LIBERO HELLENIC REGISTER

Rules and Regulations

for the Classification and Construction of

Steel Ships

Head Office:

A: 2 Efplias Street, 185 37, Piraeus, Greece

Tel: +30 210 4100535-6

E-mail: info@hellenicregister.org

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SECTION 1 Scope of Classification

1.1 Libero Hellenic Register

1.1.1 Libero Hellenic Register hereinafter referred to also as LHR or as "the Society", is a society, the activity of whose Marine Division includes the classification of vessels, crafts and floating units.

1.2 Expression of confidence

1.2.1 Classification of a vessel, craft or floating unit by the LHR is the expression of confidence extended by LHR to this vessel craft or floating unit for a specific service within a certain period of time and with reference to LHR Rules and Regulations.

1.3 Limitation of confidence

1.3.1 The expression of confidence extended by the Society reflects the views of the Society only.

1.4 Expression of opinion

1.4.1 The view of the Society is represented by the issuance of Documents in accordance with the Rules and Regulations of the Society. These Documents reflect the Society's opinion on the condition of the vessel, craft or floating unit at the time of issuance. It is the responsibility of the Owners, or of their representatives, to maintain that condition until the next survey required by the Rules and Regulations.

1.5 Documents

1.5.1 The Society develops Rules and other Documents, publishes Registers and issues Certificates, Attestations and Reports which are the confirmation of its interventions.

1.6 Delegation by Governments

1.6.1 Upon delegation by Governments, LHR may participate in the application, development and interpretation of National or International Regulations or Standards.

SECTION 2 Interpretation

2.1 Exclusivity

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2.2 Interpretation by another party

2.2.1 Application of the Rules developed by LHR does not infringe possible rights for protection of their products on the part of the manufacturers.

SECTION 3 Liability

3.1 General

3.1.1 In providing services, information or advice neither Libero Hellenic Register (hereinafter referred to as LHR) nor any of its officers, employees or agents warrants the accuracy of any information or advice supplied. Except as set out herein, neither LHR nor any of its officers, employees or agents (on behalf of each of whom LHR has agreed this clause) shall be liable for any loss, damage or expense whatever sustained by any person due to any act, omission or error of whatsoever nature and howsoever caused of LHR, its officers, employees 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 LHR, even if held to amount to a breach of warranty. Nevertheless, if any person, who is party to the agreement pursuant to which LHR provides any service, uses LHR's services or relies on any information or advice given by or on behalf of LHR and suffers loss, damage or expense thereby which is proved to have been due to any negligent act, omission or error of LHR, its officers, employees or agents or any negligent inaccuracy in information or advice given by or on behalf of LHR, then LHR will pay compensation to such person for his proved loss up to but not exceeding the amount of the fee (if any) charged by LHR for that particular service, information or advice.

3.1.2 LHR, its officers, employees or agents (on behalf of each of whom this notice is given) shall be under no liability or responsibility in negligence or otherwise howsoever to any person who is not a party to the agreement with LHR pursuant to which any certificate, statement, data or report is issued in respect of any information or advice expressly or impliedly given by LHR or in respect of any omission or inaccuracy therein or in respect of any act or omission which has been caused or contributed to any certificate, statement, data or report being issued with the information and advice it contains (if any).

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CHAPTER 2 Classification

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SECTION 1 Principles of Class assignment

1.1 The Rules

1.1.1 The present Rules and Regulations for the Construction and Classification of Seagoing Steel Ships, hereinafter referred to as the Rules, are the basis for the Classification of the afore mentioned ships by LHR.

1.1.2 The Rules came into force at midnight on 1st of July 2023.

1.2 Other Documents

1.2.1 Special Rules, Procedures, Notes, Guidelines and other Documents developed by LHR should be strictly observed and applied for the purposes of Classification.

1.3 Equivalent Standards

1.3.1 The Society is entitled to use for Classification purposes any requirements other than those dictated by the Rules, provided the former lead to equivalent standards of strength, safety and stability. To this purpose, IACS requirements are considered as equivalent.

1.4 The Class

1.4.1 Classification characters and notations are assigned following the satisfactory completion of surveys carried out by the Society's Surveyors and the completion of verification of compliance with the Rules.

1.4.2 Classification characters and notations assigned by the Society, hereinafter referred to also as the Class, indicate the degree of confidence that the ship's hull and machinery deserves for her specific service.

1.4.3 It is the responsibility of the Owner to ensure that any defect, breakdown or damage which could invalidate the vessel's assigned Class is to be reported to the Society without delay.

1.5 Survey Reports

1.5.1 Classification characters and notations are assigned or reassigned by the Society after consideration of the surveys reports issued by the Surveyors to LHR upon satisfactory completion of surveys.

1.6 Rules changes

1.6.1 Whenever necessary LHR may modify the present Rules. Rules changes become applicable to ships the contract of which is signed three months after their publication, unless LHR decides upon an earlier implementation date or it is requested by the party applying for Classification.

1.6.2 The implementation of all changes in the Rules, except those concerning the surveys, to already classed ships is not required unless deemed necessary by the Society or is requested by the party applying for Classification.

SECTION 2 Register of Ships and Classification Certificates

2.1 Periodicity of publication

2.1.1 The Society undertakes to list the classed ships in the Register of Ships which is published annually.

2.2 Draught

2.2.1 The Register of Ships gives the Classification characters and notations of a classed ship throughout the period of the Class together with the draught corresponding to her summer freeboard.

2.3 Certificates

2.3.1 Classification Certificates are issued endorsed by LHR to the classed ship after the agreement of the LHR Head Office. They are to be kept on board the ship and are made available on request to the Society's Surveyor.

2.4 Validity of Class

2.4.1 The validity of the assigned Class and of the Classification Certificates depends on compliance with the requirements of Part 1, Chapter 3.

2.5 Existing ships

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SECTION 3 Conditions for Classification

3.1 Operating conditions

3.1.1 The requirements set forth in the present Rules apply to ships operated by competent crew in accordance with the environmental, loading and operating conditions upon which Class assignment is based.

3.1.2 Any change of the conditions for which a Class has been assigned is to be reported to the Society without delay.

3.1.3 These Rules are based on the hypothesis that the ships are properly loaded and handled and they don't provide for special loading conditions and/or concentrations of loading. In such cases particulars are to be submitted for consideration and the Society reserves the right to require additional strengthening.

3.2 Exceptions

3.2.1 The Classification does not cover any kind of equipment not described in the Rules and used solely for operational activities. Furthermore, Classification does not cover the ship's structural strength and her integrity during her construction, lifting, launching etc. Vessel's structural strength with regard to construction loads, remains the responsibility of the builder.

3.3 Other Regulations

3.3.1 Governmental regulations

Governmental regulations are to be brought to the attention of the Society by the applicant for classification. These are to take precedence over the present Rules. In case of differentiation LHR reserves the right to call for the necessary adaptations to preserve the intent of the Rules or to refuse or withdraw the classification.

3.3.2 International Conventions and Codes

For ships, the arrangements and equipment of which are required to comply with the requirements of the:

- International Convention on Load Lines, 1966;
- International Convention for the Safety of Life at Sea, 1974 and its Protocol of 1978;
- International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto;
- International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC Code);

and applicable Amendments thereto. IACS Unified Interpretations may be applied for each International Convection and Code, where applicable, unless flag state provides its own interpretation or decides otherwise.

The applicable Convention Certificates are to be issued by a National Administration, or by LHR or by an organization recognized by EU, when so authorized. Safety Management Certificates in accordance with the provisions of the International Safety Management Code (ISM Code) may be issued by an organization complying with IMO Resolution A.739(18) and authorized by the National Authority with which the ship is registered. Cargo Ship Radio Certificates may be issued by an organization authorized by the National Authority with which the ship is registered or by LHR.

3.4 Failure to comply with the Rules

3.4.1 The Society reserves the right to refuse or to withdraw the Class of any ship for which any requirement applicable under the present Rules is not complied with.

3.5 Advice of LHR for Port State Control

3.5.1 When a ship has been detained by Port State Control the Owner is to advise LHR Head Office immediately. Failure to adhere to this obligation may lead to class suspension.

3.5.2 When a ship has been inspected by PSC and deficiencies have been found, the owners are to advise LHR H.O. as soon as possible for an assessment to be made of the deficiencies recorded and to determine if further action is to be taken by LHR.

3.5.3 When a ship has been inspected by Port State Control and detainable deficiencies have not been found, the owner is requested to advise LHR Head Office accordingly, for recording purposes.

3.5.4 Owners should not oppose to Port State Control Inspectors, or EU Commission inspectors, for vessels falling in the scope of EU Regulations if requested to board and inspect the Vessel. Failure to allow reasonable access to the inspectors may lead to class suspension.

SECTION 4 Procedure for Classification of ships built or converted under LHR supervision and in accordance with LHR Rules

4.1 Application by the Owner

4.1.1 The application for Classification is to be submitted to LHR in writing by the Owner or by his appointed representative. In case of change of ownership, the new Owner or his appointed representative must immediately inform LHR accordingly declaring also in writing his willingness to maintain the ship in Class.

4.2 Submission of plans

4.2.1 Plans and documentation relevant to the Class applied for are to be submitted in triplicate by the applicant for examination and approval by the Society. The Society may also request additional information according to the specific nature of the ship to be classed.

4.3 Approval of plans

4.3.1 Copies of the submitted plans and documentation will be returned duly stamped with notifications for alterations, amendments or additions as deemed necessary to meet Rules' requirements.

4.4 Deviation from the approved plans

4.4.1 Any deviations from the approved plans and documents are subject to the approval of LHR before work is commenced.

4.5 Materials and equipment

4.5.1 The Society will survey at the manufacturer's work the materials and equipment used in the construction of the ship and for which the present Rules apply.

4.6 Supervision of construction

4.6.1 The Society will also supervise the assembly of the ship, the installation of the machinery and the electrical plant and will check conformity with the approved plans and with the Rules.

4.7 Tests and trials

4.7.1 The Society will monitor tests and trials required by the Rules.

4.8 Machinery and equipment

4.8.1 In general, the machinery, boilers, auxiliary installations and equipment intended for ships built or converted under the survey of and in accordance with the present Rules are also to be built under Special Survey. This also applies to engines or equipment produced in series.

4.9 Date of Class assignment

4.9.1 Upon satisfactory completion of the surveys, tests and trials, the attending Surveyor prepares his report for the Society. On the basis of this report LHR issues the Classification Certificates. The Class

assigned to the ship will be considered granted as of the date of the last survey made during the construction or trials of the ship and will be entered in the Register of Ships.

4.10 Access of the Surveyor

4.10.1 The applicant should provide all necessary means to ensure free access of the Surveyor to the ship and the workshops where parts requiring approval are manufactured and assembled.

4.11 Procedure for Assigning Date of Build

The Class Certificates and the Society's Register of Ships shall indicate the **"Date of Build"** as defined below:

a. **For New Construction**
The year and month at which the new construction survey process is completed shall be specified as the "**Date of Build**". Where there is substantial delay between completion of construction survey process and the ship commencing active service, the date of commissioning may be also specified.

b. **After Modifications**
After modifications are completed, the "**Date of Build**" shall remain assigned to the ship. Where a complete replacement or addition of a major portion of the ship[1] is involved, the following shall apply:
- the "**Date of Build**" associated with each major portion of the ship shall be indicated on the classification certificate and in the Register where it has been agreed that the newer structure shall be on a different survey cycle;
- survey requirements shall be based on the "**Date of Build**" associated with each major portion of the ship;
- survey due dates may be aligned at the discretion of the Society

4.12 Definition of date of "contract for construction"

4.12.1 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. This date and the construction numbers (i.e. hull numbers) of all the vessels included in the contract are to be declared to the Society by the party applying for the assignment of class to a newbuilding.[1]

4.12.2 The date of "contract for construction" of a series of 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. For the purpose of this subsection, vessels built under a single contract for construction are considered a "series of vessels" if they are built to the same approved plans for classification purposes. However, vessels within a series may have design alterations from the original design provided:

1. such alterations do not affect matters related to classification, or
2. If the alterations are subject to classification requirements, these alterations are to comply with the classification requirements in effect on the date on which the alterations are contracted between the prospective owner and the shipbuilder or, in the absence of the alteration contract, comply with the classification requirements in effect on the date on which the alterations are submitted to the Society for approval. The optional vessels will be considered part of the same

[1] For example, a major portion of the ship may include a complete forward or after section, a complete main cargo section (which may include a complete hold / tank of a cargo ship), a complete block of deck structure of a passenger ship or a structural modification of a single hull to a double hull ship.

series of vessels if the option is exercised not later than 1 year after the contract to build the series was signed.

4.12.3 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. The amendment to the contract is to be considered as a "new contract" to which 4.12.1 and 4.12.2 above apply.

4.12.4 If a contract for construction is amended to change the ship type, the date of "contract for construction" of this modified vessel, or vessels, is the date on which revised contract or new contract is signed between the Owner, or Owners, and the shipbuilder.

SECTION 5 Procedure for Classification of ships not built or converted under LHR supervision and not in accordance with LHR Rules

5.1 Application by the Owner

5.1.1 The application for Classification is to be submitted to LHR in writing by the Owner or by his appointed representative.

5.2 Submission of plans

5.2.1 The Society will determine a program of surveys, appropriate to the age and condition of the ship and will decide on plans and documents considered necessary for Classification.

5.3 Date of Class Assignment

5.3.1 Upon satisfactory review of the plans and documents and upon satisfactory completion of the program of surveys determined by the Society, the Class of LHR will be granted as of the date of completion of the surveys.

5.4 Ships classed with another recognized Classification Society

5.4.1 If the ship bears the Class of another recognized Classification Society; LHR may dispense with certain inspections pending the next due date assigned by the previous Class.

5.4.2 Where classification is requested of a ship which in parallel keeps her class with another recognized Classification Society, special consideration will be given as regards the required plans and documents to be submitted and the extend of the class entry survey. In this case the equivalent LHR Class notation is assigned to the ship.

SECTION 6 Classification characters and notations

6.1 Class

6.1.1 Classification Symbols

The Classification symbols comprise the following:

- the Society's mark
- the construction mark,
- the division number,
- the rating letter,

- the equipment symbol,
- the machinery installation symbol,
- the service type notation,
- the navigation notation,
- the additional class notations,
- the mandatory additional notations.

This information is grouped together on the Certificate of Class and in the Register before any other mark or notation.

6.1.2 The construction mark

The construction mark is assigned to small craft built under the Society's survey, in compliance with the Rules and to the satisfaction of the Council. The construction mark is assigned to vessels built under the supervision of a recognized Classification Society and letter assigned class with LHR. The list of character symbols that may be used as applicable is as follows:

(a) The construction mark ✠ is assigned to ships built in compliance with the requirements of SECTION 4.

(b) The construction mark ✠ is assigned to ships built under the survey of other authorities and which have been assigned by such authorities a Class deemed equivalent to a Class described in the Rules. This mark may also be assigned to ships which are built under the survey of the Society but do not meet certain provisions of the Rules to qualify for the ✠ mark.

(c) Ships built in accordance with the requirements of SECTION 5 or classed after construction which do not qualify for the mark., will not be assigned a construction mark when classed with the Society.

One of the afore mentioned construction marks is also assigned followed by the symbol of the corresponding additional Class notation, to classed automated installations, refrigerating plants, lifting appliances, and generally to any installation for which a certificate is issued.

6.1.3 The division number

The division number is indicated by the numbers **100** or **90**. Division **100** ships are to meet the Rules requirements for construction and scantlings of the hull and essential components relating to propulsion and safety as applicable for seagoing service.

For existing ships and in the event that some rule requirements are not met although it is deemed possible to enter the craft in the Register, the craft is classed in division **90**, on condition that the craft complies with the applicable strength requirements of the Flag Administration or the applicable requirements of an EU recognized Classification Society.

6.1.4 The rating letter

The rating letter is placed after the division number and denotes the degree of confidence the ship deserves. Rating letter **A** is assigned to ships the condition of which is considered satisfactory by the Society. Rating letter **B** is assigned to ships complying generally with the Rules requirements, but for which, due to their condition and/or their age, it has been considered necessary to define periodicity of various surveys shorter than those normally granted to ships being assigned the rating **A**.

6.1.5 The equipment symbol

The equipment symbol **1** placed after the rating letter indicates that the ship's anchors and chain cables meet the Rules requirements. Where the equipment does not meet the Rules requirements, but is

deemed by the Society to be acceptable for the intended service, the symbol **1** is replaced by the symbol **(1)**.

Where the Society considers that it is not called upon to form an opinion on the equipment having regard to the specific operating conditions of the ship the symbol **1** is replaced by **—**.

6.1.6 The machinery installation symbol

The machinery installation symbol **M**, placed after the equipment symbol indicates that the ships machinery, boiler and electrical installations meet the applicable requirements of the Rules.

The construction mark ✠ is placed before the machinery installation symbol **M** when the propelling and essential auxiliary machinery has been constructed, installed and tested under the Society's Special Survey and in accordance with the Society's Rules and Regulations. The construction mark ✠ will be placed before the machinery installation symbol **M** when the propelling and essential auxiliary machinery is of an approved standard type and has not been constructed under survey at the maker's works, but has been installed and tested under the LHR's Special Survey and in accordance with the LHR's Rules and Regulations.

The symbol **M** without the construction mark, will be assigned when the propelling and essential auxiliary machinery has neither been constructed nor installed under LHR's Special Survey but the existing machinery, its installation and arrangement, has been tested and found to be acceptable by LHR. This notation is assigned to existing craft in service accepted or transferring into LHR class.

When the arrangements are such that the craft can be operated with the machinery spaces unattended the notation **UMS** is to be assigned. It denotes that the control engineering equipment has been arranged, installed and tested in accordance with the Society's Rules, or is equivalent thereto.

6.2 Service notations

6.2.1 Every ship is assigned a service notation according to its type and service. Such service notations as listed below are to be assigned to new or existing ships designed for a particular nature of service. The service notations assigned to ships are included in the following list or in other equivalent lists of other documents published by the Society.

6.2.2 A combined service notation may be granted to a ship when all the requirements corresponding to each service notation are satisfied.

6.2.3 Ships which are designed in such a way that certain cargo spaces may be empty when they sail at their maximum approved draught are assigned a suitable notation, placed after their service notation.

6.2.4 Ships the deck or decks of which are specially designed for the carriage of heavy cargoes are assigned a suitable notation, placed after their service notation.

6.2.5 Non-self-propelled ships are assigned the notation **-NSP**, placed after their service notation. Ships with auxiliary means of propulsion which allow for short restricted moves at a limited speed are assigned the notation **-AP**, placed after their service notation.

6.2.6 Ships which are designed to fight fire are assigned the class notation **FIRE FIGHTING SHIP** when they meet the relevant requirements of these Rules.

6.2.7 Ships which are designed to carry containers in their holds and on their decks are assigned the service notation **CONTAINERSHIP**, when they meet the relevant requirements of the Rules.

6.2.8 Ships which are designed to carry vehicles or loads on wheeled beds are assigned the service notation **ROROSHIP**, when they meet the relevant requirements of the Rules.

6.2.9 Ships which are designed to carry refrigerated cargoes are assigned the service notation **REFSHIP**, when they meet the relevant requirements of the Rules.

6.2.10 The class notation **BULK CARRIER** shall be assigned to sea going self-propelled single deck ships with a double bottom, hopper side tanks and topside tanks and with single or double side skin construction and intended for the carriage of dry cargoes in bulk (see 6.6.2(ii)).

The notation **ORE CARRIER** shall be assigned to sea going self-propelled single deck ships having two longitudinal bulkheads and a double bottom throughout the cargo region and intended for the carriage of ore cargoes in the centre holds only (see 6.6.2(iii)).

The notation **ORE OR OIL CARRIER** shall be assigned to sea going self-propelled single deck ships having two longitudinal bulkheads and a double bottom throughout the cargo region and intended for the carriage of ore cargoes in the centre holds or of oil cargoes in centre holds and wing tanks (see 6.6.2(iv)).

The ship type notation **OIL/BULK/ORE (OBO) CARRIER** shall be assigned to single deck ships of double skin construction, with a double bottom, hopper side tanks and topside tanks fitted below the upper deck, and intended for the carriage of oil or dry cargoes, including ore, in bulk (see 6.6.2(iv)).

6.2.11 The notation **GENERAL DRY CARGO SHIP** is assigned to ships designed to carry solid cargoes other than:

- ships described in 6.2.10
- dedicated container carriers;
- dedicated forest product carriers (not timber or log carriers);
- ro-ro cargo ships;
- refrigerated cargo ships;
- dedicated wood chip carriers;
- dedicated cement carriers;
- livestock carriers;
- dock/deck ships (i.e. ships designed to carry cargo exclusively above deck without any access for cargo below deck)

6.2.12 The class notation **OIL TANKER** shall be assigned to sea going self propelled ships having integral tanks and intended for the carriage of oil in bulk. This notation shall be assigned to tankers of both single and double skin construction, as well as tankers with alternative structural arrangements, e.g. mid-deck designs, provided they meet the relevant requirements of the Rules. When such ships benefit in their construction from certain departures from these requirements as are specifically provided for in the Rules, the notation is completed with the indication **FLASH POINT ABOVE 60°C** (closed cup test). When such ships are intended for the storage of oil, the Society may complete the service notation **OIL TANKER** by **-FLOATING STORAGE**.

6.2.13 Ships which are designed to carry dangerous liquids in bulk are assigned the service notation **CHEMICAL TANKER**, when they meet the relevant requirements of the Rules. The list of products the ship is allowed to carry is attached to the Classification Certificate.

6.2.14 The notation **TANKER** appropriately specified is assigned to ships designed with integral or independent tanks for the bulk carriage of cargo in liquid form, e.g. **ASPHALT TANKER, WATER TANKER** etc.

6.2.15 Ships which are intended for occasionally handling, storage and transportation of oil with flash point below 60°C, recovered from a spill of oil, are assigned the class notation **OIL RECOVERY SHIP**, when they meet the relevant requirements of these Rules.

6.2.16 Ships which are designed to carry more than 12 passengers are assigned the service notation **PASSENGER SHIP**, when they meet the relevant requirements of the Rules. Such ships specially equipped to carry wheeled vehicles are assigned the service notation **PASSENGER FERRY**, when they meet the relevant requirements of the Rules.

6.2.17 Ships which are specially designed for towing operations are assigned the service notation **TUG** when they meet the relevant requirements of the Rules. Ships which are specially designed for the service

of offshore units are assigned the service notation **OFFSHORE SUPPLY VESSEL**, when they meet the relevant requirements of the Rules. Non-self-propelled ships which are specially designed for the carriage of cargo are assigned the service notation **BARGE**, when they meet the relevant requirements of the Rules. Non-self-propelled ships which are specially designed for the carriage of cargo exclusively on deck are assigned the service notation **PONTOON**, when they meet the relevant requirements of the Rules. Ships which are specially designed to support lifting equipment such as cranes or derricks are assigned the service notation **FLOATING CRANE**, when they meet the relevant requirements of the Rules.

