correct functioning.

2.5.24 Systems for removal of water or cargo from interbarrier spaces and hold spaces shall be examined and tested as deemed necessary.

2.5.25 All gas-tight bulkheads shall be inspected. The effectiveness of gas-tight shaft sealings shall be verified.

3 Machinery and Systems

3.1 General - all ships

3.1.1 The survey shall cover:

a) propulsion system, see 3.1.2:

b) steering and manoeuvring systems, see 3.1.3 and 3.1.6

c) auxiliary systems, see 3.1.4

d) boilers and thermal oil heaters, see 3.1.5

e) auxiliary thrusters, see 3.1.6

f) electrical power production systems including power management systems, see 3.1.7

g) electrical installations, see 3.1.8

h) electrical equipment in gas-dangerous spaces and zones, see 3.1.9

i) control and monitoring system of main and auxiliary machinery including equipment for periodically unattended machinery space and machinery centralised operated, see 3.1.10

j) equipment and systems related to carriage of special cargoes:

- inert gas plants, see 3.1.11
- low flashpoint liquids, see 3.1.12
- potable water, see 3.1.13

k) independent tanks within machinery area, fuel and lubrication oil tanks (non-integral, self-supporting tanks which do not form part of the ship's hull), see 3.1.14

l) gas fuelled engine installations, see 3.1.15

m) gas turbine installations, see 3.1.16

o) water ingress detection system and their alarms, for ships with single cargo hold and for bulk carriers, see 3.1.17.

3.1.2 The propulsion system shall be tested for proper functioning of the following:

- alarm and safety system
- manual control of machinery
- remote control of propulsion machinery
- automatic control loops
- transfer to stand-by manual control in the engine room in case of power supply failure to the remote control system.

When cancelling of automatic load reduction and or automatic stop of engine are provided, these functions shall be demonstrated to the satisfaction of the surveyor.

The components in the propulsion system shall be examined and tested according to Table 5.1. Components are also covered by separate surveys:

- Bottom survey - see Sec.5.1
- Propeller shaft survey - see Sec.5.2
- Propulsion connection survey - see Sec.5.3.
- Thrusters for Main Propulsion and Dynapos survey, see Sec.5.4/ 5.5
- Boiler survey, including steam generator, see Sec.5.6
- Thermal oil heater, see Sec.5.7.

3.1.3 The main and auxiliary steering gear arrangement shall be tested for proper functioning including test of alarm and safety functions.

3.1.4 The auxiliary systems shall be tested for proper functioning including test of alarm and safety functions.

The components in the auxiliary systems shall be examined and tested according to Table 5.1.

3.1.5 The following surveys shall be carried out in conjunction with the renewal survey:

- Boiler survey (boilers, superheaters, economisers and air preheaters or steam heated steam generator), see Sec.5.6.
- Thermal oil heater survey, see Sec.5.7.

3.1.6 Auxiliary thrusters shall be examined and tested as follows:

- Oil analysis of gear house oil and oil for the CP mechanism.
- Examination of gear and bearings through inspection openings or by other means.
- Examination of external piping systems.

- Examination of bearings, gear and shafts and other relevant parts if any indications of abnormalities are observed. Satisfactory maintenance according to manufacturer's recommendations to be documented and considered as a base for extent of possible opening.

Opening to be carried out normally at least every 10 years.

Any opening up of a thruster shall be witnessed by a surveyor of the Society.

- Function testing of sealing arrangements.
- Function testing of lubrication and hydraulic oil system.
- Function testing of CP mechanism.
- Function testing of thruster unit including alarm system.

It is advised to take oil analysis at regular intervals and always prior to docking in order to ensure that there is no need for opening of the thruster (e.g. water in the oil).

3.1.7 Electrical power production system including power management system and electrical installations shall be tested for proper functioning.

The following tests shall be carried out to the extent deemed necessary by the surveyor:

- generator full load test
- generator parallel operation
- generator protection relays including non-important load trip (if fitted)
- generator remote speed control
- generator synchronising equipment
- power plant interlocking systems
- emergency generator including switchboards
- battery chargers.

3.1.8 Safety precautions with respect to shock, fire and explosion and other hazards of the electrical installation shall be examined for switchboards, distribution boards, cable installations, enclosures, converters (e.g. transformers, rectifiers, chargers), battery installations, lighting and heating equipment.

Documentation of “Schedule of batteries” shall be reviewed.

The following tests shall be carried out to the extent deemed necessary by the surveyor to ascertain the proper functioning of the equipment:

- mechanical ventilation of battery rooms or lockers
- navigation lights, with controllers including alarms.

The insulation resistance of the complete installation shall be measured. The results shall be presented to the surveyor.

3.1.9 Electrical equipment in gas-dangerous spaces and zones shall be examined with respect to:

- corrosion
- flameproof enclosure/ingress
- no unauthorised modification
- correct rating of lamps
- earthing (spot check)
- function testing of pressurised equipment and of associated alarms
- testing of insulation resistance of power circuits (Ex p, Ex e and Ex n). Where proper records of testing are maintained consideration may be given to accepting recent readings (maximum 12 months) by the ship's crew
- insulation monitors with alarms shall be function tested, if installed
- for rooms protected by air locks, interlocking with ventilation of electrical supply to non-explosion protected equipment and de-energising of such equipment in case of ventilation failure shall be examined and function tested as applicable.

Megger testing in gas dangerous spaces may involve risk of explosion due to sparks. Therefore appropriate procedures for such work should be followed as relevant e.g., “gas free certificate”.

Reference is made to IACS Rec. No.35 - Inspection and maintenance of electrical equipment installed in hazardous areas.

3.1.10 The survey for control and monitoring system of main and auxiliary machinery shall include verification of correct functioning of the following:

- each alarm system
- each safety system
- each fire detector in engine room
- automatic control loops.

3.1.11 For ships with inert gas plant (including ships with class notation IG), the scrubber, deck water seal and non-return valves shall be opened up for examination.

Pressure testing may be required if found relevant and necessary by the surveyor.

External examination and performance test shall be carried out for the following components and arrangements:

- deck water seal
- non-return valves
- scrubber cooling water arrangement
- blowers including regulating valve and shut down devices
- pressure/vacuum breaker
- flue gas piping system
- separate inert gas generator
- running test, including check of instruments and automatic equipment.

Opening up and/or pressure testing may be required if found necessary by the surveyor.

Last overhaul to be verified.

It shall be verified that pipe blanking arrangements and portable O2-analysers are on board and in order.

3.1.12 For ships arranged for carriage of low flash point liquids, the survey shall include examination of heating coils, anodes, tank cleaning apparatus and other equipment in cargo tanks and cofferdams. Heating coils are normally to be pressure tested.

3.1.13 For ships arranged for carriage of potable water, the following shall be examined:

- instruments for pH and conductivity
- cargo tank vents.

3.1.14 Settling tank and daily service tanks for heavy fuel oil and diesel oil as well as lubrication oil circulation tanks assessed with respect to tank cleanliness.

If inspection and cleaning have been carried out by the crew during the last 12 months and relevant log extracts are provided and confirmed, this may be credited as surveyed at the surveyor's discretion.

Opening up of tanks may be required as found necessary by the surveyor.

3.1.15 For ships with gas fuelled engine installations, (including ships with class notation GASFUEL), the survey shall include:

a) examination of gastight bulkheads with cable and shaft sealing etc. Special attention shall be paid to bulkheads in the electrical motor and or compressor room. Shaft sealing shall be checked for lubrication and possible overheating

b) testing of gas tanks high level alarm

c) examination and testing of:

- gas tanks safety relief valves
- tank room or secondary barrier space P/V valves and relief hatches, as relevant
- gas handling machinery and equipment
- auxiliary systems and equipment for gas installations
- portable gas detectors and oxygen analyser

3.1.16 For ships with gas turbine installations the survey shall include verification of records and major overhaul reports onboard. See Sec.1, 3.5 for general information on survey of gas turbines.

3.1.17 For ships with a single cargo hold and for bulk carriers an examination and test of the water ingress detection system and of their alarms shall be carried out.

3.2 Oil and chemical tankers – additional requirements

3.2.1 Heating coils, tank cleaning apparatus and other equipment in cargo tanks, cofferdams and pipe tunnels within the cargo area shall be examined. Heating coils are normally to be pressure tested. Attachments of sacrificial anodes in tanks shall be examined.

3.2.2 For ships having boilers burning crude oil or slop, examination and testing of control equipment including monitoring systems and shut down functions related to the following systems shall be carried out:

- ventilation and gas-tightness, fuel supply line and boiler with boiler front lagging
- fuel pumps and heating arrangement
- drain pipe ducts and automatic closing drain traps
- inert and purging systems
- manual and automatic quick closing valves and shut-down systems
- boiler hood ventilation system
- boiler compartment ventilation
- boiler front extinguishing system
- pilot burner arrangement
- gastight bulkhead penetrations
- gas detection system
- fuel heater.

3.2.3 For chemical tankers the survey shall include:

a) examination of systems for cargo heating and cooling

b) checking of spare parts for the mechanical ventilation fans in the cargo area

c) verification of the cargo system and equipment required in connection with the vessel's special features notations

d) testing of the instrumentation of the cargo plants

e) examination and testing as appropriate of:

- valves for drop lines, gas return lines and automatic shut-down of loading
- drip trays and spray shields
- emergency discharge pumps.

f) verification of marking of cargo tanks, pumps, pipelines, valves etc.

g) verification of the arrangement for discharge of contaminated water

h) the following shall be surveyed and tested:

- stripping tests of two cargo tanks, time of stripping shall be recorded.

3.2.4 For ships with centralised cargo control arrangement, the survey shall include:

- examination and testing of all remotely controlled operations related to cargo handling and ballasting
- checking of alarms and remote readings
- control of relevant requirements in the case of computer based systems

- examination and testing of arrangement for emergency stop of cargo pumps from the cargo manifold area
- examination and testing of arrangement in cargo control room for emergency closing of valves in cargo lines
- testing of loading computer for the following functions as applicable:
- damage stability and strength (by simulating loading conditions)
- cargo compatibility with tank coating
- certificate limitations.

3.2.5 For ships with vapour processing and recovery plant the survey shall include a VOC (volatile organic compounds) plant running test.

3.3 Liquefied gas tankers – additional requirements

3.3.1 The ventilation systems for spaces in the cargo area shall be examined and function tested.

Confirmation that spares are provided for cargo area mechanical ventilation fans (not required if double fans provided).

3.3.2 For rooms protected by air locks, interlocking with ventilation of electrical supply to non-explosion protected equipment and de-energising of such equipment in case of ventilation failure shall be examined and function tested as applicable.

3.3.3 The instrumentation of the different cargo installations shall be tested by changing the parameter as applicable and comparing with test instruments. Simulated testing may be accepted for sensors which are not accessible or for sensors located within cargo tanks or inerted hold spaces. The testing shall include testing of alarm and safety functions.

3.3.4 For ships having a gas fuel forwarding system, the safety and control equipment and alarm and shut down functions related to the following systems shall be tested:

- gas heating arrangement
- fuel gas compressor and forwarding system
- ventilation arrangement
- protection and flame screens
- gas freeing and purging systems
- manual and automatic shut-down system
- gas detection system
- pilot flame burner or “fuel floor” arrangement, if applicable
- governor stability switching from gas fuel to oil, or vice versa.

4 Tables of Close-Up Examination and Thickness Measurements

4.1 General - All ships

4.1.1 Minimum thickness measurements, all ships are given in Table 4.1.1 and for passenger ships in Table 4.1.1.1.

4.1.2 Thickness measurements, extent and pattern in way of areas with substantial corrosion, all ships are given in Table 4.1.2

4.2 General dry cargo ships

4.2.1 Close-up examination, general dry cargo ships are given in Table 4.2.1

4.2.2 Minimum thickness measurements, general dry cargo ships are given in Table 4.2.2

4.3 Single skin bulk carriers subject to Enhanced Survey Programme (ESP)

4.3.1 Close-up examination, single skin bulk carriers are given in Table 4.3.1

4.3.2 Minimum thickness measurement, single skin bulk carriers are given in Table 4.3.2

4.3.3 Thickness measurements, extent and pattern in way of areas with substantial corrosion, single skin bulk carriers are given in Table 4.3.3

4.4 Double skin bulk carriers subject to Enhanced Survey Programme (ESP)

4.4.1 Close-up examination, double skin bulk carriers are given Table 4.4.1

4.4.2 Close-up examination, ore carriers are given Table 4.4.1.1.

4.4.3 Minimum thickness measurement, double skin bulk carriers and ore carriers are given in Table 4.4.2

4.4.4 Thickness measurement, extent and pattern in way of areas of substantial corrosion, double skin bulk carriers are given in Table 4.4.3

4.5 Single hull oil tankers and single hull chemical tankers subject to Enhanced Survey Programme (ESP)

4.5.1 Close-up examination, single hull oil tankers, single hull chemical tankers and ore/oil ships are given in Table 4.5.1

4.5.2 Minimum thickness measurement, single hull oil tankers, single hull chemical tankers and ore/oil ships are given in Table 4.5.2

4.5.3 Thickness measurement, extent and pattern in way of areas of substantial corrosion, single hull oil tankers, single hull chemical tankers and ore/oil ships are given in Table 4.5.3

4.6 Double hull oil tankers subject to Enhanced Survey Programme (ESP)

4.6.1 Close-up examination, double hull oil tankers and double hull chemical tankers are given in Table 4.6.1

4.6.2 Minimum thickness measurement, double hull oil tankers and double hull chemical tankers are given in Table 4.6.2

4.6.3 Thickness measurement, extent and pattern in way of areas of substantial corrosion, double hull oil tankers and double hull chemical tankers are given in Table 4.6.3

4.7 Liquefied gas tankers

4.7.1 Close-up examination, liquefied gas tankers are given Table 4.7.1.

4.7.2 Minimum thickness measurement, liquefied gas tankers are given in Table 4.7.2.

Table 4.1.1 Minimum thickness measurements, all ships

	Area	Renewal survey no.1 Age ≤5 years	Renewal survey no. 2 Age5 - 10 years	Renewal survey no. 3Age 10 - 15 years	Renewal survey no. 4 and subsequent Age > 15 years
0	Transverse section(s) in way of cargo area within 0.5 L amidships 2)4)		One section of deck plating only.	Two complete sections – two different spaces. 5)	Three complete sections. 5)
1a	Main deck plating 3)				All exposed - full length.
1b	Cargo hold hatch covers and coamings			All - plating and stiffeners.	All - plating and stiffeners.
2	Wind- and water strakes				All - full length.
3	Strakes of transverse bulkheads in cargo spaces together with internals in way				All bulkheads – lowest strake and strakes in way of 'tween decks.
4a	Keel plates and bottom plates				All keel plates full length. Additional bottom plates in way of cofferdams, machinery space and aft end of tanks.
4b	Plating of sea chests and shell plating in way of overboard discharges				Plating of sea chests. Shell plating as considered necessary by the attending surveyor.
5	Superstructure deck plating (poop, bridge and forecastle deck)				Representative exposed deck plating.
6	Internals in peak tanks			Forepeak and aftpeak.	Forepeak and aftpeak.
7	Air pipes and ventilators			All - on the fore deck (forward quarter length). All exposed air pipes to fuel and lube oil daily service tanks. Selected air pipes and ventilator coamings aft of the forward quarter.	All - on the fore deck (forward quarter length). All exposed air pipes to fuel and lube oil daily service tanks. Selected air pipes and ventilator coamings aft of the forward quarter.

Notes:

1) Thickness measurement locations should be selected to provide the best representative sampling of areas likely to be most exposed to corrosion, considering cargo and ballast history and arrangement and condition of protective coatings.

2) For ships less than 100 m in length, the number of transverse section required at renewal survey no. 3 and subsequent renewal surveys may be reduced by one (to 1 and 2 respectively).

3) For ships more than 100 m in length, at renewal survey no. 3, thickness measurements of exposed deck plating within 0.5 L may be required.

4) Transverse sections shall be chosen where the largest reductions are suspected to occur or are revealed from deck plating measurements.

5) At least one section shall include a ballast tank, as far as applicable.

Source.: IACS UR Z7 TABLE I

Table 4.1.1.1 Minimum thickness measurements 1), passenger ships with superstructure extending over most of the ship length

	Area	Renewal survey no.1 Age ≤5 years	Renewal survey no. 2 Age5 -10 years	Renewal survey no. 3Age 10 - 15 years	Renewal survey no. 4 and subsequent Age > 15 years
0	Transverse section(s) within 0.5 L amidships 2)3)			Two sections of hull plating (keel, bottom & bilge, side) up to the bulkhead deck.	Three sections of hull plating (keel, bottom & bilge, side) up to the bulkhead deck.
1a	Tank top plating 4)		Selected plating within machinery and boiler spaces.	Selected plating within machinery and boiler spaces.	Selected plating within machinery and boiler spaces.
1b	Car decks plating			Selected plating.	All plating.
2	Wind- and water strakes				All - full length.
3	Strakes of transverse bulkheads in machinery and cargo spaces as applicable together with internals in way				All bulkheads – lowest strake.
4a	Keel plates and bottom plates				All keel plates full length. Additional bottom plates in way of cofferdams, machinery space and aft end of tanks.
4b	Plating of sea chests and shell plating in way of overboard discharges				Plating of sea chests. Shell plating as considered necessary by the attending surveyor.
5	Superstructure deck plating			Representative exposed deck plating.	Representative exposed deck plating.
6	Internals in peak tanks			Forepeak and aft peak.	Forepeak and aft peak.

Notes:

1) Thickness measurement locations should be selected to provide the best representative sampling of areas likely to be most exposed to corrosion, considering ballast history and arrangement and condition of protective coatings.

2) For ships less than 100 m in length, the number of transverse section required at renewal survey no. 3 and subsequent renewal surveys may be reduced by one (to 1 and 2 respectively).

3) Transverse sections shall be chosen where the largest reductions are suspected to occur and shall normally include ballast tanks, as far as applicable.

4) Special attention shall be given to areas within spaces where water may accumulate, i.e. in way of boilers, water makers, spaces with sewage treatment plants, areas around penetrations for steam pipes and areas showing signs of water leakage.

Table 4.1.2 Thickness measurements, extent and pattern in way of areas with substantial corrosion, all ships

Area/Structural member	Extent of measurement	Pattern of measurement
Plating	Suspect area and adjacent plates	5 points over 1 m2
Stiffeners	Suspect area 3 points in line across web	3 points in line across flange

Source.: IACS UR Z7 TABLE II

Table 4.2.1 Close-up examination, general dry cargo ships

	Area	Renewal survey no.1 Age ≤5 years	Renewal survey no. 2 Age5 -10 years	Renewal survey no. 3Age 10 - 15 years	Renewal survey no. 4 and subsequent Age > 15 years
1a	Cargo hold hatch covers and coamings - plating and stiffeners.	All	All	All	All
1b	Deck plating and underdeck structures inside line of hatch openings between cargo hold hatches.		Selected areas	All	All
2	Cargo hold transverse shell frames.	Selected frames in one forward and one aft cargo hold/ 'tween deck space.	Selected frames in all cargo holds/ 'tween deck spaces.	All frames in the forward lower cargo hold and 25% of frames in each of the remaining cargo holds/ 'tween deck spaces including upper and lower end attachments and adjacent shell plating.	All frames in all cargo holds/ 'tween deck spaces including upper and lower end attachments and adjacent shell plating.
3a	Cargo hold transverse bulkheads 1) - plating, stiffeners and girders.	one	One in each hold.	All	All
3b	Ballast tanks transverse bulkheads, including stiffening system.		Forward and aft bulkhead in one side tank.	All	All
4a	Ballast tanks transverse web frames with associated plating and framing.		One in two representative tanks of each type within the cargo area 2).	All - in all ballast tanks	All - in all ballast tanks
4b	Inner bottom plating.		Selected areas	All	All

1) Close-up examination of cargo hold transverse bulkheads to be carried out at the following levels:
   - Immediately above the inner bottom and immediately above the 'tween decks, as applicable.
   - About mid-height of the bulkheads for holds without 'tween deck.
   - Immediately below the main deck and immediately below the 'tween deck, as applicable.

2) Ballast tank types within the cargo area: top side tank, double side tank, hopper side tank, double bottom tank.

Source.: IACS UR Z7 TABLE I

Table 4.2.2 Minimum thickness measurements1), general dry cargo ships

	Area	Renewal survey no.1 Age ≤5 years	Renewal survey no. 2 Age5 -10 years	Renewal survey no. 3Age 10 - 15 years	Renewal survey no. 4 and subsequent Age > 15 years
0a	Transverse section(s) in way of cargo area within 0.5L amidships 2)3).		One section of deck plating only.	Two complete sections – two different cargo spaces. 4)	Three complete sections. 4)
0b	Structural members subject to close-up examination according to Table 4.2.1.	Measurements, for general assessment and recording of corrosion pattern.	Measurements, for general assessment and recording of corrosion pattern.	Measurements, for general assessment and recording of corrosion pattern.	Measurements, for general assessment and recording of corrosion pattern.
1	Main deck plating			All - outside line of cargo hatch openings within the cargo area.	All - outside line of cargo hatch openings within the cargo area. All exposed – outside the cargo area.
2	Wind- and water strakes.			All - within the cargo area. Selected outside the cargo area.	All - full length.
3	Transverse bulkheads	See item 0b	See item 0b	See item 0b	See item 0b
4a	Keel plates and bottom plates.				All keel plates full length. All bottom plates, including lower turn of bilge, within the cargo area. Additional bottom plates in way of cofferdams, machinery space and aft end of tanks.
4b	Sea chests and shell plating in way of overboard discharges.				Plating of sea chests. Shell plating as considered necessary by the attending surveyor.
4c	Duct keel or pipe tunnel.				Plating and internals.
5	Superstructure deck plating (poop, bridge and forecastle deck).				Representative exposed deck plating.
6	Internals in peak tanks.			Forepeak and aftpeak.	Forepeak and aftpeak.
7	Air pipes and ventilators			All - on the fore deck (forward quarter length). All exposed air pipes to fuel and lube oil daily service tanks. Selected air pipes and ventilator coamings aft of the forward quarter.	All - on the fore deck (forward quarter length). All exposed air pipes to fuel and lube oil daily service tanks. Selected air pipes and ventilator coamings aft of the forward quarter.

Note:

1) Thickness measurement locations should be selected to provide the best representative sampling of areas likely to be most exposed to corrosion, considering cargo and ballast history and arrangement and condition of protective coatings.

2) For ships less than 100 m in length, the number of transverse section required at renewal survey no. 3 may be reduced to one (1), and the number of transverse sections at subsequent renewal surveys may be reduced to two (2).

3) Transverse sections shall be chosen where the largest reductions are suspected to occur or are revealed from deck plating measurements.

4) At least one section shall include a ballast tank, as far as applicable.

Source.: IACS UR Z7.1 TABLE II

Table 4.3.1 Close-up examination, single skin bulk carriers

	Area	Renewal survey no.1 Age ≤5 years	Renewal survey no. 2 Age5 - 10 years	Renewal survey no. 3Age 10 - 15 years	Renewal survey no. 4 and subsequent Age > 15 years
1a	Cargo hold hatch covers and coamings – plating and stiffeners.	All	All	All	All
1b	Deck plating and underdeck structures inside line of hatch openings between cargo hold hatches.		All	All	All
2	Cargo hold transverse shell frames.	25% of frames in the forward cargo hold at representative positions. Selected frames in remaining cargo holds.	All frames in the forward cargo hold and 25% of frames in each of the remaining cargo holds, including upper and lower end attachments and adjacent shell plating. For bulk carriers 100 000 dwt and above, all shell frames in the forward cargo hold and 50% of shell frames in each of the remaining cargo holds, including upper and lower end attachments and adjacent shell plating.	All frames in the forward and one other selected cargo hold and 50% of frames in each of the remaining cargo holds, including upper and lower end attachments and adjacent shell plating.	All frames in all cargo holds, including upper and lower end attachments and adjacent shell plating.
3a	Cargo hold transverse bulkheads 1) - plating, stiffeners and girders, including internal structures of upper and lower stools, where fitted.	Two selected bulkheads.	All	All	All
3b	Ballast tanks transverse bulkheads, including stiffening system.		Forward and aft bulkhead in one side tank.	All	All
4a	Ballast tanks transverse web frames with associated plating and longitudinals.	One in two representative tanks of each type within the cargo area 2).	One in each tank within the cargo area2).	All - in all ballast tanks	All - in all ballast tanks

Notes:

1) Close-up examination of cargo hold transverse bulkheads to be carried out at the following levels:

   Level (a)Immediately above the inner bottom and immediately above the line of gussets (if fitted) and shedders for ships without lower stool.

   Level (b)Immediately above and below the lower stool shelf plate (for those ships fitted with lower stools), and immediately above the line of the shedder plates.

   Level (c)About mid-height of the bulkhead.

   Level (d)Immediately below the upper deck plating and immediately adjacent to the upper wing tank, and immediately below the upper stool shelf plate for those ships fitted with upper stools, or immediately below the topside tanks.

2) Ballast tank types within the cargo area: top side tank, hopper side tank, double bottom tank.

Source.: IACS UR Z10.2 TABLE I

Table 4.3.2 Minimum thickness measurements[1)], single skin bulk carriers

	Area	Renewal survey no.1 Age ≤5 years	Renewal survey no. 2 Age5 -10 years	Renewal survey no. 3Age 10 - 15 years	Renewal survey no. 4 and subsequent Age > 15 years
0a	Transverse sections within the cargo area. 2)		Two sections of deck plating only - outside line of cargo hatch openings - at least one within 0.5 L amidships. 3)	Two complete sections - outside line of cargo hatch openings - at least one within 0.5 L amidships. 3)	Three complete sections - outside line of cargo hatch openings - at least one within 0.5 L amidships. 3)
0b	Structural members subject to close-up examination according to Table D3.1.	Measurements, for general assessment and recording of corrosion pattern.	Measurements, for general assessment and recording of corrosion pattern.	Measurements, for general assessment and recording of corrosion pattern.	Measurements, for general assessment and recording of corrosion pattern.
1	Main deck plating			All - outside line of cargo hatch openings within the cargo area.	All - outside line of cargo hatch openings within the cargo area. All exposed – outside the cargo area.
2	Wind- and water strakes.		In way of the transverse sections considered in item 0a. Selected outside the cargo area.	All - within the cargo area. Selected outside the cargo area.	All - full length.
3	Transverse bulkheads	See item 0b	See item 0b	See item 0b	See item 0b
4a	Keel plates and bottom plates.				All keel plates full length. All bottom plates, including lower turn of bilge, within the cargo area. Additional bottom plates in way of cofferdams, machinery space and aft end of tanks.
4b	Sea chests and shell plating in way of overboard discharges.				Plating of sea chests. Shell plating as considered necessary by the attending surveyor.
5	Superstructure deck plating (poop, bridge and forecastle deck).				Representative exposed deck plating.
6	Internals in peak tanks.			Forepeak and aftpeak.	Forepeak and aftpeak.
7	Air pipes and ventilators			All - on the fore deck (forward quarter length). All exposed air pipes to fuel and lube oil daily service tanks. Selected air pipes and ventilator coamings aft of the forward quarter.	All - on the fore deck (forward quarter length). All exposed air pipes to fuel and lube oil daily service tanks. Selected air pipes and ventilator coamings aft of the forward quarter.
8	Vertically corrugated transverse watertight bulkhead between cargo hold Nos. 1 and 2 – Ships subject to compliance with the requirements given in Sec.9.1.		Additional requirements as given in 2.3.5	Additional requirements as given in 2.3.5	Additional requirements as given in 2.3.5
9	Side shell frames and brackets - Ships subject to compliance with the requirements given in Sec.9.6.		Additional requirements as given in 2.3.6	Additional requirements as given in 2.3.6	Additional requirements as given in 2.3.6

Note:

1) Thickness measurement locations should be selected to provide the best representative sampling of areas likely to be most exposed to corrosion, considering cargo and ballast history and arrangement and condition of protective coatings.

2) Transverse sections shall be chosen where the largest reductions are suspected to occur or are revealed from deck plating measurements.

3) At least one section shall include a ballast tank, as far as applicable.