6.2.18 The Society may define other service notations by means of separate Rules, Codes and Recommendations. Such service notations are:

a. **LIVESTOCK CARRIER** for ships specially designed to carry livestock.
b. **DREDGER** for ships specially equipped for dredging operations.
c. **HOPPER DREDGER** for ships specially equipped for dredging and carrying dredged material.
d. **HOPPER BARGE** for ships or barges specially intended to carry spoils or dredged material.
e. **SPLIT HOPPER DREDGER** for ships specially equipped for dredging and carrying dredged material and which open longitudinally.
f. **FISHING VESSEL** for ships specially designed for fishing operations.
g. **SEAGOING LAUNCH** for launches or motorboats of less than 24m in length intended for seagoing service.
h. **SPECIAL SERVICE** for ships or units not mentioned above. The type of service may be specified after the notation i.e. **SPECIAL SERVICE/CABLE LAYER, SPECIAL SERVICE/SHIP LIFT, SPECIAL SERVICE/CANNING PLANT, SPECIAL SERVICE/MOBILE OFFSHORE DRILLING UNIT, SPECIAL SERVICE/SUBMERSIBLE, SPECIAL SERVICE/FLOATING HOTEL or SPECIAL SERVICE/FLOATING HOSPITAL.**

6.3 Navigation notations

6.3.1 Every ship is assigned a navigation notation according to its design, configuration, scantlings and other constructional arrangements. The navigation notation assigned by the Society is not depended upon factors which are not considered in the Rules. Consequently, no confusion should be made between a navigation notation assigned by the Society and a navigation category defined by any national or international body.

6.3.2 Self-propelled or non-self-propelled ships which are capable of unrestricted navigation in any area and at any season of the year are not assigned a specific navigation notation and the absence of such a navigation notation indicates the judgment of the Society that the ships in concern have the capacity to operate without restrictions.

6.3.3 The navigation notation Restricted International Service **(R.I.S.)** is assigned to ships operating at a maximum distance from the nearest port of refuge not exceeding 200 nautical miles, or operating within enclosed seas, e.g. the Mediterranean Sea, the Black Sea and other waterways with similar conditions.

6.3.4 The navigation notation Coastal Service **(C.S.)** is assigned to ships operating along a coast, at a maximum distance from shore generally not exceeding 21 nautical miles.

6.3.5 The navigation notation Extended Sheltered Waters **(E.S.W.)** is assigned to ships operating in waters where the fetch is six nautical miles or less and also for short distances (generally less than 21 nautical miles) outside these waters under reasonable weather conditions.

6.3.6 The navigation notation Sheltered Waters **(S.W.)** is assigned to ships operating in harbours, roadsteads, estuaries, bays or generally calm stretches of water where there is no running of heavy seas, as well as outside these areas for not more than short distances, generally less than 6 nautical miles and under reasonable weather conditions.

6.3.7 To the navigation notation may be added the designation of the geographical area or the most unfavourable sea conditions considered.

6.3.8 The Society reserves the right to assign the navigation notations subject to the conditions of the seaway prevailing in the respective service area.

6.3.9 For ships intended to operate within the territory waters of a Member State of the European Union the following navigation notations may be assigned:

- **EU-B**: For ships engaged on domestic voyages in the course of which it is at no time more than 20 miles from the line of cost, where shipwrecked persons can land, corresponding to the medium tide height.
- **EU-C**: For ships engaged on domestic voyages in sea areas where the probability of exceeding 2,5 m significant wave height is smaller than 10% over a one-year period for all-year around operation, or over a specific restricted period of the year for operation exclusively in such period (e.g. summer period operation), in the course of which is at no time more than 15 miles from a place of refuge, no more than 5 miles from the line of coast, where shipwrecked persons can land, corresponding to the medium tide height.
- **EU-D**: For ships engaged on domestic voyages in sea areas where the probability of exceeding 1.5m significant wave height is smaller than 10% over a one-year period for all-year around operation, or over a specific restricted period of the year for operation exclusively in such period (e.g. summer period operation), in the course of which is at no time more than 6 miles from a place of refuge, no more than 3 miles from the line of coast, where shipwrecked persons can land, corresponding to the medium tide height.

6.4 Additional Class notations

6.4.1 Machinery installations which comply with the Rules of the Society for automated and/or remote-controlled systems will have the following additional Class notations affixed to the Classification character:

a. **UMS** for ships provided with equipment for unattended engine room provided that it may be left unattended continuously for a period of 24 hours.
b. **UMS-h/24** for ships provided with equipment for unattended engine room provided that it may be left unattended for a shorter period, h meaning the number of hours during which the engine room may remain unmanned on a continuous basis.
c. **CCS** for ships with attended machinery space and with remote control of the main propulsion installation and with centralized control of the installation.
d. **IP** for ships with attended machinery space and with remote control of the main propulsion installation from the bridge.

6.4.2 Ships and machinery installations which comply with the requirements of the Rules relating to strengthening for navigation in ice will be assigned the relevant notation as prescribed by the corresponding requirements of the Rules.

6.4.3 The following additional Class notations will be assigned to refrigerating plants, when they meet the relevant requirements of the Rules or other requirements deemed equivalent by the Society:

(a) ✠ **RMC** for installations which have been built and installed under the Society's Surveyors supervision in accordance with the requirements of these Rules.

(b) ✠**RMC** for installations which have been built and installed under the supervision of other recognized Society and which comply with the requirements of these Rules.

(c) **RMC** for installations which have not been built and installed under the Society's Surveyors supervision and found satisfactory after a Special Survey.

In general, notations of 6.4.3(a) and 6.4.3(b) will be followed by the minimum temperatures in the refrigerated chambers to be maintained with sea temperature maximum.

When an installation is provided with any additional equipment to suit the carriage of special cargoes or quick freezers for the catch in fishing vessels, appropriate descriptive notes will be added to the notations mentioned in 6.4.3(a) and 6.4.3(b), e.g.:

1. **Equipped for the carriage of fruit.**
2. **Equipped with quick freezers.**
3. **Equipped for the carriage of insulated containers.**

6.4.4 The additional Class notation **IGS** will be assigned by the Society for ships with the service notation **OIL TANKER**, which are equipped with an inert gas plant for cargo tanks complying with the relevant provisions of the Rules.

6.4.5 The additional Class Notaton **CL** may be assigned by the Society on request of the part applying for Classification, for ships with a container securing system which satisfy the relevant requirements of the Rules.

6.4.6 The Class notation **UNDER SURVEYS AND REPAIRS** may be assigned by the Society for ships in which repairs, conversions or alterations are affected under the supervision of LHR Surveyors, in order to declare that the ship is in a safe condition as long as repairs, conversions or alterations are lasting under the LHR supervision.

6.4.7 When the ship's hull is surveyed according to the requirements of an Enhanced Survey Program the notation **ESP** will be assigned. The ship types for which the application of the ESP Program is mandatory are described in 6.6.

6.5 Special notations

6.5.1 Special notations may be assigned upon request of the party applying for Classification and indicating that the ship or some arrangements and/or installations satisfy specific international, national or other regulations, which are not necessarily covered by the present Rules.

6.5.2 The special notation is the abbreviated description of the specific body with the regulations of which compliance has been examined and attested. Whenever a special notation is assigned, an attestation is annexed to the Classification Certificates specifying the Rules and criteria considered for this examination.

6.6 Mandatory Ship Type and Enhanced Survey Program (ESP) Notations (IACS UR Z11, Rev.5[2])

6.6.1 Preamble

.1 The regime of enhanced surveys given in Part 1, Chapter 3, SECTION 2, SECTION 3, SECTION 4, SECTION 5 and SECTION 6, as appropriate, are applicable to a number of ship types falling within the broad definitions of oil tankers, bulk carriers and chemical tankers.

.2 To clearly indicate to shipowners and the users of the Society's Register Book those ships which are subject to an Enhanced Survey Program, the following notations shall be included within the class notation assigned to all such ships, built and/or maintained in accordance with the Society's Rules and Regulations.

1.3 Survey requirements can be found in:

- Chapter 3, Section 3 for oil tankers which are not double hull oil tankers;
- Chapter 3, Section 2 for single side skin bulk carriers[3];

[2] Changes introduced in Rev.5 are to be implemented from 1 January 2017.
[3] For bulk carriers with hybrid cargo hold arrangements, i.e. with some cargo holds of single side skin and others of double side skin, the requirements of Chapter 3, Section 2 are to apply to cargo holds of single side skin and Chapter 3, Section 5 to cargo holds of double side skin

- Chapter 3, Section 4 for chemical tankers;
- Chapter 3, Section 6 for double hull oil tankers;
- Chapter 3, Section 5 for double side skin bulk carriers[3];
- Chapter 3, Section 2 and/or Section 5 for ore carriers, depending on the structural configuration;
- Chapter 3, Section 2 and/or Section 5 and Section 3 and/or Section 6 for combination carriers (ore/oil and oil/bulk/ore), depending on the structural configuration;
- Chapter 3, Section 2 and/or Section 3, Section 5 for self-unloaders, depending on the structural configuration.

These requirements should be referred to for their detailed applicability.

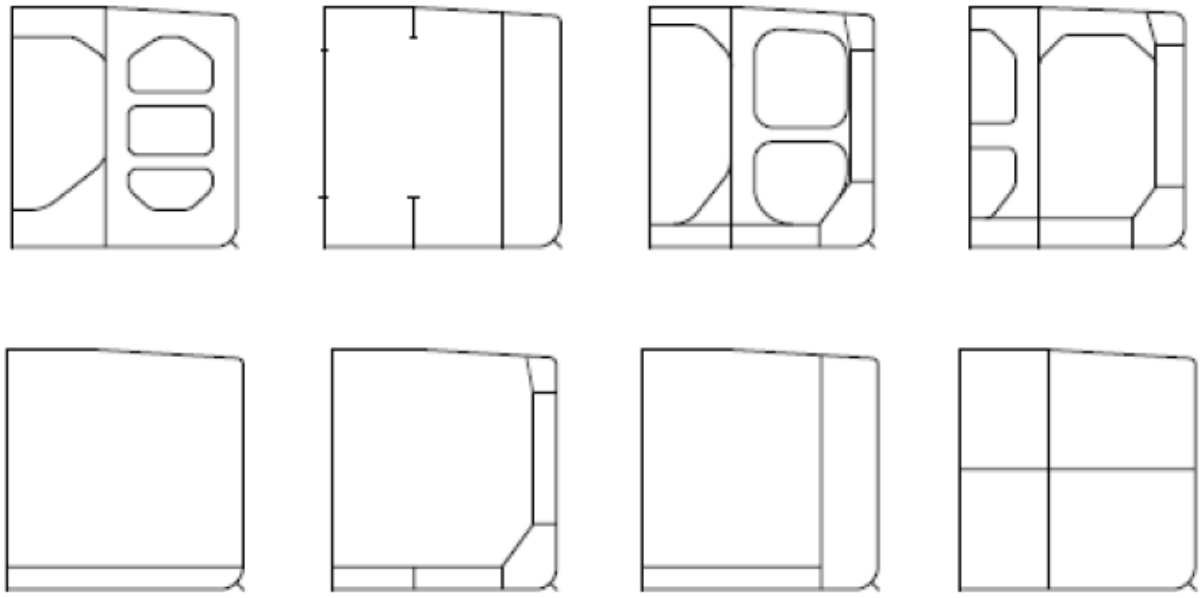
6.6.2 Ship type and Enhanced Survey Program (ESP) notations

(a) Oil Tanker

The ship type notation "OIL TANKER", or equivalent, and the notation "ESP" shall be assigned to sea going self propelled ships having integral tanks and intended for the carriage of oil in bulk. This type notation shall be assigned to tankers of both single and double skin construction, as well as tankers with alternative structural arrangements, e.g. mid-deck designs. Typical midship sections are given in Figure 2.6.1.

Note: Oil Tankers that do not comply with MARPOL I/19 may be subject to International and/or National Regulations requiring phase out under MARPOL I/20 and/or MARPOL I/21.

Figure 2.6.1: Typical midship sections of OIL TANKERS



(b) Bulk Carrier

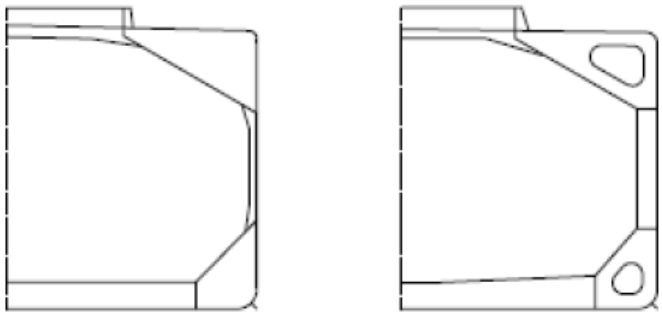
The ship type notation "BULK CARRIER", or equivalent, and the notation "ESP" shall be assigned to sea going self-propelled[4] which are constructed generally with single deck, double bottom, hopper side tanks and topside tanks and with single or double side skin construction in cargo length area and intended primarily to carry dry cargoes in bulk. Typical midship sections are given in Figure 2.6.2.

Bulk carrier of single side skin construction means a bulk carrier where one or more cargo holds are bound by the side shell only or by two watertight boundaries, one of which is the side shell, which are:

[4] Self-propelled ships are ships with mechanical means of propulsion not requiring assistance from another ship during normal operation.

(a) less than 760 mm apart in bulk carriers, the keels of which are laid or which are at a similar stage of construction before 1 January 2000,
(b) less than 1000 mm apart in bulk carriers, the keels of which are laid or which are at a similar stage of construction on or after 1 January 2000.

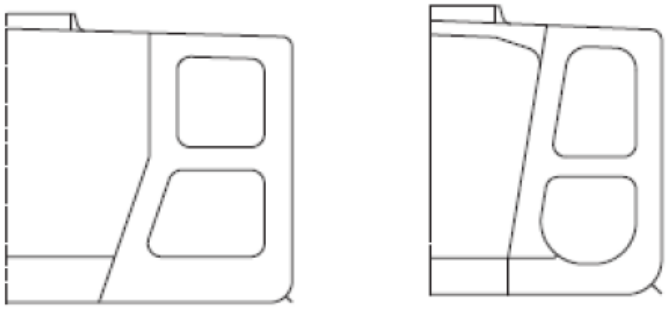
Figure 2.6.2: Typical midship sections of BULK CARRIER



(c) Ore Carrier

The ship type notation "ORE CARRIER", or equivalent, and the notation "ESP" shall be assigned to sea going self-propelled 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. A typical midship section is given in Figure 2.6.3.

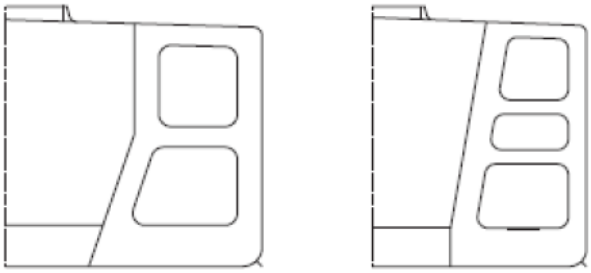
Figure 2.6.3: Typical midship section of ORE CARRIER



(d) Combination Carrier

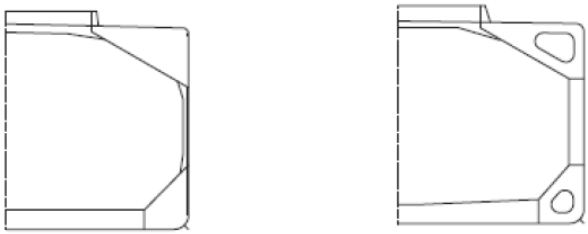
i. "Combination carrier" is a general term applied to ships intended for the carriage of both oil and dry cargoes in bulk; these cargoes are not carried simultaneously, with the exception of oil retained in slop tanks. The ship types defined in (ii) and (iii) below shall be considered to be combination carriers.
ii. The ship type notation "ORE OR OIL CARRIER", or equivalent, and the notation "ESP" shall be assigned to sea going self-propelled 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 of oil cargoes in centre holds and wing tanks. Typical midship sections are given in Figure 2.6.4.
Note: ORE/OIL carriers that do not comply with MARPOL I/19 may be subject to International and/or National Regulations requiring phase out.

Figure 2.6.4: Typical midship sections of ORE OR OIL CARRIERS



iii. The ship type notation "OIL/BULK/ORE (OBO) CARRIER", or equivalent, and the notation "ESP" shall be assigned to sea going self-propelled single deck ships of single or double skin construction, with a double bottom, hopper side tanks and topside tanks fitted below the upper deck, and intended for the carriage of oil or dry cargoes, including ore, in bulk. Typical midship sections are given in Figure 2.6.5.

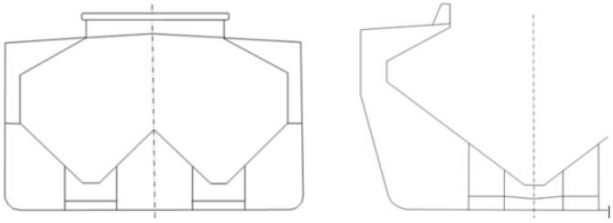
Figure 2.6.5: Typical midship sections of OIL/BULK/ORE (OBO) CARRIER



(e) Self-Unloading Bulk Carriers

The ship type notation "SELF-UNLOADERS", or equivalent, and the notation "ESP" shall be assigned to sea going self-propelled ships2 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 to carry and self-unload dry cargoes in bulk. Typical midship sections are given in Figure 2.6.6.

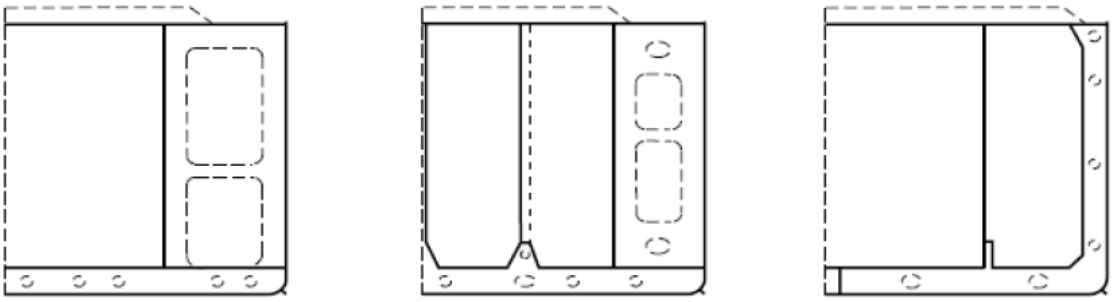
Figure 2.6.6: Typical midship sections of Self-Unloading Bulk Carriers



(f) Chemical Tankers

The ship type notation "CHEMICAL TANKERS", or equivalent, and the notation "ESP" shall be assigned to sea going self-propelled ships which are constructed generally with integral tanks and intended primarily to carry chemicals in bulk. This type notation shall be assigned to tankers of both single or double skin construction, as well as tankers with alternative structural arrangements. Typical midship sections are given in Figure 2.6.7.

Figure 2.6.7: Typical midship sections of CHEMICAL TANKERS



SECTION 7 Procedure for Adding, Maintaining or Withdrawing Double or Dual Class (IACS PR1B)

7.1 General

This Section contains procedures and requirements pertaining to adding, maintaining or withdrawing a double or dual class and is applicable, unless stated otherwise, to vessels of over 100 GT of whatever type, self propelled or not, restricted or unrestricted service, except for "inland waterway" vessels.

7.2 Definitions

- 'Double class vessel': a vessel which is classed by two Societies and where each Society works as if it is the only Society classing the vessel, and does all surveys in accordance with its own requirements and schedule.
- 'Dual class vessel': a vessel which is classed by two Societies between which there is a written agreement regarding sharing of work, reciprocal recognition of surveys carried out by each of the Societies on behalf of the other Society and full exchange of information on the class status and survey reports.
- 'First Society': a Society classing a vessel which, under request of the Owner, enters a double or dual class arrangement with another Society.
- 'Interim Certificate of Class', or
- Interim Class Certificate: the certificate issued immediately upon completion of the survey of the vessel to enable it to trade while the report of the classification surveys is processed by the gaining Society pursuant to issuing its full term Class Certificate
- 'Outstanding': still to be dealt with.
- 'Overdue': overdue on the date the first or losing Society receives the request by the second or remaining Society for its current classification survey status.
- 'Recommendations' and 'Conditions of Class' are to be read throughout this Section as being different terms used by the two Societies for the same thing i.e. requirements to the effect that specific measures, repairs, surveys etc. are to be carried out within a specific time limit in order to retain class.
- 'Remaining Society': a Society which keeps an existing vessel in class, when the class by the other Society involved in the double or dual class arrangement is suspended or withdrawn.
- 'Second Society': a Society which is requested by an Owner to accept an existing vessel already classed by another Society into its class under double or dual class arrangement.
- 'Withdrawing Society': a Society which withdraws its class to an existing vessel in class under double or dual class arrangement. (1)

NOTE:

1. The withdrawing Society is sometimes referred to simply as the "losing", when the context is obvious.

7.3 Adding class of a Second Society to a vessel classed by First Society

7.3.1 Obligations of the second Society

7.3.1.1 Whenever a Society (i.e. second Society) is requested by an Owner to accept an existing vessel already classed by another Society (i.e. first Society) into its class under double or dual class arrangement, the second Society is to immediately notify the Owner in writing that:

i. the second Society only accepts a vessel that is free from any overdue surveys or recommendations / conditions of class;
ii. the Owner is to inform first Society of his request to second Society;
iii. the Owner is to authorize first Society to submit to second Society its current classification status and documents as listed in Table 2.7.1 for information and use by second Society in conducting its class entry surveys;
iv. when the Owner decides to leave the double or dual class arrangement and prior to withdrawing from the class of one of two Societies the Owner is to inform the Societies of his intended actions;
v. when the Owner is advised that one of the Societies involved in double or dual class arrangement suspends or withdraws class the Owner is to inform the remaining Society of the action taken by the other Society without delay;
vi. copies of the plans are to be provided to second Society as a prerequisite to obtaining a full term Class Certificate. If the Owner is unable to provide all of the required plans, the second Society is to request that the Owner authorize the first Society to transfer copies of such of these plans as it may possess directly to the second Society upon request from the second Society, with the advice that the first Society will invoice the second Society and the second Society may, in turn, charge the associated costs to the Owner.