Source.: IACS UR Z10.2 TABLE II

Table 4.3.3 Thickness measurements, extent and pattern in way of areas with substantial corrosion, single skin bulk carriers

	Area	Structural member	Extent of measurement	Pattern of measurement
1a	Main deck structures	Deck plating	Suspect plate(s) and four adjacent plates.	5 points over 1 m^2 of plating.
		Deck longitudinals.	Three longitudinals in way of suspect area.	5 points both web and flange over 1 m length.
		Web frames or transverses.	Suspect plate(s)	5 points over 1 m^2 of plating.
1b	Deck cross strips	Plating.	Suspect plate(s).	5 points between stiffeners over 1 m length.
		Underdeck stiffeners.	Transverse members.	5 points at each end and midspan.
			Longitudinal members.	5 points on both web and flange.
1c	Hatch covers and coamings	Hatch covers.	Three locations on each side and end skirts.	5 points at each location.
			Two outboard strakes longitudinal bands. One centerline strake longitudinal band.	5 points each band.
		Hatch coamings.	One transverse band at lower 1/ 3 of each end. One transverse band at upper 2/ 3 of each end.	5 points each band.
			One longitudinal band at lower 1/3 of each side. One longitudinal band at upper 2/3 of each side.	5 points each band.
1d	Top side ballast tanks.	Watertight transverse bulkhead.	Lower 1/3 of bulkhead.	5 points over 1 m^2 of plating.
			Upper 2/3 of bulkhead.	5 points over 1 m^2 of plating.
			Stiffeners.	5 points over 1 m length
		Swash transverse bulkhead.	Lower 1/3 of 2 representative bulkheads.	5 points over 1 m^2 of plating.
			Upper 2/3 of 2 representative bulkheads.	5 points over 1 m^2 of plating.
			Stiffeners.	5 points over 1 m length
		Sloping tank bottom.	Three representative bays at lower 1/3 of tank.	5 points over 1 m^2 of plating.
			Three representative bays at upper 2/3 of tank.	5 points over 1 m^2 of plating.
			Longitudinals, suspect and adjacent.	5 points both web and flange over 1 m length.
2	Single side structures.	Side shell plating.	Suspect plate(s) and all adjacent plates.	5 points each panel between longitudinals.
		Side shell frames.	Suspect frame(s) and each adjacent frame.	5 points across both web and flange at each end and midspan. 5 points within 25 mm of welded attachment to both shell and lower slope plate.
3	Transverse bulkhead structures in cargo holds.	Lower stool.	Transverse band within 25 mm of welded connection to inner bottom.	5 points between stiffeners over 1 m length.
			Transverse band within 25 mm of welded connection to shelf plate.	5 points between stiffeners over 1 m length.
		Bulkhead.	Transverse band at approximately mid height	5 points over 1 m^2 of plating.
			Transverse band adjacent to upper deck or shelf plate of upper stool, whichever is applicable.	5 points over 1 m^2 of plating.
4	Double bottom and hopper structures.	Bottom, inner bottom and hopper structures plating.	Suspect plate(s) and all adjacent plates.	5 points each panel between longitudinals over 1 m length.
		Bottom, inner bottom and hopper structures longitudinals.	Three longitudinals where plates measured.	3 points in line across web. 3 points in line across flange.
		Longitudinal girders or transverse floors.	Suspect plate(s)	5 points over 1 m^2 of plating.
		Watertight bulkheads (WT floors)	Plating lower 1/3 of tank.	5 points over 1 m^2 of plating.
			Plating upper 2/3 of tank.	5 points alternate plates over 1 m2 of plating.
		Web frames	Suspect plate(s)	5 points over 1 m^2 of plating.

Source.: IACS UR Z10.2 TABLEVIII

Table 4.4.1 Close-up examination, double skin bulk carriers

	Area	Renewal survey no.1 Age ≤5 years	Renewal survey no. 2 Age5 -10 years	Renewal survey no. 3Age 10 - 15 years	Renewal survey no. 4 and subsequent Age > 15 years
1a	Cargo hold hatch covers and coamings – plating and stiffeners.	All	All	All	All
1b	Deck plating and underdeck structures inside line of hatch openings between cargo hold hatches.		All	All	All
2a	Ordinary transverse frames 1) in double side tanks.		25% of frames in the foremost double side tank.	25% of frames in all double side tanks.	All frames in all double side tanks.
2b	Ballast tanks transverse web frames with associated plating and longitudinals.	One in two representative tanks of each type within the cargo area – to include the foremost top side and double side tank on both sides 3).	One in each tank within the cargo area 3)	All - in all ballast tanks	All - in all ballast tanks
3a	Cargo hold transverse bulkheads 1) - plating, stiffeners and girders, including internal structures of upper and lower stools, where fitted.	Two selected bulkheads	One in each hold	All	All
3b	Ballast tanks transverse bulkheads, including stiffening system.		Forward and aft bulkheads in a transverse section including top side, hopper side and double side ballast tanks.	All	All
4	Double bottom structures	As covered by item 2b and 3b.	As covered by item 2b and 3b.	As covered by item 2b and 3b.	As covered by item 2b and 3b.

Notes:

1) Ordinary transverse frames are vertical stiffeners on ship side and longitudinal bulkhead between deck, possible stringers and double bottom.

2) Close-up examination of cargo hold transverse bulkheads to be carried out at the following levels:

Level (a)Immediately above the inner bottom and immediately above the line of gussets (if fitted) and shedders for ships without lower stool.

Level (b)Immediately above and below the lower stool shelf plate (for those ships fitted with lower stools), and immediately above the line of the shedder plates.

Level (c)About mid-height of the bulkhead.

Level (d)Immediately below the upper deck plating and immediately adjacent to the upper wing tank, and immediately below the upper stool shelf plate for those ships fitted with upper stools, or immediately below the topside tanks.

3) Ballast tank types within the cargo area: top side tank, double side tank, hopper side tank, double bottom tank. Source.: IACS UR Z10.5 TABLE I

Table 4.4.1.1 Close-up examination, ore carriers

	Area	Renewal survey no.1 Age ≤5 years	Renewal survey no. 2 Age5 -10 years	Renewal survey no. 3 and subsequent Age > 10 years
1	Deck transverse including adjacent deck structural members.		One - in all ballast tanks not covered by item 2.	
1a	Cargo hold hatch covers and coamings - plating and stiffeners.	All.	All.	All.
1b	Deck plating and under deck structures inside line of hatch openings between cargo hold hatches.		All.	All.
2	Transverse web frame rings including adjacent structural members.	One- in a ballast wing tank.	All - in a ballast wing tank.	All - in all ballast tanks. One in each wing void space. Additional – as considered necessary by the surveyor.
3	Transverse bulkheads including girder system and adjacent structural members.	One, lower part – in a ballast tank.	Both - in a ballast wing tank. One, lower part - in each remaining ballast tank.	All - in all ballast tanks.
3a	Cargo hold transverse bulkheads 1) - plating, stiffeners and girders, including internal structures of upper and lower stools, where fitted.	Two selected bulkheads.	One in each hold.	All.

Notes:

1) Close-up examination of cargo hold transverse bulkheads to be carried out at the following levels:

Level (a)Immediately above the inner bottom and immediately above the line of gussets (if fitted) and shedders for ships without lower stool.

Level (b)Immediately above and below the lower stool shelf plate (for those ships fitted with lower stools), and immediately above the line of the shedder plates.

Level (c)About mid-height of the bulkhead.

Level (d)Immediately below the upper deck plating and immediately adjacent to the upper wing tank, and immediately below the upper stool shelf plate for those ships fitted with upper stools, or immediately below the topside tanks.

Source.: IACS UR Z10.1 TABLE I and IACS UR Z10.5 TABLE I, as applicable

Table 4.4.2 Minimum thickness measurements1), double skin bulk carriers and ore carriers

	Area	Renewal survey no.1 Age ≤5 years	Renewal survey no. 2 Age5 -10 years	Renewal survey no. 3Age 10 - 15 years	Renewal survey no. 4 and subsequent Age > 15 years
0a	Transverse sections within the cargo area. 2)		Two section of deck plating only - outside line of cargo hatch openings - at least one within 0.5 L amidships. 3)	Two complete sections - outside line of cargo hatch openings - at least one within 0.5 L amidships. 3)	Three complete sections - outside line of cargo hatch openings - at least one within 0.5 L amidships. 3)
0b	Structural members subject to close-up examination according to Table4.4.1 and Table 4.4.1.1.	Measurements , for general assessment and recording of corrosion pattern.	Measurements, for general assessment and recording of corrosion pattern.	Measurements, for general assessment and recording of corrosion pattern.	Measurements, for general assessment and recording of corrosion pattern.
1	Main deck plating			All - outside line of cargo hatch openings, within the cargo area.	All - outside line of cargo hatch openings, within the cargo area. All exposed – outside cargo area.
2	Wind- and water strakes.		In the transverse sections considered in item 0a. Selected outside the cargo area.	All - within the cargo area. Selected outside the cargo area.	All - full length.
3	Transverse bulkheads	See item 0b	See item 0b	See item 0b	See item 0b
4a	Keel plates and bottom plates.				All keel plates full length. All bottom plates, including lower turn of bilge, within the cargo area. Additional bottom plates in way of cofferdams, machinery space and aft end of tanks.
4b	Sea chests and shell plating in way of overboard discharges.				Plating of sea chests. Shell plating as considered necessary by the attending surveyor.
5	Superstructure deck plating (poop, bridge and forecastle deck).				Representative exposed deck plating.
6	Internals in peak tanks.			Forepeak and aftpeak.	Forepeak and aftpeak.
7	Air pipes and ventilators			All - on the fore deck (forward quarter length). All exposed air pipes to fuel and lube oil daily service tanks. Selected air pipes and ventilator coamings aft of the forward quarter.	All - on the fore deck (forward quarter length). All exposed air pipes to fuel and lube oil daily service tanks. Selected air pipes and ventilator coamings aft of the forward quarter.

Note:

1) Thickness measurement locations should be selected to provide the best representative sampling of areas likely to be most exposed to corrosion, considering cargo and ballast history and arrangement and condition of protective coatings.

2) Transverse sections shall be chosen where the largest reductions are suspected to occur or are revealed from deck plating measurements.

3) At least one section shall include a ballast tank, as far as applicable.

Source.: IACS UR Z10.5 TABLE II

Table 4.4.3 Thickness measurement, extent and pattern in way of areas of substantial corrosion, double skin bulk carriers

	Area	Structural member	Extent of measurement	Pattern of measurement
1a	Main deck structures	Deck plating	Suspect plate(s) and four adjacent plates.	5 points over 1 m^2 of plating.
		Deck longitudinals.	Three longitudinals in way of suspect area.	5 points both web and flange over 1 m length.
		Web frames or transverses.	Suspect plate(s)	5 points over 1 m^2 of plating.
1b	Deck cross strips	Plating.	Suspect plate(s).	5 points between stiffeners over 1 m length.
		Underdeck stiffeners.	Transverse members.	5 points at each end and midspan.
			Longitudinal members.	5 points on both web and flange.
1c	Hatch covers and coamings	Hatch covers.	Three locations on each side and end skirts.	5 points at each location.
			Two outboard strakes longitudinal bands. One centerline strake longitudinal band.	5 points each band.
		Hatch coamings.	One transverse band at lower 1/ 3 of each end. One transverse band at upper 2/ 3 of each end.	5 points each band.
			One longitudinal band at lower 1/3 of each side. One longitudinal band at upper 2/3 of each side.	5 points each band.
1d	Top side ballast tanks.	Watertight transverse bulkhead.	Lower 1/3 of bulkhead.	5 points over 1 m^2 of plating.
			Upper 2/3 of bulkhead.	5 points over 1 m^2 of plating.
			Stiffeners.	5 points over 1 m length
		Swash transverse bulkhead.	Lower 1/3 of 2 representative bulkheads.	5 points over 1 m^2 of plating.
			Upper 2/3 of 2 representative bulkheads.	5 points over 1 m^2 of plating.
			Stiffeners.	5 points over 1 m length
		Sloping tank bottom.	Three representative bays at lower 1/3 of tank.	5 points over 1 m^2 of plating.
			Three representative bays at upper 2/3 of tank.	5 points over 1 m^2 of plating.
			Longitudinals, suspect and adjacent.	5 points both web and flange over 1 m length.
2	Double side structures.	Side shell and inner side plating.	Upper strakes and strakes in way of horizontal girders - minimum three bays along the tank.	1 point each strake and each bay when transverse frames. 1 point each panel between pair of longitudinals in each bay.
			All other strakes - same three bays as above.	1 point every third panel between pair of longitudinals.
		Side shell and inner side frames or longitudinals.	On upper strakes - all frames/ longitudinals in same three bays as above.	3 points across web. 1 point on flange.
			On all other strakes - one frame or every third longitudinal in same three bays as above.	3 points across web. 1 point on flange.
		Brackets on side shell and inner side frames or longitudinals.	Minimum of three at top, middle and bottom of tank in same three bays as above.	5 points over area of bracket.
		Vertical web frames and transverse bulkheads.	Strakes in way of horizontal girders - minimum two webs and both bulkheads.	5 points over 2 m^2 of plating.
			Other strakes - minimum two webs and both bulkheads.	2 points between each pair of vertical stiffeners.
		Horizontal girders.	Plating on each girder in a minimum of three bays.	2 points between each pair of longitudinal girder stiffeners.
		Panel stiffening.	Where applicable.	1 point measurements.
3	Transverse bulkhead structures in cargo holds.	Lower stool.	Transverse band within 25 mm of welded connection to inner bottom.	5 points between stiffeners over 1 m length.
			Transverse band within 25 mm of welded connection to shelf plate.	5 points between stiffeners over 1 m length.
		Bulkhead.	Transverse band at approximately mid height	5 points over 1 m^2 of plating.
			Transverse band adjacent to upper deck or shelf plate of upper stool, whichever is applicable.	5 points over 1 m^2 of plating.
4	Double bottom and hopper structures.	Bottom, inner bottom and hopper structures plating.	Three bays across double bottom tank, including aft bay. Around and under all suction bell mouths.	5 points each panel between longitudinals and floors.
		Bottom, inner bottom and hopper structures longitudinals.	Three - in each bay where bottom plating measured.	3 points in line across web. 3 points in line across flange.
		Bottom girders, including watertight girders.	At fore and aft watertight floors and in centre of tanks.	1 point between each panel stiffener on girder plating - vertical line of points – minimum three points.
		Bottom floors, including watertight floors.	Three - at bays where bottom plating measured, with measurements at both ends and middle.	5 points over 2 m^2 of plating.
		Web frame rings – hopper structures.	Three - at bays where bottom plating measured, with measurements at both ends and middle.	5 points over 2 m^2 of web plating. 1 point on flange.
		Transverse watertight bulkheads or swash bulkheads - hopper structures.	Lower 1/3 of bulkhead.	5 points over 1 m2 of plating.
			Upper 2/3 of bulkhead.	5 points over 2 m2 of plating.
			Three stiffeners.	2 points in line across web at each end. 1 point on web at centre of span. 1 point on flange at each end and at centre of span.
		Panel stiffening.	Where applicable	1 point measurements.

Source.: IACS UR Z10.5 TABLE III

Table 4.5.1 Close-up examination, single hull oil tankers, single hull chemical tankers and ore/oil ships

	Area	Renewal survey no.1 Age ≤5 years	Renewal survey no. 2 Age5 -10 years	Renewal survey no. 3Age 10 - 15 years	Renewal survey no. 4 and subsequent Age > 15 years
1	Deck transverse including adjacent deck structural members1).	One - in a cargo tank. One - in a cargo wing tank. One - in each of two cargo centre tanks.	One - in all ballast tanks not covered by item 2.	For oil tankers: Minimum 30% of all - in each cargo centre tank. For chemical tankers: One in each cargo centre tank.	For oil tankers: Minimum 30% of all – in each cargo centre tank. For chemical tankers: One in each cargo centre tank.
2	Transverse web frame rings including adjacent structural members.	One - in a ballast wing tank, if any, or a cargo wing tank used primarily for ballast.	All - in a ballast wing tank, if any, or a cargo wing tank used primarily for ballast.	All - in all ballast tanks. All - in a cargo wing tank. For oil tankers: Minimum 30% of all - in each remaining cargo wing tank. For chemical tankers: One in each remaining cargo wing tank. Additional – as considered necessary by the surveyor	All - in all ballast tanks. All - in a cargo wing tank. For oil tankers: Minimum 30% of all – in each remaining cargo wing tank. For chemical tankers: One in each remaining cargo wing tank. Additional – as considered necessary by the surveyor
3	Transverse bulkheads including girder system and adjacent structural members.	One, lower part - in a ballast tank. One, lower part - in a cargo wing tank. One, lower part - in a cargo centre tank2).	Both - in a ballast wing tank, if any, or a cargo wing tank used primarily for ballast. One, lower part - in each remaining ballast tank. One, lower part - in a cargo wing tank. One, lower part - in a cargo centre tank2).	All - in all ballast tanks. All - in all cargo tanks.	All - in all ballast tanks. All - in all cargo tanks.
4	Bottom transverse including adjacent bottom structural members.			For oil tankers: Minimum 30% of all - in each cargo centre tank. For chemical tankers: One in each cargo centre tank.	For oil tankers: Minimum 30% of all – in each cargo centre tank. For chemical tankers: One in each cargo centre tank.

1) Including external structure on deck in way of the tank, where applicable.

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

Source.: IACS UR Z10.1 TABLE I and Z10.3 TABLE I

Table 4.5.2 Minimum thickness measurements1), single hull oil tankers, single hull chemical tankers and ore/oil ships

	Area	Renewal survey no.1 Age ≤5 years	Renewal survey no. 2 Age5 -10 years	Renewal survey no. 3Age 10 - 15 years	Renewal survey no. 4 and subsequent Age > 15 years
0a	Transverse section(s) within the cargo area. 2)	One section ofdeck plating only - for the full beam of the ship 3)	One complete section 3)	Two complete sections - at least one within 0.5L amidships 3)	Three complete sections - at least one within 0.5L amidships 3)
0b	Structural members subject to close-up examination according to Table 4.5.1.	Measurements, for general assessment and recording of corrosion pattern.	Measurements, for general assessment and recording of corrosion pattern.	Measurements, for general assessment and recording of corrosion pattern.	Measurements, for general assessment and recording of corrosion pattern.
1	Main deck plating		All - within the cargo area.	All - within the cargo area.	All - within the cargo area. All exposed - outside the cargo area.
2	Wind- and water strakes.		Selected outside the cargo area.	All - within the cargo area. Selected outside the cargo area.	All - full length.
3	Transverse bulkheads	See item 0b	See item 0b	See item 0b	See item 0b
4a	Keel plates and bottom plates.				All keel plates full length. All bottom plates, including lower turn of bilge, within the cargo area. Additional bottom plates in way of cofferdams, machinery space and aft end of tanks.
4b	Sea chests and shell plating in way of overboard discharges.				Plating of sea chests. Shell plating as considered necessary by the attending surveyor.
5	Superstructure deck plating (poop, bridge and forecastle deck).				Representative exposed deck plating.
6	Internals in peak tanks			Forepeak and aftpeak.	Forepeak and aftpeak.
7	Air pipes and ventilators			All - on the fore deck (forward quarter length). All exposed air pipes to fuel and lube oil daily service tanks. Selected air pipes and ventilator coamings aft of the forward quarter.	All - on the fore deck (forward quarter length). All exposed air pipes to fuel and lube oil daily service tanks. Selected air pipes and ventilator coamings aft of the forward quarter.

Note:

1) Thickness measurement locations should be selected to provide the best representative sampling of areas likely to be most exposed to corrosion, considering cargo and ballast history and arrangement and condition of protective coatings.

2) Transverse sections shall be chosen where the largest reductions are suspected to occur or are revealed from deck plating measurements.

3) At least one section shall include a ballast tank, within 0.5L amidships, as far as applicable.

Source.: IACS UR Z10.1 TABLE II and Z10.3 TABLE II

Table 4.5.3 Thickness measurement, extent and pattern in way of areas of substantial corrosion, single hull oil tankers, single hull chemical tankers and ore/oil ships

	Area	Structural member	Extent of measurement	Pattern of measurement
1	Deck structures.	Deck plating.	Two bands across tank.	3 points per plate per band.
		Deck longitudinals.	Three longitudinals in each of two bays.	3 points in line vertically on webs. 2 points on flange (if fitted).
		Longitudinal girders and brackets.	At fore and aft transverse bulkhead, bracket toes and in centre of tanks.	1 point between each panel stiffener on web plating - vertical line of points - minimum three points. 2 points across flange. 5 points on girder/ bulkhead brackets.
		Transverse girders.	Two - with measurements at both ends and middle.	5 points over 2 m^2 of web plating. 1 point on flange.
		Panel stiffening.	Where provided.	1 point measurements.
2	Side shell and longitudinal bulkhead structures.	Shell and bulkhead plating.	On deckhead and bottom strakes - all longitudinals in same three bays as above.	3 points across web. 1 point on flange.
			On all other strakes – every third longitudinal in same three bays as above.	3 points across web. 1 point on flange.
		Shell and bulkhead longitudinals.	One transverse band at lower 1/ 3 of each end. One transverse band at upper 2/ 3 of each end.	5 points each band.
			One longitudinal band at lower 1/3 of each side. One longitudinal band at upper 2/3 of each side.	5 points each band.
		Brackets on longitudinals.	Minimum of three at top, middle and bottom of tank in same three bays as above.	5 points over area of bracket.
		Web frames and cross ties.	Three webs with minimum of three locations on each web, including in way of cross tie connections.	5 points over about 2 m2 web area. 1 point on web frame and cross tie flanges.
3	Transverse bulkhead and swash bulkhead structures.	Plane bulkhead plating.	Deckhead and bottom strakes, and strakes in way of stringer platforms - approximately 1/4, 1/2 and 3/4 width of tank.	5 points between each pair of stiffeners over 1m length.
			All other strakes - at middle width of tank.	1 point between each pair of stiffeners.
		Corrugated bulkhead plating.	Strakes for each change of scantling at centre of panel and at flange or fabricated connection.	5 points over 1 m2 of plating.
		Stiffeners	Three typical stiffeners.	2 points in line across web at each end. 1 point on web at centre of span. 1 point on flange at each end and at centre of span.
		Brackets.	Three at top, middle and bottom of tank.	5 points over area of bracket.
		Deep webs and girders.	At toe of brackets and at centre of span.	5 points over about 2 m2 web area. 3 points across flange.
		Stringer platforms.	All - at both ends and middle.	5 points over 1 m2 web area. 1 point near bracket toes and on flange.
4	Bottom structures.	Bottom plating.	Three bays across tank, including aft bay. Around and under all suction bell mouths.	5 points each panel between longitudinals and webs.
		Bottom longitudinals.	Three longitudinals in each bay where bottom plating measured.	3 points in line across web. 3 points in line across flange.
		Bottom girders and brackets.	At fore and aft bulkhead bracket toes and in centre of tanks.	1 point between each panel stiffener on web plating - vertical line of points - minimum three points. 2 points across flange 5 points on girder/ bulkhead brackets.
		Bottom transverse webs.	Three webs at bays where bottom plating measured, with measurements at both ends and middle.	5 points over 2 m2 of plating.
		Panel stiffening.	Where provided.	1 point measurements.

Source.: IACS UR Z10.1 TABLE IV and Z10.3 TABLE IV

Table 4.6.1 Close-up examination, double hull oil tankers and double hull chemical tankers

	Area	Renewal survey no.1 Age ≤5 years	Renewal survey no. 2 Age5 -10 years	Renewal survey no. 3Age 10 - 15 years	Renewal survey no. 4 and subsequent Age > 15 years
1	Deck transverse including adjacent deck structural members5).	One - in a cargo tank.	One - in each of two cargo tanks.	All - in a cargo tank. All - in a cargo tank. One - in each remaining cargo tank.	One - in each remaining cargo tank.
2a	Transverse double hull web frames 1), including adjacent structural members.	One - in a ballast tank within the cargo area.	All - in a ballast tank within the cargo area. One - knuckle area 3) and the upper part (approximately 3 - 5 metres) in each remaining ballast tank.	All - in all ballast tanks.	All - in all ballast tanks.
2b	Transverses web frames 4), including adjacent structural members.			All - in a cargo tank. One - in each remaining cargo tank.	All - in a cargo tank. One - in each remaining cargo tank.
3	Transverse bulkheads including girder system and adjacent structural members.	One - in a ballast tank2). One, lower part 6) - in a cargo wing\ tank. One, lower part 6) - in two cargo centre tanks 7).	One - in each ballast tank2). One, lower part 6) - in a cargo wing tank. One, lower part 6) - in a cargo centredcx tank 7).	All - in all ballast tanks. All - in all cargo tanks.	All - in all ballast tanks. All - in all cargo tanks.
4	Double bottom structures	As covered by item 2a and 2b.	As covered by item 2a and 2b.	As covered by item 2a and 2b.	As covered by item 2a and 2b.

Note:

1) Transverse double hull web frame means vertical web in double side tank, hopper web in hopper tank, floor in double bottom tank and deck transverse in double deck tank (where fitted).

   When applicable to forepeak and aftpeak tanks this means a complete transverse web frame ring.

2) Including double bottom tank, double side tank and double deck tank as applicable if these are separate tanks.

3) The knuckle area is the area of the web frame around the connections of the slope hopper plating to the inner hull bulkhead and the inner bottom plating, up to 2 metres from the corners both on the bulkhead and the double bottom.

4) Transverses web frame means deck transverse, longitudinal bulkhead vertical girder and cross ties where fitted.

5) Including external structure on deck in way of the tank, where applicable.

6) Including internal structure of lower stool, where fitted.

7) In the case of centre longitudinal bulkhead, centre tank means a tank adjacent to this bulkhead.

8) For vessels converted from single to double hull oil tankers, close-up examination for void spaces converted from cargo tanks:

   Transverse double hull web frames including adjacent structural members (where wing cargo tank divided with new inner shell). One - in each void space.

   Transverses web frame rings including adjacent structural members (where wing cargo tank converted to void space). One - in each void space.

   Transverse bulkheads including girder system and adjacent structural members. All - in all void spaces.

Source.: IACS UR Z10.4 TABLE I and Z10.3 TABLE I

Table 4.6.2 Minimum thickness measurements1), double hull oil tankers and double hull chemical tankers

	Area	Renewal survey no.1 Age ≤5 years	Renewal survey no. 2 Age5 -10 years	Renewal survey no. 3Age 10 - 15 years	Renewal survey no. 4 and subsequent Age > 15 years
0a	Transverse section(s) within the cargo area 2)	One section of deck plating only - for the full beam of the ship 3)	One complete section 3)	Two complete sections - at least one within 0.5 L amidships 3)	Three complete sections - at least one within 0.5 L amidships 3)
0b	Structural members subject to close-up examination according to Table 4.6.1.	Measurements, for general assessment and recording of corrosion pattern.	Measurements, for general assessment and recording of corrosion pattern.	Measurements, for general assessment and recording of corrosion pattern.	Measurements, for general assessment and recording of corrosion pattern.
1	Main deck plating		All - within the cargo area.	All - within the cargo area.	All - within the cargo area. All exposed - outside the cargo area.
2	Wind- and water strakes.		Selected outside the cargo area.	All - within the cargo area. Selected outside the cargo area.	All - full length.
3	Transverse bulkheads	See item 0b	See item 0b	See item 0b	See item 0b
4a	Keel plates and bottom plates.				All keel plates full length. All bottom plates, including lower turn of bilge, within the cargo area. Additional bottom plates in way of cofferdams, machinery space and aft end of tanks.
4b	Sea chests and shell plating in way of overboard discharges.				Plating of sea chests. Shell plating as considered necessary by the attending surveyor.
5	Superstructure deck plating (poop, bridge and forecastle deck).				Representative exposed deck plating.
6	Internals in peak tanks.			Forepeak and aftpeak.	Forepeak and aftpeak.
7	Air pipes and ventilators			All - on the fore deck (forward quarter length). All exposed air pipes to fuel and lube oil daily service tanks. Selected air pipes and ventilator coamings aft of the forward quarter.	All - on the fore deck (forward quarter length). All exposed air pipes to fuel and lube oil daily service tanks. Selected air pipes and ventilator coamings aft of the forward quarter.

Note:

1) Thickness measurement locations should be selected to provide the best representative sampling of areas likely to be most exposed to corrosion, considering cargo and ballast history and arrangement and condition of protective coatings.

2) Transverse sections shall be chosen where the largest reductions are suspected to occur or are revealed from deck plating measurements.

3) At least one section shall include a ballast tank, within 0.5L amidships, as far as applicable.

Source.: IACS UR Z10.4 TABLE II and Z10.3 TABLE II

Table 4.6.3 Thickness measurement, extent and pattern in way of areas of substantial corrosion, double hull oil tankers and double hull chemical tankers

	Area	Structural member	Extent of measurement	Pattern of measurement
1	Deck structures.	Deck plating.	Two bands across tank.	3 points per plate per band.
		Deck longitudinals.	Three longitudinals in each of two bays.	3 points in line vertically on webs. 2 points on flange (if fitted).
		Longitudinal girders and brackets. (usually in cargo tanks only)	At fore and aft transverse bulkhead, bracket toes and in centre of tanks.	1 point between each panel stiffener on web plating - vertical line of points - minimum three points. 2 points across flange. 5 points on girder/ bulkhead brackets.
		Transverse girders.	Two - with measurements at both ends and middle.	5 points over 2 m^2 of web plating. 1 point on flange.
		Vertical web and transverse bulkhead in wing ballast tank (two metres from deck)	Minimum of two webs, and both transverse bulkheads.	5 points over 1 m2 of plating/ web.
		Panel stiffening.	Where provided.	1 point measurements.
2a	Double side structures.	Side shell and inner side plating.	Upper strakes and strakes in way of horizontal girders - minimum three bays along the tank.	1 point each panel between pair of longitudinal in each bay.
			All other strakes - same three bays along the tank as above.	1 point every third panel between pair of longitudinals.
		Side shell and inner side longitudinals.	On upper strakes – all longitudinals in same three bays along the tank as above.	3 points across web. 1 point on flange.
			On all other strakes – every third longitudinal in same three bays along the tank as above.	3 points across web. 1 point on flange.
		Brackets on side shell and inner side longitudinals.	Minimum of three at top, middle and bottom of tank in same three bays along the tank as above.	5 points over area of bracket.
		Vertical web frames and transverse bulkheads.	Strakes in way of horizontal girders - minimum two webs and both bulkheads.	5 points over 2 m2 of plating.
			Other strakes - minimum two webs and both bulkheads.	2 points between each pair of vertical stiffeners.
		Horizontal girders	Plating on each girder in a minimum of three bays.	2 points between each pair of longitudinal girder stiffeners.
		Panel stiffening.	Where applicable.	1 point measurements.
2b	Longitudinal bulkhead structures (other than inner side longitudinal bulkheads).	Bulkhead plating.	Deckhead and bottom strakes, and strakes in way of horizontal girders (also where girders on transverse bulkheads only) – minimum 3 bays along the tank.	1 point each panel between pair of longitudinals.
			All other strakes – same three bays as above.	1 point every third panel between pair of longitudinal
		Bulkhead longitudinals.	On deckhead and bottom strakes – all longitudinals in same three bays as above.	3 points across web. 1 point on flange.
			On all other strakes – every third longitudinal in same three bays as above.	3 points across web. 1 point on flange.
		Brackets on longitudinals.	Minimum of three at top, middle and bottom of tank in same three bays as above.	5 points over area of bracket.
		Web frames and cross ties.	Three webs with minimum of three locations on each web, including in way of cross tie connections.	5 points over about 2 m2 web area. 1 point on web frame and cross tie flanges.
3	Transverse bulkhead and swash bulkhead structures in cargo tanks.	Upper and lower stool, where fitted.	Transverse band within 25 mm of welded connection to inner bottom or deck plating.	5 points between stiffeners over 1 m length.
			Transverse band within 25 mm of welded connection to shelf plate.	5 points between stiffeners over 1 m length.
		Plane bulkhead plating.	Deckhead and bottom strakes, and strakes in way of stringer platforms – approximately ¼, ½ and ¾ width of tank.	5 points each panel between pair of stiffeners over 1 m length.
			All other strakes – at middle width of tank.	1 point each panel between pair of stiffeners.
		Corrugated bulkhead plating.	Strakes for each change of scantling at centre of panel and at flange or fabricated connection.	5 points over 1 m2 of plating.
		Stiffeners	Three typical stiffeners.	2 points in line across web at each end. 1 point on web at centre of span. 1 point on flange at each end and at centre of span.
		Brackets.	Three at top, middle and bottom of tank.	5 points over area of bracket.
		Horizontal girders.	All – at both ends and middle.	5 points over 1 m2 web area. 1 point near bracket toes and on flanges.

4	Double bottom and hopper structures.	Bottom, inner bottom and hopper structures plating.	Three bays across double bottom tank, including aft bay. Around and under all suction bell mouths.	5 points each panel between longitudinals and floors.
		Bottom, inner bottom and hopper structures longitudinals.	Three - in each bay where bottom plating measured.	3 points in line across web. 3 points in line across flange.
		Bottom girders, including watertight girders.	At fore and aft watertight floors and in centre of tanks.	1 point between each panel stiffener on girder plating - vertical line of points - minimum three points.
		Bottom floors, including watertight floors.	Three - at bays where bottom plating measured, with measurements at both ends and middle.	5 points over 2 m^2 of plating.
		Web frame rings - hopper structures.	Three - at bays where bottom plating measured, with measurements at both ends and middle.	5 points over 1 m^2 of web plating. 1 point on flange.
		Transverse watertight bulkheads or swash bulkheads - hopper structures.	Lower 1/3 of bulkhead.	5 points over 1 m^2 of web plating.
			Upper 2/3 of bulkhead.	5 points over 2 m^2 of plating.
			Three stiffeners.	2 points in line across web at each end. 1 point on web at centre of span. 1 point on flange at each end and at centre of span.
		Panel stiffening.	Where applicable	1 point measurements.

Source.: IACS UR Z10.4 TABLE IV and Z10.3 TABLE IV

Table 4.7.1 Close-up examination, liquefied gas tankers

	Area	Renewal survey no.1 Age ≤5 years	Renewal survey no. 2 Age5 -10 years	Renewal survey no. 4 and subsequent Age > 10 years
1	Ballast tanks transverse bulkheads, including girder system and adjacent structural members.	One, lower part – in a tank within the cargo area	One in each tank within the cargo area	All – in all ballast tanks
2	Ballast tanks transverse web frames, including adjacent structural members.	One in a representative tank of each type within the cargo area	All in a tank, which shall be a double hull side tank or a top side tank. If such tanks are not fitted, another tank shall be selected One in each remaining tank within the cargo area	All – in all ballast tanks

Notes:

1) Ballast tank types within the cargo area: top side tank, double hull side tank, hopper side tank, double bottom tank.

2) For ships having independent tanks of type C, with a midship section similar to that of a general cargo ship, the extent of close-up surveys may be specially considered.

Source: IACS UR Z7.2 TABLE I

Table 4.7.2 Minimum thickness measurements1), 4) , liquefied gas tankers

	Area	Renewal survey no.1 Age ≤5 years	Renewal survey no. 2 Age5 -10 years	Renewal survey no. 3Age 10 - 15 years	Renewal survey no. 4 and subsequent Age > 15 years
0a	Transverse section(s) within the cargo area 2)	One section of deck plating only - for the full beam of the ship within 0.5 L amidships. 3)	One complete section - within 0.5 L amidships. 3)	Two complete sections - at least one within 0.5 L amidships. 3)	Three complete sections - at least one within 0.5 L amidships. 3)
0b	Structural members subject to close-up examination according to Table 4.7.1.	Measurements, for general assessment and recording of corrosion pattern.	Measurements, for general assessment and recording of corrosion pattern.	Measurements, for general assessment and recording of corrosion pattern.	Measurements, for general assessment and recording of corrosion pattern.
1	Main deck plating		All - within the cargo area.	All - within the cargo area.	All - within the cargo area. All exposed - outside the cargo area.
2	Wind- and water strakes.		In way of the transverse sections considered in item 0a. Selected outside the cargo area.	In way of the transverse sections considered in item 0a. Selected outside the cargo area.	All - full length.
3	Transverse bulkheads	See item 0b	See item 0b	See item 0b	See item 0b
4a	Keel plates and bottom plates.				All keel plates full length. All bottom plates, including lower turn of bilge, within the cargo area. Additional bottom plates in way of cofferdams, machinery space and aft end of tanks.
4b	Sea chests and shell plating in way of overboard discharges.				Plating of sea chests. Shell plating as considered necessary by the attending surveyor.
5	Superstructure deck plating (poop, bridge and forecastle deck).				Representative exposed deck plating.
6	Internals in peak tanks.			Forepeak and aftpeak.	Forepeak and aftpeak.
7	Air pipes and ventilators			All - on the fore deck (forward quarter length). All exposed air pipes to fuel and lube oil daily service tanks. Selected air pipes and ventilator coamings aft of the forward quarter.	All - on the fore deck (forward quarter length). All exposed air pipes to fuel and lube oil daily service tanks. Selected air pipes and ventilator coamings aft of the forward quarter.

Notes:

1) Thickness measurement locations should be selected to provide the best representative sampling of areas likely to be most exposed to corrosion, considering cargo and ballast history and arrangement and condition of protective coatings.

2) Transverse sections shall be chosen where the largest reductions are suspected to occur or are revealed from deck plating measurements.

3) At least one section shall include a ballast tank, as far as applicable.

4) For ships having independent tanks of type C, with a midship section similar to that of a general cargo ship, the extent of thickness measurements may be increased to include the tank top plating at the discretion of the Surveyor.

Source.: IACS UR Z7.2 TABLE II

5 Table of survey methods for machinery

5.1 General

5.1.1 Machinery components listed in Table 5.1 shall be surveyed according to the specified survey method as described in the table.

Table 5.1 Machinery surveys

Main propulsion

Item		Survey method
Prime movers	Diesel engine	A
	Steam turbines	A
	Gas turbines	See Sec.1 3.5
	Electrical main motors, including frequency converters	B
Shafting	Thrust-and intermediate shaft including bearings, clutch, couplings and torsional and axial vibration damper	B
Gears	Shafts, pinions, gear wheels, couplings and bearings, clutch	A
	Power Take Off /In (PTO/PTI)	A

Auxiliary machinery		Survey method
Prime movers	Diesel engine	A
	Turbines	A
	Electrical motors, including frequency converters	B
	Hydraulic motors	B
Generators		B
Shafting	Shaft, couplings, clutch and torsional and axial vibration damper	B
Gears	Shafts, pinions, gear wheels, couplings and bearings	B
	Power Take Off (PTO)	B
Sea water cooling system	Pumps, Electrical motor and starter	A
	Heat exchangers	A
	Pipes, valves and filters	B
Fresh water cooling system	Pumps, electrical motor and starter	B
	Heat exchangers	A
	Pipes, valves and filters	B
Lubricating oil system	Pumps, electrical motor and starter	B
	Heat exchangers	A
	Pipes, valves and filters	B
Fuel oil system	Pumps, electrical motor and starter	B
	Heat exchangers	A
	Pipes, valves and filters	B
Bilge and ballast system	Pumps, Electrical motor and starter	A
	Ejectors/ Adductors	A
	Pipes, valves and filters inside machinery space	B
Steam system	Heat exchangers	A
	Pipes, valves and filters inside machinery space	B
Feed water and condensate system	Pumps, electrical motors and starters	A
	Turbines	A
	Evaporators (Fresh water generator (only for steam turbine propulsion)) and condensers with ejectors	A
	Heat exchangers	A
	Pipes, valves and filters	B
Compressed air system	Air compressors, piston	B
	Air compressors, screw	B
	Emergency compressors	B
	Compressed air receivers	A
	Pipes, valves and filters inside machinery space	B
Hydraulic system	Pumps, electrical motor and starter	B
	Pipes, valves and filters inside machinery space	B
	Controllable pitch propeller oil distribution box	B
	Controllable pitch propeller inboard actuators	B
	Hydraulic motors	B

Cargo handling systems		Survey method
	Piston pumps	B
	Centrifugal pumps	B
	Screw pumps	B
	Electrical motors and starters	B
	Turbines	A
	Heat exchangers	A
	Pipes, valves and filters	B
	Gas compressors	A
	Diesel engine	A

Miscellaneous		Survey method
	Forced draught fan	B
	Other turbines	A
	Incinerator arrangement	A

The survey methods are defined as follows:

Survey method A: Visual inspection by opening up fully or partly as found necessary by the surveyor. Function testing and or pressure testing to be carried out when relevant

Survey method B: Visual inspection without dismantling and performance test to be carried out. Opening up if found necessary. Last overhaul to be verified.

Section 5 Miscellaneous Surveys

1 Bottom Surveys

1.1 General

1.1.1 Bottom surveys are surveys of the outside of the ship's hull below the deepest load waterline and related items.

1.1.2 The survey shall include examination of:

- hull plating and stern frame
- openings. All sea valves, including scuppers and sanitary discharges, shall be fully or partly opened up and examined at alternate bottom survey
- for ships fitted with box coolers, the coolers shall be withdrawn at alternate bottom survey for examination of the box cooler space, water cover and top plate, mounting flange with weld connection to the hull, connection bolts and gaskets
- steering fins, shaft brackets and other appendages fitted
- rudder with attachments and bearings, see 1.2
- propeller with attachments and propeller shaft external parts, see 1.3
- thrusters, see 1.4
- stabiliser fins.

The survey of stabiliser fins shall include, as far as practicable, examination of:

- fin including tail flap with hinge and link systems as applicable
- fin box with watertight boundaries
- fin bushes
- main seals of the stabiliser.

An operational test shall be carried out including mechanical securing devices. At the time of dry docking, NDT shall be carried out as deemed necessary by the surveyor.

1.1.3 Bottom surveys are normally to be carried out with the ship in dry dock or on a slipway.

If the ship is built for in-water survey of the bottom and related items and sea conditions are such that an inwater survey can be satisfactorily carried out, bottom surveys may be permitted while the ship is afloat.

1.1.4 At the time of drydocking, the painting of markings required for the class notation INWATERSURVEY shall be checked and confirmed in order.

1.1.5 At the time of drydocking, a dock trial shall be carried out to confirm satisfactory operation of main and auxiliary machinery.

1.2 Rudder with attachments and bearings

1.2.1 Visible parts of the following items shall be examined:

- rudder
- rudder horn
- sole piece
- rudderstock and rudder shafts with couplings
- rudder pintles and gudgeons.

Dismantling may be required to the extent found necessary by the surveyor.

1.2.2 For oil lubricated rudder bearings the sealing arrangement shall be examined for tightness and the bearings shall be checked for wear as far as practicable.

For water lubricated rudder bearings the bearing clearances shall be measured.

1.2.3 For cone couplings, nuts shall be examined for verifying that all parts are intact and secure.

Inspection plates, where fitted, shall be removed.

1.2.4 For flange couplings, bolts and nuts shall be examined for verifying that all parts are intact and secure.

1.2.5 Areas susceptible to fractures shall be checked by an efficient crack detection method at every docking.

Such areas are:

- weld connections at flanged connection between rudder and rudder stock, in particular for spade rudders
- rudder plating in way of abrupt changes in rudder cross section, e.g. at cutout for rudder horn bearing
- weld connections in way of removable plate for access to nut on rudder stock, pintle or shaft.

1.2.6 For flap rudders, the hinge and link systems shall be examined.

Retaining arrangement for hinge pins shall be examined as far as practicable.

1.3 Propeller with attachments

1.3.1 The propeller blades, propeller boss and propeller shaft external part shall be examined.

Dismantling may be required to the extent found necessary by the surveyor.

If a rope guard is fitted, this shall be of such a construction as to facilitate the inspection of the shafting between the propeller hub and stern frame box.

1.3.2 The propeller shaft external sealing arrangement and the propeller blade sealing arrangement shall be examined for tightness.

The propeller shaft bearing clearance shall be measured.

1.3.3 The following securing arrangements shall be examined for tightness:

- propeller nut
- propeller hub coupling bolts or nuts, if bottom survey afloat, only the securing of the protective arrangement to be examined
- propeller blade bolts.

1.4 Thrusters

1.4.1 All thrusters shall be externally examined. This comprise examination of gear housing, propeller blades, bolt locking and other fastening arrangements.

Dismantling may be required to the extent found necessary by the surveyor.

1.4.2 Thrusters for propulsion and thrusters for propulsion and steering shall have the sealing arrangement of propeller blades, propeller shaft and steering column examined.

1.5 Bottom survey afloat

1.5.1 Every alternate bottom survey may in general be permitted while the ship is afloat for ships with class notation INWATERSURVEY .

For ships which have not been assigned the class notation INWATERSURVEY alternate bottom survey afloat may be permitted provided the following design conditions are met:

- Rudder bearings shall have synthetic or metallic material. For water lubricated bearings, clearance measurements shall be possible while the ship is afloat.
- Propeller shaft bearing and sealing arrangement shall be of such type which does not require propeller shaft withdrawal carried out in less than 5-years intervals.

For water lubricated propeller shaft bearing, clearance measurements shall be possible while the ship is afloat.

- Thrusters/podded thrusters for propulsion and dynamic positioning systems need not have standard maintenance or examination schedule requiring the ship in dry dock at less than 5-years interval.

In such cases a proposal for in-water survey shall be submitted in advance of the survey confirming that rudder, tail shaft and/ or propulsion thrusters can be satisfactorily examined - as applicable, including the operating history for these components.

1.5.2 Bottom surveys afloat may be permitted subject to the following restrictions:

- For general dry cargo ships, for liquefied gas tankers and for ships with class notation ESP the bottom survey in conjunction with the renewal survey must be carried out with the ship in dry dock.
- For ships more than 15 years of age bottom surveys afloat will only be permitted after special consideration.
- For ships more than 15 years of age, with class notation ESP, bottom surveys afloat will not be permitted.

1.5.3 The in-water survey shall provide the information obtained from a docking survey. During such surveys the following conditions shall be satisfactorily fulfilled:

- the water conditions at the location of the survey shall be satisfactory with respect to visibility, current, swell, etc.
- an approved diving company shall be used in the survey, using pictorial equipment of such quality that the surveyor is fully satisfied with the information relayed to him
- a diving report shall be presented
- location of possible damage to be ascertained
- the survey shall be witnessed by a surveyor of the Society.

The removal of inspection plates as given in 1.2.3 may be dispensed with if the surveyor is satisfied with the condition based on:

- examination of visible parts of rudderstock, rudder shafts and pintles with couplings and gudgeons
- the measurement of bearing clearances
- review of operating history
- on board testing as applicable.

1.5.4 If the in-water survey reveals damage or deterioration that requires early attention, the surveyor may require that the ship be dry-docked in order that a detailed survey can be undertaken and the necessary repairs carried out.

1.5.5 On a case by case basis, the society may accept a survey scheme allowing two consecutive periodical bottom surveys to be carried out afloat.

2 Propeller Shaft Survey

2.1 General

2.1.1 The propeller shaft shall be drawn to permit examination of the shaft and the following parts:

- propeller shaft bearing areas
- stern bushes or bearings
- shaft sealing arrangement, including lubricating oil system
- aft bearing clearances to be measured/calculated and recorded
- oil level monitoring of lubricating oil system.

Bearing clearances to be measured or calculated from wear down measurements and clearance from new building or last shaft withdrawal.

2.1.2 For oil lubricated propeller shafts with type approved sealing glands, the withdrawal of the propeller shaft may be exempted at alternate surveys, i.e. extended to 10 years intervals, provided the following items have been examined with satisfactory result (Reduced scope):

- new oil seals fitted
- oil sealing contact surfaces in order
- aft bearing clearances measured/calculated and recorded
- oil level monitoring of lubricating oil system
- oil analysis (not older than 3 months) in order.

Bearing clearances to be measured or calculated from wear down measurements and clearance from new building or last shaft withdrawal.

In addition to the above, a propeller connection survey in accordance with 3.1.1 shall be carried out for propeller shafts with a keyway.

The lubricating oil analysis should include the minimum parameters:

- water content
- chlorides content (sodium and magnesium)
- content of bearing metal particles (iron, aluminium, nickel, chromium, copper, tin, and lead)
- content of other particles (silicon)
- oil aging, resistance to oxidation (TAN, TBN).

Oil sample should be taken under service conditions.

3 Propeller Connection Survey

3.1 General

3.1.1 For arrangements where the propeller is mounted on a keyed taper the following shall be examined after the propeller is backed off:

- propeller shaft threaded end
- propeller shaft taper and keyway
- propeller hub taper and keyway
- key
- NDT of fore part of the shaft taper and shaft keyway by an approved crack detection method.

3.1.2 For arrangements where the propeller is mounted on a keyless taper, or by means of a cylindrical/conical sleeve the following shall be examined after the propeller is backed off:

- propeller shaft threaded end
- propeller shaft tapered or cylindrical section
- propeller hub taper
- NDT of the fore part of the shaft taper, or shaft cylinder, by an approved crack detection method.

3.1.3 For arrangements where the propeller hub is fitted to a flange coupling or a forged

propeller shaft flange the following shall be examined:

- visual inspection of the flange and its fittings
- tightness of bolts or nuts
- NDT of the flange fillet radius, by an approved crack detection method, may be required if the visual examination of the area is not satisfactory.

4 Survey of Geared Thrusters for Main Propulsion and Dynamic Positioning Systems

4.1 General

4.1.1 The requirements in this sub-section apply to thrusters for propulsion and thrusters for propulsion and steering of the ship.

Thrusters installed to achieve redundant main propulsion systems shall be subject to the requirements in this subsection.

4.1.2 Thrusters for main propulsion and dynamic positioning systems shall be subjected to oil samples at regular intervals of not more that 3 months and analysed by recognized laboratories. The result shall be presented in a way that makes it is easy to read the trends from the previous analyses. Record of results shall be available on board at all times.

A representative oil sample shall be taken before the filters and with the unit in its normal running condition.

Oil analysis shall detect iron (Fe) and other solid contamination in addition to possible water content. The water content due to condensation is normally not to exceed 0.5%. The oil analysis shall if applicable cover all of the following areas:

- lubrication oil for gears, bearings
- sealing boxes
- steering gear
- propeller.

If the propeller shafts seal oil systems do not allow for sampling unless the vessel is in dry dock, a representative oil analysis shall be taken in connection with the Bottom Survey.

4.1.3 Outboard (wet) parts of the thruster accessible from the outside are covered by the bottom surveys.

4.1.4 Thrusters for main propulsion and dynamic positioning systems shall be subjected to survey every 5 years. The renewal survey shall include:

1) evaluation of oil analysis of gear lubrication oil, propeller hydraulic system oil and sealing system oil. See 4.1.2

2) opening up of protection covers

3) inspection of power transmission gear (gear clearance to be measured), bearings (axial play to be measured), visible parts of shafts and general condition of housing internally.

4) examination of controllable pitch mechanism oil transmission system and feedback system for wear down and damage

5) full stroke ahead and astern to be verified and correct blade position feed-back and indication verified

6) examination of steering column and related sealing and bearing

7) running test at MCR.

Provided that an approved Thruster Condition Monitoring (CM) Survey Arrangement is in place.

The scope described from 1) to 7) is covered by the Thruster CM Arrangement, and followed up through annual Thruster CM Survey and Bottom Survey.

4.1.5 Inboard parts of the thruster accessible from the inside, such as drive motors, shafting system, gear transmissions, pumps and piping systems, alarm, safety and control systems are covered by the main class surveys of machinery. In addition to geared thrusters this will be applicable for e.g. Voith-Schneider and pump type thrusters.

4.1.6 At each overhaul of the thruster unit the following shall be carried out in the presence of a surveyor to the Society:

- all relevant parts of the components made accessible during overhaul shall be surveyed using adequate methods, such as visual inspection MPI or DP, wear down measurements
- NDT for sub-surface cracking of the tooth flanks
- MPI shall be carried out of gear teeth and at least in way of stress raisers in the shafts
- proper assembly of the thruster shall be verified
- proper gear mesh shall be documented in same extent as required for new thruster.

Mounting of the thruster on board shall be verified and function tested.

5 Survey of Podded Thrusters for Main Propulsion and dynamic positioning systems

5.1 General

5.1.1 The requirements in this sub-section apply to thrusters of podded design, here after denoted pods, for propulsion and steering of the ship.

5.1.2 Propulsion pod survey implies a survey of the pod's internal power transmission elements and driving motor enclosed in the pod, strut and steering column.

Pods have two scheduled surveys:

- annual
- renewal.

For some pod sizes it will be limited access from inside the vessel and annual survey should be done to the extent that is practically possibly. Renewal survey might require some dismantling.

5.1.3 Parts of the survey may be replaced by an approved condition monitoring arrangement.

5.1.4 At each overhaul, all relevant parts of the components made accessible shall be presented for survey by the society, see 5.2.3.

Assembly and mounting on board shall be verified and tested.

5.2 Scheduled surveys

5.2.1 Annual survey

Scope of the annual pod survey by the society shall include:

- evaluation of lube oil analysis from recognized laboratory (see Sec.5 3.1.1)
- survey of functionality and calibration of onboard control and monitoring system (incl. alarm functions if fitted for continuous monitoring systems)
- review of insulation resistance (megger-test) records
- maintenance records for various items, such as alarm tests for bilges, bearing inspections, pod inspections, maintenance of the slip rings electrical connections, etc.
- visual inspection of pod motor air cooling system
- record of running hours.

5.2.2 Renewal survey

The renewal survey shall include:

- same as for annual
- examination of drive motor rotor and stator condition and associated equipment, shafts, and stator fixation arrangement
- internal overall survey, check for cleanliness, oil leaks, general condition
- verification of seal tightness
- verification of bearing condition (e.g. Boroscopic examination to be carried out)
- external survey in dry dock, check housing for cracks, corrosion, damage
- verification of seals condition (pod/ship)
- verify condition of slewing gears and bearing.

5.2.3 At overhaul of the thruster unit the following shall be included in addition to the survey requirements given in 5.2.2:

- all relevant parts of the components made accessible during overhaul shall be surveyed using adequate methods, such as visual inspection and MPI or DP, wear down measurements
- MPI shall be carried out in way of stress raisers in the shafts

- proper assembly of the thruster shall be verified.

Mounting of the thruster on board shall be verified and function tested.

6 Boiler Survey

6.1 General

6.1.1 The requirements in this sub-section applies to all boilers, steam drums, steam generators and/or pipe arrangements.

Also applicable to steam/thermal oil heated steam generators.

6.1.2 Owner's duties prior to survey:

- cleanliness of boiler on both water and gas sides shall be ensured to a condition required to assess structures
- boiler to be completely isolated/secured from live steam systems, cooled down and opened up to give access to both steam/water and fire/gas sides. Hand-hole covers on headers/at bottom of water space shall be opened up to facilitate internal examination. Boiler armatures shall be readied for opening up
- boiler to be well ventilated on both steam/water and fire side. Safe work lighting to be provided.

6.1.3 The survey covers:

- internal examination of the water-steam and fire side, which includes functional testing of safety valves

On small boilers and/or units fitted with steam generating coils / tube panels making internal examination unpracticable, the internal examination may be substituted by hydraulic pressure testing at 1.5 times the design pressure

- external examination
- examination of mountings and fittings, including safety valves, pressure, level and temperature transmitters for control and monitoring. Opening up as found necessary by the surveyor
- review of the following records since the last survey:
  - operation
  - maintenance
  - repair history
  - boiler water management.
- verification of the safety valve setting
- examination and testing of the operation / function of safety valve relieving gear.

If not possible to circulate steam/hot water through the exhaust gas heated economizer at the time of survey, setting of economizer safety valve(s) may be carried out by the Chief Engineer at sea, and results recorded in the log book.

For shell type exhaust gas heated economizers, operating in fully flooded condition, the survey will include visual examination of all accessible welded joints. Crack detection by non destructive testing method as found necessary by the surveyor.

(Ref. IACS UR Z 18)

6.1.4 Upon completion of the internal examinations, boilers and steam / thermal oil heated steam generators shall be function tested according to the requirements for new installations.

The test shall include instrumentation, automatic and remote control equipment, and be witnessed by a ACS surveyor.

If not possible to raise steam and carry out testing at the time of the internal examination, the following procedure applies:

- Before surveyed unit is taken into use, safety valves to be set and control, monitoring and safety systems tested

under steam by the Chief Engineer and the results recorded in the log book.

- At the vessel's next port of call and not later than 45 days from the date of internal examination, the safety valve setting and control, monitoring and safety systems shall be tested in the presence of a ACS surveyor.

6.1.5 For exhaust boilers fitted with a "bursting disc", the disc shall be undamaged and comply with the original setting.

6.1.6 Soot-cleaning arrangements is subject to visual inspection and function testing. Drainage of cleaning water shall be in working order.

6.1.7 Heaters for main boiler combustion air will be surveyed concurrently with internal boiler examination.

For rotary air heaters, the survey will include the satisfactory functioning of exhaust gas and combustion air bypass dampers, and assessment of the fixed fire extinguishing arrangement.

6.2 Damage and repairs to boilers and pressure vessels

6.2.1 All damage shall be reported to the Society for assessment.

6.2.2 The Society will determine necessary accessibility to ensure that the full extent of the damage is ascertained.

6.2.3 The following procedure applies:

a) A repair plan shall be discussed with the Society, and concluded.

b) The Society will normally supervise execution of repairs at agreed hold-points.

c) Repairs shall in general be carried out in such a way that the original design and scantlings are restored.

d) Repair work shall be carried out by qualified personnel observing good engineering practices.