Table 2.7.1: Content of Vessel's History Report Regarding Class Items

Damages by events and dates (1)
Major repairs / rectifications by dates (1)
Conversion of hull-dates (1)
Major alterations of machinery installation-dates (1)
Condition evaluation / hull summary report if applicable
Type of cargoes (coal, logs, aggressive bulks, chemical product, type of oil) when available
History of recommendations / conditions of class (1)
Thickness measurements from last Special Survey and subsequent thickness measurements, including areas with substantial corrosion
Report of last Special Survey and subsequent periodical reports
Information on coating condition of water ballast tanks (including non ESP vessels) (1)
Restrictions / limitations in navigation area
Optional photos when available

NOTE:

1. As retained by the losing Society

7.3.1.2 Within two (2) working days of receipt of a written request from the Owner for entry into second Society's class at a Society's Headquarters or one of its designated control or management centers, the second Society is to notify the first Society of the requested entry into class using the relevant form duly completed and attaching the Owner's authorization for release of survey status.

7.3.1.3 Prior to issuing an Interim Certificate of Class the second Society is to:

1. obtain from the Owner, a written application for entry into second Society's class, containing an authorization for second Society to obtain the current classification status from the first Society;
2. obtain the current classification survey status from the Headquarters of the first Society or one of its designated control or management centers;
3. for double class: carry out its class entry survey taking account of the recommendations / conditions of class in the status provided by the first Society;
4. for dual class: carry out an initial survey having the scope of an annual survey as a minimum.

7.3.1.4 The second Society is, within one month from issuing its Interim Certificate of Class, to advise the first Society of the date of issuing this certificate. The relevant report duly completed is to be used.

Any additional information regarding outstanding surveys or recommendations / conditions of class received from the first Society in accordance with 7.3.2.2 is to be taken into account in accordance with 7.3.1.3(3), as applicable, and reported to the first Society with the relevant form duly completed within one (1) month from the completion of the survey.

7.3.1.5 Prior to final entry into the second Society's class, the second Society is obligated to:

1. carry out the class survey record review to the extent deemed necessary, but not less than the contents specified in Table 2.7.1 in order to prepare an auditable Vessel's History Report covering the present class and prior transfer of class performed after 1 July 2001; this Vessel's History Report is to be reviewed by an authorized person;
2. obtain plans and information in accordance with the requirements of the Society.

7.3.1.6 To ensure mutual exchange of information on vessels adding class and on the survey status of such vessels, the second Society is, on completion of final entry into class, to dispatch the relevant form duly completed to the first Society.

7.3.2 Obligations of the first Society

7.3.2.1 The first Society:

1. within two (2) working days of receipt of a written request at its Headquarters or one of its designated control or management centers is to notify the second Society the current classification status including a full list of surveys and recommendations / conditions of class. The most recent condition evaluation report/executive hull summary reports and survey planning document for the commenced Special Survey for vessels under Enhanced Survey Program are also to be provided. In cases where the class status is received in a language not readily understood by the second Society or contains vague or unclear descriptions the first Society is to provide additional detailed information in English language on request of the second Society. The first Society is obliged to advise the second Society of the possibility of further recommendations / conditions of class arising from surveys, which the first Society knows have been carried out but for which reports have not

yet been received. The relevant report is to be used by the first Society to report on the class status; details may be amplified, if necessary, in accompanying documents;

2. is obliged to make available, within one (1) month of receipt of request referred to in (1), all class survey records to the second Society for record review and relevant reporting, to the extent this information is in possession of the first Society, to enable the second Society to construct the Vessel's History Report outlined in Table 2.7.1, in accordance with 7.3.1.5(1);
3. alternatively to (2) above, upon request is obliged to provide, within one (1) month of receipt of the request referred to in (1), a copy of all the class survey records to the second Society, to enable the second Society to construct the Vessel's History Report outlined in Table 2.7.1, in accordance with 7.3.1.5(1) of this Section. These survey records will be transferred electronically if electronic files are available;
4. is also to submit, within one month of receipt of the request referred to in (1) above, any Vessel's History Reports regarding class items (see Table 2.7.1) available during the present class and from prior transfers of class performed after 1 July 2001.

7.3.2.2 The first Society has one month from issuance of its classification status to the second Society as per 7.3.2.1 to forward to the second Society:

1. the additional information on outstanding surveys and/or recommendations / conditions of class arising from surveys performed proximate to the date of Owner's written request for adding class which were not included in said status, by dispatching the relevant form duly completed; and
2. the structural diminution allowances which were applying to the vessel, by dispatching the relevant form duly completed.

7.4 Adding class of a Second Society to a vessel classed by First Society at vessel's delivery

7.4.1 The procedural requirements for adding class at vessel's delivery are applicable when the Society which has carried out the new construction technical review and surveys (i.e. First Society) has issued its first Certificate of Class.

7.4.2 Obligations and reporting of the second Society

7.4.2.1 Whenever a Society (i.e. Second Society) is requested by an Owner to accept a vessel already classed by another Society (i.e. first Society) into its class under double or dual class arrangement at vessel's delivery, the second Society is to immediately notify the Owner in writing that:

1. the Owner is to inform first Society of his request to second Society;
2. the Owner is to authorize first Society to submit to second Society its Certificate of Class;
3. when the Owner decides to leave the double or dual class arrangement and prior to withdrawing from the class of one of two Societies the Owner is to inform the Societies of his intended actions;
4. when the Owner is advised that one of the Societies involved in double or dual class arrangement suspends or withdraws class the Owner is to inform the remaining Society of the action taken by the other Society without delay;
5. copies of the plans are to be provided to second Society as a prerequisite to obtaining a full term Certificate of Class. If the Owner is unable to provide all of the required plans, the second Society is to request that the Owner authorize the first Society to transfer copies of such of these plans as it may possess directly to the second Society upon request from the second Society, with the advice that the first Society will invoice the second Society and the second Society may, in turn, charge the associated costs to the Owner.

7.4.2.2 After receipt of a written request from the Owner for entry into second Society's class at a Society's Headquarters or one of its designated control or management centers, the second Society is to notify the first Society of the requested entry into class using the relevant form duly completed and attaching the Owner's authorization for release of the first Certificate of Class, including the list of any

recommendations / conditions of class – with the respective due dates - issued against the subject vessel and the list of any information normally contained in the classification status.

7.4.2.3 Prior to issuing an Interim Certificate of Class on the date of the vessel's delivery, the second

Society is to:

- obtain from the Owner, a written request for entry into second Society's class at vessel's delivery, containing an authorization for second Society to obtain a copy of the first Certificate of Class, from the first Society;
- obtain the first Certificate of Class from the Headquarters of the first Society or one of its designated control or management centers or from the attending Surveyor at the yard of the builders, including any outstanding recommendations / conditions of class and information normally contained in the classification status.
- carry out and satisfactorily complete all relevant surveys.

7.4.2.4 The second Society is, within one month from issuing its Interim Certificate of Class, to advise the first Society of the date of issuing this certificate. The relevant report duly completed is to be used.

7.4.2.5 Prior to final entry into the second Society's class, the second Society is obligated to obtain plans and information.

7.4.2.6 To ensure mutual exchange of information on vessels adding class and on the survey status of such vessels, the second Society is, on completion of final entry into class, to dispatch the relevant form duly completed to the first Society.

7.4.3 Obligations and reporting of first Society

7.4.3.1 Upon receipt of a written request at its Headquarters or one of its designated control or management centers and on the date of the vessel's delivery, the first Society is to notify the second Society its first Certificate of Class, including the list of any recommendations / conditions of class - with respective due dates - issued against the subject vessel and the list of any information normally contained in the classification status. The relevant report is to be used by the first Society; details may be amplified, if necessary, in accompanying documents;

7.4.3.2 The first Society has one month from issuance of its Certificate of Class to the second Society to forward to the second Society:

- the structural diminution allowances which were applying to the vessel, by dispatching the relevant form.

7.5 Maintaining Class in a Double or Dual Class Arrangement

7.5.1 Double class

7.5.1.1 Each Society acts independently while the vessel is in double class.

7.5.2 Dual class

7.5.2.1 Each Society acts also on behalf of the other Society, while the vessel is in dual class, in accordance with the agreement adopted by the two Societies.

7.6 Withdrawing Class of a Society from a Double Class Arrangement

7.6.1 Obligations of the remaining Society maintaining its class

7.6.1.1 Whenever a Society (i.e. the remaining Society) being in a double class arrangement with another Society receives a written request from an Owner pertaining to his intention to withdraw from class of

the other Society (i.e. withdrawing Society), or information that her class has been withdrawn by the other Society, the remaining Society is to immediately notify the Owner in writing that:

(a) the validity of the remaining Society's Class Certificate is subject:

1. for vessels less than 15 years of age[(1)], to completion by the remaining Society of all overdue recommendations / conditions of class of the withdrawing Society at the first port of call at which surveys can be carried out and to completion by the remaining Society of all outstanding recommendations / conditions of class of the withdrawing Society by the due date;
2. for vessels of 15 years of age and over, to completion by the withdrawing Society of all overdue recommendations / conditions of class and to completion by the remaining Society of all outstanding recommendations / conditions of class of the withdrawing Society by the due date;

(b) the Owner is to authorize remaining Society to request from withdrawing Society its current classification status;

(c) principles given in[(1)] above apply to any additional recommendations / conditions of class issued against the vessel, which were not included in the initial survey status provided to the remaining Society by the withdrawing Society because they have arisen from the surveys carried out in close proximity to the request for withdrawal from class. Such additional recommendations / conditions of class, if received after the issuance of the Interim Certificate of Class by the remaining Society and which are overdue, are to be dealt with at the first port of call at which surveys can be carried out by the relevant Society, depending on the age of the vessel.

NOTE:

1. To be calculated from the date of delivery to either the date of notification by the Owner of his intention to withdraw from class or the date of advice by the withdrawing Society to the Remaining Society that class has been withdrawn, not at the request of the Owner.
With the information provided by the Owner and, after complying with the other relevant requirements of this Section, the Society may confirm the validity of its Class Certificate.

7.6.1.2 The remaining Society is to obtain from the Owner a written confirmation of intention to withdraw from the other Society's class, containing an authorization for remaining Society to obtain the current classification status from the Headquarters of the withdrawing Society or one of its designated control or management centers.

7.6.1.3 Within two (2) working days of receipt of a written confirmation of intention from the Owner to withdraw from the other Society's class at the remaining Society's Headquarters or at one of its designated control or management centres, the remaining Society is to request the withdrawing Society, on the basis of Owner's authorization, to release the survey status using the relevant form duly completed and attaching the Owner's authorization for release of survey status. However, if the remaining Society does not receive the classification survey status from the withdrawing Society within three (3) working days from the request, the remaining Society may utilize the withdrawing Society' survey status.

7.6.1.4 The remaining Society is to suspend the validity of its Class Certificate or other documents enabling the vessel to trade, if any overdue recommendations / conditions of class previously issued against the subject vessel by the withdrawing Society have not been satisfactorily completed by the relevant Society, depending on the age of the vessel, at the first port of call where surveys can be carried out.

When repair facilities are not available in the first port of survey, a direct voyage to a repair port may be accepted to complete surveys for overdue recommendations / conditions of class. In that case, the remaining Society is to inform the owner and withdrawing Society of the decision taken, e.g. direct voyage conditions agreed and port of repairs.

7.6.1.5 The validity of remaining Society's Class Certificate is subject to any outstanding recommendations / conditions of class previously issued against the vessel by the withdrawing Society being completed by the due date and as specified by the withdrawing Society. Any outstanding recommendations / conditions of class with their due dates are to be clearly stated on the:

- class survey record if available on board; and
- survey status.

7.6.1.6 Within one (1) month from the completion of the survey, the remaining Society is to advise the withdrawing Society of the actions taken with dates and locations to satisfy each overdue recommendation / condition of class, if any, issued against the subject vessel as specified to the Owner by the withdrawing Society. The relevant report duly completed is to be used. A list of dates, locations and actions taken to satisfy each overdue recommendation/overdue condition of class as specified to the Owner by the withdrawing Society is to be attached to the copy sent to the withdrawing Society.

Where no overdue items are provided by the withdrawing Society, this form is to be sent to the withdrawing Society within one (1) month from the date of sending the relevant form.

7.6.1.7 Any additional information regarding outstanding recommendations / conditions of class received from the withdrawing Society in accordance with 7.6.2.3 is to be dealt with in accordance with 7.6.1.4 and 7.6.1.5, as applicable, and reported to the withdrawing Society with the relevant form duly completed within one (1) month from the completion of the survey. When this additional information is received any recommendations / conditions of class which are overdue are to be dealt with at the first port of call at which surveys can be carried out by the relevant Society, depending on the age of the vessel. If this is not accomplished, the Class Certificate is to be suspended immediately unless the Owner agrees to proceed directly, without further trading, to a suitable port where any overdue recommendations / conditions of class are to be dealt with for completion.

7.6.1.8 The remaining Society is, within one (1) month of completion of a transfer of vessel into single class, to dispatch the relevant form duly completed, to the withdrawing Society. In cases where the withdrawing Society has reported recommendations / conditions of class on the vessel, the due dates of which are yet to come, the remaining Society is to provide to the withdrawing Society, together with the relevant form, an itemized list of the actions taken with dates and locations and actions to be taken, to satisfy each recommendation / condition of class.

7.6.1.9 The reporting by remaining Society to withdrawing Society required in 7.6.1.8 is to be done in accordance with the Harmonization of Reporting in Table 2.7.2.

7.6.1.10 The remaining Society is to carry out the class survey record review on the withdrawing Society during the period of double class arrangement to the extent deemed necessary, but not less than the contents specified in Table 2.7.1 in order to prepare an auditable Vessel's History Report to be reviewed by an authorized person.

Table 2.7.2: Harmonization of Reporting

ITEM	ACTION	LOCATION	DATE	GAINING SOCIETY'S REPORT REQUIREMENTS
Overdue Survey	Continued	Port	Survey Date	List items credited and items remaining to be credited, if any. Explain why the entire survey was not completed at this port. List conditions for direct voyage to port where survey will be completed, including the need to discharge current cargo if applicable.
Overdue Survey	Continued	Port	Survey Date	In cases where surveys are continued at the port where the current cargo is discharged, list items credited and items remaining to be credited, if any. Explain why the entire survey was not completed at this port. List conditions for direct voyage to port where survey will be completed.
Overdue Survey	Completed	Port	Survey Date	List place and date where survey was completed.

Overdue recommendation / condition of class	Cleared	Port	Survey Date	Explain actions taken to complete overdue recommendation / condition of class as specified by the losing Society.
Overdue recommendation / condition of class	Commenced	Port	Survey Date	In cases where overdue recommendations / conditions of class are postponed or partly postponed at the port where the current cargo is discharged, list items credited and items remaining to be credited, if any. Explain why the overdue recommendation was not completed at this port. List conditions for discharge voyage to port where recommendation will be completed as specified by losing Society.
Overdue recommendation / condition of class	Cleared	Port	Survey Date	List date and actions take for completion of overdue recommendations / conditions of class

7.6.2 Obligations of the withdrawing Society

7.6.2.1 If an Owner advises a Society in writing of an intention to withdraw from its class or class is withdrawn by the withdrawing Society, the withdrawing Society is to immediately confirm to the Owner any overdue surveys and outstanding recommendations / conditions of class, together with any outstanding fees. The remaining Society is to be informed of the actual or intended withdrawal of class using the relevant form, completed as applicable.

7.6.2.2 The withdrawing Society:

(1) within two (2) working days of receipt of a written request from the remaining Society at its Headquarters or one of its designated control or management centers, is to notify the remaining Society the latest class details in its possession including a full list of overdue surveys and recommendations / conditions of class - with the respective due dates - issued against the subject vessel. The most recent Condition Evaluation / Executive Hull Summary Reports and Survey Planning Document for the commenced Special Survey for vessels under Enhanced Survey Program, if any during the period of double class arrangement, are also to be provided. In cases where the class status is received in a language not readily understood by the remaining Society or contains vague or unclear descriptions, the withdrawing Society is to provide additional detailed information in English language on request of the remaining Society. The withdrawing Society is obliged to advise the remaining Society of the possibility of further recommendations / conditions of class arising from surveys, which the withdrawing Society knows have been carried out but for which reports have not yet been received. The report the relevant form is to be used by the withdrawing Society to report on the class status. Details may be amplified, if necessary, in accompanying documents;

(2) is obliged to make available, within one month of receipt of the request referred to in 7.6.2.1, all class survey records to the remaining Society for record review and relevant reporting during the period of double class arrangement to the extent this information is in the possession of the withdrawing Society;

(3) alternatively to (2) above, the withdrawing Society is obliged to provide, within one month of receipt of the request referred to in (1), a copy of all class survey records to the remaining Society upon request.

7.6.2.3 The withdrawing Society has one (1) month from issuance of its survey status to the remaining Society per 7.6.2.2 (2) to forward to the remaining Society the additional information on outstanding surveys and/or recommendations / conditions of class arising from surveys performed proximate to the date of Owner's written request to withdraw from class which were not included in said status to the Owner, by dispatching the relevant form.

7.6.2.4 For vessels of 15 years of age and over, the withdrawing Society is, within one (1) month from completion of any overdue recommendations / conditions of class imposed by the withdrawing Society, to confirm to the remaining Society the date, location and action taken to satisfy each item. The relevant report duly completed, is to be used. The reporting by the withdrawing Society to the remaining Society is to be done in accordance with the Harmonization of Reporting in Table 2.7.2.

7.6.2.5 To ensure mutual exchange of information on vessels transferring class and on the survey status of such vessels, the withdrawing Society is, on completion of a withdrawal of class, to dispatch the relevant form duly completed, to the remaining Society.

7.6.2.6 Should the withdrawing Society, upon receiving information from the remaining Society pursuant to the disposition of the withdraw of class, have clear grounds for believing that the remaining Society did not fulfill its obligations as specified in 7.6.1, the withdrawing Society is to notify the remaining Society of its concerns and attempt to resolve any differences.

7.7 Withdrawing Class of a Society from a Dual Class Arrangement

7.7.1 In the case of dual classed vessels, the withdrawing Society - according to agreement between the two Societies - is to inform the remaining Society that the class has been withdrawn using the relevant form.

7.8 Other Requirements

7.8.1 The obligations of the withdrawing and remaining Societies continue to apply when a vessel's class is suspended and for six (6) months following withdrawal of a vessel's class.

SECTION 8 Procedure for Suspension and Reinstatement or Withdrawal of Class

8.1 General

This Section contains procedures and requirements pertaining to suspension and reinstatement or withdrawal of class and is applicable, unless stated otherwise, to vessels of over 100 GT of whatever type, self propelled or not, restricted or unrestricted service, except for "inland waterway" vessels.

8.2 Definitions

"Disclassed": class has been suspended or withdrawn.

"Dual class vessel": a vessel which is classed by two Societies between which there is a written agreement regarding sharing of work, reciprocal recognition of surveys carried out by each of the Societies on behalf of the other Society and full exchange of information on the class status and survey reports.

"Recommendations" and "Conditions of Class" are to be read throughout this Section as being different terms used by Societies for the same thing, i.e. requirements to the effect that specific measures, repairs, surveys etc. are to be carried out within a specific time limit in order to retain class.

"Exceptional circumstances": 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.

"Force Majeure": damage to the ship; unforeseen inability of the Society 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 or civil strife; acts of war; or other force majeure.

8.3 Procedure for Suspension and Reinstatement or Withdrawal of Class

8.3.1 Suspension of class

8.3.1.1 When a ship is operating beyond the limitations defined by its class characters and additional class notations or any other additional conditions as approved, its class will be suspended and its classification certificate will be invalidated

8.3.1.2 Any damage, defect, failure or grounding that may lead to the invalidation of the assigned class may, if not reported to LHR without inappropriate delay or agreement of LHR prior to foreseen repairs not obtained, lead to suspension of the class and invalidation of the classification certificate

8.3.1.3 Suspension of the class and invalidation of the classification certificate will occur in any of the following cases, unless the Surveyor has boarded the ship for completion of these surveys:

1) When any outstanding recommendation or condition of class specified by LHR is overdue, and no extension is granted by LHR;

2) When continuous survey item(s) due or overdue at the time of annual survey have not been dealt with, and no extension is granted by LHR;

3) When surveys after construction other than annual, intermediate or special surveys are overdue, and no extension is granted by LHR;

4) When repairs of any damage, defect, failure or grounding have not been completed and surveyed as specified;

5) When the shipowner fails to arrange for the unscheduled surveys as required in the Rules for Classification of Sea-going Steel Ships.

8.3.1.4 Automatic suspension of the class and invalidation of the classification certificate will occur in any of the following cases:

1) When an annual survey has not been completed within 3 months of the due date of the anniversary, unless the ship is under attendance for completion of the annual survey;

2) When an intermediate survey has not been completed within 3 months of the due date of the third annual survey in the five-year special survey period, unless the ship is under attendance for completion of the intermediate survey;

3) When a special survey has not been completed within the period of time specified by LHR and no extension is granted by LHR, unless the ship has been under attendance for completion of the special survey prior to resuming trading, by the due date.

a. Under "exceptional circumstances", the Society may grant an extension not exceeding three (3) months to allow for completion of the Special Survey provided that the vessel is attended and the attending Surveyor(s) so recommend(s) after the following has been carried out:

(a) annual survey;
(b) re-examination of Recommendations / Conditions of Class;
(c) progression of the Special Survey as far as practicable;
(d) in the case where dry docking 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 dry-docking survey not exceeding 36 months interval provided the ship is without outstanding Recommendation / Condition of Class regarding underwater parts.

b. In the case that the Class Certificate will expire when the vessel is expected to be at sea, the shipowner has submitted a written application to LHR for an extension to allow for completion of the special survey prior to the expiry date of the certificate, and positive arrangements have been made for attendance of the Surveyor at the first port of call, when LHR believes that there is technical justification for such an extension, the completion of the special survey can be extended to be done at the first port of call after the expiry date of the certificate. However, if owing to "exceptional circumstances" the special survey cannot be completed at the first port of call, subparagraph (a) may be followed, but the total period of extension shall in no case be longer than three months after the original due date of the special survey.

8.3.1.5. If, due to circumstances reasonably beyond the control of the shipowner or LHR, the ship is not in a port where the overdue surveys can be completed at the expiry of the periods allowed above, LHR may allow the ship to sail, in class, directly to a discharge port, and if necessary, hence, in ballast, to a port at which the survey will be completed, at request of the shipowner and provided that:

1) Relevant records are examined;

2) The due and/or overdue surveys and examination of outstanding recommendations/class conditions are carried out by LHR at the next port of call when there is an unforeseen inability of LHR to attend the ship at the present port;

3) Upon review of the ship's history and survey at the present port, the attending Surveyor believes that the ship is in a condition appropriate to sail for one trip to a discharge port and if necessary, hence, in ballast to a repair facility, and this is to be confirmed by the Headquarters of LHR. Where there is an unforeseen inability of LHR to attend the ship at 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 prescribed above.

8.3.1.6. Where a ship has been detained following a Port State Control inspection on two occasions in one year or three occasions in two years, with serious deficiencies found, then the class will be liable to be suspended, at the discretion of LHR, and a corresponding note will be given in the Register of Ships.

8.3.1.7 Continuous Survey Item(s):

Continuous survey item(s) due or overdue at time of annual survey is to be dealt with. The vessel's class will be subject to a suspension procedure if the item(s) is not surveyed, or postponed by agreement.

8.3.1.8 Laid-up vessels

Vessels laid-up in accordance with the Society's Rules prior to surveys becoming overdue need not be suspended when surveys addressed above become overdue. However, vessels which are laid-up after being suspended as a result of surveys going overdue, remain suspended until the overdue surveys are completed.

8.3.1.9 When a vessel is intended for a 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 the demolition yard. In such cases a short-term Class 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.

8.3.1.10 Force Majeure:

If, due to circumstances reasonably beyond the owner's or the Society's control as defined above, the vessel is not in a port where the overdue surveys can be completed at the expiry of the periods allowed above, the Society 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 the Society:

1. exams the ship's records;
2. carries out the due and/or overdue surveys and examination of Recommendations / Conditions of Class at the first port of call when there is an unforeseen inability of the Society to attend the vessel in the present port, and
3. has satisfied itself that the vessel is in 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 Society 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 prescribed in this paragraph.

8.3.4 Suspension and reinstatement of class of dual classed vessels

8.3.4.1 When a vessel is dual classed and in the event that one of the Societies involved takes action to suspend the class of the vessel for technical reasons, the Society concerned will advise the other Society of the reasons for such action and the full circumstances within five (5) working days.

8.3.4.2 The other Society will, upon receipt of this advice, also suspend the class of the vessel, unless it can otherwise document that such suspension is incorrect.

8.3.4.3 When either Society decides to reinstate class, it is to inform the other Society.

8.3.5 Reinstatement of class

1. At owner's request, the class of a ship may be reinstated in any of the following cases:

(a) The class of a ship will be reinstated upon satisfactory completion of the overdue surveys. Such surveys are to be credited as of the original due date. However, the ship has no class from the date of suspension until the reinstatement date;

(b) The class of a ship will be reinstated upon verification that the due or overdue continuous survey items have been satisfactorily dealt with;

(c) The class of a ship will be reinstated upon verification that due or overdue outstanding recommendations have been satisfactorily dealt with.

8.3.6 Withdrawal of class

8.3.6.1 The class of a ship will be withdrawn in any of the following cases:

(a) At the request of the shipowner;
(b) The circumstances leading to suspension of class are not corrected within the time specified;
(c) The class of a ship will be withdrawn immediately when the ship proceeds to sail without having completed recommendations or conditions of class which were required to be dealt with before sailing;
(d) When the class of the ship has been suspended for a period of six (6) months due to overdue annual, intermediate, special surveys or other surveys after construction as required by the Rules and/or overdue outstanding recommendations/conditions of class. A longer suspension period may be granted for ships which are either laid up, awaiting disposition of a casualty or under attendance for reinstatement;

(e) Where hull, equipment or machinery (including electrical installations) is so badly damaged or in other conditions (e.g. sinking, scrapping, etc.) that continuing operation of the ship is confirmed as not possible;
(f) When the payment of survey fees is not made in time.

8.3.6.2 Where a ship has been detained following a Port State Control inspection on two occasions in one year or three occasions in two years, with serious deficiencies found, then the class will also be liable to be withdrawn, at the discretion of LHR, and a corresponding note will be given in the Register of Ships.

8.4 Notification and Reporting

8.4.1 Notification to Owners and Flag States

8.4.1.1 The Society is to confirm in writing the suspension of class and reinstating of the vessel's class to the Owner and to the Flag State.

8.4.1.2 The Society is to confirm in writing the withdrawal of class to the Owner and to the Flag State.

8.4.1.3 For new vessels constructed on or after 1 July 1998 under SOLAS Reg. II-1/3.1, the letters according to 8.4.1.1 and 8.4.1.2 are to state that certain statutory certificates are implicitly invalidated by the suspension / withdrawal of class.

NOTES:

1. The Class Certificate is to include as a minimum:
   - an expiry date based on the five-year Special Survey (Renewal Survey);
   - an endorsement section to record the completion of Annual [and Intermediate] Surveys;
   - a statement to indicate that the Class Certificate becomes invalid and classification is automatically suspended, if:
   (a) the Annual Survey has not been completed within three (3) months of the due date of the annual survey; or
   (b) the Intermediate Survey has not been completed within three (3) months of the due date of the third annual survey in each periodic survey cycle, unless the vessel is under attendance for completion of the relevant survey; or alternatively, a reference to the class suspension requirement contained in the Society's Rules.
2. At the discretion of each Society, the following types of vessels may be exempted from compliance with this Section provided the Society has procedures for the suspension and withdrawal of their class:
   - Mobile Offshore Drilling Units;
   - Mobile Offshore Units;
   - Floating Production and/or Storage Vessels;
   - Military vessels or commercial vessels owned or chartered by Governments, which are utilised in support of military operations or service; or
   - Vessels in lay-up;
   - Fishing vessels.

8.5 Maintenance of class

8.5.1. The ship's hull (including equipment) and machinery (including electric installations) are subject to various surveys in accordance with the requirements of LHR classification rules to ensure that their technical conditions are in compliance with the specifications regarding the assigned class characters

and additional class notations or the validity of the certificates. These surveys mainly include special survey, intermediate survey, annual survey, docking survey, propeller shaft and stern tube shaft surveys, boiler survey, continuous survey, occasional survey, alteration or conversion survey, etc.

8.5.2. The ship's hull (including equipment) and machinery (including electric installations) should be well maintained and managed according to the specifications regarding the assigned class characters and additional class notations or the validity of the certificates, including distribution of cargo loading and ballast, manoeuvring speed and course of the ship under bad weather conditions.

8.5.3. The operation of ships should abide by the loading conditions and other prescribed navigation conditions, including those restrictions set out by additional class notations.

8.5.4. Cargo stowage and stacking should be conducted in accordance with the requirements of the loading manual and/or loading instrument and cargo securing manual (including containers and unit cargoes) approved by LHR If there is any change of the above-mentioned stowage and stacking, the loading manual and/or loading instrument (if any) and cargo securing manual should be changed correspondingly and sent to LHR for approval.

8.5.5. If there are any damages, breakdowns, fractures or groundings and repairs that may affect the assigned class characters and additional class notations or the validity of the certificates, the master should inform LHR without delay, and LHR will assign surveyors to carry out a survey and put forward relevant requirements and recommendations for repair.

SECTION 9 Classification Regulations

9.1 New buildings

9.1.1 Constructional plans of hull, equipment and machinery as detailed in the Rules for ships intended to be classed with LHR are to be submitted for approval before the commencement of works. Any subsequent modification or additions to scantlings, arrangements or equipment shown on the approved plans are also to be submitted for approval.

9.1.2 Materials used in the construction of hull and machinery which are intended to be classed with LHR are to be of good quality free from defects and are to be tested in accordance with the requirements of LHR Rules. The steel is to be of shipbuilding quality and manufactured by an approved process at works recognized by the Society. Alternatively tests to the satisfaction of the Society will be required to demonstrate the suitability of the steel.

9.1.3 New ships intended for Classification are to be built under LHR Special Survey. Construction and qualifying works from the commencement of the work until the completion of the ship have to be supervised by LHR Surveyors who are to be satisfied that the materials, workmanship and arrangements are in accordance with the Rules. Any items found not to be in accordance with the Rules or the approved plans or any material, workmanship or arrangement found to be unsatisfactory, are to be rectified.

9.1.4 In compliance with 9.1.3, LHR is prepared to consider special methods of survey and inspection for hull construction based on shipyards' quality management system provided that it meets at least ISO 9001 relevant requirements.

9.1.5 Offshore supply ships, tugs, dredgers, hopper dredgers and other auxiliary vessels are to comply with the draught and stability requirements of the National Authority and are to have on board sufficient stability data to enable the crew to properly load and handle the vessel. These data are to take full account of any intended special distribution or concentration of loading. In the case of an unmanned ship under tow, the data are to be handed to the tug master.

9.1.6 When in the construction of a ship new and/or unusual materials or methods are used for which the present Rules are not directly applicable and sufficient experience is not available, the vessel may be

classed upon special consideration by the Society, which reserves the right to require special tests before and during service.

9.1.7 When the machinery is constructed under LHR Special Survey, this survey is to relate to the period from the commencement of the work until final tests under normal operating conditions. Any items found not to be in accordance with the Rules or the approved plans, or any materials workmanship or arrangements found to be unsatisfactory are to be rectified.

9.1.8 When remote control and/or automatic control equipment are used in essential machinery the same are to be arranged, installed and tested in accordance with LHR Rules.

9.1.9 The date of completion of the Special Survey during construction of ships built under LHR supervision will be taken as the date of build and will be entered in the Register Book.

9.1.10 New ships which are required by IMO Conventions to comply with a sub-division and damage stability standard will be assigned Class only after such compliance has been demonstrated. Approval by the relevant Administration may be accepted for the purpose of Classification. If not approved by the Administration the standard of sub-division and damage stability should not be less than that provided by the applicable IMO Convention and Amendments thereto or other standards, established by IMO with respect to special ship types where applicable.

9.2 Existing ships

9.2.1 Ships which have not been built under LHR Special Survey but under Special Survey of another recognized Classification Society may be classed with LHR following satisfactory completion of a Special Survey for Classification in accordance with the requirements of LHR Rules and after approval by the Society.

9.2.2 When reclassification is desired for a ship for which the Class has been withdrawn or suspended, the Society will request that a survey appropriate to the age of the ship and the circumstances of the case be carried out by LHR Surveyors. On satisfactory completion of such a survey in accordance with the Rules the Society will be prepared to reinstate her Class.

9.2.3 If the Class has been withdrawn or suspended for a reasonably short time period, the existing class certificates retain their validity after having been properly endorsed.

9.3 Repairs and alterations

9.3.1 Repairs to hull and machinery which may be required in order that the ship maintain her Class are to be carried out to LHR Surveyor's satisfaction. Concerning repairs effected at a port or location where an LHR Surveyor is not available these repairs must be surveyed by an LHR Surveyor at the earliest opportunity thereafter.

9.3.2 The recommendations for repairs resulting from damage or wear and tear revealed after survey are to be notified to the Owner or his representative. When such recommendations are not complied with immediate notification should be given to the Society by the Surveyors.

9.3.3 If a ship classed with LHR is taken in tow whilst at sea, the Owner is to advise LHR of the circumstances at the first practicable opportunity.

9.3.4 Any alteration to approved scantlings and arrangements of hull, machinery or equipment are to be submitted for approval and modification are to be undertaken to the Surveyor's satisfaction.

9.4 Existing ships - Periodical Surveys

9.4.1 Annual Surveys are to be held on all ships within three (3) months before or after each anniversary of the completion, commissioning or Special Survey in accordance with the requirements of Part 1, Chapter 3.

9.4.2 Intermediate Surveys are to be held on all ships instead of the second or third Annual Survey after completion, commissioning or Special Survey in accordance with the requirements given in Part 1, Chapter 3.

9.4.3 Ships are to be examined in drydock or on a slipway two times in any five-year special survey period, with an interval not exceeding 36 months. One of the two Docking Surveys required in each five-year period should coincide with the Special Survey. A Docking Survey is considered to coincide with the Special Survey when held within the fifteen (15) months prior to the due date of the Special Survey.

The Society may accept an In-water Survey in lieu of the intermediate docking between Special Surveys (see Part 1, Chapter 3, SECTION 9, 9.5). The interval between examinations of the outside of ship's bottom and related items for ships operating in fresh water and for certain harbor or non-self-propelled craft may be greater than that given above. An extension of examination of the ship's bottom of three (3) months beyond the due date can be granted in exceptional circumstances such as:

- 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

9.4.4 All ships are to be subjected to Special Surveys in accordance with the requirements given in Part 1, Chapter 3 at five-year intervals. The first Special Survey becomes due five (5) years from the date of build or date of Special Survey for Classification. At the discretion of the Society consideration can be given to any exceptional circumstances justifying an extension of the hull Classification to a maximum of three months beyond the fifth year. If an extension is agreed the next period of class (hull Classification) will start from the expiry date of the Special Survey before the extension was granted (IACS UR Z7, Cor. 1, 2.1.2).

9.4.5 Special Surveys may be commenced on the fourth anniversary after completion, commissioning or a previous Special Survey and progressed during the succeeding year with a view to completion by the fifth anniversary. As part of the preparation for the Special Survey, the thickness determination should be dealt with so far as is practicable, in connection with the fourth Annual Survey. When the Special Surveys is commenced prior to the fourth Annual Survey, the entire survey is to be completed within fifteen (15) months if such work is to be credited to the Special Survey. (IACS UR Z7, Cor. 1, 2.1.4)

Where the Special Survey is completed more than three months before the due date, the new record of Special Survey will be the final date of survey. In all cases the date recorded will be the fifth anniversary.

9.4.6 At the Owner's request the Society may agree the Special Survey of the hull, for ships other than bulk carriers, combination carriers, oil tankers and general dry cargo ships to be carried out on a Continuous Survey basis. In this case all compartments of the hull are to be opened for survey and testing, in rotation, with an interval of five (5) years between consecutive examinations of each part. Approximately one-fifth of the surveyable items are to be surveyed each year and all the requirements of the particular hull Special Survey must be completed at the end of the five-year cycle. The intervals of inspection of items concerning fire protection, inert gas system, ballast and double bottom tanks, are to be specially agreed. The surveyor may extend the inspection at his discretion, to other items if the inspections carried out revealed any defects. For ships more than 10 years of age, the ballast tanks are to be internally examined twice in each five-year class period, i.e. once within the scope of the intermediate survey and once within the scope of the continuous system for the hull special survey. The agreement may be withdrawn at discretion of the Society.

9.4.7 Complete surveys of machinery become due at five (5) years intervals the first one five (5) years from the date of build or date of the first Classification. Consideration can be given by the Society to any

exceptional circumstances justifying an extension of machinery Class to a maximum of three (3) months beyond the fifth year. If an extension is granted to the subsequent period of machinery, Class will start from the due date of complete Special Survey of machinery before the extension was granted. Where the complete survey is completed more than three (3) months before the due date, the new date recorded will be the final date of Survey. In all other cases the date recorded will be the fifth anniversary.

9.4.8 Upon application by an Owner, the Society may agree to an extension of the survey requirements for main engines which by the nature of the ship's normal service do not attain the number of running hours recommended by the engines' maker for major overhauls within the survey periods given in 9.4.7.

9.4.9 In the case it has been agreed by the Society that the survey of the machinery may be carried out on a continuous survey basis every item is to be opened for inspection in rotation, so far as is practicable, to ensure that the intervals between consecutive examinations of each item do not exceed five (5) years. Generally, one-fifth of the machinery items are to be examined each year.

9.4.10 At the Owner's request, the Society may agree that subject to certain conditions, some items of machinery may be examined by the Chief Engineer of the ship at ports where LHR is not represented or where else practicable at sea. To this purpose the Owner should submit to LHR Head Office a written application including the following information:

- name of the Chief Engineer
- age
- professional qualification
- number and date of issue of his license
- service seniority
- time in service with the Owner

The Head Office, after having positively decided on the acknowledgement of the Chief Engineer will send an authorization letter to the Owner. A copy of this letter should be kept on board, for use by the LHR Surveyors. In this case, a limited confirmatory survey will be carried out at the next port, where an exclusive Surveyor is available.

9.4.11 Where condition monitoring equipment is fitted, the Society will be prepared to amend applicable Periodical Survey requirements where details of the equipment are submitted and found satisfactory. Where machinery installations are accepted for this method of survey, an Annual Survey should be held at which time monitored records will be analyzed and machinery examined under working conditions.

9.4.12 On completion of the Special Survey and after submission of the required reports by the Surveyors and approval by the Society, certificates of first entry of Classification signed by the General Technical Director will be issued. At the Owner's request certificates of Class maintenance, following completion of Periodical Surveys of hull and machinery will also be issued.

9.4.13 Provisional (Interim) certificates are permitted to be issued by the Surveyors so enabling the ship to proceed on her voyage upon satisfactory completion of relevant surveys. Such certificates will embody the Surveyors' recommendations but in all cases are subject to confirmation by the Society.

9.4.14 Under special circumstances the results of corresponding previous surveys carried out on behalf of Flag Administrations may be taken into account by the Society for classification purposes.

9.5 Notice of Surveys

9.5.1 Owners will be notified by LHR about forthcoming surveys by means of electronic communication. The omission of such notice, however, does not absolve the Owner from his responsibility to comply with LHR survey requirements for maintenance of Class.

9.6 Appeal from Surveyors' recommendations

9.6.1 In case the recommendations of LHR Surveyors are considered to be unnecessary or unreasonable appeal may be made to the Society.

9.7 Laying up and reactivation

9.7.1 LHR is to be notified by the owner that a ship is in laid-up condition and this status is to be noted in the Record of the Ship.

9.7.2 A ship in laid up condition retains her class until the date of expire of her running period of class. Thus periodical surveys are to be carried out normally, with some relaxation with respect to the complete periodical surveys, at Head's Office discretion. Dry docking and propeller shaft surveys may be postponed until reactivation.

9.7.3 When the period of class expires and the ship remains in laid-up condition further extension of the class may be granted subject, at first, to a special survey to be carried out in laid-up condition and subsequently, to periodical laid-up surveys. In this case the notation **"LAID-UP SHIP"** will be assigned and published in the Register Book. These surveys may be held with some relaxation with respect to the normal surveys, at the discretion of Head Office, taking into account the duration of the laid-up period and the conditions under which the ship has been maintained during that period.

9.7.4 The submission and approval by LHR Head Office of a special maintenance program which is verified by annual surveys may be considered as an equivalent alternative for a ship to retain her class during laid-up period.

9.7.5 For the purposes of classification in laid-up condition hull and machinery may be considered separately.

9.7.6 For ships returning to active service and whose laid-up period exceeds three months a reactivation survey is required in order to verify that ship structure, machinery and equipment are in good and efficient condition after the laid-up period. The extent of the reactivation survey is determined by LHR Head Office taking into account the length of the laid-up period, the status of periodical laid-up surveys and the conditions under which the ship has been maintained during that period. In addition to the reactivation survey all overdue periodical surveys, not covered by the reactivation survey, are to be carried out.

9.7.7 Applicable items of the reactivation survey may be credited to the forthcoming special survey provided that it is completed within a period of approximately twelve months, or it is on continuous basis.

SECTION 10 Procedures for certification of a company engaged in thickness measurement of hull structures

10.1 Application

10.1.1 This guidance applies for certification of a company, which intends to engage in the thickness measurement of hull structures of ships.

10.2 Procedures for certification

10.2.1 Submission of documents

The following documents should be submitted to the Society for approval:

- Outline of the company, e.g. organization and management structure.

- Experience of the company on thickness measurement of hull structures of ships.
- Technicians careers, i.e. experiences of technicians as thickness measurement operators, technical knowledge and experience of hull structure, etc. Operators should be qualified according to a recognized industrial NDT Standard.
- Equipment used for thickness measurement such as ultra-sonic testing instruments and their maintenance/calibration procedures.
- A guide for thickness measurement operators.
- Training programs for technicians for thickness measurement.
- Measurement record format in accordance with recommended procedures for thickness measurements.

10.2.2 Auditing of the company

Upon reviewing the documents submitted with satisfactory results, the company should be audited in order to ascertain that the company is duly organized and managed in accordance with the documents submitted, and eventually is capable of conducting thickness measurement of the hull structure of ships.

Certification is conditional upon an on-board demonstration of thickness measurement as well as satisfactory reporting.

10.3 Certification

10.3.1 Upon satisfactory results of both the audits of the company in 10.2.2(a) and the demonstration tests in 10.2.2(b) the Society should issue a Certificate of Approval as well as a notice to the effect that the thickness measurement operation system of the company has been certified.

10.3.2 Renewal/endorsement of the certificate should be made at intervals not exceeding 3 years by verification that original conditions are maintained.

10.4 Report of any alteration to the certified thickness measurement operation system

10.4.1 In case where any alteration to the certified thickness measurement operation system of the company is made, such an alteration should be immediately reported to the Society. Re-audit should be made where deemed necessary by the Society.

10.5 Withdrawal of the certification

10.5.1 The certification may be withdrawn in the following cases:

a) Where the measurements were improperly carried out or the results were improperly reported.
b) Where the surveyor found any deficiencies in the approved thickness measurement operation systems of the company.
c) Where the company failed to report any alteration in 10.4 to the organization recognized by the Administration as required.

CHAPTER 3 Periodical Surveys

CONTENTS

SECTION 1 General

1.1 Frequency of Surveys

1.1.1 All ships classed with LHR are to be subjected to the following periodical surveys:

- Annual Surveys of hull and machinery.
- Intermediate Surveys.
- Docking Surveys.
- Special Surveys of hull and machinery.
- Boiler Surveys.
- Propeller Shaft Surveys.

Bulk carriers, oil tankers and chemical tankers are to be subject to an Enhanced Survey Program as stated in the relevant applicable requirements stated in this Chapter.

1.1.2 **Annual Surveys** are to be held within 3 months before or after each anniversary from the date of the initial classification survey or of the date of the Special Survey and wherever practicable concurrently with the statutory Annual Surveys.

1.1.3 **Intermediate Surveys** are to be held at, between or instead of either the 2nd or 3rd Annual Survey. Those items which are additional to the requirements of the Annual Surveys may be surveyed either at or between the 2nd and 3rd Annual Survey. A survey planning meeting is to be held prior to the commencement of the survey. Concurrent crediting to both Intermediate Survey and Special Survey for surveys and thickness measurements of spaces are not acceptable.

1.1.4 **Docking Surveys** are to be held at intervals not exceeding 36 months (see Part 1, Chapter 2, SECTION 7, 7.4.3).

1.1.5 **Special Surveys** of hull and machinery are to be held at five-year intervals to renew the Classification Certificate.

The first Special Survey is to be completed within 5 years from the date of the initial classification survey and thereafter within 5 years from the credited date of the previous Special Survey. However, an extension of class of 3 months maximum beyond the 5th year can be granted in exceptional circumstances. In this case, the next period of class will start from the expiry date of the Special Survey before the extension was granted.