6.2.4 Class requirements apply to all repair work.

6.3 Emergency repairs

6.3.1 To retain the ship's manoeuvrability, reach safe- or scheduled port, emergency measures/repairs to pressure parts may have to be performed without ACS attendance.

Information about such emergency measures planned or initiated shall however, always be submitted to ACS without delay.

Any such repairs are considered temporary measures only, and permanent repairs/ repair solutions shall be finalized prior to further trading.

Repair work may carried out without the attendance of a surveyor (e.g. during voyage), provided the Society is informed, and a repair plan accepted in advance by the Society.

6.3.2 A ACS surveyor shall be called to survey repairs performed according to 6.3.1, when completed.

It is for the owner to document to the satisfaction of the attending surveyor that the agreed repair plan has been adhered to.

6.4 Repairs

6.4.1 A repair proposal shall detail:

a) Full extent of damage to be repaired

b) Material certification

c) Certification of consumables

d) Welding procedures

e) Welding procedure certification

f) Welders qualification certification

g) Testing schedule.

h) Access work, including procedures for "buttering up" (welding up) of material lost when cutting out the temporary opening.

6.4.2 Plugging of boiler tubes initially constitutes a temporary measure only, and shall be reported to the Society without delay.

The extent of plugging and possible acceptance as permanent repair, is subject to assessment by the Society.

6.4.3 Cracked steel boiler shell plating, tube plates, corroded welding and pitting shall be repaired through plate replacement.

6.4.4 Heat affected zones of insert welding shall not interfere with heat affected zones of original welding.

6.4.5 Longitudinal and circumferential main joints on boiler shells/drums shall be full penetration butt welds.

6.4.6 Joints shall be welded from both sides of the plates unless otherwise approved.

Circumferential joints where dimensions do not allow welding from both sides in headers, pipes and tubes may be welded from one side only, with or without backing strip.

6.4.7 No attachment shall be welded on in the immediate vicinity of a welded joint.

If this cannot be avoided, the welds shall cross or overlap each other completely.

6.4.8 Ends made of welded plates shall be so arranged that they are exposed to the least possible stress. Welded joints passing through flanged curvatures shall be at right angles to these.

6.5 Boiler armature/valve replacement

6.5.1Safety valves shall be designed and manufactured according to a recognized standard.

Acceptable standard could be e.g. ASME, DIN or equivalent.

An ACS product certificate is required for valves with D > 100 mm having a design pressure, p > 16 bar. For other valves, manufacturers' certificate is acceptable.

A ACS material certification is required when operating temperature > 400ºC.

6.6 Post weld heat treatment

6.6.1 Pressure vessels including boilers shall be thermally stress relieved after welding when the material thicknesses at any welded connection exceed 20 mm for any material other than 1Cr 0.5Mo and 2.25Cr 1Mo where all thicknesses shall be subject to heat treatment.

Alternatively, if the manufacturer can document that work procedures control or even eliminate formation of undue stresses, the requirement for additional stress relieving may be omitted by the Society.

6.7 Testing

6.7.1 Non-destructive testing shall be carried out as follows:

- All longitudinal butt welded joints in drums, shells and headers subjected to 100% radiographic testing.
- 25% of the length of circumferential butt welded joints in drums, shells and headers subjected to radiographic testing.
- 10% of the total number of circumferential butt welded joints in pipes and tubes shall be subject to radiographic testing
- For set-in flat plates the cylindrical shell shall be ultrasonically tested for lamellar tearing in way of the circumferential weld to the flat plate. For shell plate thickness 15 mm and less the extent of testing shall be at least 10% and for greater thickness at least 20% of the total length of the weld. The internal fillet weld to be 100% magnetic particle tested for surface flaws.
- For standpipes and branches with outside diameter exceeding 100 mm, all weld connections to shell and reinforcement rings shall be subjected to magnetic particle testing. For outside diameters 100 mm and less, spot testing is considered a satisfactory extent. The magnetic particle testing shall also cover weld joints between reinforcement rings and shell.
- For furnaces and fireboxes non-destructive testing shall as minimum be carried out as follows, and be witnessed by a ACS Surveyor:

- 10% of the length of longitudinal butt welded joints subjected to radiographic examination
- 10% of the length of circumferential butt welded joints subjected to radiographic examination.
- 25% of the length of T-welds and corner welds subjected to ultrasonic examination.

6.7.2 Hydraulic pressure testing shall be carried out at 1.5 times the design (calculated) pressure, and be witnessed by a ACS surveyor.

7 Thermal Oil Heater Survey

7.1 General

7.1.1 For thermal oil heaters the following will be assessed:

- tightness of the installation
- external condition of coils heated by
  - oil or gas burner(s)
  - exhaust gases
- functional testing of plant instrumentation and safety systems
- setting of liquid relief valves.

Safety valves may be set and tested hydraulically in a test bench

- condition of oil burning equipment
- condition of fire extinguishing system
- soot blowing arrangements including automatic operation
- exhaust gas bypass arrangement
- fire fighting arrangement
- drainage of fire fighting/cleaning water.

7.1.2 Assessment of laboratory analysis report of thermal oil in circulation will be part of the survey.

If the laboratory analysis reveals, either:

- chemical degrading of oil in circulation
- contamination by low flashpoint petrochemical products
- contamination by carbon particles, one or more of the following actions shall be initiated by the owner, and verified by the Society:
- selected sections of heating coils and/or piping internally examined for accumulation of coke deposits
- chemical cleaning of the piping system
- circulating pumps opened for examination
- oil charge replaced.

7.2 Testing

7.2.1 Testing shall be witnessed by an ACS surveyor.

7.2.2 Performance test

Instrumentation, automatic equipment and remote control systems shall be subjected to testing and verification that flow of thermal oil has not been restricted.

7.2.3 Hydraulic pressure testing

For coils in thermal oil installations heated by oil or gas burner(s) or by exhaust, which are not accessible for visual external inspection, survey may be performed by hydraulic pressure testing 1.5 times the calculated working pressure.

The test pressure shall be maintained for a period of at least 30 minutes.

Section 6 Optional Class Notation Surveys

1 Fire Fighting Installations

1.1 General

1.1.1 The requirements in this sub-section apply to vessels with class notation:

Fire Fighting Ship

1.2 Renewal survey (2.5 years)

1.2.1 Water spray plant for self protection, including pumps, pipes and nozzles, shall be surveyed and tested.

1.2.2 Pumps for water monitors including their prime movers shall be surveyed and tested at maximum capacity. Remote control of monitors including valve operation shall be tested.

1.2.3 Hoses with their equipment shall be surveyed and tested.

1.2.4 Firefighters' outfits and compressors for charging the air bottles shall be surveyed.

1.2.5 Floodlights shall be tested.

1.2.6 It shall be verified that the required operation manual is in order.

1.2.7 For ships with class notation Fire Fighting Ship 2, 3, or E the survey shall include examination of the mobile generator for foam production with its equipment.

1.2.8 For ships with class notation Fire Fighter the survey shall include examination of the fixed foam monitors with foam production equipment and remote control.

2 Well Stimulation Installation

2.1 General

2.1.1 The requirements in this sub-section apply to ships with class notation:

WS

2.1.2 Survey requirements for installed equipment, systems and features which are generally covered by classification, are included in the main class surveys.

2.2 Annual survey

2.2.1 The flexible high pressure hose including end connectors shall be hydraulically pressure tested to 1.25 times its maximum working pressure.

2.2.2 The survey shall include examination and testing of:

- emergency remote stop of pumps and shut-off of liquid nitrogen supply valves
- tank level gauges
- tank level alarms and liquid leakage alarms
- hydrogen and oxygen detection and alarm system
- hydrogen and oxygen detection and alarm system

- decontamination showers and eye washes
- personnel protective equipment.

2.3 Renewal survey (5 years)

2.3.1 Liquid nitrogen tanks shall be inspected internally. On highly stressed parts, non-destructive testing may be required if considered necessary by the surveyor. The tanks shall be hydrostatically, hydropneumatically or otherwise pressure tested to their MARVS (Maximum Allowable Relief Valve Setting).

2.3.2 Acid tanks shall be examined internally.

2.3.3 All pressure relief valves shall be opened for survey, adjusted, sealed and function tested.

2.3.4 Pressure/vacuum relief valves for the acid tanks shall be surveyed and tested for proper function.

2.3.5 Spot checking by NDT of the high pressure piping shall be carried out.

2.3.6 The nitrogen vaporiser shall be opened for internal inspection and hydraulically tested to 1.25 times its maximum working pressure after reassembly.

2.3.7 The high pressure piping shall be hydraulically tested to 1.25 times its maximum working pressure.

2.3.8 The emergency depressurisation and disconnecting of the transfer hose shall be tested.

3 Reception Systems for Recovered Oil

3.1 General

3.1.1 The requirements in this sub-section apply to ships with class notation:

OIL RECOVERY SHIP

3.1.2 Survey requirements for installed equipment, systems and features which are generally covered by classification, are included in the main class surveys.

3.2 Renewal survey (2.5 years)

3.2.1 The survey is normally to include examination of the following components and arrangements:

- tanks intended for storage of recovered oil if the tanks are not separated from the engine room by cofferdams
- piping system for oil recovery operations. If recovered oil is led into tanks through hatch openings, the existence of special hatch covers to prevent gas outflow through the openings shall be verified
- blanking-off arrangements for pipe systems not in use during oil recovery operations
- disconnecting arrangements of non-certified electrical equipment in spaces adjacent to tanks for recovered oil and on open deck
- dry powder fire extinguishers including hoses

- portable hydrocarbon gas-measuring instrument
- electrical equipment certified for use in gas dangerous areas
- instruction book for oil recovery operations and signboards.

4 Refrigerated Cargo Plants

4.1 General

4.1.1 The requirements in this sub-section apply to ships with class notation:

Refrigerated Cargo Ship, REF-CARGO.

102 Survey requirements for installed equipment, systems and features which are generally covered by classification, are included in the main class surveys.

4.2 Annual survey

4.2.1 The refrigerating plant, with machinery and equipment, shall be surveyed in running condition, preferably without cargo onboard. Temperature- and capacity control systems as well as alarm and shut-down systems shall be checked.

4.2.2 A tightness test shall be carried out of refrigerant systems with odourless refrigerants. Systems with a refrigerant with distinct odour and brine systems shall be inspected for tightness.

4.2.3 The freezing point (density) and acidity (pH value) of the brine shall be checked.

4.2.4 Thermometers and other equipment for measuring temperature in holds, chambers, air ducts, RSW tanks, freezing tunnels and plate freezers shall be surveyed and their accuracy checked to the extent found necessary by the surveyor.

4.2.5 CO2 detectors, if required installed, shall be checked.

4.2.6 For ships equipped for carriage of fruit needing controlled atmosphere in cargo chambers, the survey shall include:

a) examination and testing of the controlled atmosphere installation as follows:

- check that P/V-valves are operational
- examination of cleats, hinges, catches and locks for hatches and doors
- examination of seals and gaskets on hatches and doors
- spot check of interlocks on inlet valve arrangement
- examination of required ventilation fans during operation
- examination of portable ventilators
- spot check of N2 release prealarm
- spot check of water seals
- examination of the N2 generating unit during operation
- if arranged, examination of the CO_2 scrubber(s) during operation

- examination and spot check of gas analysing and monitoring equipment, including fixed quipment, portable equipment for chamber or space monitoring and portable equipment for personal protection.

Calibration records and procedures shall be checked. Use and availability of certified test gases shall be confirmed

- verification of satisfactory maintenance and function testing procedures for instrumentation. Spot check of monitoring, alarm and safety functions
- all signboards on the entrances to rooms adjacent to controlled atmosphere chambers shall be checked. The signboards shall be in accordance with the approved instruction manual
- locks on doors and hatches to be checked. For number and location of locks, see approved instruction manual.

b) tightness testing with air of all controlled atmosphere chambers or gastight groups of chambers, to the design overpressure.

The pressure drop during 15 minutes shall not exceed 30% of the design overpressure. Testing by the vessel's master carried out maximum one month prior to the survey may be accepted based on written report by the master and provided the visual inspection does not cause doubts about the tightness.

c) verification that the approved instruction manual is onboard, is complete and that the responsible officers are familiar with its content.

4.3 Renewal survey (5 years)

4.3.1 The refrigerating plant with machinery and equipment shall be tested while cooling down from ambient temperature to the lowest design temperature for the chambers. The ability to maintain stable delivery air temperature at all design chamber temperatures shall be demonstrated. Satisfactory operation during defrosting shall be demonstrated.

4.3.2 The insulation shall be examined for cold spots when the chambers are at the lowest design temperature.

4.3.3 Sufficient areas of insulation shall be stripped from the holds, air trunks, pressure vessels, piping and other insulated parts in order to assess the condition of the insulated steel and the insulation itself.

4.3.4 At the second and all subsequent renewal surveys pressure vessels with R717 shall be examined internally with regard to possible ammonia stress corrosion cracking.

4.3.5 Reciprocating compressors may be required opened up for examination, if found necessary by the surveyor. Screw- and turbo-type compressors may be examined without opening up, provided they are test-run to the surveyor's satisfaction.

4.3.6 Air coolers, freezing tunnels and plate freezers shall be examined.

4.3.7 Condenser cooling water pumps, brine pumps and RSW pumps shall be opened up and examined.

4.3.8 Brine and RSW piping systems shall be examined at working pressure.

4.3.9 Water side of water cooled condensers and brine side of brine coolers shall be opened up for examination of tubes, tube plates and end covers.

4.3.10 Pressure gauges, thermometers and automatic controls and alarms shall be tested.

4.3.11 Pressure relief valves and safety discs shall be examined externally and on the outlet side after dismantling of outlet piping and possible external bodies. The tightness over the seat shall be verified. Testing or opening up is required only when specially deemed necessary by the surveyor. Discharge piping shall be examined with regard to integrity and non-obstructed flow.

4.3.12 For ships equipped for carriage of fruit needing controlled atmosphere in cargo chambers, the survey shall include:

- examination and testing of the complete controlled atmosphere installation. Air compressors, pressure vessels and other machinery components shall be surveyed in accordance with the principles of the main class machinery renewal survey
- tightness testing with air of all controlled atmosphere chambers or gastight groups of chambers, to the design overpressure.
- The testing shall be carried out in the presence of the surveyor, and the pressure drop during 15 minutes shall not exceed 30% of the design overpressure
- examination of all entrances to controlled atmosphere chambers, through running pipes, hatches and other connections from adjacent spaces, with respect to corrosion, damaged gaskets and other items which may affect the tightness between controlled atmosphere chambers and adjacent spaces
- testing of gas separating and absorption units, with regard to capacity and quality of the produced gas.

4.4 Survey in loading port, upon request

4.4.1 The Society may upon request carry out surveys of refrigerated cargo installations in the loading port for such cargo. Such surveys are not mandatory for retention of class.

The chambers shall be examined in an empty state to ascertain that they are clean and free from odour, that the dunnage ribs are in good order, and that no damage has been sustained to the aid ducts, facing or insulation.

The surveyor shall ascertain that all pipes for the drainage of the chambers and the drip pans are in good working order. The temperatures in the chambers shall be recorded, and the condition of the remote thermometers shall be checked. It shall be ascertained that the plant is free from leakage.

5 Arrangement for Carriage of Dangerous Goods

5.1 General

5.1.1 The requirements in this sub-section apply to ships intended to carry dangerous goods

5.2 Renewal survey (5 years)

5.2.1 These survey requirements are applicable to all types of cargo spaces and classes of dangerous goods.

5.2.2 It shall be verified that the following documents are available onboard:

- International Maritime Dangerous Goods Code (IMDG), IMO Res. A.81(IV), as amended.
- Relevant sections and the related parts of Appendix B of the Code of Safe Practice for Solid Bulk Cargoes (BC Code), IMO Res. A.434(XI), as amended.
- The IMO/WHO/ILO Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG), 1982.

5.2.3 The following shall be surveyed and tested as applicable:

- electrical installation in cargo spaces
- ventilation system for cargo spaces
- separate bilge pumping system or drainage for cargo spaces
- personnel protective clothing and breathing apparatus
- portable fire extinguishers for cargo spaces
- insulation of machinery space boundaries
- water spray system on open Ro-Ro cargo spaces.

6 Cranes

6.1 General

6.1.1 The requirements in this sub-section apply to ships with class notation:

Crane

6.2 Annual survey

6.2.1 An overall survey shall be carried out with particular emphasis on structural integrity, including examination of:

- wire ropes and end attachments
- blocks and sheaves
- hooks with accessories
- shackles
- bearings of boom heel and eyebolt connections
- securing arrangement for crane during passages.

6.2.2 Slewing system (slewing bearing or hook rollers) including tightness of bolts shall be examined as found necessary by the surveyor.

6.2.3 Examination and functional testing shall be carried out as found necessary by the surveyor for the following:

- correct adjustment of brakes
- resistance measurement of electrical systems
- leakages in hydraulic system

- safety devices
- emergency stop function
- fire extinguisher.

6.2.4 It shall be verified that the load charts, marking and components certificates are available and in order.

6.3 Renewal survey (5 years)

6.3.1 Thickness measurements of structural parts shall be carried out as far as deemed necessary.

6.3.2 The following components shall be dismantled (opened up) and/or checked by MPI (magnetic particle inspection):

- boom heel bearings
- fixed sheaves
- blocks
- axle pin and housing
- eyebolt connections
- hooks, ring and balls.

6.3.3 Slewing ring shall be opened up, and internal fillets, raceway and bolts shall be subjected to MPI.

Alternatively, if a crane has an approved securing device (retainer) fitted, opening up is not required, but at least 50% of the holding down bolts shall be drawn and subjected to MPI.

6.3.4 Flatness and condition of bearing mounting flanges shall be checked.

6.3.5 A load test, according to ACS Standard for Certification of Lifting Appliances, shall be carried out.

7 Cable Laying Installations

7.1 General

7.1.1 The requirements in this sub-section apply to ships with class notation:

Cable Laying Ship

7.2 Annual survey

7.2.1 An overall survey shall be carried out and shall include:

- hydraulic systems
- function testing.

7.3 Renewal survey (5 years)

7.3.1 Bearings and shafts of revolving equipment shall be opened up for examination.

7.3.2 Gear wheel and pinions of cable winch shall be checked.

7.3.3 Resistance measurements of electrical systems related to cable laying systems shall be carried out.

8 Helicopter Decks

8.1 General

8.1.1 The requirements in this sub-section apply to ships equipped with Helicopter landing area

8.2 Renewal survey (5 years)

8.2.1 The survey required is normally to include examination of the following components and arrangements:

- drainage arrangements
- surface protection on wooden decks
- safety net
- lashing arrangements for the helicopter
- arrangement for the prevention of sliding
- helicopter deck including supporting structure.

9 Diving Systems

9.1 General

9.1.1 The requirements in this sub-section apply to ships equipped with diving systems.

9.1.2 The requirements also apply to transferable diving systems, where the regular periodical surveys are carried out when such systems are in service.

When transferable diving systems are out of commission, annual surveys according to lay up procedure in 9.5.1 are carried out.

9.1.3 Survey requirements by a recognised classification society apply to all diving systems on vessels classed by the Society.

9.1.4 A Survey Planning Document shall be part of the documentation on board for the lifetime of the diving system.

9.1.5 For transferable diving systems, the Survey Planning Document shall specify scope for surveys when the system is installed and for surveys when the system is in storage (laid-up).

9.1.6 The Survey Planning Document shall be written in English (or translated into English), and approved by the Society prior to the survey taking place. Checklists shall be included, as attachments.

It shall have the following information printed on the front page:

- "Diving System Survey Planning Document " (title)
- name of support vessel or installation given in the Classification Register
- the Society’s identity number given in the Classification Register

- IMO number (for statutory surveys)
- name of company
- revision number and date.

A Survey Planning Document gives owners and surveyors a chance to tailor the instructions to fit each individual system or component and thereby avoid misunderstandings often encountered with respect to the application of generic requirements. This may also streamline the surveys in consideration of the operational situations in each case.

9.1.7 Checklists shall be made available for the surveyor to fill out and endorse at each survey. The checklists shall include the following information at the top of each page:

- name of support vessel or installation given in the Classification Register
- the Society's identity number given in the Classification Register
- IMO number (for statutory surveys)
- page number
- name of company
- scope of survey (Annual, Intermediate, Renewal or otherwise)
- in columns:

Survey item, Condition, Action, Comment.

9.2 Annual survey

9.2.1 The survey is normally to include:

- calibration of essential instrumentation (depth gauges, gas analysers etc.)
- switching from main to emergency electrical power supply
- emergency systems including bell emergencies (buoyancy if applicable)
- functional and power testing of normal and emergency systems of the bell handling system shall be carried out with a load of at least 1.25 times the working weight in the most unfavourable position
- partly dismounting of heat protection and penetrators on the bell may be required.

9.3 Intermediate survey

9.3.1 The following tests shall be carried out:

- gas leak tests
- testing of safety valves
- functional test of fire detection-, alarm- and extinction systems
- functional tests of life support systems
- functional tests of alarm systems
- functional tests of mechanical and electrical systems.

9.4 Renewal survey (5 years)

9.4.1 Bell buoyancy materials, heat protection, penetrators, windows and attached members shall be dismounted for inspection for possible corrosion and deterioration.

9.4.2 Pressure tests and inspections shall be carried out according to an approved procedure given as part of the Survey Planning Document, and following the principles given in items 9.4.6 and 9.4.7.

Test pressure shall be stamped on the pressure vessels according to the design code or, in the case of welded pressure vessels, engraved on an attached tag.

Applicable codes, standards and regional requirements shall be specified in the procedure.

Pressure testing shall be carried out according to the design code of the pressure vessel and to international standards for such testing.

The test pressure shall be as stamped on the pressure vessel and given in the accompanying certificate.

International testing standards include EN 1968 "Transportable gas cylinders - Periodic inspection and testing of seamless steel gas cylinders". The applicable working pressure and corresponding filling ratios should meet the requirements in BS5355 "Filling ratios and developed pressures for liquefiable and permanent gases" or equivalent standard.

9.4.3 Proof test or volumetric expansion test shall be carried out according to that which is required by the design code or regional requirements.

9.4.4 Downgrading of chambers may be requested either:

- to carry out periodical pressure testing after ten years pneumatically at a reduced pressure, or
- after installation of view-ports with a lower design pressure than the chamber, or
- after any other causes which do not imply a reduction of strength of the pressure vessel.

The procedure necessitates re-stamping of the pressure vessel, and issue of Memo to Owners (MO). The MO shall include the necessary information with respect to:

- the new maximum operating pressure of the diving system, and
- the reasons behind the downgrading.

9.4.5 Pneumatic testing shall not be carried out at pressures above the design working pressure.

9.4.6 At 1st Renewal survey the interval for hydraulic pressure testing of gas containers may be extended to 10 years if the following principles are applied:

- External and internal survey by intrascope.
- If internal survey is not possible or if corrosion or other items of concern are found, hydraulic test shall be carried out to the test pressure determined by the design code.

At all subsequent Renewal periodical surveys:

- External and internal survey by intrascope.
- Hydraulic test to the test pressure determined by the design code.

9.4.7 At 1st Renewal survey the interval for hydraulic pressure testing of bell and chambers may be extended to 10 years if the following principles are applied:

- External and internal survey.
- If internal survey is not entirely possible or if corrosion or other items of concern are found, hydraulic test shall be carried out to the test pressure determined by the design code.
- Alternatively, pneumatic test to the working pressure may be carried out and the pressure vessel down graded, see 9.4.4

At all subsequent Renewal periodical surveys:

- External and internal survey.
- Hydraulic test to the test pressure determined by the design code.
- Alternatively, pneumatic test to the working pressure may be carried out and the pressure vessel down graded, see 9.4.4

9.4.8 The working weight of the bell shall be checked.

9.4.9 A test of the bell handling system with a static load equal to the design load shall be carried out.

9.4.10 If applicable the bell's releasable ballast system with attachments shall be structurally tested with a static load 1.5 times the weight of the ballast in air.

411 Viewports with an age of 10 years or more shall be changed unless a special survey warrants an extension.

The special survey shall be carried out to a procedure approved by the Society in accordance with ASME PVHO-2-2002 "In-Service Guidelines for PVHO acrylic windows".

9.5 Survey of diving systems 'out of commission'

9.5.1 Diving systems which have been out of commission, i.e. laid up, for a period normally of at least 12 months, shall be surveyed and tested before re-entering service. The extent of the surveys and tests will be considered in each case depending upon:

- the time the diving system has been out of commission
- the maintenance and preservative measures taken during lay-up
- the extent of surveys carried out during this time.

As a minimum, a sea trial for function testing of the diving system shall be carried out.

9.5.2 During lay-up, diving system shall be subjected to a lay-up survey on an annual basis.

The extent of the lay-up survey is reduced compared to the regular annual survey, but shall cover system integrity, planned maintenance system, fire protection and equipment in use.

9.5.3 If the lay-up period is more than 12 months, other periodical surveys may be postponed, depending on the maintenance and preservative measures taken during lay-up.

10 De-icing or Anti-icing Systems

10.1 General

10.1.1 The requirements in this sub-section apply to ships with class notation:

COLD

10.2 Annual survey

10.2.1 Visual inspection of anti-icing and de-icing switchboards and confirm heating load on each circuit according to marking on the switchboards.

10.2.2 Examination of equipment for de-icing and anti-icing including:

- heaters
- covers
- equipment for manual de-icing
- radar equipment
- heating coils
- steam tracing lines.

11 Additional Fire Protection Arrangements

11.1 General

11.1.1 The requirements in this sub-section apply to ships with additional fire protection arrangement.

class notation:

11.2 Renewal survey (2.5 years)

11.2.1 Fire pumps including emergency fire pump and prime movers shall be examined and tested.

11.2.2 Firefighters' outfits and compressors for charging of air bottles shall be examined.

11.2.3 For ships with additional fire protection for accommodation spaces, the survey shall include:

- examination of fire retarding partitions in the accommodation
- examination and testing of automatic fire-detecting and alarm systems including release arrangement for self-closing doors in passageways, stairways and machinery casings
- examination of hose stations in the accommodation together with their equipment.

11.2.4 For ships with additional fire protection for machinery spaces, the survey shall include:

- examination and test of main and local extinguishing systems in engine and boiler rooms including detection and alarm arrangements. The quantity of extinguishing medium shall be checked
- survey of portable dry powder fire extinguishers and spare charges
- survey of hose stations in the engine and boiler rooms together with their equipment
- review of the report resulting from the annual “infrared scanning”.

An infrared scanning of all engines and similar equipment shall be carried out on an annual basis.

12 Dynamic Positioning Systems

12.1 General

12.1.1 These rules do not include verification of requirements or recommendations in regard to the vessels operation or other characteristics.

12.1.2 The owner shall advise the Society of major alterations to the DP system hardware or software.

The owner may, however, assign the task of advising the Society to a responsible body, representing the owner, e.g. the manufacturer.

The Society will consider the need for documentation, re-survey or test.

In addition to renewal of the DP controller hardware or software, a major alteration might also be:

- installation of a new position reference system or other sensor interfaced to the DP-control system
- installation of new thrusters
- software changes
- structural changes
- changes in power system.

12.1.3 The requirements in this sub-section apply to ships with class notations for dynamic positioning systems.

DYNAPOS

12.2 Annual survey

12.2.1 System maintenance documentation, including information regarding hardware and software changes, shall be reviewed.

This requirement includes, in addition to the DP-control system, the joystick control system and other systems necessary for performing position keeping, e.g. thruster control system.

12.2.2 The electrical installation in excess of the main class requirements shall be visually inspected, i.e. installations comprising the DP system, e.g. controllers and operating stations for DP and independent joystick, references systems, sensors and mode

change system.

12.2.3 The technical condition of the DP system shall be verified during the survey.

Verification of the technical condition of the DP system denotes testing to verify that the DP system is capable of positioning the vessel, and thus validating that system functionality is in place.

Testing should preferably be done during a sea trial. However, in the case where this is inconvenient (e.g. the vessel is in the middle of a long term operation) the survey may be performed during regular operations. This may imply that it may not be possible to test all different operational modes.

12.2.4 If the survey is carried out when the vessel is undergoing regular operations, then tests that possibly can introduce unacceptable risks shall not be performed.

12.2.5 Capacity of UPSs and other battery systems serving the DP-control system, including its peripherals, shall be verified. The alarm for loss of charging power shall be verified.

If the survey is carried out during regular operations, then the capacity of the batteries need not be proven by testing.