For surveys completed within 3 months before the expiry date of the Special Survey, the next period of class will start from the expiry date of the Special Survey. For surveys completed more than 3 months before the expiry date of the Special Survey, the period of class will start from the survey completion date. In cases where the vessel has been laid up or has been out of service for a considerable period because of a major repair or modification and the owner elects to only carry out the overdue surveys, the next period of class will start from the expiry date of the special survey. If the owner elects to carry out the next due special survey, the period of class will start from the survey completion date.

The Special Survey may be commenced at the 4th Annual Survey and be progressed with a view to completion by the 5th anniversary date. When the Special Survey is commenced prior to the 4th Annual Survey, the entire survey is to be completed within 15 months if such work is to be credited to the Special Survey.

A survey planning meeting is to be held prior to the commencement of the survey.

Concurrent crediting to both Intermediate Survey and Special Survey for surveys and thickness measurements of spaces are not acceptable.

1.1.6 **Boiler Surveys** are to be held at 2 ½-year intervals internally and generally examined externally at the time of the Annual Survey of the ship (see 16.1).

1.1.7 **Propeller Shaft Surveys** are to be held according to 18.1.

1.2 Definitions

1.2.1 An **Oil Tanker** is a ship of single or double skin construction having integral tanks and intended primarily to carry oil in bulk. In this category are also included combination carriers such as ore/oil, ore/bulk/oil etc.

1.2.2 A **Double Hull Oil Tanker** is a ship which is constructed primarily for the carriage of oil[5] in bulk, which have the cargo tanks protected by a double hull which extends for the entire length of the cargo area, consisting of double sides and double bottom spaces for the carriage of water ballast or void spaces.

1.2.3 A **Bulk Carrier** is a ship of single or double skin construction normally constructed with a double bottom, single deck, hopper side tanks in cargo spaces and topside tanks. A bulk carrier is intended primarily to carry dry cargo in bulk and includes ship types such as ore carriers and combination carriers.

1.2.4 A **Double Skin Bulk Carrier** is a ship which is constructed generally with single deck, topside tanks and hopper side tanks in cargo spaces, and is intended primarily to carry dry cargo in bulk, including such types as ore carriers and combination carriers[6], in which all cargo holds are bounded by a double-side skin (regardless of the width of the wing space).

1.2.5 A **Chemical Tanker** is a ship of single or double skin construction having integral tanks and constructed or adapted and used for the carriage in bulk of any liquid product listed in Chapter 17 of the "International Code For The Construction And Equipment Of Ships Carrying Dangerous Chemicals In Bulk", (IBC Code).

1.2.6 A **Ballast Tank** is a single or double side tank which is used primarily for the carriage of salt water ballast and includes side ballast tanks, ballast double-bottom spaces, peak tanks, topside tanks, hopper side tanks. A space that is used for both cargo and ballast will be treated as a ballast tank when substantial corrosion has been found in that space. A Double Side Tank is to be considered as a separate tank even if it is in connection to either the topside tank or the hopper side tank.

1.2.7 A **Combined Cargo/Ballast Tank** is a tank which is used for the carriage of cargo or ballast water as a routine part of the vessel's operation and will be treated as a Ballast Tank. Cargo tanks in which water ballast might be carried only in exceptional cases per MARPOL I/18.3 are to be treated as cargo tanks.

1.2.8 An **Overall Survey** is a survey intended to report on the overall condition of the tank or cargo hold structure or hull structure and determine the extent of additional Close-up Surveys.

1.2.9 A **Close-up Survey** is a survey where the details of structural components are within the close visual inspection range of the Surveyor, i.e. normally within the reach of hand.

1.2.10 A **Transverse Section** includes all longitudinal members such as plating, longitudinals and girders at the deck, sides, bottom, inner bottom and hopper side plating, inner sides top wing inner sides, longitudinal bulkheads and bottom plating in top wing tanks. For transversely framed vessels, a transverse section includes adjacent frames and their end connections in way of transverse sections.

1.2.11 **Critical Structural Areas** are locations which have been identified from calculations to require monitoring or from the service history of the subject ship or from similar ships or sister ships, if applicable, to be sensitive to cracking, buckling or corrosion which would impair the structural integrity of the ship.

1.2.12 **Suspect Areas** are locations showing Substantial Corrosion and/or are considered by the surveyor to be prone to rapid wastage.

[5] MARPOL Annex I cargoes
The requirements in UR Z10.4 are also applicable to existing double hull tankers not complying with MARPOL Regulation 13F, but having a U-shaped midship section.

[6] For combination carriers with longitudinal bulkheads additional requirements are specified in UR Z10.1 or UR Z10.4, as applicable.

1.2.13 **Substantial Corrosion** is an extent of corrosion such that assessment of corrosion pattern indicates a wastage in excess of 75% of allowable margins, but within acceptable limits.

For vessels built under the IACS Common Structural Rules, substantial corrosion is an extent of corrosion such that the assessment of the corrosion pattern indicates a gauged (or measured) thickness between t_{net} + 0.5mm and t_{net}.

1.2.14 **Coating Condition** is defined as follows:

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.

1.2.15 A **Corrosion Prevention System** is normally considered a full hard protective coating.

Hard Protective Coating is usually to be epoxy coating or equivalent. Other coating systems, which are neither soft nor semi-hard coatings, may be considered acceptable as alternatives provided that they are applied and maintained in compliance with the manufacturer's specifications.

Protective coating should usually be epoxy coating or equivalent. Other coating systems may be considered acceptable as alternatives provided that they are applied and maintained in compliance with the manufacturer's specifications. Where soft or semi-hard coatings have been applied, safe access should be provided for the surveyor to verify the effectiveness of the coating and to carry out an assessment of the conditions of internal structures which may include spot removal of the coating. When safe access cannot be provided, the soft or semi-hard coating should be removed.

1.2.16 A **Prompt and Thorough Repair** is 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.

1.2.17 **Spaces** are separate compartments including holds, tanks, cofferdams and void spaces bounding cargo holds, decks and the outer hull, if applicable.

1.2.18 **Representative Spaces** are those which are expected to reflect the conditions of other Spaces of similar type and service and with similar corrosion prevention systems. When selecting Representative Spaces, account should be taken of the service and repair history on board and identifiable Critical Structural Areas and/or Suspect Areas.

1.2.19 **Representative Tanks** are those 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 is to be taken of the service and repair history onboard and identifiable Critical Structural Areas and/or Suspect Areas.

1.2.20 **Cargo (Length) Area** is that part of the ship which includes all cargo holds and tanks and adjacent areas including cargo tanks, slop tanks and cargo/ballast pump-rooms, fuel tanks, cofferdams, ballast tanks and void spaces adjacent to cargo tanks and also deck areas throughout the entire length and breadth of the part of the ship over the above-mentioned spaces.

1.2.21 **Special Consideration** or specially considered (in connection with close-up surveys and thickness measurements) means sufficient close-up inspection and thickness measurements are to be taken to confirm the actual average condition of the structure under the coating.

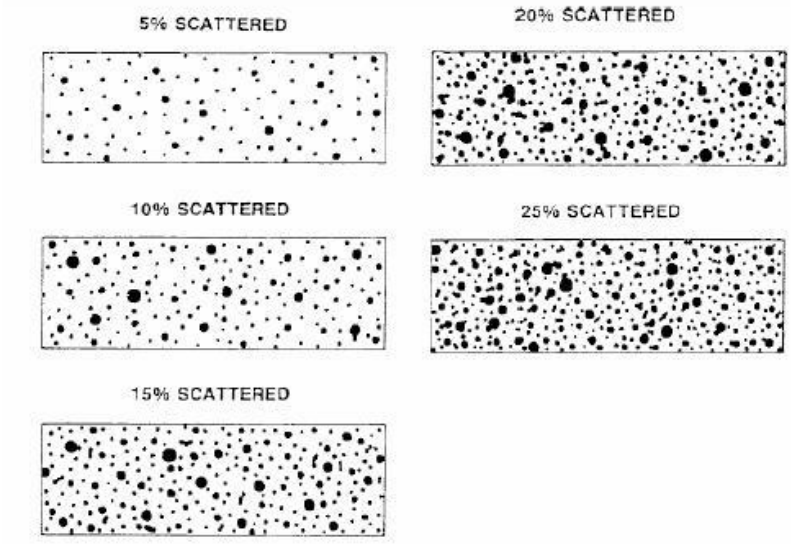
1.2.22 **Air pipe heads** installed on the exposed decks are those extending above the freeboard deck or superstructure decks.

1.2.24 **Renewal Thickness** (t_{ren}) is the minimum allowable thickness, in mm, below which renewal of structural members is to be carried out.

1.2.25 **Remote Inspection Technique (RIT)** is a means of survey that enables examination of any part of the structure without the need for direct physical access of the surveyor (refer to IACS Rec. 42).

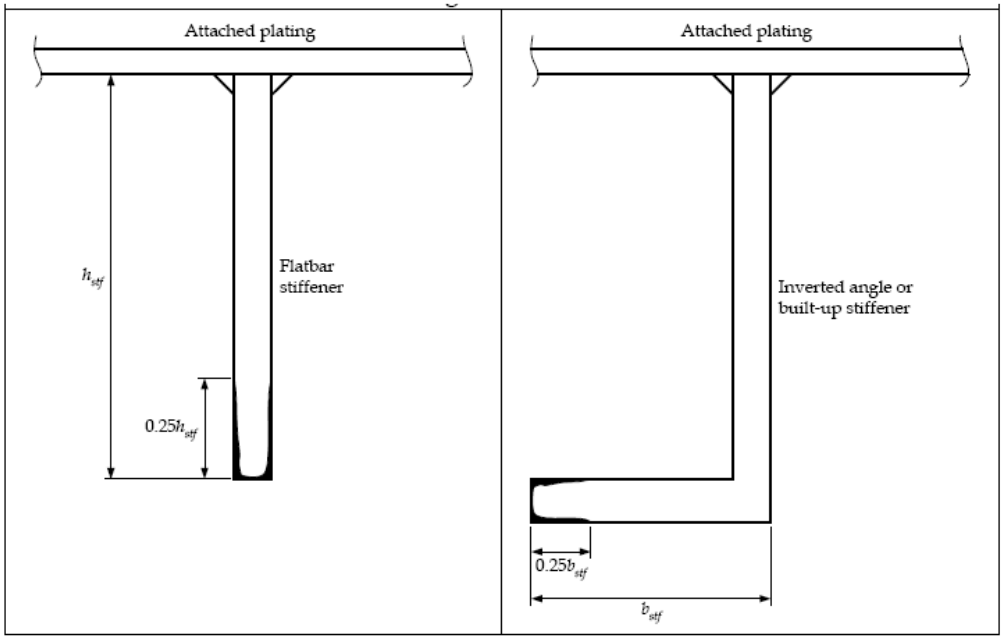
1.2.26 **Pitting Corrosion** is defined as scattered corrosion spots/areas with local material reductions which are greater than the general corrosion in the surrounding area. Pitting intensity is defined in Figure 3.1.1(a).

Figure 3.1.1(a): Pitting Intensity Diagrams



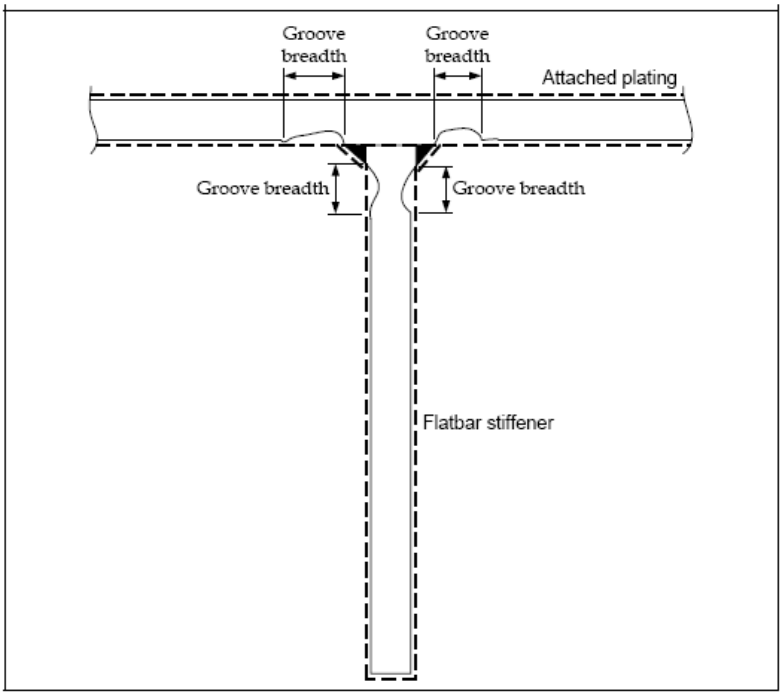
1.2.27 **Edge Corrosion** is defined as local corrosion at the free edges of plates, stiffeners, primary support members and around openings. An example of edge corrosion is shown in Figure 3.1.1(b).

Figure 3.1.1(b): Edge Corrosion



1.2.28 **Grooving Corrosion** is typically local material loss adjacent to weld joints along abutting stiffeners and at stiffener or plate butts or seams. An example of groove corrosion is shown in Figure 3.1.1(c).

Figure 3.1.1(c): Grooving Corrosion



1.3 Unscheduled Surveys

1.3.1 Beyond the system of Periodical Surveys, the Society reserves the right to perform unscheduled surveys of the hull or machinery in order to verify that the Class assigned is being maintained.

1.4 Procedures for thickness measurements

1.4.1 General

(a) The required thickness measurements, if not carried out by the Society itself, are to be witnessed by a Surveyor of the Society. The Surveyor is to be on board to the extent necessary to control the process. The attendance of the surveyor shall be recorded.

(b) The thickness measurement firm is to be part of the survey planning meeting to be held prior to commencing the survey.

(c) Thickness measurements of structures in areas where close-up surveys are required are to be carried out simultaneously with close-up surveys.

(d) In all cases the extent of thickness measurements is to be sufficient as to represent the actual average condition.

1.4.2 Certification of Thickness Measurement Firm

The thickness measurements normally to be taken by means of ultrasonic test equipment and are to be carried out by a qualified firm certified by the LHR according to the procedures for certification of firms engaged in thickness measurement of hull structures, in accordance with *LHR's Requirements for Service Suppliers*. For non-ESP ships less than 500 gross tons and all fishing vessels, a suitably qualified Surveyor may carry out thickness measurements. On all other occasions, an approved firm is to carry out the thickness measurements.

1.4.3 Reporting

(a) A thickness measurement report is to be prepared. The report is to give the location of measurements, the thickness measured as well as corresponding original thickness. Furthermore,

the report is to give the date when the measurements were carried out, type of measurement equipment, names of personnel and their qualifications and has to be signed by the operator.
The thickness measurement report is to follow the principles as specified in the Recommended Procedures:

a. Thickness Measurements of Bulk Carriers, contained in UR Z10.2 Annex II.
b. Thickness Measurements of Oil Tankers, contained in UR Z10.1 Annex II
c. Thickness Measurements of Chemical Tankers, contained in UR Z10.3 Annex II
d. Thickness Measurements of Double Skin Bulk Carriers, contained in UR Z10.5 Annex II
e. Thickness Measurements of Double Hull Oil Tankers, contained in UR Z10.4 Annex II

(b) The Surveyor is to review the final thickness measurement report and countersign the cover page.

1.4.4 Survey meeting

Prior to commencement of the Intermediate or Special Survey, as required by 1.7 and 1.8, a meeting is to be held between the attending surveyor(s), , the master of the ship or an appropriately qualified representative appointed by the master or Company, the owner's representative(s) in attendance and the thickness measurement firm's representative(s) so as to ensure the safe and efficient execution of the surveys and thickness measurements to be carried out onboard.

Communication with the thickness measurement operator(s) and owner's representative is to be agreed during the meeting, with respect to the following:

- reporting of thickness measurements on regular basis
- prompt notification of the surveyor in case of findings:
  - excessive and/or extensive corrosion or pitting / grooving of any significance
  - structural defects like buckling, fractures and deformed structures
  - detached and/or holed structure
  - corrosion of welds.

When thickness measurements are taken in association with Intermediate or Special Survey, a documented record indicating where and when the meeting took place and who attended (the name of the surveyor(s), the master of the ship or an appropriately qualified representative appointed by the master or Company, the owner's representative(s) and the representative(s) thickness measurement firm(s)) is to be maintained.

1.4.5 Monitoring of the thickness measurement process onboard

The surveyor is to decide final extent and location of thickness measurements after overall survey of representative spaces onboard.

In case the owner prefers to commence the thickness measurements prior to the overall survey then the surveyor is to advise that the planned extent and locations of thickness measurements are subject to confirmation during the overall survey. Based on findings, the surveyor may require that additional thickness measurements have to be taken.

The surveyor should direct the gauging operation by selecting locations such that readings taken represent, on average, the condition of the structure for that area.

Thickness measurements taken mainly to evaluate the extent of corrosion, which may affect the hull girder strength, are to be carried out in a systematic manner of all longitudinal structural members that are required to be gauged.

Where thickness measurements indicate substantial corrosion or wastage in excess of allowable diminution, the surveyor is to direct locations for additional thickness measurements in order to delineate areas of substantial corrosion and to identify structural members for repairs / renewals.

Thickness measurements of structures in areas where close-up surveys are required shall be carried out simultaneously with close-up surveys.

1.4.6 Review and verification

Upon completion of the thickness measurements, the surveyor is to confirm that no further gaugings are needed, or specify additional gaugings.

If, where special consideration is allowed by the Rules, the extent of thickness measurements is reduced, the surveyor's special consideration is to be reported.

In case thickness measurements are partly carried out, the extent of remaining thickness measurements is to be reported for the use of the next surveyor.

1.4.7 In case of ships assigned the ESP class notation, the extent of the thickness measurements at areas of substantial corrosion should be in accordance with the Table 3.1.2, Table 3.1.3, Table 3.1.4 and Table 3.1.6 depending on the type of the ship.

1.4.8 For tanks where substantial corrosion covers more than 20% of the deck surface, the whole deck structure including longitudinal and web frames above the tank should be thickness measured in accordance with the applicable requirements stated in the Table 3.1.2, Table 3.1.3 , Table 3.1.4 and Table 3.1.6.

1.4.9 When thickness measurements indicate substantial corrosion, in ships other than those assigned the ESP class notation, the number of thickness measurements shall be increased to determine the extent of Substantial Corrosion. Table 3.1.7 may be used as guidance for additional thickness measurements.

1.4.10 In the thickness measurements reports, the relevant maximum allowable diminution should be stated.

1.4.11 Sampling method of thickness measurements for longitudinal strength evaluation and repair methods

1) Extent of longitudinal strength evaluation

Longitudinal strength should be evaluated within 0.4L amidships for the extent of the hull girder length that contains tanks therein and within 0.5L amidships for adjacent tanks which may extend beyond 0.4L amidships, where tanks means ballast tanks and cargo tanks.

2) Sampling method of thickness measurement

(a) Pursuant to the requirements of 3.6.5, transverse sections should be chosen such that thickness measurements can be taken for as many different tanks in corrosive environments as possible, e.g. ballast tanks sharing a common plane boundary with cargo tanks fitted with heating coils, other ballast tanks, cargo tanks permitted to be filled with sea water and other cargo tanks. Ballast tanks sharing a common plane boundary with cargo tanks fitted with heating coils and cargo tanks permitted to be filled with sea water should be selected where present.

(b) The minimum number of transverse sections to be sampled should be in accordance with Table 3.1.1. The transverse sections should be located where the largest thickness reductions are suspected to occur or are revealed from deck and bottom plating measurements prescribed in 3.6.4 and should be clear of areas which have been locally renewed or reinforced.

(c) At least two points should be measured on each deck plate and/or bottom shell plate required to be measured within the cargo area in accordance with the requirements of Table 3.1.1.

(d) Within 0.1D (where D is the ship's moulded depth) of the deck and bottom at each transverse section to be measured in accordance with the requirements of Table 3.1.1, every longitudinal and girder should be measured on the web and face plate, and every plate should be measured at one point between longitudinals.

(e) For longitudinal members other than those specified in 3.6.5 to be measured at each transverse section in accordance with the requirements of Table 3.1.1, every longitudinal and girder should be measured on the web and face plate, and every plate should be measured at least in one point per strake.

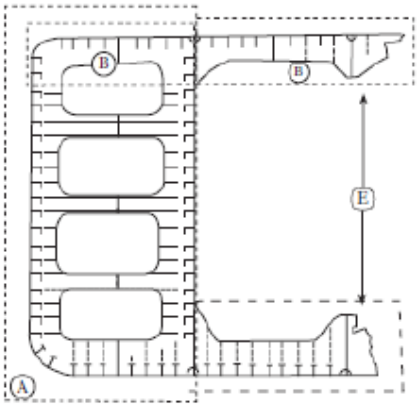
(f) The thickness of each component should be determined by averaging all of the measurements taken in way of the transverse section on each component.

Table 3.1.1: Minimum requirements to thickness measurements at Special Survey of Oil Tankers, Ore/Oil Ships and etc.

Special Survey No 1 (Age < 5)	**Special Survey No 2 (5 < Age ≤ 10)**	**Special Survey No 3 (10 < Age ≤ 15)**	**Special Survey No 4 (Age >15)**
1. Suspect Areas	1. Suspect Areas	1. Suspect Areas	1. Suspect Areas
2. One section of deck plating for the full beam of the ship within the cargo area (in way of a ballast tank, if any, or a cargo tank used primarily for water ballast)	2. Within the cargo area: – Each deck plate – One transverse section	2. Within the cargo area: – Each deck plate – Two transverse sections (Note 1) – All wind and water strakes	2. Within the cargo area: – Each deck plate – Three transverse sections (Note 1) – Each bottom plate
	3. Selected wind and water strakes outside the cargo area	3. Selected wind and water strakes outside the cargo area	3. All wind and water strakes, full length
4. Measurements of those structural members subject to close-up survey according to Table 3.3.1, for general assessment and recording of corrosion pattern	4. Measurements of those structural members subject to close-up survey according to Table 3.3.1, for general assessment and recording of corrosion pattern	4. Measurements of those structural members subject to close-up survey according to Table 3.3.1, for general assessment and recording of corrosion pattern	4. Measurements of those structural members subject to close-up survey according to Table 3.3.1, for general assessment and recording of corrosion pattern
NOTE: (1) At least one section is to include a ballast tank within 0,5L amidships.			

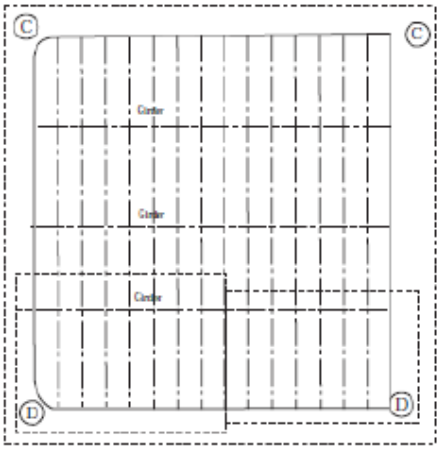
Figure 3.1.2: Thickness Measurement - Oil Tankers, Ore/Oil ships and etc. Close-up survey requirements

Oil Tanker
Typical transverse section close-up survey



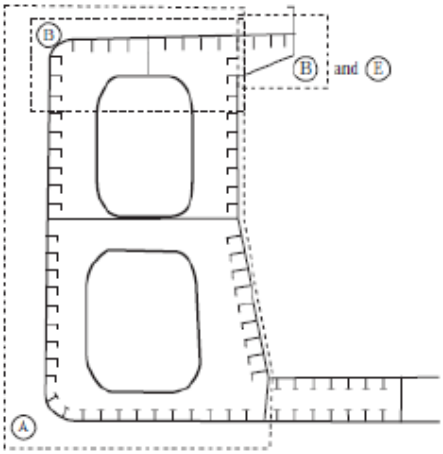
Thickness to be reported on
TM3-T and TM4-T as appropriate

Oil Tanker
Typical transverse bulkhead



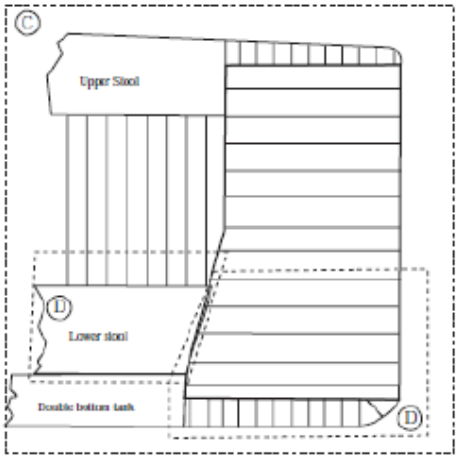
Thickness to be reported on TM5-T

Oil/Ore ship
Typical transverse section close-up survey



Thickness to be reported on
TM3-T and TM4-T as appropriate

Oil/Ore ship
Typical transverse bulkhead



Thickness to be reported on TM5-T

Close-up survey area

Recommendations for the extent and patterm of gaugings are indicated in Table IV of the IACS Unified Requirements

3) Additional measurements where the longitudinal strength is deficient

(a) Where one or more of the transverse sections are found to be deficient in respect of the longitudinal strength requirements, the number of transverse sections for thickness measurement should be increased such that each tank within the 0.5L amidships region has

(b) been sampled. Tank spaces that are partially within, but extend beyond, the 0.5L region, should be sampled.

(c) Additional thickness measurements should also be performed on one transverse section forward and one aft of each repaired area to the extent necessary to ensure that the areas bordering the repaired section also comply with the requirements of SECTION 3.

4) Effective repair methods

(a) The extent of renewal or reinforcement carried out to comply with this paragraph should be in accordance with 3.3.3.

(b) The minimum continuous length of a renewed or reinforced structural member should be not less than twice the spacing of the primary members in way. In addition, the thickness diminution in way of the butt joint of each joining member forward and aft of the replaced member (plates, stiffeners, girder webs and flanges, etc.) should not be within the substantial corrosion range (75% of the allowable diminution associated with each particular member). Where differences in thickness at the butt joint exceed 15% of the lower thickness, a transition taper should be provided.

(c) Alternative repair methods involving the fitting of straps or structural member modification should be subject to special consideration. In considering the fitting of straps, it should be limited to the following conditions:

.1 to restore and/or increase longitudinal strength;

.2 the thickness diminution of the deck or bottom plating to be reinforced should not be within the substantial corrosion range (75% of the allowable diminution associated with the deck plating);

.3 the alignment and arrangement, including the termination of the straps, is in accordance with a standard recognized by the Society;

.4 the straps are continuous over the entire 0.5L amidships length; and

.5 continuous fillet welding and full penetration welds are used at butt welding and, depending on the width of the strap, slot welds. The welding procedures applied should be acceptable to the Society.

(d) The existing structure adjacent to replacement areas and in conjunction with the fitted straps, etc. should be capable of withstanding the applied loads, taking into account the buckling resistance and the condition of welds between the longitudinal members and hull envelope plating.

Table 3.1.2: Bulk carriers - Extent of thickness measurements at areas of substantial corrosion – Special Survey with the Cargo Area Length

Structural member	Extent of measurement	Pattern of measurement
SHELL STRUCTURE		
1. Bottom and side shell plating	(a) Suspect plate, plus four adjacent plates (b) See other tables for particulars on gauging in way tanks and cargo holds	5-point pattern for each panel between longitudinals
2. Bottom / side shell longitudinals	Minimum of three longitudinals in way of suspect areas	3 measurements in line across web 3 measurements on flange
TRANSVERSE BULKHEADS IN CARGO HOLDS		
1. Lower stool	(a) Transverse band within 25mm of welded connection to inner bottom.	(a) 5-point between stiffeners over 1m length
	(b) Transverse band within 25mm of welded connection to shelf plate.	(b) 5-point between stiffeners over 1m length
2. Transverse bulkhead	(a) Transverse band at approx. mid-height	(a) 5-point pattern over 1m² of plating
	(b) Transverse band at part of bulkhead adjacent to upper deck or below upper stool shelf plate (for those ships fitted with upper stools)	(b) 5-point pattern over 1m² of plating
DECK STRUCTURE INCLUDING CROSS STRIPS, MAIN CARGO HATCHWAYS, HATCH COVERS, COAMINGS AND TOPSIDE TANKS		
1. Cross deck strip plating	Suspect cross deck strip plating	5-point pattern between underdeck stiffeners over 1m length
2. Underdeck stiffeners	(a) Transverse members	5-point pattern at each end and mid-span
	(b) Longitudinal member	5-point pattern on both web and flange
3. Hatch covers	(a) Side and end skirts, each 3 locations	5-point pattern at each location
	(b) 3 Longitudinal bands outboard strakes (2) and centerline strake (1)	5-point measurement each band
4. Hatch coamings	Each side and end of coaming, one band lower 1/3, one band upper 2/3 of coaming	5-point measurement each band
5. Topside water ballast tanks	(a) Watertight transverse bulkheads:	
	- lower 1/3 of bulkhead	5-point pattern over 1m² of plating
	- upper 2/3 of bulkhead	5-point pattern over 1m² of plating
	- stiffeners	5-point pattern over 1m length
	(b) 2 representative swash transverse bulkheads:	
	- lower 1/3 of bulkhead	5-point pattern over 1m² of plating
	- upper 2/3 of bulkhead	5-point pattern over 1m² of plating
	- stiffeners	5-point pattern over 1m length
	(c) 3 representative bays of slope plating	
	- lower 1/3 of tank	5-point pattern over 1m² of plating
	- upper 2/3 of tank	5-point pattern over 1m² of plating
	(d) Longitudinals, suspect and adjacent	5-point pattern both web and flange over 1 metre length
6. Main Deck Plating	Suspect plates and adjacent	5-point pattern over 1m² of plating
7. Main Deck Longitudinals	Minimum of 3 longitudinals where plating measured	5-point pattern on both web and flange over 1m length
8. Web frames / Transverses	Suspect plates	5-point pattern over 1m²
DOUBLE BOTTOM AND HOPPER STRUCTURE		
1. Inner/Double bottom plating	Suspect plate plus all adjacent plates	5-point pattern for each panel between longitudinals over 1m length
2. Inner/Double bottom longitudinals	3 longitudinals where plates measured	3 measurements inline across web, and 3 measurements on flange

Structural member	Extent of measurement	Pattern of measurement
3. Longitudinal girders or transverse floors	Suspect plates	5-point pattern over about 1m²
4. Watertight bulkheads (WT floors)	- lower 1/3 of tank	5-point pattern over 1m² of plating
	- upper 2/3 of tank	5-point pattern alternate plates over 1m² of plating
5. Web frames	Suspect plate	5-point pattern over 1m² of plating
6. Bottom/side longitudinals	Minimum of three longitudinals in way of suspect areas	3 measurements in line across web 3 measurements on flange
CARGO HOLDS		
1. Side shell frames	Suspect frame and each adjacent	At each end and midspan: 5-point pattern of both web and flange 5-point pattern within 25 mm of welded attachment to both shell and lower slope plate

Table 3.1.3: Oil tankers - Extent of thickness measurements at areas of substantial corrosion – Special Survey with the Cargo Area Length

Structural member	Extent of measurement	Pattern of measurement
BOTTOM STRUCTURE		
1. Bottom plating	Minimum of 3 bays across tank, Including aft bay. Measurements around and under all bell mouths.	5-point pattern for each panel between longitudinals and webs.
2. Bottom longitudinals	Minimum of 3 longitudinals in each bay where bottom plating measured.	3 measurements in line across flange and 3 measurements on vertically web.
3. Bottom girders and brackets	At fore and aft transverse bulkhead bracket toes and in center of tanks.	Vertical line of single measurements on web plating with one measurement between each panel stiffener, or a minimum of three measurements. Two measurements across face flat. 5-point pattern on girder/bulkhead brackets.
4. Bottom transverse webs	3 webs in bays where bottom plating measured, with measurements at both ends and middle.	5-point pattern over 2 m² area. Single measurements on face flat.
5. Panel stiffening	Where provided	Single measurements
DECK STRUCTURE		
1. Deck plating	Two bans across tank.	Minimum of three measurements per plate per band.
2. Deck longitudinals	Minimum of 3 longitudinals in each of two bays.	3 measurements in line vertically on webs, and 2 measurements on flange (if fitted).
3. Deck girders and brackets	At fore and aft transverse bulkhead, bracket toes and in center of tanks.	Vertical line of single measurements on web plating with one measurement between each panel stiffener or a minimum of three measurements. Two measurements across face flat. 5-point pattern on girder/bulkhead brackets.
4. Deck transverse webs	Minimum of two webs with measurements at middle and both ends of span.	5 points pattern over about 2 m² areas. Single measurements on face flat.
5. Panel stiffening	Where provided	Single measurements.

Structural member	Extent of measurement	Pattern of measurement
SIDE SHELL AND LONGITUDINAL BULKHEADS		
1. Deckhead and bottom strakes, and strakes in way of stringer platforms.	Plating between each pair of longitudinals in a minimum of 3 bays.	Single measurement.
2. All other strakes	Plating between every 3rd pair of longitudinals in same 3 bays.	Single measurement.
3. Longitudinals-deckhead and bottom strakes	Each longitudinal in same 3 bays.	3 measurements across web and 1 measurement on flange.
4. Longitudinals-all others	Every third longitudinal in same 3 bays.	3 measurements across web and 1 measurement on flange.
5. Longitudinals-brackets	Minimum of three at top, middle and bottom of tank in same 3 bays.	5-point pattern over area of bracket.
6. Web frames and cross ties	3 webs with minimum of three locations on each web, including in way of cross tie connections.	5-point pattern over about 2 m^2 area, plus single measurements on web frame and cross tie face flats.
TRANSVERSE BULKHEADS AND SWASH BULKHEADS		
1. Deckhead and bottom strakes, and strakes in way of stringer platforms.	Plating between pair of stiffeners at three locations - approx. ¼, ½ and ¾ width of tank.	5-point pattern between stiffeners over 1 m length.
2. All other strakes	Plating between pair of stiffeners at middle location	Single measurement
3. Strakes in corrugated bulkheads	Plating for each change of scantling at center of panel and at flange or fabricated connection.	5-point pattern over about 1 m^2 of plating.
4. Stiffeners	Minimum of three typical stiffeners.	For web, 5-point pattern over span between bracket connections (2 measurements across web at each bracket connection, and one at center of span). For flange, single measurements at each bracket toe and at center of span.
5. Brackets	Minimum of three at top, middle and bottom of tank.	5-point pattern over area of brackets.
6. Deep webs and girders	Measurements at toe of bracket and at center of span.	For web, 5-point pattern over about 1 m^2. 3 measurements across face flat.
7. Stringer platforms	All stringers with measurements at both ends and middle.	5-point pattern over 1 m^2 of area plus single measurements near bracket toes and on face flats.

Table 3.1.4: Chemical tankers - Extent of thickness measurements at areas of substantial corrosion – Special Survey with the Cargo Area Length

Structural member	Extent of measurement	Pattern of measurement
Bottom, Inner Bottom and Hopper Structure		
Bottom, inner bottom and hopper structure plating	Minimum of three bays across tank, including aft bay Measurements around and under all suction bell mouths	5-point pattern for each panel between longitudinals and floors
Bottom, inner bottom and hopper structure longitudinals	Minimum of three longitudinals in each bay where bottom plating measured	Three measurements in line across the flange and three measurements on vertical web
Bottom girders, including the watertight ones	At fore and aft watertight floors and in centre of tanks	Vertical line of single measurements on girder plating with one measurement between each panel stiffener, or a minimum of three measurements. Two measurements across face flat where fitted.

Structural member	Extent of measurement	Pattern of measurement
Bottom floors, including the watertight ones	Three floors in bays where bottom plating measured, with measurements at both ends and middle	5-point pattern over 2 m^2 area
Hopper structure web frame ring	Three floors in bays where bottom plating measured	5-point pattern over 1 m^2 of plating. Single measurements on flange
Hopper structure transverse watertight bulkhead or swash bulkhead	- lower 1/3 of bulkhead	- 5-point pattern over 1 m^2 of plating
	- upper 2/3 of bulkhead	- 5-point pattern over 2 m^2 of plating
	- stiffeners (minimum of three)	- For web, 5-point pattern over span (two measurements across web at each end and one at centre of span). For flange, single measurements at each end and centre of span
Panel stiffening	Where applicable	Single measurements
Deck structure		
Deck plating	Two transverse bands across tank.	Minimum of three measurements per plate per band.
Deck longitudinals	Every third longitudinal in each of two bands with a minimum of one longitudinal.	3 measurements in line vertically on webs, and 2 measurements on flange (if fitted).
Deck girders and brackets	At fore and aft transverse bulkhead, bracket toes and in center of tanks.	Vertical line of single measurements on web plating with one measurement between each panel stiffener or a minimum of three measurements. Two measurements across face flat. 5-point pattern on girder/bulkhead brackets.
Deck transverse webs	Minimum of two webs with measurements at middle and both ends of span.	5-points pattern over 1 m^2 area. Single measurements on flange.
Vertical web and transverse bulkhead in wing ballast tank for double hull design (2 m from deck)	Minimum of two webs, and both transverse bulkheads	5-point pattern over 1 m^2 area
Panel stiffening	Where applicable	Single measurement
Side shell and longitudinal bulkheads		
Side shell and longitudinal bulkhead plating: - Deckhead and bottom strakes, and strakes in way of horizontal girders. - All other strakes	- Plating between each pair of longitudinals in a minimum of 3 bays (along the tank). - Plating between every third pair of longitudinals in same 3 bays	- Single measurement - Single measurement
Side shell and longitudinal bulkhead longitudinals on: - Deckhead and bottom strakes - All other strakes	- Each longitudinal in same 3 bays - Every third longitudinal in same 3 bays	- 3 measurements across web and 1 measurement on flange
Longitudinals-brackets	- Minimum of three at top, middle and bottom of tank in same 3 bays.	- 5-point pattern over area of bracket.
Vertical web and transverse bulkheads of double side tanks (excluding deck area) - Strakes in way of horizontal girders - Other strakes	- Minimum of 2 webs and both transverse bulkheads - Minimum of 2 webs and both transverse bulkheads	- 5-point pattern over approximately 2 m^2 area - 2 measurements between each pair of vertical stiffeners
Web frames and cross ties for other tanks than double side tanks	- 3 webs with minimum of three locations on each web, including in way of cross tie connections and lower end bracket.	- 5-point pattern over about 2 m^2 area of webs, plus single measurements on web frame and cross ties.
Horizontal girders	- Plating on each girder in a minimum of three bays	- 2 measurements between each pari of longitudinal girder stiffeners
Panel stiffening	- Where applicable	- Single measurements
Transverse watertight and swash bulkheads		
Upper and lower stool, where fitted	Transverse band within 25 mm of welded connection to inner bottom/deck plating Transverse band within 25 mm of welded connection to shelf plate	5-point pattern between stiffeners over 1 m length
Deckhead and bottom strakes, and strakes in way of horizontal stringers.	Plating between pair of stiffeners at three locations - approx. ¼, ½ and ¾ width of tank.	5-point pattern between stiffeners over 1 m length.
All other strakes	Plating between pair of stiffeners at middle location	Single measurement

Structural member	Extent of measurement	Pattern of measurement
Strakes in corrugated bulkheads	Plating for each change of scantling at center of panel and at flange or fabricated connection.	5-point pattern over about 1 m^2 of plating.
Stiffeners	Minimum of three typical stiffeners.	For web, 5-point pattern over span between bracket connections (2 measurements across web at each bracket connection, and one at center of span). For flange, single measurements at each bracket toe and at center of span.
Brackets	Minimum of three at top, middle and bottom of tank.	5-point pattern over area of brackets.
Deep webs and girders	Measurements at toe of bracket and center of span.	For web, 5-point pattern over about 1 m^2. 3 measurements across face flat.
Horizontal stringers	All stringers with measurements at both ends and middle.	5-point patterns over 1 m^2 of area plus single measurements near bracket toes and on flanges.

Table 3.1.5: Double Skin Bulk Carriers - Extent of thickness measurements at those areas of substantial corrosion within the cargo length area

Structural member	Extent of measurement	Pattern of measurement
BOTTOM, INNER BOTTOM AND HOPPER STRUCTURE		
Bottom plating, inner bottom and hopper structure plating	Minimum of 3 bays across double bottom tank, including aft bay. Measurements around and under all suction bell mouths	5-point pattern for each panel between longitudinals and floors.
Bottom, inner bottom and hopper structure longitudinals	Minimum of 3 longitudinals in each bay where bottom plating measured.	3 measurements in line across the flange and 3 measurements on the vertical web.
Bottom girders, including the watertight ones.	At fore and aft watertight floors and in center of tanks.	Vertical line of single measurements on girder plating with one measurement between each panel stiffener, or a minimum of three measurements.
Bottom floors, including the watertight ones.	3 floors in bays where bottom plating measured, with measurements at both ends and middle.	5-point pattern over 2 m^2 area.
Hopper structure web frame ring	Three floors in bays where bottom plating measured.	5-point pattern over 1 m^2 of plating. Single measurements on flange.
Hopper structure transverse watertight bulkhead or swash bulkhead.	- Lower 1/3 of bulkhead	- 5-point pattern over 1 m^2 of plating.
	- Upper 2/3 of bulkhead	- 5-point pattern over 2 m^2 of plating.
	- Stiffeners (minimum of three)	- For web, 5-point pattern over span (two measurements across web at each end and one at center of span). For flange, single measurements at each end and center of span.
Panel stiffening	Where applicable	Single measurements
DECK STRUCTURE INCLUDING CROSS STRIPS, MAIN CARGO HATCHWAYS, HATCH COVERS, COAMINGS AND TOPSIDE TANKS		
Cross Deck Strip plating	Suspect Cross Deck Strip plating	5-point pattern between underdeck siffeners over 1 m length
Underdeck Stiffeners	Transverse members	5-point pattern at each end and mid span
	Longitudinal member	5-point pattern on both web and flange
Hatch Covers	Side and end skirts, each three locations	5-point pattern at each location
	Three longitudinal bands, outboard strakes (2) and centreline strake (1)	5-point measurement each band
Hatch Coamings	Each side and end of coaming, one band lower 1/3, one band upper 2/3 of coaming	5-point measurement each band i.e., end or side coaming
Topside Ballast Tanks	a. watertight transverse bulkheads: - Lower 1/3 of bulkhead	5-point pattern over 1 m^2 of plating

Structural member	Extent of measurement	Pattern of measurement
	- Upper 2/3 of bulkhead - Stiffeners	5-point pattern over 1 m^2 of plating 5-point pattern over 1 m length
Topside Ballast Tanks	b. two representative swash transverse bulkheads: - Lower 1/3 of bulkhead - Upper 2/3 of bulkhead - Stiffeners	 5-point pattern over 1 m^2 of plating 5-point pattern over 1 m^2 of plating 5-point pattern over 1 m length
Topside Ballast Tanks	c. three representative bays of slope plating - Lower 1/3 of tank - Upper 2/3 of tank	 5-point pattern over 1 m^2 of plating 5-point pattern over 1 m^2 of plating
Topside Ballast Tanks	d. Longitudinals, suspect and adjacent	5-point pattern on both web and flange over 1 m length
Main Deck Plating	Suspect Plates and adjacent (4)	5-point pattern over 1 m^2 of plating
Main Deck Longitudinals	Suspect Plates	5-point pattern on both web and flange over 1 m length
11. Web Frames/Transverses	Suspect Plates	5-point pattern over 1 m^2
STRUCTURE IN DOUBLE SIDE SPACES OF DOUBLE SKIN BULK CARRIERS INCLUDING WING VOID SPACES OF ORE CARRIERS		
Side shell and inner plating: - Upper strake and strakes in way of horizontal girders. - All other strakes	 - Plating between each pair of transverse frames / longitudinals in a minimum of 3 bays (along the tank). - Plating between every 3rd pair of longitudinals in same 3 bays.	 - Single measurement - Single measurement
Side shell and inner side transverse frames / longitudinals on: - Upper strake - All others strakes	 - Each transverse frame/longitudinal in same 3 bays. - Every 3rd transverse frame/longitudinal in same 3 bays.	 - 3 measurements across web and 1 measurement on flange. - 3 measurements across web and 1 measurement on flange.
Transverse frames / Longitudinals - brackets	Minimum of 3 at top, middle and bottom of tank in same 3 bays.	5-point pattern over area of bracket.
Vertical web and transverse bulkheads: - Strakes in way of horizontal girders - Other strakes	 - Minimum of 2 webs and both transverse bulkheads. - Minimum of 2 webs and both transverse bulkheads.	 - 5-point pattern over approxim. 2 m^2 area. - Two measurements between each pair of vertical stiffeners.
Horizontal girders	Plating on each girder in a minimum of three bays	Two measurements between each pair of longitudinal girder stiffeners
Panel stiffening.	Where applicable	Single measurements.
TRANSVERSE BULKHEADS IN CARGO HOLDS		
Lower stool, where fitted	- Transverse band within 25mm of welded connection to inner bottom - Transverse bands within 25mm of welded connection to shelf plate.	- 5-point pattern between stiffeners over 1 m length - 5-point pattern between stiffeners over 1 m length
Transverse bulkheads	- Transverse band at approx. mid height - Transverse band at part of bulkhead adjacent to upper deck or below upper stool shelf plate (for those ships fitted with upper stools)	- 5-point pattern over 1 m^2 of plating - 5-point pattern over 1 m^2 of plating