12.2.6 For class notation DYNAPOS, normal working condition of the back-up DP-control system shall be verified, if applicable.

If the survey is carried out during regular operations, then control need not be transferred to the back-up DP-control system.

12.2.7 Emergency stop of thrusters from the DP-control centre shall be tested. If the survey is carried out when the vessel is undergoing regular operations, then testing shall not be performed if there is any possibility of introducing unacceptable risks.

12.3 Renewal survey (5 years)

12.3.1 With the vessel in DP mode, a sea trial shall be performed.

12.3.2 The complete system shall be tested in all operational modes. The testing shall include simulation of different failure conditions to verify switching of modes, back-up systems and the alarm system.

12.3.3 The different modes of thruster control from the DP control centre(s) shall be tested:

- manual control
- joystick control (independent joystick, if installed)
- DP control
- transfer of control.

Manual override i.e. by thruster lever control and independent joystick control shall be demonstrated during normal operation and during failure conditions.

12.3.4 Emergency stop of DP thrusters from DP-control centre to be tested.

12.3.5 All sensors, peripheral equipment and reference systems shall be tested:

- verify correct operation and adequate accuracy

- failure of sensors and reference systems shall be simulated to check the alarm system and the switching logic
- switch-over between reference systems as input to controller shall be carried out to assure that warnings, alarms and information to operator are satisfactory.

Due to practicalities some reference systems may be unavailable during the tests. In such cases the testing can be performed by the crew as soon as possible after survey. When testing is left to the crew this must be recorded in the survey report, and a condition of class or memo to owner must be issued. The condition of class or memo to owner can be deleted based on a signed test report from the master.

The survey of the thruster unit shall be carried out as for thrusters for propulsion. Surveys of the thrusters are separate survey elements and these surveys do not need to take place at the same time as the DP survey.

12.3.6 Alarm for loss of position and heading out of limit shall be demonstrated.

12.3.7 The electrical installation in excess of the main class requirements, shall be visually inspected, i.e. installations comprising the DP system, e.g. controllers and operating stations for DP and independent joystick, references systems, sensors and mode change system.

12.3.8 Single failures in thruster control systems including signal wire breaks of thruster command and feedback signals shall be tested in order to verify safe response on the thrust output. Equivalent testing may also be required for rudders controlled by the DP-control system.

12.3.9 Overload prevention shall be tested.

If it is possible to induce overload by setting out thrust command from the DP-control system (e.g. by use of joystick function) then the overload protection function (e.g. pitch reduction) shall be tested.

System configuration and/or available power considerations may lead to this test being omitted.

12.3.10 Capacity of UPSs and other battery systems serving the DP-control system including it peripherals shall be verified by testing. Alarm for loss of charging power shall also be verified.

12.3.11 The required redundancy with respect to defined single failures modes shall be verified by redundancy testing.

12.3.12 The FMEA report and FMEA test program shall be verified to ensure that they have been updated when alterations have been done.

This requirement is only valid for vessels with class request after 1. July 2004.

12.3.13 Correct functioning of the Consequence Analysis facility shall be verified as far as possible.

13 Vibration Class

13.1 General

13.1.1 The requirements in this sub-section apply to ships with class notation:

COMFORT

13.1.2 Before the notation can be issued, vibration measurements at the different positions and components, as described in the Protocol, shall be carried out. The Protocol is a table of positions to be measured worked out prior to the measurements based on a risk evaluation and experience. If minor excessive vibration levels are found for non-critical components or positions, dispensation may be given, which may also include a requirement for new measurements, after a limited period. This will be decided by the Society.

13.2 Renewal survey (5 years)

13.2.1 Complete measurements at the different positions, as described in the Protocol, shall be carried out by or under the supervision of a surveyor of the Society.

14 Hull Monitoring Systems

14.1 General

14.1.1 The requirements in this sub-section apply to ships with class notation:

MON-HULL(...)

14.2 Annual survey

14.2.1 The following documents shall be present:

- user/operational manual for the system
- maintenance manual
- maintenance record (if applicable)
- calibration record for sensors.

A yearly calibration of the sensors is required. The calibration may be carried of by the crew.

14.2.2 The inspection of the hull monitoring system shall include verification of the following:

- that all dedicated MON-HULL(...) sensors are functioning (visual inspection of display)
- that all connections to ship systems are functioning (visual inspection of display)
- that the UPS can power the system for at least 10 minutes
- that the deviation between the measured global still water bending moments (stresses) and global moments calculated by loading computer is within 5% of maximum permitted moments (stresses), and
- run the self-check procedure for the system, if applicable.

Typical ship systems connected to the hull monitoring system are loading computer, GPS, speed log and gyro.

If data from the loading computer is not available for the present condition, historical data from last month may be used.

15 Vapour Control Systems

15.1 General

15.1.1 The requirements in this sub-section apply to ships with class notation:

VCS

15.1.2 Survey requirements for the optional class notations(VCS) are partly covered by the main class requirements for tankers for oil and chemicals.

15.2 Renewal survey (5 years)

15.2.1 The survey shall include:

- internal examination of deck tank for liquefied gas, if fitted, including piping, valves etc. and including NDT and thickness measurement as found necessary
- external examination and tightness testing of deck tank.

At the 2nd and 4th Renewal survey, and thereafter at each renewal survey deck tanks shall be strength tested.

- examination, testing and sealing of deck tank safety relief valves
- examination and testing of cooling machinery and equipment.

15.2.2 For ships with class notation VCS, the survey shall include examination and testing of the following instruments and equipment:

- the means to inert the vapour transfer hose
- oxygen analyzer with alarms
- detonation arrester.

16 Clean Ships

16.1 General

16.1.1 The requirements in this sub-section apply to ships with class notation:

CLEANSHIP

16.2 Annual survey

16.2.1 The basic requirement is that the vessel holds a valid international pollution prevention certificate.

For the oil pollution prevention certificate, the following shall be checked onboard during survey:

- certificates for type approved oily water separating or filtering equipment, process unit and oil content meters

- oil record book entries
- approved SOPEP manual
- means of control of sludge
- standard discharge connection.

Additionally, the following shall be examined and tested, as applicable:

- oil filtering equipment (15 ppm) and process unit with alarm
- automatic stopping device (15 ppm)
- separation of oil fuel and water ballast system
- sludge tank and discharge arrangement externally.

16.2.2 In addition the following shall be checked or verified as applicable:

- all refrigerant consumption figures
- consumption figures for fire fighting substances with global warming potential (GWP) > 0
- garbage record book
- oil record books and cargo record book
- fuel oil log
- NOx emission control equipment log, where applicable
- ballast water management log
- documentation of antifouling used during dry-dockings since last review.

17 Tailshaft Monitoring

17.1 General

17.1.1 The requirements in this sub-section apply to ships with class notation MON-SHAFT.

17.1.2 A tailshaft condition monitoring arrangement (class notation MON-SHAFT) will be granted for oil lubricated tailshafts that are monitored to ascertain the condition of the tailshaft system during operation, and that fulfils the design requirements provided a successful initial survey is carried out.

In such cases the Society will not require any specific time interval between propeller shaft withdrawal surveys.

17.1.3 Ships with more than 3 years since the last propeller shaft withdrawal are normally to carry out a propeller shaft survey as described in Sec. 5.2 in connection with the MON-SHAFT initial survey.

The requirement for a propeller shaft withdrawal at MON-SHAFT initial survey may be waived on a case by case basis, provided that documentation showing satisfactory condition of the stern tube arrangement is presented to the Society.

Such documentation, normally covering the last 3 years, should include:

- monthly measurements of stern tube bearing temperatures with corresponding sea water temperatures, oil consumption, water content in oil

- bearing clearances from new building and last dry docking and clearances calculated from wear down

measurements since new building shall be presented, where available

- lub. oil analysis reports from accredited laboratory with conclusion, where available.

17.2 Initial survey

17.2.1 The survey shall include:

- verification of correct readings of remote thermometers for stern tube bearing, seawater and alarm set point
- low level alarm for lubricating oil gravity tank and sealing gravity tanks to be tested
- a general survey of shafting and sealing arrangement shall be carried out
- verification that the oil sampling point is identified with signboard
- verification that a written procedure for taking representative oil samples is present onboard
- verification that electric grounding device is fitted on the propeller shaft.

17.3 Annual survey

17.3.1 The survey shall include:

a) examination of the MON-SHAFT record file:

- verification that the on board oil analysis for checking of water content in the stern tube lubricating oil has been performed monthly and recorded in the file by the Chief Engineer. As an alternative to the monthly onboard checking of the water content in the oil, submitted lubricating oil samples to an accredited laboratory every 3 months is acceptable below.
- verification that the stern tube bearing temperatures have been recorded every month with highest and lowest temperatures, with corresponding seawater temperatures
- verification that the consumption of stern tube lubricating oil has been recorded for every month by the Chief Engineer
- if there are performed any overhauls, complete oil changes or similar, this shall be recorded in the MON-SHAFT record file on the overhaul page
- verify functionality of tailshaft grounding device, where applicable
- verification that wear down measurements have be taken at every dry-docking.

b) testing of stern tube aft bearing alarm

c) visual inspection of inner and outer shaft seal for leakage, as far as practicable

d) verification that documentation of laboratory analysis is kept on board:

- at least two oil samples per year shall be submitted to an accredited laboratory for analysis testing of water content, iron, chromium, copper, tin, silicon, natrium and magnesium

- the documentation shall contain a conclusion regarding the condition of the oil and its suitability for further use
- the report from the latest oil analysis shall be less than three months old.

Section 7 Alternative Survey Arrangements

1 General

1.1 General overview of survey arrangements

1.1.1 Alternative survey arrangements may be accepted as an option to applicable periodical surveys for main class.

1.1.2 The following survey arrangements may be granted upon written request from the owner:

- Hull Continuous, see 2.1
- Hull PMS (Planned Maintenance System), see 2.2
- Machinery Continuous, see 3.1.
- Machinery PMS (Planned Maintenance System), see 3.2.
- Machinery CM (Condition Monitoring), a survey arrangement that is based on Machinery PMS, but allow for use of condition based maintenance methods on selected parts of the machinery, see 3.3.

2 Hull Survey Arrangements

2.1 Hull Continuous

2.1.1 Hull Continuous is a survey arrangement whereby the survey items in the hull list established for the ship are subject to separate surveys with interval 5 years.

The arrangement shall provide for survey of approximately 20% of the total number of survey items during each year of the five-year class period.

For ships over 10 years of age:

- all ballast tanks
- tanks used for sewage (black water) and/or wastewater (gray water), shall be examined twice in each five-year class period and the arrangement shall provide for approximately 40% of the total number of survey items for such tanks during each year of the five-year class period.

The time window for surveys to be carried out are generally set as 6 months before the due dates as distributed.

2.1.2 Hull Continuous may normally be accepted for ships less than 20 years of age.

Hull Continuous for ships above 20 years of age may be specially considered provided the following additional acceptance criteria are complied with:

Coating

- The hard protective coating in ballast tanks shall be not less than FAIR condition with no areas under consideration with coating in POOR condition.

Corrosion

- Substantial corrosion shall not be accepted.

- Local corrosion shall be within 2/3 of the main class allowable limit.

With local corrosion is normally meant findings such as edge corrosion, grooving and pitting Hull Continuous is not acceptable for ships with class notation ESP.

2.1.3 The bottom survey in dry dock or on a slipway in accordance with Sec.5.1 may be carried out at any time within the five-year class period.

The overall and close-up examination and thickness measurements, as applicable, of the lower portions of the ballast tanks shall be carried out not later than concurrently with the bottom survey in dry dock.

Lower portions of the ballast tanks are considered to be the parts below light ballast water line.

The examination and gauging of anchoring equipment including internal examination of chain lockers in accordance with Sec.4.2 shall normally be carried out during the bottom survey in dry-dock.

The survey planning meeting shall be held prior to commencement of the renewal survey and the bottom survey in dry-dock.

2.2 Hull PMS (Planned Maintenance System)

2.2.1 Hull PMS is a survey arrangement offered as an integral part of classification compliance for the hull structure through the alignment and integration of classification requirements with an approved and implemented planned inspection and maintenance system. The system performance and condition of hull structure and maintenance work carried out shall be verified by the society during annual survey and in connection with dry docking of the ship.

2.2.2 Hull PMS is applicable for ships with survey arrangement Hull Continuous.

2.2.3 An initial survey shall be carried out onboard the ship in order to verify that the system has been implemented in accordance with the approved documentation and that the system is used as intended. It is required that the planned maintenance system has been operated for at least 6 months before the initial survey is carried out.

2.2.4 For Hull PMS the structural condition and coating condition shall be maintained to a standard above the minimum class requirement.

Coating

- The hard protective coating in ballast tanks shall be not less than FAIR condition with no areas under consideration with coating in POOR condition.

Corrosion

- Substantial corrosion shall not be accepted.
- Local corrosion shall be within 2/3 of the main class allowable limit.

For ships with Hull PMS, the retention of this survey arrangement will be evaluated in connection with completion of 5 yearly hull renewal survey.

2.2.5 If the conditions for the survey arrangement are not complied with or in case of change of technical management of the vessel, the survey arrangement will be cancelled and substituted by Hull Continuous survey arrangement.

3 Machinery Survey Arrangements

3.1 Machinery Continuous

3.1.1 Machinery Continuous is a survey arrangement where the components in the machinery list established for the vessel are subject to separate surveys with survey interval 5 years.

The due dates shall normally be distributed with 20% of the surveys each year and the separate surveys shall in all cases be carried out once in each 5 year period of the class certificate.

The time window for surveys to be carried out are generally set as 6 months before the due dates as distributed.

3.1.2 A follow-up system covering the Society's machinery list shall be established on board the ship.

3.1.3 Machinery component surveys may be credited based on documented maintenance history presented by the Chief Engineer.

The following conditions apply:

a) The Owner/Manager is responsible for ensuring that the Chief Engineer is qualified to register and carry out maintenance on all class related machinery items.

In reference to Res. 741 (18) ISM Code, 1995 STCW A-III as amended.

b) The Chief Engineer shall be the responsible person for the follow-up of the machinery maintenance onboard.

c) Documented maintenance history shall include extract of engine logbook, maintenance history, wear measurements forms etc.

d) Half of all machinery component surveys, for components of which there are more than one, can be credited based on documented maintenance history presented by the Chief Engineer, every second time they are credited. This does not apply to complete main engines and engines in an electric propulsion system. These can not be credited based on documented maintenance history, even if more than one main engine is installed.

e) The surveyor can, if found necessary, require a re-survey of items surveyed by the Chief Engineer.

3.1.4 Survey of the following items shall be carried out by a surveyor:

- steam turbines for propulsion and power generation
- reduction gears in steam driven propulsion plants.

3.2 Machinery PMS (Planned Maintenance System) requirements

3.2.1 General requirements:

a) Machinery PMS is a survey arrangement based on audits of an approved and implemented planned

maintenance system onboard which shall cover all component surveys in the machinery list for the vessel.

b) The audits shall be part of the main class annual survey.

c) The Owner/Manager is responsible for ensuring that the Chief Engineer is qualified to register and carry out maintenance on all class related machinery items.

In reference to Res. 741 (18) ISM Code, 1995 STCW A-III as amended.

d) The Chief Engineer shall be the responsible person on board in charge of the Machinery PMS.

e) If the conditions for the survey arrangement are not complied with, or in case of change of technical management of the vessel, the Survey Arrangement Machinery PMS will be cancelled and substituted by Survey Arrangement Machinery Continuous or Survey Arrangement Machinery Renewal, as applicable.

3.2.2 The Survey Arrangement Machinery PMS shall be operated under the following conditions:

a) The surveyor may credit relevant component surveys in the machinery list based on the recorded

maintenance, except for the following, that shall be surveyed by the Society:

- main steam piping
- feed water piping
- steam turbines for propulsion and power generation
- reduction gears in steam driven propulsion plants.

b) Change or a major upgrade of planned maintenance system shall always be notified to the Society and will be subject to new approval.

Major upgrade meaning changes that affects reporting of maintenance on machinery items, or changes that might implicate additional training of crew.

c) Back up of the PMS database, making it possible to restore all data, shall be taken at least once a week.

d) The surveyor can, if found necessary, require a re-survey of items reported by the Chief Engineer.

e) All damage/break-downs on class related machinery items shall be reported to class and included in the system.

3.2.3 The planned maintenance system onboard shall comply with the following requirements:

a) The system shall be computer based.

b) The system shall be able to produce a maintenance history report of all main overhauls carried out for a specific time period.

c) Corrective maintenance shall be possible to be especially identified in the system and traceable.

d) The system shall include at least the applicable machinery and equipment. All these components shall be identified with their belonging the Society’s machinery item

code or alternatively the full name of the component survey according to the machinery list for the specific ship.

e) All main overhaul jobs on class related components shall be identified as class related jobs in the

maintenance system.

f) For ships with class notation AUT, the system shall include the periodical testing of control, alarm and safety components and systems.

g) The system is subject to approval by the Society, either a Type Approved system or non-Type Approved system.

h) Changes to the system (maintenance intervals, job descriptions, etc) shall be traceable and documented and presented to the attending surveyor at the next annual survey for acceptance.

Documentation in order to adjust maintenance intervals, job descriptions etc, may be accepted by attending surveyor on the basis of maintenance reports, wear measurement forms, service letters from maker etc.

i) The job descriptions for the main overhaul for all the machinery and equipment subject to class shall be available either as part of the planned maintenance system and/or as specific reference to makers' manuals.

The extent of the job descriptions either within the PMS or in the referred manual, shall be self-explaining to a surveyor. When references to makers' manuals are made, these shall be ready available onboard.

j) Job intervals shall be based on maker’s recommendations, adjusted for prevailing operational conditions.

Deviations from initial intervals shall only be accepted when documented experience can justify changes.

For items with few running hours (compared to makers maintenance recommendations) in one class period (e.g. standby functions), or with no running hours recommendations, calendar-based maintenance are recommended.

k) The job descriptions and maintenance history shall be in English.

3.2.4 The approval process for the Machinery PMS survey arrangement is a two step process: The first step, called “Management Approval”, is a review by the Society of the set-up of the planned maintenance system prior to the initial survey onboard the first vessel in a fleet. The final step is the initial survey onboard each applicable vessel, see 3.2.5. This process applies to each type of planned maintenance system used by the management company.

The “Management Approval” includes, but is not limited to:

- examination of examples of points 3.2.3 a) to k)
- document describing how to handle periodical surveys (“User Guide” for the C/E) for the Society.

The “Management approval” is valid until cancelled in writing from the Society.

3.2.5 An initial survey shall be carried out onboard the vessel in order to verify that the system has been implemented in accordance with the approved documentation and that the system is used as intended. It is recommended that the planned maintenance system has been operated for at least 6 months before the initial survey is carried out.

During the initial survey, it will be verified that:

a) The Chief Engineer is familiar with the planned maintenance system and is able to demonstrate the different functionalities in the system to the attending surveyor.

b) The general condition of the machinery and the machinery systems in the engine room is good.

c) All the requirements in 3.2.3 except h) are complied with.

Provided the initial survey is carried out with a satisfactory result, the Survey Arrangement Machinery PMS will be granted and a certificate will be issued stating system name and conditions for the survey arrangement for the specific vessel.

Prior to the initial survey onboard, requirements listed under 3.2.5 c) may be carried out in the owner's/ manager's office, if found convenient both to the Society and owner/manager. This requires that the onboard database is available in subject office. Results of this review must be given to the attending surveyor onboard.

3.2.6 The components in the machinery list are credited at the first annual survey after their main overhaul is carried out.

This also applies if the maintenance interval is based on running hours and the time between main overhauls for this reason exceeds 5 years.

3.2.7 An annual survey shall be carried out onboard the vessel in order to verify that the conditions for maintaining the Survey Arrangement Machinery PMS are complied with.

During the annual survey, in addition to 3.2.6, the following will be verified:

a) The vessel Machinery PMS certificate is valid for present management.

b) The Chief Engineer is familiar with the planned maintenance system and is able to demonstrate the different functionalities in the system to the attending surveyor.

c) Reasons for overdue/ postponed (deferred) jobs shall be explained.

d) General maintenance is satisfactory, including an in depth examination of reported maintenance history since last annual survey, to the extent deemed necessary by attending surveyor.

e) The general condition of the machinery and the machinery systems in the engine room is good.

f) The onboard machinery list is reflecting the machinery list of the Society.

Documented changes to the system (maintenance intervals, job descriptions, etc) shall be presented to the attending surveyor for acceptance.

3.3 Machinery CM (Condition Monitoring)

3.3.1 Machinery CM is a survey arrangement based on audits of an approved and implemented condition monitoring programme onboard. Machinery CM allows the

manager to adjust maintenance intervals based on condition monitoring of applicable components onboard the ships.

The audits shall be part of the main class annual survey.

3.3.2 The following conditions apply:

- the extent of condition monitoring is based on the company's own choice
- valid Machinery PMS survey arrangement shall be approved and implemented
- condition monitoring strategy shall be successfully implemented onboard
- condition monitoring shall be an implemented part of a planned maintenance system
- programme for fuel oil bunker analysis shall be implemented and documented onboard
- programme for lubricating oil analysis shall be implemented and documented onboard
- vibration measuring equipment and software shall be provided and in use onboard.

If propulsion steam turbines, including reduction gears shall be a part of the survey arrangement, a renewal survey will be a part of the survey arrangement. This survey shall be a voyage survey for the surveyor to verify the condition of the propulsion plant.

3.3.3 The following components, if monitored, shall be analysed by use of FFT (Fast Fourier Transformation) analysis:

- steam turbines
- electrical motors for propulsion
- reduction gears and power take off
- generators
- reciprocating machinery
- steam turbines.

3.3.4 The following documentation shall be submitted for approval:

- description of the company's maintenance strategy
- monitoring methods for components, including baseline
- condition monitoring equipment
- implementation of condition monitoring in the planned maintenance system
- training programme and plan
- programme for fuel oil bunker analysis, if applicable
- programme for lubricating oil analysis.

3.3.5 A company approval certificate will be issued upon satisfactory review and approval of the documentation submitted in accordance with 3.3.4.

3.3.6 An initial survey shall be carried out onboard the ship in order to verify that the system has been

implemented in accordance with the approved documentation.

It is required that the programme has been operated for at least 6 months before the initial survey is carried out.

Provided the initial survey is carried out with satisfactory results, the Machinery CM survey arrangement will be granted and a certificate will be issued stating conditions for the survey arrangement for the specific vessel.

3.3.7 Damage to machinery systems or equipment covered by classification shall always be reported to the Society and into the planned maintenance system as a corrective action.

3.3.8 If the conditions for the survey arrangement are not complied with or in case of change of technical manager of the vessel, the survey arrangement will be cancelled and substituted by Machinery Continuous survey arrangement or the Machinery PMS survey arrangement.

4 Surveys by Approved Companies or Service Suppliers

4.1 Thickness measurements

4.1.1 Thickness measurements as parts of the periodical surveys shall be carried out by a qualified company approved by the Society unless carried out by the surveyor himself.

4.1.2 Thickness measurements shall normally be carried out by means of ultrasonic test equipment. The accuracy of the equipment shall be proven to the surveyor as required.

4.1.3 A thickness measurement report shall be prepared. The report shall give the location of the measurements, the thickness measured and the corresponding original thickness. Furthermore, the report shall give the date when the measurements were carried out, type of measuring equipment, names of personnel and their qualifications. The report shall be signed by the operator.

4.2 Examination of bow, side and stern doors on roll on/ roll off ships.

4.2.1 Parts of the periodical examination of bow door (outer and inner), side and stern doors on roll on/ roll off ships may be accepted as basis for limiting the extent of the annual class survey when carried out by companies engaged by the owner and approved by the Society for such inspections.

4.2.2 Inspections acceptable may include locking arrangement and supports, cleats, hydraulic operating system, electric control and indicator or monitoring systems, sealing arrangement and tightness testing.

Inspections encompass visual examination, NDT of vital elements (i.e. dye penetrant, magnetic particle inspection) and measurement of clearances.

4.2.3 An inspection report shall be prepared. The report shall give information on arrangement and systems covered by the inspection and the results of visual examination and tests as applicable. Furthermore, the report shall give the date when the inspection was carried out, type of test equipment, names of personnel and their qualifications. The report shall be signed by the person in charge.

4.2.4 Upon satisfactory review of the inspection report, the extent of annual surveys may be limited at the discretion of the surveyor.

4.3 Bottom survey afloat

4.3.1 An approved diving company shall be used for the underwater inspection.

4.3.2 The survey shall be witnessed by a surveyor of the Society. The diver shall use pictorial equipment of such quality that the surveyor is fully satisfied with the information relayed.

Section 8 Retroactive Requirements, Bulk Carrier

1 Bulk Carriers

Corrugated Transverse Watertight Bulkhead considering Cargo Hold Flooding

1.1 Application and definition

1.1.1 These requirements apply to all bulk carriers of 150 m in length and above, in the foremost hold, subject to mandatory class notation Bulk Carrier ESP, intending to carry solid bulk cargoes having a density of 1.78 t/m3 or above, with single deck, topside tanks and hopper tanks and fitted with vertically corrugated transverse bulkheads between cargo holds no. 1 and 2. Where:

a) the foremost hold is bounded by the side shell only for ships which were contracted for construction prior to 1 July 1998, and have not been constructed in compliance with IACS Unified Requirement S18

b) the foremost hold is double side skin construction of less than 760 mm breadth measured perpendicular to the side shell in ships, the keel of which was laid, or which was at a similar stage of construction, before 1 July 1999 and has not been constructed in compliance with IACS Unified Requirement S18. (Rev.2, Sept. 2000).

These requirements apply to vertically corrugated transverse watertight bulkheads between cargo hold no. 1 and 2.

The net thickness tnet is the thickness obtained by applying the strength criteria as given in 1.3.1 to 1.3.8.

The required thickness is obtained by adding the corrosion addition ts, given in 1.5, to the net thickness tnet.

In this requirement, homogeneous loading condition means a loading condition in which the ratio between the highest and the lowest filling ratio, evaluated for each cargo hold, does not exceed 1.2 (corrected for different cargo densities).

The requirements shall, at the latest, be complied with as follows:

a) for ships which were 20 years of age or more on 1 July 1998, by the due date of the first intermediate, or the due date of the first renewal survey to be held after 1 July 1998, whichever comes first

b) for ships which were 15 years of age or more but less than 20 years of age on 1 July 1998, by the due date of the first renewal survey to be held after 1 July 1998, but not later than 1 July 2002

c) for ships which were 10 years of age or more but less than 15 years of age on 1 July 1998, by the due date of the first intermediate or the first renewal survey to be held after the date on which the ship reaches 15 years of age but not later than the date on which the ship reaches 17 years of age

d) for ships which were 5 years of age or more but less than 10 years of age on 1 July 1998, by the due date, after 1 July 2003, of the first intermediate or first renewal survey after the date on which the ship reaches 10 years of age, whichever occurs first

e) for ships which were less than 5 years of age on 1 July 1998, by the date on which the ship reaches 10 years of age.

Thickness measurements shall be taken according to Ch.1 Sec.4.2 prior to the relevant compliance deadline.

1.2 Load model

1.2.1 General

The loads to be considered as acting on the bulkhead are those given by the combination of the cargo loads with those induced by the flooding of cargo hold no.1. The most severe combinations of cargo induced loads and flooding loads shall be used for the check of the scantlings of the bulkhead, depending on the loading conditions included in the loading manual:

- homogeneous loading conditions
- non-homogeneous loading conditions.

Non-homogeneous part loading conditions associated with multiport loading and unloading operations for homogeneous loading conditions need not be considered according to these requirements.

1.2.2 Bulkhead corrugation flooding head

The flooding head hf (see Fig.1.1) is the distance in m, measured vertically with the ship in the upright position, from the calculation point to a level located at a distance df, in m, from the baseline equal to:

a) in general:

D for the foremost transverse corrugated bulkhead

b) for ships less than 50 000 tonnes deadweight with B freeboard:

0.95 D for the foremost transverse corrugated bulkhead

c) for ships to be operated at an assigned load line draught T_r less than the permissible load line draught T, the flooding head defined in a) and b) above may be reduced by $(T - T_r)$.

1.2.3 Pressure in non-flooded bulk cargo loaded hold

At each point of the bulkhead, the pressure p_c, in kN/m^2, is given by:

$$p_c = \rho_c \, g \, h_1 \, K$$

ρ_c = bulk cargo density, in t/m^3

g = 9.81 m/s^2, gravity acceleration

h1 = vertical distance, in m, from the calculation point to horizontal plane corresponding to the volume of the cargo (see Fig.1.1), located at a distance d_1, in m, from the baseline

$K = \sin 2\alpha \tan 2 (45 - 0.5\delta) + \cos 2\alpha$

α= angle between panel in question and the horizontal plane, in degrees

δ= angle of repose of the cargo, in degrees, that may generally be taken as 35° for iron ore.

$$d_1 = \frac{M_c}{\rho_c l_c B} + \frac{V_{LS}}{l_c B} + (h_{HT} - h_{DB})\frac{b_{HT}}{B} + h_{DB}$$

Mc = mass of cargo, in tonnes, in cargo hold no. 1

ρ_c = bulk cargo density, in t/m^3

l_c = length of cargo hold no. 1, in m

VLS = volume, in m3, of the bottom stool above the inner bottom

h_{HT} = height of the hopper tanks amidship, in m, from the base line

h_{DB} = height of the double bottom, in m

b_{HT} = breadth of the hopper tanks amidship, in m

B = ships breadth amidship.

The force F_c, in kN, acting on a corrugation is given by:

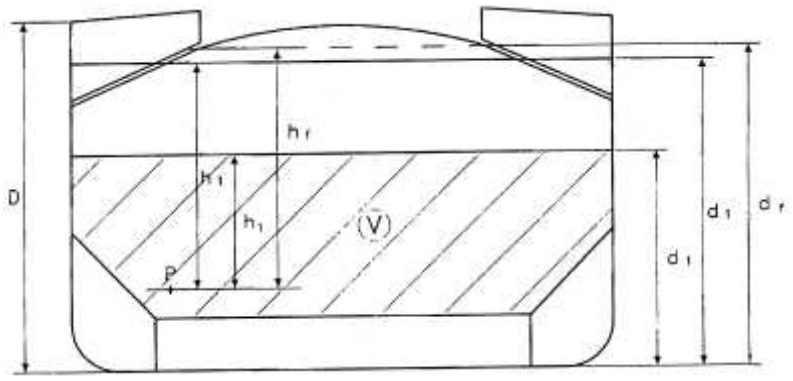
$$F_c = \rho_c g s_1 (d_1 - h_{DB} - h_{LS})^2 K / 2$$

ρ_c, g, d_1, K = as given above

s_1 = spacing of corrugations, in m (see Fig.1.2)

h_{LS} = mean height of the lower stool, in m, from the inner bottom

h_{DB} = height of the double bottom, in m.



V=Volume of cargo P=Calculation point

Fig. 1.1: Definition of D, $h_1$and d_1

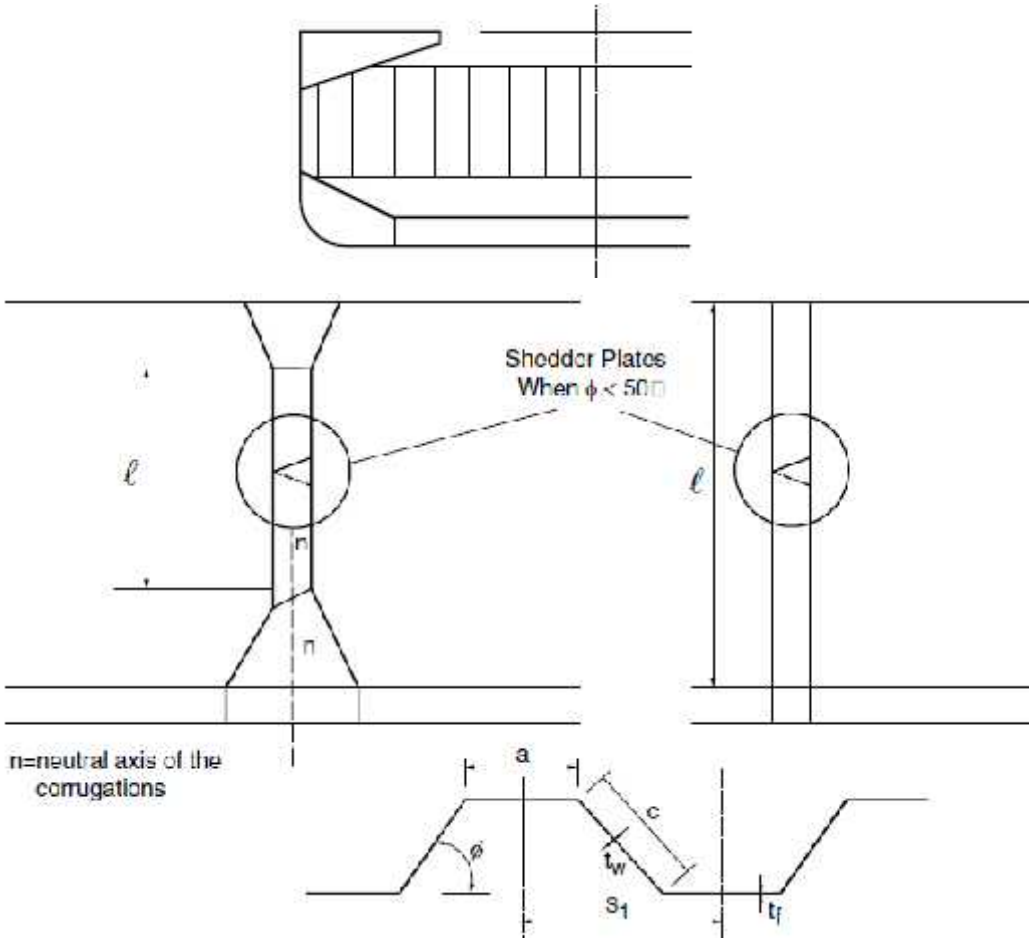


Fig. 1.2: Spacing of corrugations

1.2.4 Pressure in flooded bulk cargo holds

Two cases shall be considered, depending on the values of d_1 and d_f.

a) $d_f \geq d_1$

At each point of the bulkhead located at a distance between d_1 and d_f from the baseline, the pressure $p_{c,f}$, in kN/m^2, is given by:

$p_{c,f} = \rho\, g\, h_f$

ρ= sea water density, in t/m^3

g = as given in 1.2.3

h_f = flooding head as defined in 1.2.2.

At each point of the bulkhead located at a distance lower than d_1 from the baseline, the pressure $p_{c,f}$, in kN/ m^2, is given by:

$p_{c,f} = \rho\, g\, h_f + [\rho_c - \rho(1 - perm)]\, g\, h_1\, K$

ρ, h_f = as given above

ρ_c, g, h_1, K = as given in 1.2.3

perm = permeability of cargo, to be taken as 0.3 for ore (corresponding bulk cargo density for iron ore may generally be taken as 3.0 t/m3).

The force $F_{c,f}$, in kN, acting on a corrugation is given by:

$$F_{c,f} = s_1\left[\rho g(d_f - d_1)^2/2 + (\rho g(d_f - d_1) + (p_{c,f})_{le})(d_1 - h_{DB} - h_{LS})/2\right]$$

ρ= as given above

s_1, g, d_1 = as given in 1.2.3

h_{DB}, h_{LS} = as given in 1.2.3

d_f = as given in 1.2.2

$(P_{c,f})_{le}$ = pressure, in kN/m2, at the lower end of the corrugation.

b) $d_f < d_1$

At each point of the bulkhead located at a distance between d_f and d1 from the baseline, the pressure pc,f, in kN/m2, is given by:

$p_{c,f} = \rho_c\, g\, h_1\, K$

ρc, g, h1, K = as given in 1.2.3.

At each point of the bulkhead located at a distance lower than d_f from the baseline, the pressure $p_{c,f}$, in kN/m2, is given by:

$$p_{c,f} = \rho g\, h_f + [\, \rho_c\, h_1 - \rho(1 - perm)\, h_f\,]\, g\, K$$

ρ, h_f, perm = as given in a) above

ρ c, g, h_1, K = as given in 1.2.3.

The force $F_{c,f}$, in kN, acting on a corrugation is given by:

$$F_{c,f} = s_1\left[\rho_c g(d_1 - d_f)^2 K/2 + (\rho_c g(d_1 - d_f)K + (p_{c,f})_{le})(d_f - h_{DB} - h_{LS})/2\right]$$

s_1, ρ_c, g, d_1 = as given in 1.2.3

h_{DB}, h_{LS}, K = as given in 1.2.3

d_f = as given in 1.2.2

$(P_{c,f})_{le}$ = pressure, in kN/m^2, at the lower end of the corrugation.

1.2.5 Empty cargo holds and pressure due to flooding water alone

At each point of the bulkhead, the hydrostatic pressure pf induced by the flooding head h_f shall be considered.

The force Ff, in kN, acting on a corrugation is given by:

$$F_1 = s_1 \rho g(d_f - h_{DB} - h_{LS})^2/2$$

s_1, g, h_{DB}, h_{LS} = as given in 1.2.3

ρ= as given in 1.2.4 a)

d_f = as given in 1.2.2.

1.2.6 Resultant pressure and force - Homogeneous loading conditions

At each point of the bulkhead structures, the resultant pressure p, in kN/m^2, to be considered for the scantlings of the bulkhead is given by:

$p = p_{c,f} - 0.8\ pc$

The resultant force F, in kN, acting on a corrugation is given by:

$F = F_{c,f} - 0.8\ F_c$

1.2.7 Resultant pressure and force - Non-homogeneous loading conditions

At each point of the bulkhead structures, the resultant pressure p, in kN/m^2, to be considered for the scantlings of the bulkhead is given by:

$p = p_{c,f}$

The resultant force F, in kN, acting on a corrugation is given by:

$F = F_{c,f}$

In case cargo hold no. 1, in non-homogeneous loading conditions, is not allowed to be loaded, the resultant pressure p, in kN/m^2, to be considered for the scantlings of the bulkhead is given by:

$p = p_f$

and the resultant force F, in kN, acting on a corrugation is given by:

$F = F_f$

1.2.8 Bending moment in the bulkhead corrugation

The design bending moment M, in kNm, for the bulkhead corrugation is given by:

$M=Fl/8$

F = resultant force, in kN, as given in 1.2.6 or 1.2.7 as relevant

l = span of the corrugation, in m, to be taken according to Fig.1.2 and Fig.1.3.

1.2.9 Shear force in the bulkhead corrugation

The shear force Q, in kN, at the lower end of the bulkhead corrugations is given by:

$Q = 0.8\ F$

F = as given in 1.2.8.

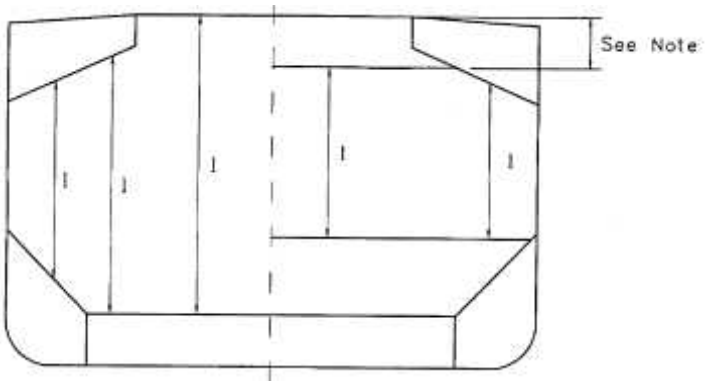


Fig. 1.3: Definition of l

Note: For the definition of l, the internal end of the upper stool is not to be taken more than a distance from the deck at the deck at the centre line equal to:

- 3 times the depth of corrugations, in general
- 2 times the depth of corrugations, for rectangular stool

1.3 Strength criteria

1.3.1 General

The following criteria are applicable to transverse bulkheads with vertical corrugations (see Fig.1.2 and Fig.1.3).

Where the corrugation angle ϕ shown in Fig.1.2 is less than 50°, an horizontal row of staggered shedder plates to be fitted at approximately mid depth of the corrugations (see Fig.1.2) to help preserve dimensional stability of the bulkhead under flooding loads. The shedder plates shall be welded to the corrugations by double continuous welding, but they shall not be welded to the side shell.

Requirements for local net plate thickness are given in 1.3.8.

In addition, the criteria as given in 1.3.2 and 1.3.5 shall be complied with.

The thickness of the lower part of corrugations considered in the application of 1.3.2 and 1.3.3 shall be maintained

for a distance from the inner bottom, or the top of the lower stool not less than 0.15 *l*.

The thickness of the middle part of corrugations as considered in the application of 1.3.2 and 1.3.4 shall be maintained to a distance from the deck, or the bottom of the upper stool not greater than 0.3 *l*.

1.3.2 Bending capacity and shear stress τ

The bending capacity shall comply with the following relationship:

$$10^3 \frac{M}{0.5Z_{le}\pm_{a,le} + Z_m\pm_{a,m}} \leq 1.0$$

M = bending moment, in kNm, as given in 1.2.8

Z_{le} = section modulus, in cm3, at the lower end of corrugations, to be calculated according to 1.3.3

Z_m = section modulus, in cm3, at the midspan of corrugations, to be calculated according to 1.3.4

$\sigma_{a,le}$ = allowable stress, in N/mm^2, as given in 1.3.5, for the lower end of corrugations

$\sigma_{a,m}$ = allowable stress, in N/mm^2, as given in 1.3.5, for the mid-span of corrugations.

In no case is Z_m to be taken greater than the lesser of 1.15 Z_{le} and 1.15 Z'_{le} for calculation of the bending capacity, Z'_{le} as being defined below.

In case shedder plates are fitted which:

- are not knuckled
- are welded to the corrugations and the top of the lower stool by one side penetration welds or equivalent
- are fitted with a minimum slope of 45° and their lower edge is in line with the stool side plating, or gusset plates are fitted which:
- have a height not less than half of the flange width
- are fitted in line with the stool side plating
- have thickness and material properties at least equal to those provided for the flanges, the section modulus Z_{le}, in cm3, shall be taken not larger than the value Z'_{le}, in cm3, given by:

$$Z'_{le} = Z_g + 10^3 \frac{Qh_g - 0.5h_g^2 s_1 p_g}{\pm_a}$$

Z_g = section modulus, in cm^3, of the corrugations calculated, according to 1.3.4, in way of the upper end of shedder or gusset plates, as applicable

Q = shear force, in kN, as given in 1.2.9

h_g = height, in m, of shedders or gusset plates, as applicable (see Fig.1.4, Fig.1.5, Fig.1.6 and Fig.1.7)

s_1 = as given in 1.2.3

p_g = resultant pressure, in kN/ m^2, as defined in 1.2.6 or 1.2.7 as relevant calculated in way of the middle of the shedders or gusset plates, as applicable

σ_a = allowable stress, in N/mm^2, as given in 1.3.5.

Stresses, τ, are obtained by dividing the shear force, Q, by the shear area. The shear area shall be reduced in order to account for possible non-perpendicularity between the corrugation webs and flanges. In general, the reduced shear area may be obtained by multiplying the web sectional area by ($\sin\phi$), ϕ being the angle between the web and the flange.

When calculating the section modulus and the shear area, the net plate thickness shall be used.

The section modulus of corrugations shall be calculated on the bases of the following requirements given in 1.3.3 and 1.3.4.

1.3.3 Section modulus at the lower end of corrugations

The section modulus shall be calculated with the compression flange having an effective flange width, b_{ef}, not larger than as given in 1.3.6.

If the corrugation webs are not supported by local brackets below the stool top (or below the inner bottom) in the lower part, the section modulus of the corrugations shall be calculated considering the corrugation webs 30% effective.

a) Provided that effective shedder plates, as defined in 1.3.2, are fitted (see Fig.1.4 and Fig.1.5), when calculating the section modulus of corrugations at the lower end (cross- section (1) in Fig.1.4 and Fig.1.5), the area of flange plates, in cm^2, may be increased by:

$$\left(2.5\, a \sqrt{t_f t_{sh}} \sqrt{(\pm_{Fsh} / \pm_{Ffl})}\right)$$

(not to be taken greater than 2.5 a t_f)

where:

a = width, in m, of the corrugation flange (see Fig.1.2)

t_{sh} = net shedder plate thickness, in mm

t_f = net flange thickness, in mm.

σ_{Fsh} = minimum upper yield stress, in N/mm^2 of the material used for the shedder plates

σ_{Ffl} = minimum upper yield stress, in N/mm^2 of the material used for the corrugation flanges.

b) Provided that effective gusset plates, as defined in 1.3.2, are fitted (see Fig.1.6 and Fig.1.7) when calculating the section modulus of corrugations at the lower end (cross-section (1) in Fig.1.6 and Fig.1.7), the area of flange plates, in cm^2, may be increased by (7 hg tgu) where:

h_g = height of gusset plate in m, see Fig.1.6 and Fig.1.7, not to be taken greater than:

s_{gu} = width of the gusset plates, in m

t_f = net flange thickness, in mm, based on the as built condition.

t_{gu} = net gusset plate thickness, in mm not to be taken greater than tf

c) If the corrugation webs are welded to a sloping stool top plate, which is at an angle not less than 45° with the horizontal plane, the section modulus of the corrugations may be calculated considering the corrugation webs fully effective. In case effective gusset plates are fitted, when calculating the section modulus of corrugations the area of flange plates may be increased as specified in b) above. No credit can be given to shedder plates only.

For angles less than 45°, the effectiveness of the web may be obtained by linear interpolation between 30% for 0° and 100% for 45°.

1.3.4 Section modulus of corrugations at cross-sections other than the lower end

The section modulus shall be calculated with the corrugation webs considered effective and the compression flange having an effective flange width, b_{ef}, not larger than as given in 1.3.6.

1.3.5 Allowable stress check

The normal and shear stresses σ and τ, shall not exceed the allowable values σ_a and τ_a, in N/mm^2, given by:

$\sigma_a = \sigma_F$

$\tau_a = 0.5\ \sigma_F$

σ_F being the minimum upper yield stress, in N/mm^2, of the material.

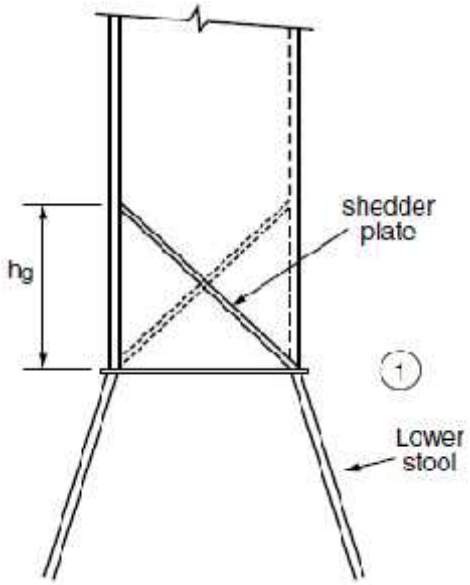


Fig. 1.4: Symmetric shedder plates

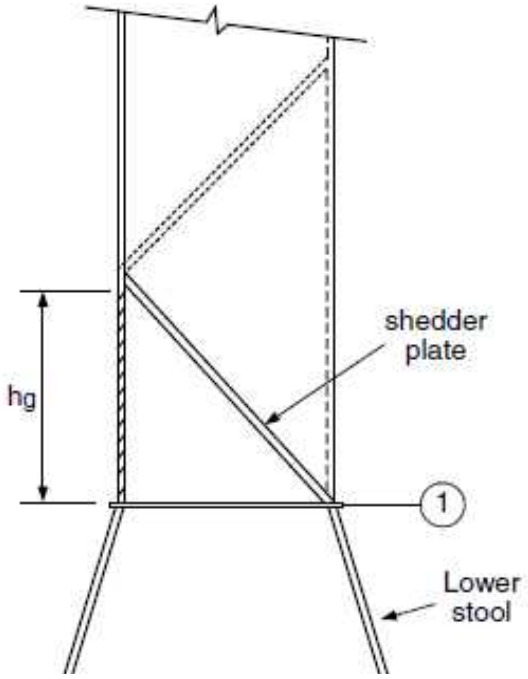


Fig. 1.5: Asymmetric shedder plates

1.3.6 Effective width of compression flange of corrugations

The effective width b_{ef}, in m, of the corrugation flange is given by:

$b_{ef} = C_e\, a$

where:

$C_e = 2.25/\quad -1.25/\quad ^2$ for $\quad > 1.25$

$C_e = 1.0 \quad$ for $\quad \leq 1.25$

$= 10^3 \dfrac{a}{t_f}\sqrt{\pm_F / E}$

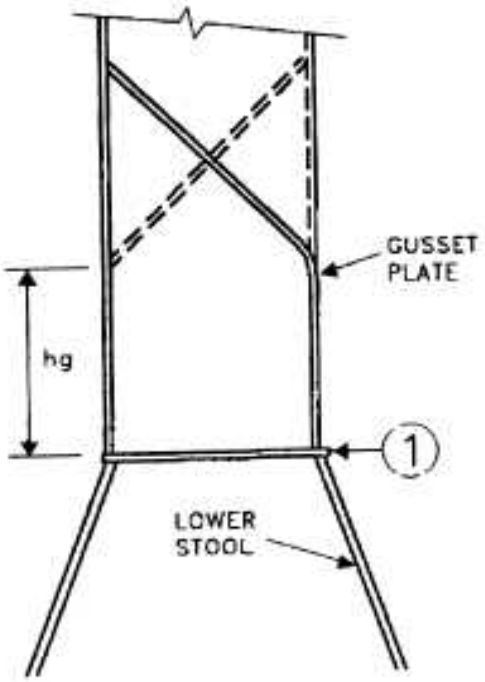


Fig. 1.6: Symmetric gusset or shedder plates

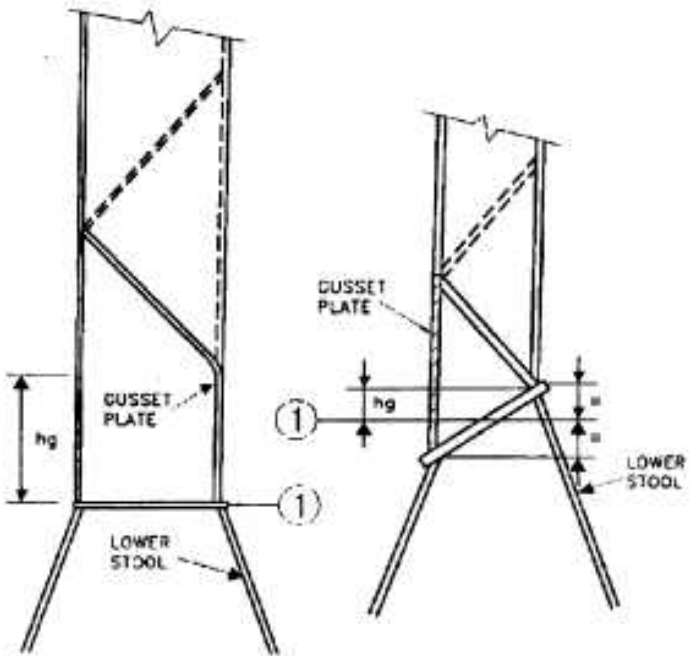


Fig. 1.7: Asymmetric gusset or shedder plates

t_f = net flange thickness, in mm

a = width, in m, of the corrugation flange (see Fig.1.2)

σ_F = minimum upper yield stress, in N/mm^2, of the material

E = modulus of elasticity of the material, in N/mm^2, to be assumed equal to $2.06 \cdot 10^5$ for steel.

1.3.7 Shear buckling

The buckling check shall be performed for the web plates at the corrugation ends.

The shear stress, τ, shall not exceed the critical value τ_c, in N/mm^2, assuming a buckling factor $k_t = 6.34$ and net plate thickness as defined in this subsection.

1.3.8 Local net plate thickness

The bulkhead local net plate thickness t, in mm, is given by:

$$t = 14.9 s_w \sqrt{1.0 p / \pm_F}$$

s_W = plate width, in m, to be taken equal to the width of the corrugation flange or web, whichever is the greater (see Fig.1.2)

p = resultant pressure, in kN/ m^2, as defined in 1.2.6 or 1.2.7 as relevant, at the bottom of each strake of plating. In all cases, the net thickness of the lowest strake shall be determined using the resultant pressure at the top of the lower stool, or at the inner bottom, if no lower stool is fitted or at the top of shedders, if shedder or gusset or shedder plates are fitted

σ_F = minimum upper yield stress, in N/mm^2 of the material.

For built-up corrugation bulkheads, when the thickness of the flange and web are different, the net thickness of the narrower plating shall be not less than t_n, in mm, given by:

$$t_n = 14.9 s_n \sqrt{1.0 p / \pm_F}$$

s_n being the width, in mm, of the narrower plating.

The net thickness of the wider plating, in mm, shall not be taken less than the maximum of the following values:

$$t_w = 14.9 s_w \sqrt{1.0 p / \pm_F}$$

and

$$t_w = \sqrt{440 s_w^2 1.0 p / \pm_F - t_{np}^2}$$

$t_{np} \leq$ actual net thickness of the narrower plating and not to be greater than:

$$14.9 s_w \sqrt{1.0 p / \pm_F}$$

1.4 Local details

1.4.1 The design of local details, for the purpose of transferring the corrugated bulkhead forces and moments to the boundary structures, shall reflect local stress concentration due to abrupt change in stiffness. Areas of concern are in particular connection to double bottom, cross-deck structures and connection of stool construction (upper and lower) to top-wing and hopper tank construction.

The thickness and stiffening of effective gusset and shedder plates, as defined in 1.3.3, based on the pressure load as given in 1.2.1 to 1.2.7.

Unless otherwise stated, weld connections and materials shall be dimensioned and selected in accordance with rule requirement.

1.5 Corrosion addition and steel renewal

1.5.1 Steel renewal is required where the gauged thickness is less than t_{net} + 0.5 mm, t_{net} being the thickness used for the calculation of bending capacity and shear stresses as given in 1.3.2 or the local net plate thickness as given in 1.3.8. Alternatively, reinforcing doubling strips may be used providing the net thickness is not dictated by shear strength requirements for web plates (see 1.3.5 and 1.3.7) or by local pressure requirements for web and flange plates (see 1.3.8).

Where the gauged thickness is within the range t_{net} + 0.5 mm and t_{net} + 1.0 mm, coating (applied in accordance with the coating manufacturer's requirements) or annual gauging may be adopted as an alternative to steel renewal.

1.5.2 Where steel renewal or reinforcement is required, a minimum thickness of t_{net} + 2.5 mm shall be replenished for the renewed or reinforced parts.

1.5.3 When:

$$0.8(\pm_{Ffl}\, t_{fl}) \geq \pm_{FS} t_{st}$$

σ_{Ffl} = minimum upper yield stress, in N/ mm^2, of the material used for the corrugation flanges

σ_{FS} = minimum upper yield stress, in N/ mm^2, of the material used for the lower stool side plating or floors (if no stool is fitted)

t_{fl} = flange thickness, in mm, which is found to be acceptable based on the criteria specified in 1.5.1 above or, when steel renewal is required, the replenished thickness according to the criteria specified in 1.5.2 above. The above flange thickness dictated by local pressure requirements (see 1.3.8) need not be considered for this purpose

t_{st} = as built thickness, in mm, of the lower stool side plating or floors (if no stool is fitted).

Gussets with shedder plates, extending from the lower end of corrugations up to 0.1 l, or reinforcing doubling strips (on bulkhead corrugations and stool side plating) shall be fitted.

If gusset plates are fitted, the material of such gusset plates shall be the same as that of the corrugation flanges.

The gusset plates shall be connected to the lower stool shelf plate or inner bottom (if no lower stool is fitted) by deep penetration welds (see Fig.1.8).

1.5.4 Where steel renewal is required, the bulkhead connections to the lower stool shelf plate or inner bottom (if no stool is fitted) shall be at least made by deep penetration welds (see Fig.1.8).

1.5.5 Where gusset plates shall be fitted or renewed, their connections with the corrugations and the lower stool shelf plate or inner bottom (if no stool is fitted) shall be at least made by deep penetration welds (see Fig.1.8).

2 Limit to Hold Loading considering Hold Flooding

2.1 Application and definition

2.1.1 These requirements apply to the double bottom structure of cargo hold no. 1 for all bulk carriers of 150 m in length and above, in the foremost hold, subject to mandatory class notation Bulk Carrier ESP, intending to carry solid bulk cargoes having a density of 1.78 t/m3 or above with single deck, topside tanks and hopper tanks. Where:

a) the foremost hold is bounded by the side shell only for ships which were contracted for construction prior to 1 July 1998, and have not been constructed in compliance with IACS Unified Requirement S20

b) the foremost hold is double side skin construction of less than 760 mm breadth measured perpendicular to side shell in ships, the keel of which were laid, or which were at a similar stage of construction, before 1 July 1999 and have not been constructed in compliance with IACS Unified Requirement S20. (Rev.2, Sept. 2000).