Table 3.1.6: Double Hull Oil tankers - Extent of thickness measurements at areas of substantial corrosion

Structural member	Extent of measurement	Pattern of measurement
BOTTOM, INNER BOTTOM AND HOPPER STRUCTURE		
Bottom plating, inner bottom and hopper structure plating	Minimum of 3 bays across double bottom tank, including aft bay. Measurements around and under all suction bell mouths	5-point pattern for each panel between longitudinals and floors.
Bottom, inner bottom and hopper structure longitudinals	Minimum of 3 longitudinals in each bay where bottom plating measured.	3 measurements in line across flange and 3 measurements on vertical web.
Bottom girders, including the watertight ones.	At fore and aft watertight floors and in center of tanks.	Vertical line of single measurements on girder plating with one measurement between each panel stiffener, or a minimum of three measurements.
Bottom floors, including the watertight ones.	3 floors in bays where bottom plating measured, with measurements at both ends and middle.	5-point pattern over 2 m^2 area.
Hopper structure web frame ring	Three floors in bays where bottom plating measured.	5-point pattern over 1 m^2 of plating. Single measurements on flange.
Hopper structure transverse watertight bulkhead or swash bulkhead.	- Lower 1/3 of bulkhead	- 5-point pattern over 1 m^2 of plating.
	- Upper 2/3 of bulkhead	- 5-point pattern over 2 m^2 of plating.
	- Stiffeners (minimum of three)	- For web, 5-point pattern over span (two measurements across web at each end and one at center of span). For flange, single measurements at each end and center of span.
Panel stiffening	Where applicable	Single measurements
DECK STRUCTURE		
Deck plating	Two transverse bands across tank.	Minimum of three measurements per plate per band.
Deck longitudinals	Every third longitudinal in each of two bands with a minimum of one longitudinal.	3 measurements in line vertically on webs, and 2 measurements on flange (if fitted).
Deck girders and brackets (usually in cargo tanks only).	At fore and aft transverse bulkhead, bracket toes and in center of tanks.	Vertical line of single measurements on web plating with one measurement between each panel stiffener, or a minimum of three measurements. Two measurements across flange. 5-point pattern on girder/bulkhead brackets.
Deck transverse webs	Minimum of two webs with measurements at middle and both ends of span.	5 points pattern over 1 m^2 area. Single measurements on flange.
Vertical web and transverse bulkhead in wing ballast tank (2m from deck)	Minimum of two webs, and both transverse bulkheads.	5 points pattern over 1 m^2 area.
Panel stiffening	Where applicable.	Single measurements.
STRUCTURE IN WING BALLAST TANKS		
Side shell and longitudinal bulkhead plating: - Upper strake and strakes in way of horizontal girders.	- Plating between each pair of longitudinals in a minimum of 3 bays (along the tank).	- Single measurement
- All other strakes	- Plating between every 3rd pair of longitudinals in same 3 bays.	- Single measurement
Side shell and longitudinal bulkhead longitudinals on: - Upper strake	- Each longitudinal in same 3 bays.	- 3 measurements across web and measurement on flange.
- All others strakes	- Every 3rd pair longitudinals in same 3 bays.	- 3 measurements across web and measurement on flange.
Longitudinals-brackets	Minimum of 3 at top, middle and bottom of tank in same 3 bays.	5-point pattern over area of bracket.

Structural member	Extent of measurement	Pattern of measurement
Vertical web and transverse bulkheads (excluding deckhead area): - Strakes in way of horizontal girders - Other strakes	 - Minimum of 2 webs and both transverse bulkheads. - Minimum of 2 webs and both transverse bulkheads.	 - 5-point pattern over about 2 m^2 area. - Two measurements between each pair vertical stiffeners.
Horizontal girders	Plating on each girder in a minimum of three bays.	Two measurements between each pair of longitudinal girder stiffeners.
Panel stiffening.	Where applicable.	Single measurements.
LONGITUDINAL BULKHEADS IN CARGO TANKS		
Deckhead and bottom strakes, and strakes in way of the horizontal stringers of transverse bulkheads.	Plating between each pair of longitudinals in a minimum of 3 bays.	Single measurement
All other strakes	Plating between every 3rd pair of longitudinals in same 3 bays	Single measurement
Longitudinals on deckhead and bottom strakes	Each longitudinal in same three bays	3 measurements across web and one measurement on flange.
All other longitudinals	Every third longitudinal in same three bays	Three measurements across web and one measurement on flange
Longitudinals - brackets	Minimum of three at top, middle and bottom of tank in same three bays	5-point pattern 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-point pattern over approximately two square metre area of webs, plus single measurements on flanges of web frame and cross ties
Lower end brackets (opposite side of web frame)	Minimum of three brackets	5-point pattern over approximately two square metre area of brackets, plus single measurements on bracket flanges
TRANSVERSE WATERTIGHT AND SWASH BULKHEADS IN CARGO TANKS		
Upper and lower stool, where fitted.	- Transverse band within 25mm of welded connection to inner bottom/deck plating - Transverse band within 25mm of welded connection to shelf plate	5-point pattern between stiffeners over one metre length
Deckhead and bottom strakes, and strakes in way of horizontal stringers	Plating between pair of stiffeners at three locations: approximately 1/4, 1/2 and 3/4 width of tank	5-point pattern between stiffeners over one metre length
All other strakes	Plating between pair of stiffeners at middle location	Single measurement
Strakes in corrugated bulkheads	Plating of each change of scantling at centre of panel and at flange of fabricated connection	5-point pattern over about one square metre of plating
Stiffeners	Minimum of three typical stiffeners	For web, 5-point pattern over span between bracket connections (two measurements across web at each bracket connection and one at centre of span). For flange, single measurements at each bracket toe and at centre of span
Brackets	Minimum of three at top, middle and bottom of tank	5-point pattern over area of bracket
Horizontal stringers	All stringers with measurements at both ends, and middle	5-point pattern over one square metre area, plus single measurements near bracket toes and on flanges

Table 3.1.7: Guidance for additional thickness measurements in way of substantial corrosion

Structural member	Extent of measurement	Pattern of measurement
Plating	Suspect area and adjacent plates	5-point pattern over 1 m^2

Stiffeners	Suspect area	3 measurements, each in line across web and flange

1.5 Repairs

1.5.1 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 vessel's structural, watertight or weathertight integrity, is to be promptly and thoroughly (see 1.2.16) repaired. Areas to be considered include:

- bottom structure and bottom plating;
- side shell frames, their end attachments and adjacent shell plating;
- deck structure and deck plating;
- watertight or oil tight bulkheads,
- hatch covers and / or hatch coamings, where fitted;
- (inner) bottom structure and (inner) bottom plating;
- inner side structure and inner side plating;
- weld connection between air pipes and deck plating;
- all air pipe heads installed on the exposed decks;
- ventilators, including closing devices, if any.

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

1.5.2 Additionally, when a survey results in the identification of substantial corrosion or structural defects, either of which, in the opinion of the Surveyor, will impair the vessel's fitness for continued service, remedial measures are to be implemented before the ship continues in service.

1.5.3 Where the damage found on structure mentioned in 1.5.1 is isolated and of a localised nature which does not affect the ship's structural integrity, consideration may be given by the surveyor to allow an appropriate temporary repair to restore watertight or weathertight integrity after careful evaluation of the surrounding structure and impose a Condition of Class in accordance with IACS PR 35, with a specific time limit in order to complete the repair and retain classification.

1.6 Documentation on board

1.6.1 General

(a) The requirements of this subsection apply to all ships assigned the **ESP** class notation.
(b) The Owner should obtain, supply and maintain the following on board documentation, which should be readily available for the surveyor.
(c) The documentation is to be kept on board for the life time of the ship.
(d) For tankers and bulk carriers subject to SOLAS Chapter II-1 Part A-1 Regulation 3-10, the Owner is to arrange the updating of the Ship Construction File (SCF) throughout the ship’s life whenever a modification of the documentation included in the SCF has taken place. Documented procedures for updating the SCF are to be included within the Safety Management System.

1.6.2 Survey report file

(a) A survey report file should be a part of the documentation on board consisting of:
- Reports on structural surveys;
- Executive Hull Summary;
- Thickness measurements reports

(b) The survey report file should be available also in the Owner's and the Society's offices.

1.6.3 Supporting documents

(a) The following additional documentation should be available on board:
- Survey Program as required by 1.7.2 until such time as the Special Survey or Intermediate Survey, as applicable, has been completed,
- main structural plans of cargo spaces and ballast tanks;
- previous repair history,
- cargo and ballast history,
- extent of use of inert gas plant and tank cleaning procedures,
- records of inspections by ship's personnel with reference to:
    - structural deterioration in general;
    - leakages in bulkheads and piping;
    - condition of coating or corrosion prevention system, if any
- any other information that will help identify Critical Structural Areas and/or Suspect Areas requiring inspection

(b) For tankers and bulk carriers subject to SOLAS Chapter II-1 Part A-1 Regulation 3-10, the Ship Construction File (SCF), limited to the items to be retained on board, is to be available on board.

1.6.4 Review of documentation on board

(a) Prior to survey, the surveyor should examine the completeness of the documentation onboard, and its contents as a basis for the survey.

(b) For tankers and bulk carriers subject to SOLAS Chapter II-1 Part A-1 Regulation 3-10, on completion of the survey, the surveyor is to verify that the update of the Ship Construction File (SCF) has been done whenever a modification of the documentation included in the SCF has taken place.
- For the SCF stored on board ship, the surveyor is to examine the information on board ship. In cases where any major event, including, but not limited to, substantial repair and conversion, or any modification to the ship structures, the surveyor is to also verify that the updated information is kept on board the ship. If the updating of the SCF onboard is not completed at the time of survey, the Surveyor records it and requires confirmation at the next periodical survey.
- For the SCF stored on shore archive, the surveyor is to examine the list of information included on shore archive. In cases where any major event, including, but not limited to, substantial repair and conversion, or any modification to the ship structures, the surveyor is to also verify that the updated information is stored on shore archive by examining the list of information included on shore archive or kept on board the ship. In addition, the surveyor is to confirm that the service contract with of the Archive Center is valid. If the updating of the SCF Supplement ashore is not completed at the time of survey, the Surveyor records it and requires confirmation at the next periodical survey.

(c) For tankers and bulk carriers subject to SOLAS Chapter II-1 Part A-1 Regulation 3-10, on completion of the survey, the surveyor is to verify any addition and/or renewal of materials used for the construction of the hull structure are documented within the Ship Construction File inventory list.

1.7 Preparation for ESP Survey

1.7.1 The requirements of this subsection apply to ships assigned the **ESP** class notation, i.e. ships examined in this Chapter under SECTION 2, SECTION 3, SECTION 4, SECTION 5 and SECTION 6.

1.7.2 Survey Program

(a) The Owner in co-operation with the Society is to work out a specific Survey Program prior to the commencement of any part of:

- the Special Survey
- the Intermediate Survey for bulk carriers, double skin bulk carriers, chemical tankers and oil tankers over **10** years of age

The Survey Program is to be in a written format by filling the applicable form. The survey is not to commence until the survey programme has been agreed. The Survey Program at Intermediate Survey may consist of the Survey Program at the previous Special Survey supplemented by the Executive Hull Summary of that Special Survey and later relevant survey reports.

Prior to the development of the Survey Program, the survey planning questionnaire is to be completed by the owner and forwarded to the Society.

The Survey Program is to be worked out taking into account any amendments to the survey requirements implemented after the last Special Survey carried out.

(b) In developing the Survey Program, the following documentation should 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 1.6
- Main structural plans (of cargo and ballast tanks) (scantling drawings), including information regarding use of high tensile steels (HTS), clad steel and stainless steel,
- Executive Hull Summary,
- Relevant previous damage and repair history,
- Relevant previous survey and inspection reports from both the Society and the owner,
- Description and history of the coating and corrosion protection system (including previous class notations), if any,
- Information regarding the use of the ship's holds and tanks, typical cargoes and other relevant data,
- Cargo and ballast history for the last 3 years, including carriage of cargo under heated conditions;
- details of the inert gas plant and tank cleaning procedures,
- information and other relevant data regarding conversion or modification of the ship's cargo and ballast tanks since the time of construction,
- description and history of the coating and corrosion protection system (previous class notations), if any,
- 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, if any,
- information regarding the relevant maintenance level during operation including port state control reports of inspection containing hull related deficiencies, Safety Management System non-conformities relating to hull maintenance, including the associated corrective action(s),
- any other information that will help identify suspect areas and critical structural areas.

(c) The submitted Survey Program is to account for and comply, as a minimum, with the relevant requirements according to:
a. For Bulk carriers Table 3.2.2, Table 3.2.3, 2.6.8 close-up survey, thickness measurement and tank testing, respectively;
b. For Oil tankers Table 3.3.1, Table 3.3.2 and Table 3.3.3 for close-up survey, thickness measurement and tank testing, respectively;
c. For Chemical tankers Table 3.4.1, Table 3.4.2, 4.6.6 for close-up survey, thickness measurement, tank testing and pipe testing respectively;
d. For Double skin bulk carriers Table 3.5.1, Table 3.5.2, Table 3.5.3 and 5.4.6 for close-up survey, thickness measurement and tank testing, respectively
e. For Double Hull Oil Tankers Table 3.6.1, Table 3.6.2 and 6.4.6 for close-up survey, thickness measurement and tank testing, respectively

The Survey Program is to include relevant information including at least (as applicable):

- basic ship information and particulars;
- main structural plans (scantling drawings), including information regarding use of high tensile steels (HTS), clad steel and stainless steel;
- plan of holds and tanks;
- list of holds and tanks with information on use, protection, corrosion prevention and condition of coating;
- conditions for survey (e.g., information regarding tank cleaning, gas freeing, ventilation, lighting, etc.);
- provisions and methods for access to structures;
- equipment for surveys;
- identification of holds and tanks and areas for close-up survey;
- identification of areas and sections for thickness measurement;
- identification of tanks for tank testing and the pipes that are to undergo pipe testing;
- identification of the thickness measurement firm;
- damage experience related to the ship in question; and
- critical structural areas and suspect areas, where relevant.

(d) The Classification Society will advise the Owner of the maximum acceptable structural corrosion diminution levels applicable to the vessel.

(e) Use may also be made of the following IACS Guidelines:

- Guidelines for Technical Assessment in conjunction with the Planning of Enhanced Surveys of Oil Tankers. Special Survey–Hull
- Guidelines for Technical Assessment in conjunction with the Planning of Enhanced Surveys of Bulk Carriers. Special Survey–Hull
- Guidelines for Technical Assessment in conjunction with the Planning of Enhanced Surveys of Chemical Tankers. Special Survey–Hull
- Guidelines for Technical Assessment in Conjunction with Planning for Enhanced Surveys of Double Hull Oil Tankers Special Survey – Hull contained in 1.11 respectively.
  These guidelines are a recommended tool which may be invoked at the discretion of the Society, when considered necessary and appropriate, in conjunction with the preparation of the required Survey Program.

1.7.3 Conditions for surveys

(a) The Owner should provide the necessary facilities for a safe execution of the survey.

- In order to enable the attending surveyors to carry out the survey, provisions for proper and safe access are to be agreed between the owner and the Society.
- Details of the means of access are to be provided in the survey planning questionnaire.
- In cases where the provisions of safety and required access are judged by the attending surveyor(s) not to be adequate, the survey of the spaces involved is not to proceed.

(b) Cargo holds, Tanks and Spaces are to be safe for access. Tanks and spaces are to be gas freed and properly ventilated. Prior to entering a tank, void or enclosed space, it is to be verified that the atmosphere in that space is free from hazardous gas and contains sufficient oxygen.

(c) In preparation for survey and thickness measurements and to allow for a thorough examination, all spaces are to be cleaned including removal from surfaces of all loose accumulated corrosion scale. Spaces are to be sufficiently clean and free from water, scale, dirt, oil residues etc. to reveal corrosion, deformation, fractures, damages, or other structural deterioration as well as the condition of the coating. However, those areas of structure whose renewal has already been decided by the owner need only be cleaned and descaled to the extent necessary to determine the limits of the areas to be renewed.

(d) Sufficient illumination is to be provided to reveal significant corrosion, deformation, fractures, damages or other structural deterioration, as well as the condition of the coating.

(e) Where Soft or semi-hard coatings have been applied, safe access is to be provided for the surveyor to verify the effectiveness of the coating and to carry out an assessment of the conditions of internal structures which may include spot removal of the coating. When safe access cannot be provided, the soft or semi-hard coating is to be removed.

(f) The surveyor(s) are to always be accompanied by at least one responsible person, assigned by the owner, experienced in tank and enclosed spaces inspection. In addition, a back-up team of at least two experienced persons is to be stationed at the hatch opening of the tank or space that is being surveyed. The back-up team is to continuously observe the work in the tank or space and is to keep lifesaving and evacuation equipment ready for use.

(g) A communication system is to be arranged between the survey party in the cargo hold, tank or space being examined, the responsible officer on deck and, as the case may be, the navigation bridge. The communication arrangements are to be maintained throughout the survey.

1.7.4 Access to structures

(a) For overall survey, means should be provided to enable the surveyor to examine the hull structure in a safe and practical way.

(b) For close-up survey of the hull structure, other than cargo hold shell frames, one or more of the following means for access, acceptable to the surveyor, should be provided:

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

(c) For close-up surveys of the cargo hold shell frames of bulk carriers less than cape size bulk carriers (100,000 dwt and above), one or more of the following means for access, acceptable to the Surveyor, is to be provided:

- permanent staging and passages through structures;
- temporary staging and passages through structures;
- portable ladder restricted to not more than 5 m in length may be accepted for surveys of lower section of a shell frame including bracket;
- hydraulic arm vehicles such as conventional cherry pickers, lifts and movable platforms;
- boats or rafts; provided the structural capacity of the hold is sufficient to withstand static loads at all levels of water;
- other equivalent means.

(d) For close-up surveys of the cargo hold shell frames of cape size bulk carriers (100,000 dwt and above), the use of portable ladders is not accepted, and one or more of the following means for access, acceptable to the surveyor, is to be provided:

Annual Surveys, Intermediate Survey under 10 years of age and Special Survey No. 1

- permanent staging and passages through structures;
- temporary staging and passages through structures.
- hydraulic arm vehicles such as conventional cherry pickers, lifts and movable platforms;
- boats or rafts provided the structural capacity of the hold is sufficient to withstand static loads at all levels of water;
- other equivalent means.

Subsequent Intermediate Surveys and Special Surveys:

- either permanent or temporary staging and passage through structures for close-up survey of at least the upper part of hold frames;
- hydraulic arm vehicles such as conventional cherry pickers for surveys of lower and middle part of shell frames as alternative to staging;
- lifts and movable platforms;
- boats or rafts provided the structural capacity of the hold is sufficient to withstand static loads at all levels of water;
- other equivalent means.

Notwithstanding the above requirements:

a. the use of a portable ladder fitted with a mechanical device to secure the upper end of the ladder is acceptable for the "close-up examination of sufficient extent, minimum 25% of frames, to establish the condition of the lower region of the shell frames including approx. lower one third length of side frame at side shell and side frame end attachment and the adjacent shell plating of the forward cargo hold" at Annual Survey, required in second bullet of 2.2.4(a), and the "one other selected cargo hold" required in second bullet of 2.2.4(b).
b. The use of hydraulic arm vehicles or aerial lifts ("Cherry picker") may be accepted by the attending surveyor for the close-up survey of the upper part of side shell frames or other structures in all cases where the maximum working height is not more than 17 m.

(e) For Surveys conducted by use of a remote inspection technique, one or more of the following means for access, acceptable to the Surveyor, is to be provided:

- Unmanned robot arm.
- Remote Operated Vehicles (ROV).
- Unmanned Aerial Vehicles / Drones.
- Other means acceptable to the Classification Society.

1.7.5 Equipment for survey

(a) Thickness measurements should normally be carried out by means of ultrasonic test equipment. The accuracy of the equipment should be proved to the surveyor as required.
(b) One or more of the following fracture detection procedures may be required if deemed necessary by the surveyor:
  - radiographic equipment
  - ultrasonic equipment
  - magnetic particle equipment
  - dye penetrant
  - other equivalent means
(c) Explosimeter, oxygen-meter, breathing apparatus, lifelines, riding belts with rope and hook and whistles together with instructions and guidance on their use are to be made available during the survey. A safety check-list is to be provided.
(d) Adequate and safe lighting is to be provided for the safe and efficient conduct of the survey.
(e) Adequate protective clothing is to be made available and used (e.g. safety helmet, gloves, safety shoes, etc.) during the survey.

1.7.6 Rescue and emergency response equipment

If breathing apparatus and/or other equipment is used as 'Rescue and emergency response equipment' then it is recommended that the equipment should be suitable for the configuration of the space being surveyed.

1.7.7 Survey at sea or at anchorage

(a) Survey at sea or at anchorage may be accepted provided the surveyor is given the necessary assistance from the personnel on board. Necessary precautions and procedures for carrying out the survey should be in accordance with 1.7.2, 1.7.3, 1.7.4, and 1.7.5.

(b) A communication system should be arranged between the survey party in the spaces and tank and the responsible officer on deck. This system is also to include the personnel in charge of Ballast pump handling if boats or rafts are used.

(c) Surveys of tanks by means of boats or rafts may only be undertaken with the agreement of the Surveyor, who is to take into account the safety arrangements provided, including weather forecasting and ship response under foreseeable conditions and provided the expected rise of water within the tank does not exceed 0,25m.

(d) When rafts or boats will be used for close-up surveys, appropriate life jackets are to be available for all participants. Boats or rafts are to have satisfactory residual buoyancy and stability even if one chamber is ruptured. A safety checklist is to be provided. Furthermore, the following conditions are to be observed:

.1 only rough duty, inflatable rafts or boats, having satisfactory residual buoyancy and stability even if one chamber is ruptured, are to be used;

.2 the boat or raft is to be tethered to the access ladder and an additional person is to be stationed down the access ladder with a clear view of the boat or raft;

.3 appropriate lifejackets are to be available for all participants;

.4 the surface of water in the tank is to be calm (under all foreseeable conditions the expected rise of water within the tank is to not exceed 0.25 m) and the stationary water level. On no account is to the level of the water be rising while the boat or raft is in use;

.5 the tank or space must contain clean ballast water only. Even a thin sheen of oil or cargo on the water is not acceptable;

.6 at no time is the water level to be allowed to be within 1 m of the deepest under deck web face flat so that the survey team is not isolated from a direct escape route to the tank hatch. Filling to levels above the deck transverses is only to be contemplated if a deck access manhole is fitted and open in the bay being examined, so that an escape route for the survey party is available at all times. Other effective means of escape to the deck may be considered;

.7 if the tanks (or spaces) are connected by a common venting system, or Inert Gas system, the tank in which the boat or raft is to be used is to be isolated to prevent a transfer of gas from other tanks (or spaces).