The requirements shall, at the latest, be complied with as follows:

a) for ships which were 20 years of age or more on 1 July 1998, by the due date of the first intermediate, or the due date of the first renewal survey to be held after 1 July 1998, whichever comes first

b) for ships which were 15 years of age or more but less than 20 years of age on 1 July 1998, by the due date of the first renewal survey to be held after 1 July 1998, but not later than 1 July 2002

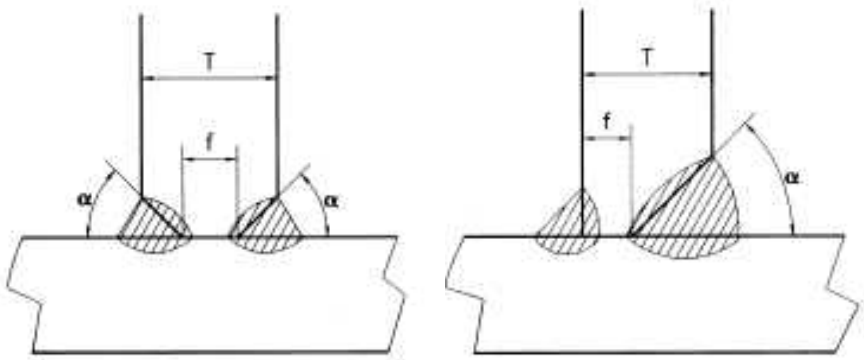
c) for ships which were 10 years of age or more but less than 15 years of age on 1 July 1998, by the due date of the first intermediate or the first renewal survey to be held after the date on which the ship reaches 15 years of age but not later than the date on which the ship reaches 17 years of age

d) for ships which were 5 years of age or more but less than 10 years of age on 1 July 1998, by the due date, after 1 July 2003, of the first intermediate or first renewal survey after the date on which the ship reaches 10 years of age, whichever occurs first

e) for ships which were less than 5 years of age on 1 July 1998, by the date on which the ship reaches 10 years of age.

The loading in cargo hold no. 1 shall not exceed the limit to hold loading in flooded condition, calculated as per 401, using the loads given in 1.2.1 and 1.2.2 and the shear capacity of the double bottom given in 1.3.1 to 1.3.3.

In no case is the loading in each cargo hold to exceed design hold loading in intact condition.



Root Face(f): 3 mm to T/3 mm Groove Angle (α): 40 ^{O} to 60 ^{O}

Fig. 1.8: Deep penetration welds

2.2 Load model

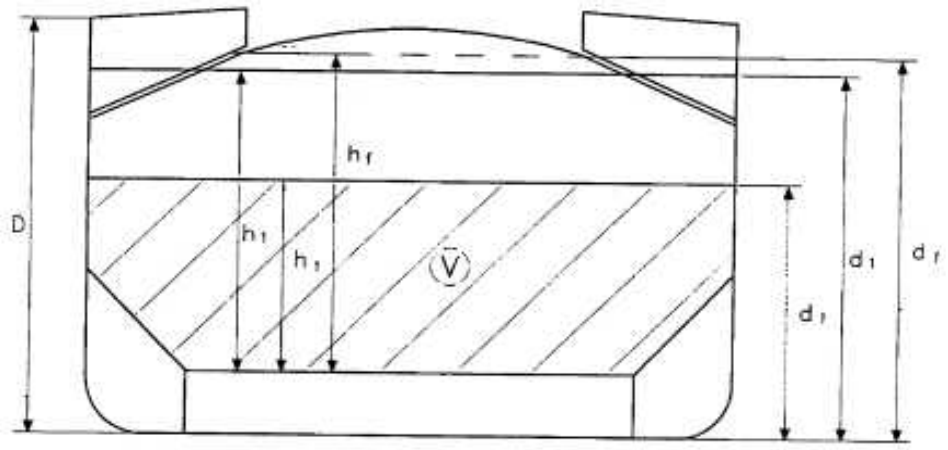
2.2.1 General

The loads to be considered as acting on the double bottom of cargo hold no.1 are those given by the external sea pressures and the combination of the cargo loads with those induced by the flooding of cargo hold no.1.

The most severe combinations of cargo induced loads and flooding loads shall be used, depending on the loading conditions included in the loading manual:

- homogeneous loading conditions
- non-homogeneous loading conditions
- packed cargo conditions (such as steel mill products).

For each loading condition, the maximum bulk cargo density to be carried shall be considered in calculating the allowable hold loading limit.



V=Volume of Cargo

Fig. 2.1: Definition of flooding head and D

2.2.2 Inner bottom flooding head

The flooding head hf (see Fig.2.1) is the distance, in m, measured vertically with the ship in the upright position, from the inner bottom to a level located at a distance df, in m, from the baseline equal to:

a) in general:

- for the foremost cargo hold

b) for ships less than 50000 tonnes deadweight with Type B freeboard:

- 0.95 D for the foremost cargo hold.

D being the distance, in m, from the baseline to the freeboard deck at side amidships (see Fig.2.1).

2.3 Shear capacity

2.3.1 Shear capacity of the double bottom

The shear capacity, C, of the double bottom of cargo hold no.1 is defined as the sum of the shear strength at each end of:

- all floors adjacent to both hoppers, less one half of the strength of the two floors adjacent to each stool, or transverse bulkhead if no stool is fitted (see Fig.2.2)
- all double bottom girders adjacent to both stools, or transverse bulkheads if not stool is fitted.

The strength of girders or floors which run out and are not directly attached to the boundary stool or hopper girder shall be evaluated for the one end only.

Note that the floors and girders to be considered are those inside the cargo hold boundaries formed by the hoppers and stools (or transverse bulkheads if no stool is fitted). The hopper side girders and the floors directly below the connection of the bulkhead stools (or transverse bulkheads if no stool is fitted) to the inner bottom shall not be included.

When the geometry and/or the structural arrangement of the double bottom are such to make the above assumptions inadequate, the shear capacity C of double bottom will be subject to special consideration.

In calculating the shear strength, the net thickness of floors and girders shall be used. The net thickness t_{net}, in mm, is given by:

$t_{net} = t - 2.0$

t = thickness, in mm, of floors and girders.

2.3.2 Floor shear strength

The floor shear strength in way of the floor panel adjacent to hoppers S_{f1}, in kN, and the floor shear strength in way of the openings in the outmost bay (i.e. that bay which is closer to hopper) S_{f2}, in kN, are given by the following expressions:

$$\pm_{f1} = 10^{-3} A_f^2{}_a / \text{¦}_1$$

$$\pm_{f2} = 10^{-3} A_{f,h}^2{}_a / \text{¦}_2$$

A_f = sectional area, in mm^2, of the floor panel adjacent to hoppers

$A_{f,h}$ = net sectional area, in mm^2, of the floor panels in way of the openings in the outmost bay (i.e. that bay which is closer to hopper)

τ_a = the allowable shear stress, in N/mm^2, to be taken equal to:

σ_F = minimum upper yield stress, in N/mm^2, of the material

$\eta_1 = 1.10$

$\eta_2 = 1.20$

η_2 may be reduced to 1.10 when appropriate reinforcements are fitted around openings.

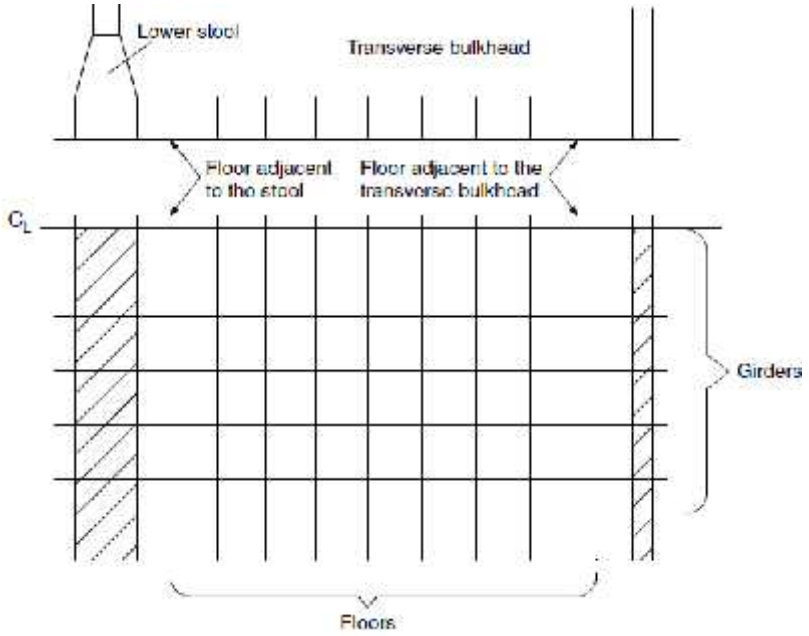


Fig. 2.2: Arrangement of double bottom

2.3.3 Girder shear strength

The girder shear strength in way of the girder panel adjacent to stools (or transverse bulkheads, if no stool is fitted) S_{gl}, in kN, and the girder shear strength in way of the largest opening in the outmost bay (i.e. that bay which is closer to stool, or transverse bulkhead, if no stool is fitted) S_{g2}, in kN, are given by the following expressions:

$$\pm_{g1} = 10^{-3} A_g^2{}_a / \text{¦}_1$$

$$\pm_{g2} = 10^{-3} A_{g,h}^2{}_a / \text{¦}_2$$

where:

A_g = minimum sectional area, in mm^2, of the girder panel adjacent to stools (or transverse bulkheads, if no stool is fitted)

$A_{g,h}$ = net sectional area, in mm^2, of the girder panel in way of the largest opening in the outmost bay (i.e. that bay which is closer to stool, or transverse bulkhead, if no stool is fitted)

τ_a = allowable shear stress, in N/ mm^2, as given in 2.3.2

η_1 = 1.10

η_2 = 1.15

η_2 may be reduced to 1.10 when appropriate reinforcements are fitted around openings.

2.4 Limit to cargo hold loading, considering flooding

2.4.1 The limit to cargo hold loading, W, in tonnes, is given by:

$$w = \rho_c V l / F$$

F = 1.1 in general

= 1.05 for steel mill products

ρ_c = bulk cargo density, in t/m^3 (see 2.2.1).

V = volume, in m^3, occupied by cargo at a level h_1

$$h_1 = X /(\rho_c g)$$

X = the lesser of X_1 and X_2 given by

$$X_1 = (Z + \rho g(E - h_f))/(1 + \rho(perm - 1)/\rho_c)$$

$$X_2 = (Z + \rho g(E - h_f perm))$$

P = sea water density, in t/m^3

g = 9.81 m/s^2, gravity acceleration

E = ship immersion in m for flooded hold condition

= d_f – 0.1 D

d_f, D = as given in 2.2.2

h_f = flooding head, in m, as defined in 2.2.2

Z = the lesser of Z_1 and Z_2 given by:

$$Z_1 = C_h / A_{DB,h}$$

$$Z_2 = C_e / A_{DB,e}$$

C_h = shear capacity of the double bottom, in kN, as defined in 2.3.1, considering, for each floor, the lesser of the shear strengths S_{f1} and S_{f2} (see 2.3.2) and, for each girder, the lesser of the shear strengths S_{g1} and S_{g2} (see 2.3.3)

C_e = shear capacity of double bottom, in kN, as defined in 2.3.1, considering, for each floor, the shear strength S_{f1} (see 2.3.2) and, for each girder, the lesser of the shear strengths S_{g1} and S_{g2} (see 2.3.3)

$$A_{DH,h} = \sum_{i=1}^{i=n} S_i B_{DB,i}$$

$$A_{DB,c} = \sum_{i=1}^{i=n} S_i (B_{DB} - s_l)$$

n = number of floors between stools (or transverse bulkheads, if no stool is fitted)

S_i = space of i^{th}-floor, in m

$B_{DB,\,i} = B_{DB} - s_l$ for floors whose shear strength is given by S_{fl} (see 2.3.2)

$B_{DB,\,i} = B_{DB,h}$ for floors whose shear strength is given by S_{f2} (see 2.3.2)

B_{DB} = breadth of double bottom, in m, between hoppers (see Fig.2.3)

$B_{DB,\,h}$ = distance, in m, between the two considered opening (see Fig.2.3)

s_l = spacing, in m, of double bottom longitudinals adjacent to hoppers

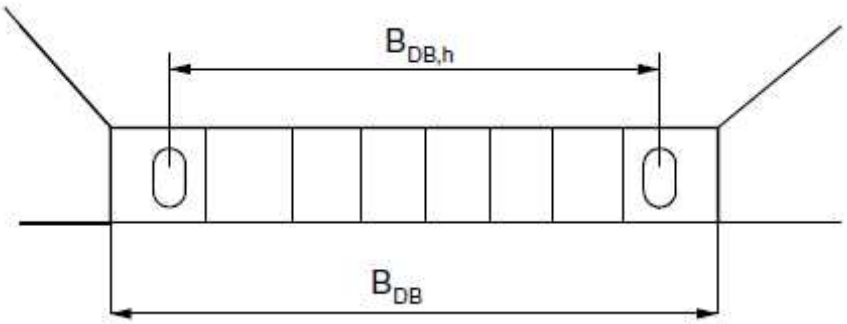


Fig. 2.3: Dimensions of double bottom

3 Damage Stability

3.1 Application

3.1.1 Vessels subject to rule requirements in subsections 1 and 2 shall, when loaded to the summer load line, be able to withstand flooding of the foremost cargo hold in all loading conditions and remain afloat in a satisfactory condition of equilibrium as specified in 3.1.2.

3.1.2 The condition of equilibrium after flooding shall satisfy the condition of equilibrium laid down in the annex to resolution A.320(IX) - Regulation equivalent to regulation 27 of the International Convention on Load Lines, 1966, as amended by resolution A.514(13). The assumed flooding need take into account flooding of the cargo hold space only. The permeability of the loaded hold shall be assumed as 0.9 and the permeability of an empty cargo hold shall be assumed as 0.95, unless a permeability relevant to a particular cargo is assumed for the volume of a flooded hold occupied by cargo and a permeability of 0.95 is assumed for the remaining empty volume of the hold.

3.1.3 Bulk carriers which have been assigned a reduced freeboard in compliance with the provisions of regulation 27(8) of the annex to resolution A.320(IX), as amended by resolution A.514(13) may be considered as complying with requirements as given in 3.1.1.

3.1.4 Vessels not satisfying the requirements given in 3.1.1 or 3.1.3 shall be provided with detailed information on specific cargo hold flooding scenarios. This information shall be accompanied by detailed instructions on evacuation preparedness under the provisions of Section 8 of the International Safety Management (ISM) Code and be used as the basis for crew training and drills. (SOLAS Ch. XII/9.3).

4 Loading Information

4.1 Loading computer system

4.1.1 All vessels with one of the following class notations shall be provided with an approved loading computer system:

Bulk Carrier ESP

Ore Carrier ESP

Bulk Carrier or Tanker for Oil ESP

Ore Carrier or Tanker for Oil ESP.

This is applicable for vessels of 150 m in length (L) and above, that were contracted for construction before 1 July 1998. The loading computer system shall be installed, in approved order, not later than their entry into service or 1 January 1999, whichever occurs later.

4.1.2 The loading computer system shall be of a multipoint type and be able to easily and quickly ascertain that, at specified read-out points, the still water bending moment, shear forces and still water torsional and lateral loads, where applicable, in any load or ballast condition will not exceed the specified permissible values.

4. 2 Loading sequences

4.2.1 All single side skin vessels with class notation:

Bulk Carrier ESP

of 150 m in length (L) and above, that were contracted for construction before 1 July 1998 shall be provided, before 1 July 1999 or their entry into service, whichever occurs later, with an approved loading manual with typical loading and unloading sequences. The loading sequences should describe the loading from commencement of cargo loading to reaching full deadweight capacity, for homogenous conditions, relevant part-load conditions and alternate conditions where applicable.

5 Detection of Water Ingress into Cargo Holds, Ballast and Dry Spaces and Availability of Drainage

5.1 Application and definition

5.1.1 The requirements in 5.2 apply to vessels subject to the damage stability requirements in 3, but which do not satisfy either 3.1.1 or 3.1.3 due to having been constructed with an insufficient number of transverse watertight bulkheads.

5.1.2 The requirements in 5.2 shall be complied with as follows:

a) for ships that were 20 years of age or more on 1 July 1998, by the due date of the first intermediate, or the due date of first renewal periodical survey to be held after 1 July 1998, whichever comes first

b) for ships that were 15 years of age or more but less than 20 years of age on 1 July 1998, by due date of the first renewal periodical survey to be held after 1 July 1998, but not later than 1 July 2002

c) for ships that were 10 years of age or more but less than 15 years of age on 1 July 1998, by the due date of the next renewal periodical survey after the date on which the ship reaches 15 years of age but not later than the date on which the ship reaches 17 years of age, and

d) for ships that were less than 10 years of age on 1 July 1998, by the date on which the ship reaches 15 years of age. (IACS UR S23.1)

However, ships that have already passed their due date shall comply not later than the first intermediate or the first renewal periodical survey.

5.1.3 The requirements in 5.3 and 5.4 shall apply to all bulk carriers constructed before 1 July 2004 not later than the date of the annual, intermediate or renewal survey of the ship to be carried out after 1 July 2004, whichever comes first.

5.1.4 The requirements in 5.5 shall apply to all bulk carriers constructed before 1 July 2004 not later than the date of the first intermediate or renewal survey of the ship to be carried out after 1 July 2004, but in no case later than 1 July 2007.

5.2 Detection of water ingress

5.2.1 The vessel shall be provided with an approved bilge well high water level alarm in all cargo holds, or in cargo conveyor tunnels, as appropriate, giving an audible and visual alarm on the navigation bridge. (SOLAS Ch. XII/9.2)

5.2.2 In addition, the vessel shall be provided with an approved permanent means of detecting the presence of water in the cargo holds, in excess of the small amounts which may be normally expected in the bilge wells. (IACS UR S24.2)

5.3 Hold, ballast and dry space water level detectors

5.3.1 Bulk carriers shall be fitted with water level detectors:

a) In each cargo hold, giving audible and visual alarms, one when the water level above the inner bottom in any hold reaches a height of 0.5 m and another at a height not less than 15% of the depth of the cargo hold but not more than 2.0 m. Detectors with only the latter alarm need be installed on bulk carriers for which 5.2 applies.

b) In any ballast tank forward of the collision bulkhead, giving an audible and visual alarm when the liquid in the tank reaches a level not exceeding 10% of the tank capacity.

c) In any dry or void space other than a chain cable locker, any part of which extends forward of the foremost cargo hold, giving an audible and visual alarm at a water level of 0.1 m above the deck. Such alarms need not be provided in enclosed spaces

the volume of which does not exceed 0.1% of the ship's maximum displacement volume. (SOLAS Ch. XII/12)

5.4 Installation, testing and survey

5.4.1 The system shall be installed and tested in accordance with the manufacturer's specifications. At the initial installation and at each subsequent renewal periodical survey the surveyor shall verify the proper operation of the water detection system. (IACS UR S24.5).

5.5 Availability of drainage

5.5.1 On bulk carriers, the means for draining and pumping ballast tanks forward of the collision bulkhead, and bilges of dry spaces any part of which extends forward of the foremost cargo hold, shall be capable of being brought into operation from a readily accessible enclosed space, the location of which is accessible from the navigation bridge or propulsion machinery control position without traversing exposed freeboard or superstructure decks. This does not apply to the enclosed spaces the volume of which does not exceed 0.1% of the ship's maximum displacement volume and to the chain cable locker. Where pipes serving such tanks or bilges pierce the collision bulkhead, as an alternative to the valve control, valve operation by means of remotely operated actuators may be accepted, provided that the location of such valve controls complies with this regulation. (SOLAS Ch. XII/13)

6 Renewal Criteria for Side Shell Frames and Brackets in Single Side Skin Bulk Carriers, which were not built in accordance with the Society's Rules July 1998 or subsequent Rules

6.1 Application and definitions

6.1.1 These requirements apply to the side shell frames and brackets of cargo holds bounded by the single side shell of bulk carriers constructed with single deck, topside tanks and hopper tanks in cargo spaces intended primarily to carry dry cargo in bulk, which were not built in accordance with the Society's rules July 1998 or subsequent rules (IACS UR S12 Rev.1 or subsequent revisions).

These requirements also apply to the side shell frames and brackets of cargo holds bounded by the single side shell of Oil/Bulk/Ore (OBO) carriers, as defined in IACS UR Z11, but of single side skin construction.

In the case where a vessel does not satisfy the definition in one or more holds, the requirements in this Subsection shall not apply to these individual holds.

Ships subject to these requirements shall be assessed for compliance with the requirements of these rules (IACS UR S31) and steel renewal, reinforcement or coating, where required in accordance with these rules (IACS UR S31), shall be carried out in accordance with the following schedule and at subsequent intermediate and special surveys:

- for ships which will be 15 years of age or more on 1 January 2004 by date of the first intermediate or special survey after that date
- for ships which will be 10 years of age or more on 1 January 2004 by the due date of the first special survey after that date

- for ships which will be less than 10 years of age on 1 January 2004 by the date on which the ship reaches 10 years of age.

Completion prior to 1 January 2004 of an intermediate or special survey with a due date after 1 January 2004 cannot be used to postpone compliance. However, completion prior to 1 January 2004 of an intermediate survey the window for which straddles 1 January 2004 can be accepted.

These requirements define steel renewal criteria or other measures to be taken for the webs and flanges of side shell frames and brackets as per 6.2.

Reinforcing measures of side frames are also defined as per 6.2.3.

6.1.2 Ice strengthened ships

Where bulk carriers are reinforced to comply with an ice class notation, the intermediate frames shall not be included when considering compliance with these rules (IACS UR S31).

If the ice class notation is requested to be withdrawn, the additional ice strengthening structure, with the exception of tripping brackets, ref. 6.2.9, is not considered to contribute to compliance with these rules (IACS UR S31).

6.2 Renewal or other measures

6.2.1 Definitions

t_M = thickness as measured (mm)

t_{REN} = thickness at which renewal is required, see 6.2.2

t_{REN}, d/t = thickness criteria based on d/t ratio, see 6.2.3

$t_{REN,S}$ = thickness criteria based on strength, see 6.2.4

t_{COAT} = 0.75 tS12

t_{S12} = thickness (mm) of frame and bracket webs as required according to the Rules.

t_{AB} = thickness as built (mm)

t_C = defined in Table 6.1

Table 6.1 t_C values (mm)

Ship length L (m)	Holds other than No.1		Hold No.1	
	Span and upper brackets	Lower brackets	Span and upper brackets	Lower brackets
100 or less	2.0	2.5	2.0	3.0
150	2.0	3.0	3.0	3.5
200 or more	2.0	3.0	3.0	4.0

Note: For intermediate ship lengths, t_C is obtained by linear interpolation between the above values.

6.2.2 Criteria for webs

The webs of the side shell frames and brackets shall be renewed when the measured thickness TM is equal to or less than the thickness (t_{REN}) as defined below:

t_{REN} is the greatest of:

a) $t_{COAT} - t_C$

b) $0.75\ t_{AB}$

c) $t_{REN,d}/t$ (Applicable to Zones A and B only)

d) $t_{REN,S}$ (where required by 6.2.4)

6.2.3 Thickness criteria based on d/t ratio

Subject to b) and c) below, $t_{REN,d}/t$ is given by the following equation:

$t_{REN,\ d/t}$ = (web depth in mm)/R

where:

For frames:

$R = 65\ k^{0.5}$ for symmetrically flanged frames

$= 55\ k^{0.5}$ for asymmetrically flanged frames

For lower brackets (see a) below):

$R = 87\ k^{0.5}$ for symmetrically flanged frames

$= 73\ k^{0.5}$ for asymmetrically flanged frames

where $k = 1/f_1$.

f1 = material factor *)

= 1.0 for Normal Strength steel

= 1.28 for Higher Strength steel grade 32

= 1.39 for Higher Strength steel grade 36

= 1.47 for Higher Strength steel grade 40

$= \left(\pm_f/235\right)^a$ for steel forgings and castings.

$\pm_f$ = minimum upper yield stress in N/mm2, not to be taken greater than 70% of the ultimate tensile strength.

If not specified on the drawings, $\pm_f$ is taken as 50% of the ultimate tensile strength.

$a = 0.75\ \pm_f > 235$

$= 1\ \pm_f < 235$

In no instance is $t_{REN,d}/t$ for lower integral brackets to be taken as less than $t_{REN,d}/t$ for the frames they support.

a) Lower brackets

Lower brackets shall be flanged or face plate shall be fitted.

In calculating the web depth of the lower brackets, the following will apply:

- The web depth of lower bracket may be measured from the intersection of the sloped bulkhead of the hopper tank and the side shell plate, perpendicularly to the face plate of the lower bracket.
- Where stiffeners are fitted on the lower bracket plate, the web depth may be taken as the distance between the side shell and the stiffener, between the stiffeners or between the outermost stiffener and the face plate of the brackets, whichever is the greatest.

b) Tripping bracket alternative

When t_M is less than $_{t}REN,d/t$ at section b) of the side frames, tripping brackets in accordance with 6.2.9 may be fitted as an alternative to the requirements for the web depth to thickness ratio of side frames. Then $t_{REN,d/t}$ may be disregarded in the determination of t_{REN} in 6.2.2.

The value of tm shall be based on Zone B according to IACS URZ10.2, Annex V, see Fig.6.1.

c) Immediately abaft collision bulkhead

For the side frames including the lower bracket, located immediately abaft the collision bulkhead, whose scantlings are increased in order that their moment of inertia is such to avoid undesirable flexibility of the side shell, when their web as built thickness t_{AB} is greater than 1.65 $t_{REN,S}$, the thickness $t_{REN,d/t}$ may be taken as the value $t'_{REN,d/t}$ obtained from the following equation:

$$t'_{REN,d/t} = (t_{REN,d/t}{}^2 \, t_{REN,S})^{1/3}$$

where $t_{REN,S}$ shall be obtained from 6.3.4.

6.2.4 Thickness criteria based on shear strength check

Where t_M in the lower part of the side frames, as defined in Fig. 6.1, is equal to or less than t_{COAT}, $t_{REN,S}$ shall be determined in accordance with 6.3.4.

6.2.5 Thickness of renewed webs of frames and lower brackets

Where steel renewal is required, the renewed webs shall be of a thickness not less than t_{AB}, 1.2 t_{COAT}, or 1.2 t_{REN}, whichever is greatest.

6.2.6 Criteria for other measures

When $t_{REN} < t_M \leq t_{COAT}$, measures shall be taken, consisting of all the following:

- sand blasting, or equivalent, and coating (see 6.2.8)
- fitting tripping brackets (see 6.2.9)

- maintaining the coating in “as-new” condition (i.e. without breakdown or rusting), at renewal and intermediate surveys.

The above measures may be waived if the structural members show no thickness diminution with respect to the as built thicknesses and coating is in “as-new” condition (i.e. without breakdown or rusting).

When the measured frame webs thickness t_M is such that $t_{REN} < t_M \leq t_{COAT}$ and the coating is in GOOD condition, sand blasting and coating as required in a) above may be waived even if not found in “as-new” condition, as defined above, provided that tripping brackets are fitted and the coating damaged in way of the tripping bracket welding is repaired.

6.2.7 Bending check criteria for frames and brackets

When lower end brackets were not fitted with flanges at the design stage, flanges shall be fitted so as to meet the bending strength requirements in 6.3.5. The full width of the bracket flange shall extend up and beyond the point at which the frame flange reaches full width. Adequate back-up structure in the hopper shall be ensured, and the bracket shall be aligned with the bracket structure.

Where the length or depth of the lower bracket does not meet the requirements in the Society’s rules from July 1998 to January 2003 (IACS UR S12 Rev.3), a bending strength check in accordance with 305 shall be carried out and renewals or reinforcements of frames and/or brackets effected as required therein.

The bending check need not to be carried out in the case the bracket geometry is modified so as to comply with IACS URS12 Rev.3.

6.2.8 Thickness measurements, steel renewal, sand blasting and coating

For the purpose of steel renewal, sand blasting and coating, four zones A, B, C and D are defined, as shown in Fig. 6.1.

Representative thickness measurements shall be taken for each zone and shall be assessed against the criteria in 6.2.2-6.2.7.

When zone B is made up of different plate thicknesses, the requirements shall be based on the lesser thickness.

In case of integral brackets, when the criteria in 6.2.2-6.2.7 are not satisfied for zone A or B, steel renewal, sand blasting and coating, as applicable shall be done for both zones A and B.

In case of separate brackets, when the criteria in 6.2.2-6.2.7 are not satisfied for zone A or B, steel renewal, sand blasting and coating shall be done for each one of these zones, as applicable.

When steel renewal is required for zone C according to 6.2.2-6.2.7, it shall be done for both zones B and C. When sand blasting and coating is required for zone C according to 6.2.2-6.2.7, it shall be done for both zones B, C and D.

When steel renewal is required for zone D according to 6.2.2-6.2.7 it needs only to be done for this zone. When sand blasting and coating is required for zone D according to 6.2.2-6.2.7, it shall be done for zones C and D.

Special consideration may be given by the society to zones previously renewed or re-coated, if found in “asnew” condition (i.e. without breakdown or rusting).

When adopted, on the basis of the renewal thickness criteria in 6.2.2-6.2.7, in general coating shall be applied in compliance with the requirements (IACS UR Z9), as applicable.

Where, according to the requirements in 6.2.2-6.2.7, a limited number of side frames are shown to require coating over part of their length, the following criteria apply:

a) The part to be coated includes:

- the web and the face plate of the side frames and brackets
- the hold surface of side shell, hopper tank and topside tank plating, as applicable, over a width not less than 100 mm from the web of the side frame.

b) Epoxy coating or equivalent shall be applied.

In all cases, all the surfaces to be coated shall be sand blasted prior to coating application.

When flanges of frames or brackets shall be renewed according to this Sub-section the outstanding breadth to thickness ratio shall comply with the requirements in IACS UR S31.

6.2.9 Reinforcing measures

Reinforcing measures are constituted by tripping brackets, located at the lower part and at mid-span of side frames (see Fig.6.3). Tripping brackets may be located at every two frames, but lower and mid-span brackets shall be fitted in line between alternate pairs of frames.

The thickness of the tripping brackets shall be not less than the as-built thickness of the side frame webs to which they are connected.

Double continuous welding shall be adopted for the connections of tripping brackets to the side shell frames and shell plating.

6.2.10 Weld throat thickness

In case of steel renewal the welded connections shall comply with rule requirements.

6.2.11 Pitting and grooving

If pitting intensity is higher than 15% in area (see Fig.6.4), thickness measurement shall be taken to check pitting corrosion.

The minimum acceptable remaining thickness in pits or grooves is equal to:

- 75% of the as built thickness, for pitting or grooving in the frame and bracket webs and flanges
- 70% of the as built thickness, for pitting or grooving in the side shell, hopper tank and topside tank plating attached to the side frame, over a width up to 30 mm each side of it.

6.2.12 Renewal of all frames in one or more cargo holds

When all frames in one or more holds are required to be renewed according to IACS UR S31, the compliance with the rule requirements may be accepted in lieu of the compliance with the requirements in this Sub-section, provided that:

- It is applied at least to all the frames of the hold(s)
- The coating requirements for side frames of "new ships" are complied with
- The section modulus of side frames is calculated according to the Classification Society Rules.

6.2.13 Renewal of damaged frames

In case of renewal of a damaged frame already complying with these rules (IACS URS31), the following requirements apply:

- The conditions accepted in compliance with these rules shall, as a minimum, be restored.
- For localised damage, the extension of the renewal shall be carried out according to the standard practice of the individual classification society.

6.3 Strength check criteria

6.3.1 In general, loads shall be calculated and strength checks shall be carried out for the aft, middle and forward frames of each hold. The scantlings required for frames in intermediate positions shall be obtained by linear interpolation between the results obtained for the above frames.

When scantlings of side frames vary within a hold, the required scantlings are also to be calculated for the mid frame of each group of frames having the same scantlings. The scantlings required for frames in intermediate positions shall be obtained by linear interpolation between the results obtained for the calculated frames.

6.3.2 Load model

The following loading conditions shall be considered:

- Homogeneous heavy cargo (density greater than 1.78 t/ m^3)
- Homogeneous light cargo (density less than 1.78 t/ m^3)
- Non homogeneous heavy cargo, if allowed
- Multi port loading/unloading conditions need not to be considered.

The forces $P_{fr,a}$ and $P_{fr,b}$ (kN) to be considered for the strength checks at sections a) and b) of side frames (specified in Fig.6.2; in the case of separate lower brackets, section b) is at the top of the lower bracket), are given by:

$P_{fr,a} = P_S + \max(P_1, P_2)$

$P_{fr,b} = P_{fr,a}(h - 2h_B)/h$

P_S = still water force (kN)

$= sh[(p_{S,U} + p_{S,L})/2]$, when the upper end of the side frame span h (see Fig.6.1) is below the load

water line = sh' $[(p_{S,L})/2]$, when the upper end of the side frame span h (see Fig.6.1) is at or above the load water line

P_1 = wave force (kN) in head sea

= sh $[(p_{1,U} + p_{1,L})/2]$

P_2 = wave force (kN) in beam sea

= sh $[(p_{2,U} + p_{2,L})/2]$

h, h_B = side frame span and lower bracket length, in metres, defined in Fig.6.1 and 6.2, respectively

h' = distance (m) between the lower end of side frame and the load water line

s = frame spacing (m)

$p_{S,U}$, $p_{S,L}$= still water pressure (kN/ m^2) at the upper and lower end of the side frame span h (see Fig.6.1), respectively

$p_{1,U}$, $p_{1,L}$= wave pressure (kN/ m^2) as defined in 1) Wave pressure p_1 below for the upper and lower end of the side frame span h, respectively

$p_{2,U}$, $p_{2,L}$= wave pressure (kN/ m^2) as defined in 2) Wave pressure p_2 below for the upper and lower end of the side frame span h, respectively

1) Wave pressure p_1

- The wave pressure p1 (kN/m_2) at and below the waterline is given by:

$p_1 = 1.50 \{p_{11} + 135 [(B/ 2 (B + 75)] – 1.2(T – z)\}$

where:

$p_{11} = 3k_SC + k_f$

- The wave pressure p1 (kN/m_2) above the water line is given by:

$p_1 = p_{1w1} – 7.50 (z – T)$

2) Wave pressure p_2

- The wave pressure p_2 (kN/m_2) at and below the waterline is given by:

$p_2 = 13.0 \{0.5B [50c_r / 2(B + 75)] + CB [(0.5B + k_f)/14][0.7 + 2 z/T]\}$

- The wave pressure p_2 (kN/m_2) above the water line is given by:

$p_2 = p_{2wl}\ 5.0 – (z – T)$

where:

$p_{1w1} = p_1$ wave sea pressure at the waterline

$p_{2w1} = p_2$ wave sea pressure at the waterline

L = rule length (m)

(IACS UR S2)

B = greatest moulded breadth (m)

C_B = block coefficient, but not to be taken less than 0.6

T = maximum design draught (m)

C = coefficient

= 0.0707 L for L< 90

= $10.75 – [(300 – L)/100]^{1.5}$ for 90 ≤ L ≤ 300 m

= 10.75 for L > 300 m

$C_r = [1.25 – 0.025 (2 k_r/(GM)^{1/2})] k$

k = 1.2 for ships without bilge keel

= 1.0 for ships with bilge keel

k_r = roll radius of gyration. If the actual value of k_r is not available:

GM = 0.12 B if the actual value of GM is not available

z = vertical distance (m) from the baseline to the load point

$k_S = C_B + 0.83/(CB)^{1/2}$ at aft end of L

= C_B between 0.2 L and 0.6 L from aft end of L

= $C_B + 1.33/C_B$ at forward end of L

Between the above specified points, ks shall be interpolated linearly.

$k_f = 0.8$ C

6.3.3 Allowable stresses

The allowable normal and shear stresses σ_a and τ_a (kN/m^2) in the side shell frames are given by:

$\sigma_a = 0.90 \sigma_F$

$\sigma_a = 0.40 \sigma_F$

where σF is the minimum upper yield stress (kN/m^2) of the material.

6.3.4 Shear strength check

Where t_M in the lower part of the side frames, as defined in Fig. 6.1, is equal to or less than t_{COAT}, shear strength check shall be carried out in accordance with the following.

The thickness $t_{REN,S}$ (mm) is the greater of the thicknesses $t_{REN,Sa}$ and $t_{REN,Sb}$ obtained from the shear strength check at sections a) and b) (see Fig.13 and 6.3.2) given by the following, but need not be taken in excess of 0.75 t_{S12}:

- at section a): $t_{REN,Sa} = 1\ 000\ k_S\ P_{fr,a} / d_a \sin\phi\ \tau a$
- at section b): $t_{REN,Sb} = 1\ 000\ k_S\ P_{fr,b} / d_b \sin\phi\ \tau a$

where:

k_S = shear force distribution factor to be taken equal to 0.6

$P_{fr,a}$, $P_{fr,b}$ = pressures forces defined in 6.3.2

da, db = bracket and frame web depth (mm) at sections a) and b), respectively (Fig.6.2); in case of separate (non integral) brackets, db shall be taken as the minimum web depth deducting possible scallops

ϕ= angle between frame web and shell plate

τ_a = allowable shear stress (kN/m^2) defined in 6.3.3.

6.3.5 Bending strength check

Where the lower bracket length or depth does not meet the requirements in IACS UR S12(Rev.3), the actual section modulus, in cm^3, of the brackets and side frames at sections a) and b) shall be not less than:

- at section a): $Z_a = 1000\ P_{fr,a}\ h / m_a\ \sigma_a$
- at section b): $Z_b = 1000\ P_{fr,a}\ h / m_b\ \sigma_a$

where:

$P_{fr,a}$ = pressures force defined in 6.3.2

h = side frame span (m) defined in Fig.1.1

σ_a = allowable normal stress (kN/m^2) defined in 6.3.3

m_a m_b= bending moment coefficient defined in Table 6.2.

The actual section modulus of the brackets and side frames shall be calculated about an axis parallel to the attached plate, based on measured thicknesses. For pre-calculations, alternative thickness values may be used, provided they are not less than:

- t_{REN}, for the web thickness
- the minimum thicknesses allowed by the Society renewal criteria for flange and attached plating.

The attached plate breadth is equal to the frame spacing, measured along the shell at midspan h.

= 0.39 B for ships with even distribution of mass in transverse section (e.g. alternate heavy cargo loading or homogeneous light cargo loading)

= 0.25 B for ships with uneven distribution of mass in transverse section (e.g. homogeneous heavy cargo distribution)

If the actual section moduli at sections a) and b) are less than the values Z_a and Z_b, the frames and brackets shall be renewed or reinforced in order to obtain actual section moduli not less than 1.2 Z_a and 1.2 Z_b, respectively.

In such a case, renewal or reinforcements of the flange shall be extended over the lower part of side frames, as defined in Fig.6.1.

Table 6.2 Bending moment coefficients m_a and m_b

	m_a	M_b		
		$h_B \leq 0.08h$	$h_B = 0.1h$	$h_B \geq 0.125h$
Empty holds of ships approved to operate in non homogeneous loading conditions	10	17	19	22
Other cases	12	20	22	26

Note 1: Non homogeneous loading condition means a loading condition in which the ratio between the highest and the lowest filling ratio, evaluated for each hold, exceeds 1.20 corrected for different cargo densities.

Note 2: For intermediate values of the bracket length hB, the coefficient mb is obtained by linear interpolation between the table values.

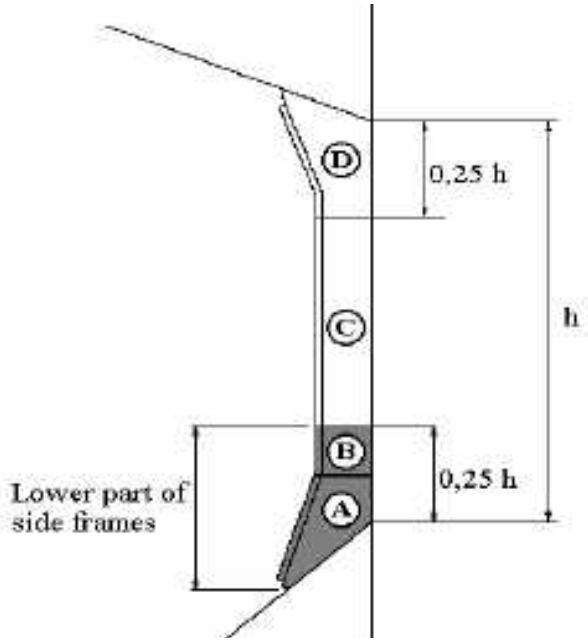


Fig. 6.1: Lower part of side frames

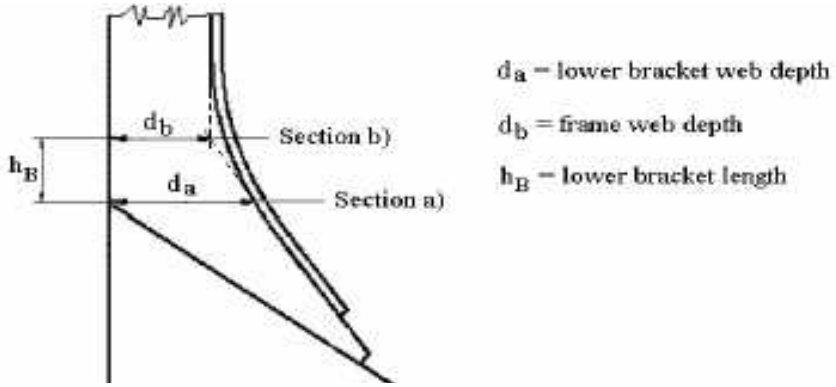


Fig. 6.2: Sections a) and b)

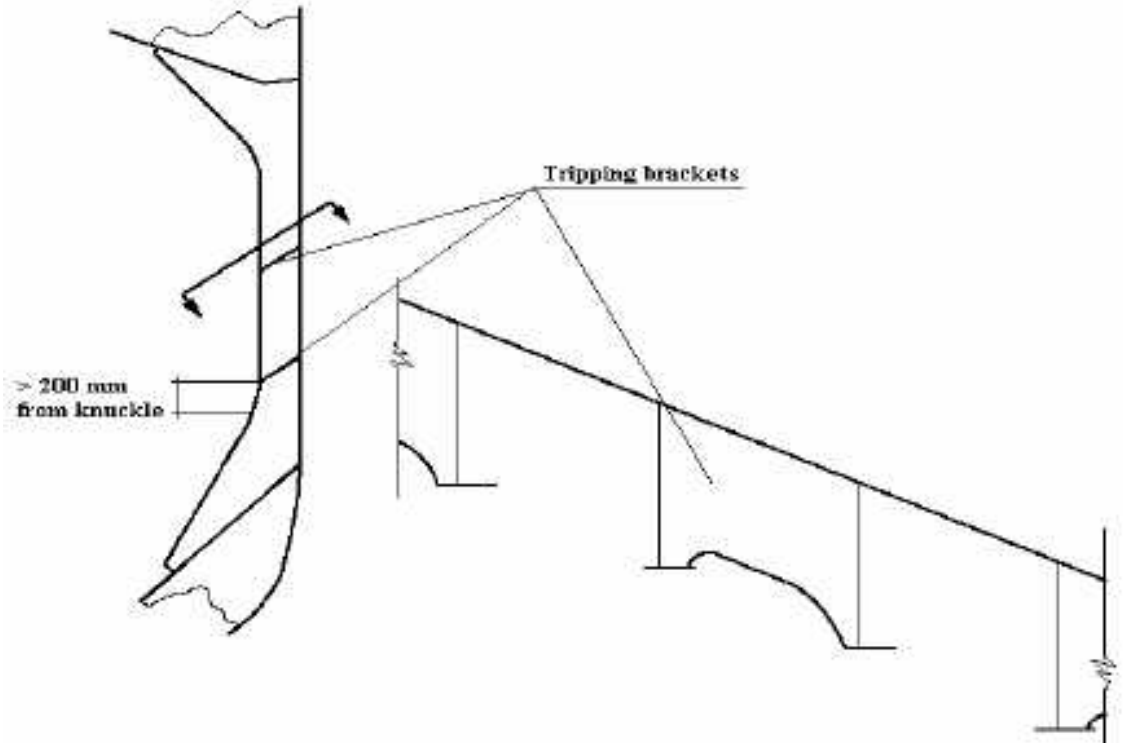


Fig. 6.3: Tripping brackets

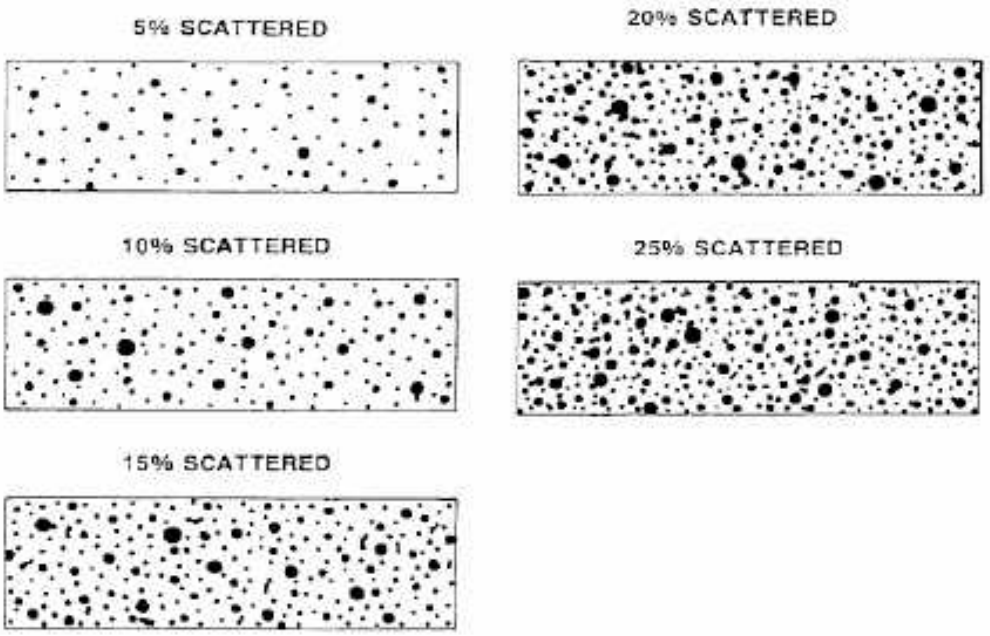


Fig. 6.4: Pitting intensity diagrams (from 5% to 25% intensity) (IACS UR S31)

7 Cargo Hatch Cover Securing Arrangements for Bulk Carriers not Built in accordance with UR S21 (Rev.3)

7.1 Application and implementation

7.1.1 These requirements apply to all bulk carriers, (UR Z11.2.2), which were not built in

accordance with IACS UR S21 (Rev.3) and are for steel hatch cover securing devices and stoppers for cargo hold hatchways No. 1 and No. 2 which are wholly or partially within 0.25 L of the fore perpendicular, except pontoon type hatch cover.

Pontoon covers in terms of S30 application are steel covers, either double plates or single plate, secured by tarpaulins and battening devices. Any other steel cover fitted with gaskets and clamping devices should comply with the S30 requirements.

7.1.2 All bulk carriers not built in accordance with IACS UR S21 (Rev.3) shall comply with the requirements of these rules (IACS UR S30) in accordance with the following schedule:

- for ships which will be 15 years of age or more on 1 January 2004 by the due date of the first intermediate or special survey after that date
- for ships which will be 10 years of age or more on 1 January 2004 by the due date of the first special survey after that date
- for ships which will be less than 10 years of age on 1 January 2004 by the date on which the ship reaches 10 years of age.

7.1.3 Completion prior to 1 January 2004 of an intermediate or special survey with a due date after 1 January 2004 cannot be used to postpone compliance.

However, completion prior to 1 January 2004 of an intermediate survey the window for which straddles 1 January 2004 can be accepted.

7.2 Securing devices

7.2.1 The strength of securing devices shall comply with the following requirements:

1) Panel hatch covers shall be secured by appropriate devices (bolts, wedges or similar) suitably spaced alongside the coamings and between cover elements.

Arrangement and spacing shall be determined with due attention to the effectiveness for weather-tightness, depending upon the type and the size of the hatch cover, as well as on the stiffness of the cover edges between the securing devices.

2) The net sectional area of each securing device shall not be less than:

$A = 1.4\ a / f\ (cm^2)$

a = spacing between securing devices not to be taken less than 2 meters

$f = (\sigma_Y / 235)^e$

σ_Y = specified minimum upper yield stress (N/mm^2) of the steel used for fabrication, not to be taken greater than 70% of the ultimate tensile strength.

e = 0.75 for $\sigma_Y > 235$

=1.0 for $\sigma_Y \leq 235$

Rods or bolts shall have a net diameter not less than 19 mm for hatchways exceeding 5 m^2 in area.

3) Between cover and coaming and at cross-joints, a packing line pressure sufficient to obtain weather tightness shall be maintained by the securing devices.

For packing line pressures exceeding 5 N/mm^2, the cross section area shall be increased in direct proportion.

The packing line pressure shall be specified.

4) The cover edge stiffness shall be sufficient to maintain adequate sealing pressure between securing devices. The moment of inertia I of edge elements shall not be less than:

$I = 6\ p\ a^4\ (cm^4)$

P = packing line pressure (N/mm) minimum 5 N/mm

a = spacing (m) of securing devices.

5) Securing devices shall be of reliable construction and securely attached to the hatchway coamings, decks or covers. Individual securing devices on each cover shall have approximately the same stiffness characteristics.

6) Where rod cleats are fitted, resilient washers or cushions shall be incorporated.

7) Where hydraulic cleating is adopted, a positive means shall be provided to ensure that it remains mechanically locked in the closed position in the event of failure of the hydraulic system.

7.3 Stoppers

7.3.1 No. 1 and 2 hatch covers shall be effectively secured, by means of stoppers, against the transverse forces arising from a pressure of 175 kN/m^2.

7.3.2 No. 2 hatch covers shall be effectively secured, by means of stoppers, against the longitudinal forces acting on the forward end arising from a pressure of 175 kN/m^2.

7.3.3 No. 1 hatch cover shall be effectively secured, by means of stoppers, against the longitudinal forces acting on the forward end arising from a pressure of 230 kN/m^2.

This pressure may be reduced to 175 kN/m^2 if a forecastle is fitted.

7.3.4 The equivalent stress in:

- in stoppers and their supporting structures, and
- calculated in the throat of the stopper welds shall not exceed the allowable value of 0.8 σ_Y.

7.4 Materials and welding

7.4.1 Where stoppers or securing devices are fitted to comply with these rules, they shall be manufactured of materials, including welding electrodes, meeting relevant requirements in IACS UR S30.

Section 9 Retroactive Requirements Miscellaneous Requirements

1 Ice Class ICE-IA and ICE-IA Super - Minimum Power Requirement

1.1 General

1.1.1 The propulsion power requirements for existing ships as defined in following Guidance Note are not mandatory for maintenance of the Society's ice class notations ICE-IA and ICE-IA Super.

To comply with the equivalent Finnish-Swedish ice classes IA or IA Super a ship the keel of which has been laid or which has been at a similar stage of construction before 1 September 2003 shall comply with the new minimum power requirements by:

- 1 January 2005
- 1 January in the year when 20 years has elapsed since the year the ship was delivered, whichever occurs the latest.

When, for an existing ship, values for some of the hull parameters required for the calculating method are difficult to obtain, then the following alternative formulae can be used:

$$R_{CH} = C_1 + C_2 + C_H (H_F + H_M)^2 (B + 0.658 H_F) + C_4 L H_F^2 + C_5 (LT / B^2)^3 B / 4 \text{ N}$$

For ice class ICE-IA, C_1 and C_2 can be taken as zero. For ice class ICE-IA Super, ship without bulb, the following apply:

$$C_1 = f_1 BL / (2T / B + 1) + 1.84 (f_2 B + f_3 L + f_4 BL)$$

$$C_1 = 3.52 (g_1 + g_2 B) + g_3 (1 + 1.2T / B) B^2 / \sqrt{L}$$

For ice class ICE-IA Super, ship with bulb, C_1 and C_2 shall be calculated as follows:

$$C_1 = f_1 BL / (2T / B + 1) + 2.89 (f_2 B + f_3 L + f_4 BL)$$

$$C_1 = 6.67 (g_1 + g_2 B) + g_3 (1 + 1.2T / B) B^2 / \sqrt{L}$$

f_1 = 10.3 N/ m^2 f_2 = 45.8 N/m f_3 = 2.94 N/m f_4 = 5.8 N/ m^2

g_1 = 1 530 N g_2 = 170 N/m g_3 = 400 N/ $m^{1.5}$

C_3 = 460 kg/(m^2s^2) C_4 = 18.7 kg/(m^2s^2) C_5 = 825 kg/ s^2

$(LT / B^2)^3$ shall not be taken less than 5 and not more than 20.

2 Fore Deck Fittings

2.1 Strength and securing of small hatches on the exposed fore deck, and strength requirements for fore deck fittings.

2.1.1 These requirements shall apply to bulk carriers, general dry cargo ships (excluding container vessels and Ro-Ro ships), and combination carriers (e.g. OBO ships, Ore/Oil Carriers) of length 100 m or more, constructed prior to 1 January 2004.

Air pipes and ventilators with their closing appliances, and small hatches on the exposed deck serving spaces or giving access to spaces forward of the collision

bulkhead, and to spaces which extend over this line aft wards, shall comply with the rule requirements.

2.1.2 The requirements shall, at the latest, be complied with as follows:

- for ships which will be 15 years of age or more on 1 January 2004 by the due date of the first intermediate or renewal survey after that date
- for ships which will be 10 years of age or more on 1 January 2004 by the due date of the first renewal survey after that date
- for ships which will be less than 10 years of age on 1 January 2004 by the date on which the ship reaches 10 years of age.
- (IACS UR S26 and S27)

3 Existing Convention Ships – Oil Fuel Arrangement

3.1 Application

3.1.1 These requirements apply to all SOLAS convention ships from 1 July 2003 (all SOLAS references are to Consolidated edition 2001).

3.2 Technical requirements

3.2.1 All external high pressure fuel delivery lines between the high pressure fuel pumps and fuel injectors shall be protected with a jacketed piping system capable of containing fuel from a high pressure line failure. A jacketed pipe incorporates an outer pipe into which the high pressure fuel pipe is placed forming a permanent assembly. The jacketed piping system shall include a means for leak collection and arrangements shall be provided for an alarm to be given in the event of a failure in a fuel line. (SOLAS II-2/15.2.9)

3.2.2 For ships constructed before 1 July 1998, a suitable enclosure may be used as an alternative to 3.2.1 provided the diesel engine:

- output is 375 kW or less, and
- has fuel injection pumps serving more than one injector.

(SOLAS II-2/15.2.12)

3.2.3 All surfaces with temperatures above 220°C which may be impinged as a result of a fuel system failure shall be properly insulated. (SOLAS II-2/15.2.10)

3.2.4 Oil fuel lines shall be screened or otherwise suitably protected to avoid, as far as practicable, oil spray or oil leakage onto hot surfaces, into machinery air intakes, or other sources of ignition. The number of joints in such piping systems shall be kept to a minimum. (SOLAS II-2/15.2.11)

4 Water level detectors on single hold cargo ships

4.1 Application and definition

4.1.1 These requirements apply to single hold cargo ships having a length (L) of less than 80 m, or 100 m if constructed before 1 July 1998, and a single cargo hold below the freeboard deck or cargo holds below the freeboard deck which are not separated by at

least one bulkhead made watertight up to that deck. (SOLAS II-1/23-3)

4.1.2 The requirements in 4.2.1 and 4.2.2 shall apply to all single hold cargo ships other than bulk carriers constructed before 1 January 2007 not later than the date of the intermediate or renewal survey of the ship to be carried out after 1 January 2007, whichever comes first.

4.2 Cargo hold water level detectors

4.2.1 Single hold cargo ships shall be fitted with water level detectors giving an audible and visual alarm at the navigation bridge when the water level above the inner bottom in the cargo hold reaches a height of not less than 0.3 m, and another when such level reaches not more than 15% of the mean depth of the cargo hold.

4.3 Installation, testing and survey

4.3.1 The system shall be installed and tested in accordance with the manufacturer's specifications. At the initial installation and at each subsequent renewal periodical survey the surveyor shall verify the proper operation of the water detection system.

5 Ice Class Draught Marks and Warning Triangle

5.1 Application

5.1.1 Ships built before 1 July 2007 and having any ice class notation shall be provided with required marking, not later than the first scheduled dry-docking after 1 July 2007, if the UIWL (Upper Ice Water Line) is below the Summer Load Line.

Ships with length <100 m and built in accordance with 1972 - 1986 rules, or equivalent to the Finnish-Swedish 1971 Ice Class Rules, need not to be marked and amended with draught limitation in their ice class notation.

For new ships the draught limitation shall be included in the ships’ ice class notation.