(e) Rafts or boats alone may be allowed for inspection of the under-deck areas for tanks or spaces, if the depth of the webs is 1,5 m or less.

(f) If the depth of the webs is more than 1,5 m, rafts or boats alone may be allowed only:

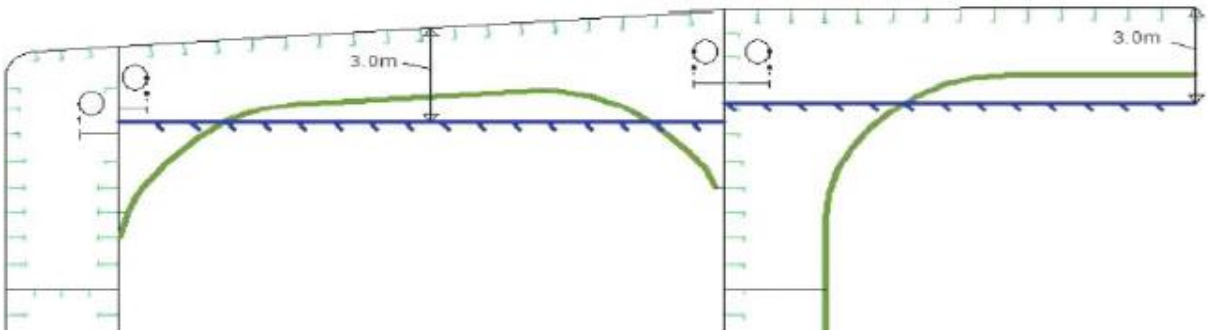
1. when the coating of the under-deck structure is in GOOD condition as defined in 1.2.14 and there is no evidence of wastage; or
2. if a permanent means of access is provided in each bay to allow safe entry and exit. This means:
   - access direct from the deck via a vertical ladder and a small platform 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 is to be assumed not more than 3m from the deck plate measured at the midspan of deck transverses and in the middle length of the tank (See Figure 3.1.3).

If neither of the above conditions are met, then staging or an "other equivalent means" is to be provided for the survey of the under-deck areas.

(g) The use of rafts or boats alone in 1.7.7(e) and 1.7.7(f) does not preclude the use of boats or rafts to move about within a tank during a survey.

Reference is made to IACS Recommendation 39 – Guidelines for the use of Boats and Rafts for Close-up Surveys.

Figure 3.1.3: Maximum water level in a tank



1.7.7 Survey planning meeting

(a) Proper preparation and close co-operation between the attending surveyor(s) and the owner's representatives onboard prior to and during the survey are an essential part in the safe and efficient conduct of the survey. During the survey on board safety meetings are to be held regularly.

(b) Prior to the commencement of any part of the Special and Intermediate Survey, a survey planning meeting is to be held between the attending Surveyor(s), the Owner's Representative in attendance and the TM firm representative, where involved, and the master of the ship or an appropriately qualified representative appointed by the master or Company for the purpose of ascertaining that all the arrangements envisaged in the survey program are in place, so as to ensure the safe and efficient conduct of the survey work to be carried out. See also 1.4.1(c).

(c) The following is an indicative list of items that are to be addressed in the meeting:

1. schedule of the vessel (i.e. the voyage, docking and undocking manoeuvres, periods alongside, cargo and ballast operations, etc.);
2. provisions and arrangements for thickness measurements (i.e. access, cleaning/de-scaling, illumination, ventilation, personal safety);
3. extent of the thickness measurements;
4. acceptance criteria (refer to the list of minimum thicknesses);
5. extent of close-up survey and thickness measurement considering the coating condition and suspect areas/areas of substantial corrosion;
6. execution of thickness measurements;
7. taking representative readings in general and where uneven corrosion/pitting is found;
8. mapping of areas of substantial corrosion;
9. communication between attending surveyor(s) the thickness measurement firm operator(s) and owner representative(s) concerning findings.

1.8 Preparation for surveys other than ESP

1.8.1 Conditions for survey

(a) The Owner is to provide the necessary facilities for a safe execution of the survey.

(b) Tanks and spaces are to be safe for access, i.e. gas freed, ventilated and illuminated.

(c) In preparation for survey and thickness measurements and to allow for a thorough examination, all spaces are to be cleaned including removal from surfaces of all loose accumulated corrosion scale. Spaces are to be sufficiently clean and free from water, scale, dirt, oil residues etc. to reveal corrosion, deformation, fractures, damages, or other structural deterioration. However, those areas of structure whose renewal has already been decided by the owner need only be cleaned and descaled to the extent necessary to determine the limits of the renewed areas.

(d) Sufficient illumination is to be provided to reveal corrosion, deformation, fractures, damages or other structural deterioration.
(e) Where soft or semi-hard coatings have been applied, safe access is to be provided for the surveyor to verify the effectiveness of the coating and to carry out an assessment of the conditions of internal structures which may include spot removal of the coating. When safe access cannot be provided, the soft or semi-hard coating is to be removed.

1.8.2 Access to structures

(a) For overall survey, means are to be provided to enable the surveyor to examine the hull structure in a safe and practical way.
(b) For Close-up Surveys in cargo holds and salt water ballast tanks, one or more of the following means for access, acceptable to the Surveyor, is to be provided:

- permanent staging and passages through structures
- temporary staging and passages through structures
- lifts and movable platforms
- boats or rafts
- other equivalent means

1.8.3 Equipment for survey

(a) Thickness measurement is normally to be carried out by means of ultrasonic test equipment. The accuracy of the equipment is to be proven to the Surveyor as required. Thickness measurements are to be carried out by a firm approved by the society, except that in respect of measurements of non-ESP ships less than 500 gross tonnage and all fishing vessels, the firm need not be so approved.
(b) One or more of the following fracture detection procedures may be required if deemed necessary by the Surveyor:
  - radiographic equipment
  - ultrasonic equipment
  - magnetic particle equipment
  - dye penetrant.

1.8.4 Survey at sea or at anchorage

(a) Survey at sea or at anchorage may be accepted provided the Surveyor is given the necessary assistance from the personnel onboard. Necessary precautions and procedures for carrying out the survey are to be in accordance with 1.8.1, 1.8.2, and 1.8.3.
(b) A communication system is to be arranged between the survey party in the tank and the responsible officer on deck. This system must also include the personnel in charge of ballast pump handling if boats or rafts are used.
(c) When boats or rafts are used, appropriate life jackets are to be available for all participants. Boats or rafts are to have satisfactory residual buoyancy and stability even if one chamber is ruptured. A safety checklist is to be provided.
(d) Surveys of tanks by means of boats or rafts may only be undertaken at the sole discretion of the Surveyor, who is to take into account the safety arrangements provided, including weather forecasting and ship response in reasonable sea conditions.
(e) For use of rafts for the survey reference is made to IACS Recommendation 39 - Guidelines for use of Boats or Rafts for Close-up surveys.

1.8.5 Survey planning meeting

Prior to the commencement of any part of the Special and Intermediate Survey a survey planning meeting is to be held between the attending Surveyor(s), the Owner's Representative in attendance and the TM company representative, where involved.

1.9 Reporting and evaluation of Survey

1.9.1 The requirements of this subsection apply to ships assigned the **ESP** class notation.

1.9.2 Evaluation of Survey Report

(a) The data and information on the structural condition of the vessel collected during the survey is to be evaluated for acceptability and continued structural integrity of the vessel.

(b) In case of oil tankers of 130 m in length and upwards (as defined in the International Convention on Load Lines in force), the ship's longitudinal strength should be evaluated by using the thickness of structural members measured, renewed and reinforced, as appropriate, during the renewal survey of safety construction carried out after the ship reached 10 years of age in accordance with the criteria for longitudinal strength of the ship's hull girder for oil tankers specified in MSC.105(73).

(c) The final result of evaluation of the ship's longitudinal strength required in (b), after renewal or reinforcement work of structural members, if carried out as a result of initial evaluation, should be reported as a part of the Executive Hull Summary.

1.9.3 Reporting

(a) Principles for survey reporting are shown in Table 3.1.8.

(b) When a survey is split between different survey stations, a report is to be made for each portion of the survey. A list of items examined and/or tested (pressure testing, thickness measurements etc.) and an indication of whether the item has been credited, are to be made available to the next attending surveyor(s), prior to continuing or completing the survey.

(c) An Executive Hull Summary of the survey and results is to be issued to the Owner and placed on board the vessel for reference at future surveys. The Executive Hull Summary is to be endorsed by LHR Head Office.

Table 3.1.8: Survey Reporting Principles

1. General

1.1. A survey report is to be generated in the following cases:

– In connection with commencement, continuation and/or completion of periodical hull surveys, i.e. annual, intermediate and special surveys, as relevant
  - When structural damages/defects have been found
  - When repairs, renewals or modifications have been carried out
  - When condition of class (recommendation) has been imposed or deleted

1.2. The purpose of reporting is to provide:

– Evidence that prescribed surveys have been carried out in accordance with applicable LHR rules
– Documentation of surveys carried out with findings, repairs carried out and condition of class (recommendation) imposed or deleted
– Survey records, including actions taken, which shall form an auditable documentary trail. Survey reports are to be kept in the survey report file required to be on board
– Information for planning of future surveys
– Information which may be used as input for maintenance of classification rules and instructions

1.3. When a survey is split between different survey stations, a report is to be made for each portion of the survey. A list of items surveyed, relevant findings and an indication of whether the item has been credited is to be made available to the next attending surveyor, prior to continuing or completing the survey. Thickness measurement and tank testing carried out is also to be listed for the next surveyor.

2. Extent of the survey

2.1. Identification of compartments where an overall survey has been carried out.

2.2. Identification of locations, in each tank, where a close-up survey has been carried out, together with information of the means of access used.

2.3. Identification of locations, in each tank, where thickness measurement has been carried out.

2.4. For areas in ballast tank, tanks and/or cargo holds where protective coating is found to be in GOOD condition as defined in 1.2.14 and the extent of close-up survey and/or thickness measurement has been specially considered, structures subject to special consideration are to be identified.

2.5. Identification of tanks subject to tank testing.
2.6. Identification of cargo piping on deck, including crude oil washing (COW) piping, and cargo and ballast piping within cargo holds and ballast tanks, pump rooms, pipe tunnels and void spaces, where:
– Examination including internal examination of piping with valves and fittings and thickness measurement, as relevant, has been carried out
– Operational test to working pressure has been carried out

3. Result of the survey
3.1. Type, extent and condition of protective coating in each tank, as relevant (rated GOOD, FAIR or POOR).
3.2. Structural condition of each compartment with information on the following, as relevant:
– Identification of findings, such as:
  - Corrosion with description of location, type and extent
  - Areas with substantial corrosion
  - Cracks/fractures with description of location and extent
  - Buckling with description of location and extent
  - Indents with description of location and extent
– Identification of compartments where no structural damages/defects are found
The report may be supplemented by sketches/photos.
3.3. Thickness measurement report is to be verified and signed by the surveyor controlling the measurements on board.
3.4. Evaluation result of longitudinal strength of the hull girder of oil tankers of 130 m in length and upwards and over 10 years of age. The following data is to be included, as relevant:
– Measured and as-built transverse sectional areas of deck and bottom flanges
– Diminution of transverse sectional areas of deck and bottom flanges
– Details of renewals or reinforcements carried out, as relevant.

Actions taken with respect to findings
4.1. Whenever the attending surveyor is of the opinion that repairs are required, each item to be repaired is to be identified in a numbered list. Whenever repairs are carried out, details of the repairs effected are to be reported by making specific reference to relevant items in the numbered list.
4.2. Repairs carried out are to be reported with identification of:
– Compartment
– Structural member
– Repair method (i.e. renewal or modification)
– Repair extent
– NDT/Tests
4.3. For repairs not completed at the time of survey, condition of class (recommendation) is to be imposed with a specific time limit for the repairs. In order to provide correct and proper information to the surveyor attending for survey of the repairs, condition of class (recommendation) is to be sufficiently detailed with identification of each item to be repaired. For identification of extensive repairs, reference may be given to the survey report.

NOTE:
1. As a minimum, the identification of location of close-up survey and thickness measurement is to include a confirmation with description of individual structural members corresponding to the extent of requirements stipulated in SECTION 3 based on type of periodical survey and the ship's age.
Where only partial survey is required, i.e. one web frame ring / one deck transverse, the identification is to include location within each tank by reference to frame numbers.

1.10 Voyage repairs and maintenance (IACS UR Z13 Rev.3[7])

1.10.1 Where repairs to hull, machinery or equipment, which affect or may affect classification, are to be carried out by a riding crew during a voyage they are to be planned in advance. A complete repair procedure including the extent of proposed repair 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 the Society, in advance of the repairs, may result in suspension of the vessel's class.

1.10.2 Where in any emergency circumstance, emergency repairs are to be effected immediately, the repairs should be documented in the ship's log and submitted thereafter to the Society for use in determining further survey requirements.

1.10.3 The requirements in 1.10.1 & 1.10.2 are not intended to include maintenance and overhaul to hull, machinery and equipment in accordance with manufacturer's recommended procedures and established marine practice and which does not require the Society's approval; however, any repair as a result of such maintenance and overhauls which affects or may affect classification is to be noted in the ship's log and submitted to the attending Surveyor for use in determining further survey requirements.

[7] Change introduced in Rev.3 is to be uniformly applied by the Society for surveys commenced on or after 1 July 2011.

1.11 Guidelines for Technical Assessment in conjunction with Planning for Enhanced Surveys of Special Survey – Hull

1.11.1 General

These guidelines contain information and suggestions concerning technical assessments which may be of use in conjunction with the planning of enhanced special surveys. As indicated in 1.7.2(e), the guidelines are a recommended tool which may be invoked at the discretion of the Society, when considered necessary and appropriate, in conjunction with the preparation of the required Survey Program.

1.11.2 Purpose and Principals

1.11.2.1 Purpose

The purpose of the technical assessments described in these guidelines is to assist in identifying critical structural areas, nominating suspect areas and in focusing attention on structural elements or areas of structural elements which may be particularly susceptible to, or evidence a history of, wastage or damage. This information may be useful in nominating locations, areas and tanks for thickness measurement, close-up survey and tank testing.

Critical Structural Areas are locations which have been identified from calculations to require monitoring or from the service history of the subject ship or from similar or sister ships (if available) to be sensitive to cracking, buckling or corrosion which would impair the structural integrity of the ship.

1.11.2.2 Minimum Requirements

However, these guidelines may not be used to reduce the requirements pertaining to thickness measurement, close-up survey and tank testing contained in

a. For Bulk carriers Table 3.2.2, Table 3.2.3 and 2.6.8, respectively;
b. For Oil tankers Table 3.3.1, Table 3.3.2 and Table 3.3.3, respectively;
c. For Chemical tankers Table 3.4.1, Table 3.4.2, Table 3.4.3, respectively;
d. For Double skin bulk carriers Table 3.5.1, Table 3.5.2, Table 3.5.3 and 5.4.6, respectively
e. For Double Hull Oil Tankers Table 3.6.1, Table 3.6.2 and Table 3.6.3, respectively

which are, in all cases, to be complied with as a minimum.

1.11.2.3 Timing

As with other aspects of survey planning, the technical assessments described in these guidelines are to be worked out by the Owner or operator in cooperation with the Society well in advance of the commencement of the Special Survey, i.e., prior to commencing the survey and normally at least 12 to 15 months before the survey's completion due date.

1.11.2.4 Aspects to be considered

Technical assessments, which may include quantitative or qualitative evaluation of relative risks of possible deterioration, of the following aspects of a particular ship may be used as a basis for the nomination of holds, tanks and areas for survey:

- Design features such as stress levels on various structural elements, design details and extent of use of high tensile steel.
- Former history with respect to corrosion, cracking, buckling, indents and repairs for the particular ship as well as similar vessels, where available.

- Information with respect to types of cargo carried, use of different tanks for cargo/ballast, protection of tanks and condition of coating, if any, of holds and tanks.

Technical assessments of the relative risks of susceptibility to damage or deterioration of various structural elements and areas are to be judged and decided on the basis of recognized principles and practices, such as may be found in publications:

- Tanker Structure Cooperative Forum (TSCF), (Refs. 2 and 3)
- TSCF, "Guidance Manual for the Inspection and Condition Assessment of Tanker Structures, 1986."
- TSCF, "Condition Evaluation and Maintenance of Tanker Structures, 1992."
- IACS, "Bulk Carriers: Guidelines for Surveys, Assessment and Repair of Hull Structure,"
- TSCF, "Guidelines for the Inspection and Maintenance of Double Hull Tanker Structures, 1995."
- TSCF, "Guidance Manual for Tanker Structures, 1997."

1.11.3 TECHNICAL ASSESSMENT

1.11.3.1 General

There are three basic types of possible failure which may be the subject of technical assessment in connection with planning of surveys; **corrosion**, **cracks** and **buckling**. Contact damages are not normally covered by the survey plan since indents are usually noted in memoranda and assumed to be dealt with as a normal routine by Surveyors.

Technical assessments performed in conjunction with the survey planning process are, in principle to be as shown schematically in Figure 3.1.4 depicts, schematically, how technical assessments can be carried out in conjunction with the survey planning process. The approach is basically an evaluation of the risk based on the knowledge and experience related to design and corrosion.

The design is to be considered with respect to structural details which may be susceptible to buckling or cracking as a result of vibration, high stress levels or fatigue. Corrosion is related to the ageing process, and is closely connected with the quality of corrosion protection at newbuilding, and subsequent maintenance during the service life. Corrosion may also lead to cracking and/or buckling.

1.11.3.2 Methods

(a) Design Details

Damage experience related to the ship in question and similar ships, where available, is the main source of information to be used in the process of planning. In addition, a selection of structural details from the design drawings is to be included.

Typical damage experience to be considered will consist of:

- Number, extent, location and frequency of cracks.
- Location of buckles.

This information may be found in the survey reports and/or the Owner's files, including the results of the Owner's own inspections. The defects should be analyzed, noted and marked on sketches.

In addition, general experience is to be utilized.

Such figures and notes are to be used together with a review of the main drawings, in order to compare with the actual structure and search for similar details which may be susceptible to damage. Examples are shown in Figure 3.1.5(a), (b) and Figure 3.1.6.

The review of the main structural drawings, in addition to using the above-mentioned documents, should include checking for typical design details where cracking has been experienced. The factors contributing to damage are to be carefully considered.

The use of high tensile steel (HTS) is an important factor. Details showing good service experience where ordinary, mild steel has been used may be more susceptible to damage when HTS, and its higher associated stresses, are utilized. There is extensive and, in general, good experience, with the use of HTS for longitudinal material in deck and bottom structures. Experience in other locations, where the dynamic stresses may be higher, is less favorable, e.g. side structures.

In this respect, stress calculations of typical and important components and details, in accordance with the latest Rules or other relevant methods, may prove useful and are to be considered. The selected areas of the structure identified during this process are to be recorded and marked on the structural drawings to be included in the Survey Program.

(b) Corrosion

In order to evaluate relative corrosion risks, the following information is generally to be considered:

- Usage of Tanks and Spaces
- Condition of Coatings
- Cleaning Procedures
- Previous Corrosion Damage
- Ballast use and time for Cargo Holds / Tanks
- Risk of Corrosion in Cargo Holds and Ballast Tanks, or Corrosion Risk Scheme
- Location of Ballast Tanks Adjacent to Heated Fuel Oil Tanks or Location of Heated Tanks

For Oil Tankers:

- TSCF, "Condition Evaluation and Maintenance of Tanker Structures, 1992." gives definitive examples which can be used for judging and describing coating condition, using typical pictures of conditions.
- The evaluation of corrosion risks is to be based on information in TSCF, "Condition Evaluation and Maintenance of Tanker Structures, 1992.", together with relevant information on the anticipated condition of the ship as derived from the information collected in order to prepare the Survey Programme and the age of the ship.

For Bulk Carriers:

- TSCF, "Condition Evaluation and Maintenance of Tanker Structures, 1992." gives definitive examples which can be used for judging and describing coating condition, using typical pictures of conditions.
- For bulk carriers, IACS, "Bulk Carriers: Guidelines for Surveys, Assessment and Repair of Hull Structures, 1994." is to be used as the basis for the evaluation, together with relevant information on the anticipated condition of the ship as derived from the information collected in order to prepare the Survey Programme and the age of the ship.

For Chemical Tankers / Double Hull Oil Tankers:

- TSCF, "Guidance Manual for Tanker Structures, 1997." gives definitive examples which can be used for judging and describing coating condition, using typical pictures of conditions.
- The evaluation of corrosion risks is to be based on information in TSCF, "Guidance Manual for Tanker Structures, 1997.", together with relevant information on the anticipated condition of the ship as derived from the information collected in order to prepare the Survey Programme and the age of the ship.
- Special attention is to be given to the areas where the double hull tanker is particularly exposed to corrosion. To do this end, the specific aspects addressing corrosion in double hull tankers indicated in 3.4 (Corrosion trends) of TSCF, "Guidelines for the Inspection and Maintenance of Double Hull Tanker Structures, 1995." are to be taken into account.

For Double Skin Bulk Carriers

- TSCF, "Guidance Manual for Tanker Structures, 1997." gives definitive examples which can be used for judging and describing coating condition, using typical pictures of conditions.
- The evaluation of corrosion risks is to be based on information in both IACS, "Bulk Carriers: Guidelines for Surveys, Assessment and Repair of Hull Structures, January 2002" and TSCF, "Guidance Manual for Tanker Structures, 1997.", as far as applicable to double skin bulk carriers, together with relevant information on the anticipated condition of the ship as derived from the information collected in order to prepare the Survey Programme and the age of the ship.

The various tanks, holds and spaces are to be listed with the corrosion risks nominated accordingly.

(c) Locations for Close-up Survey and Thickness Measurement

On the basis of the table of corrosion risks and the evaluation of design experience, the locations for initial close-up survey and thickness measurement (sections) may be nominated.

The sections subject to thickness measurement are to normally be nominated in tanks, holds and spaces where corrosion risk is judged to be the highest.

The nomination of tanks and spaces for close-up survey should, initially, be based on highest corrosion risk, and should always include ballast tanks. The principle for the selection is to be that the extent is increased by age or where information is insufficient or unreliable.

Figure 3.1.4: Technical Assessment and the Survey Planning Process

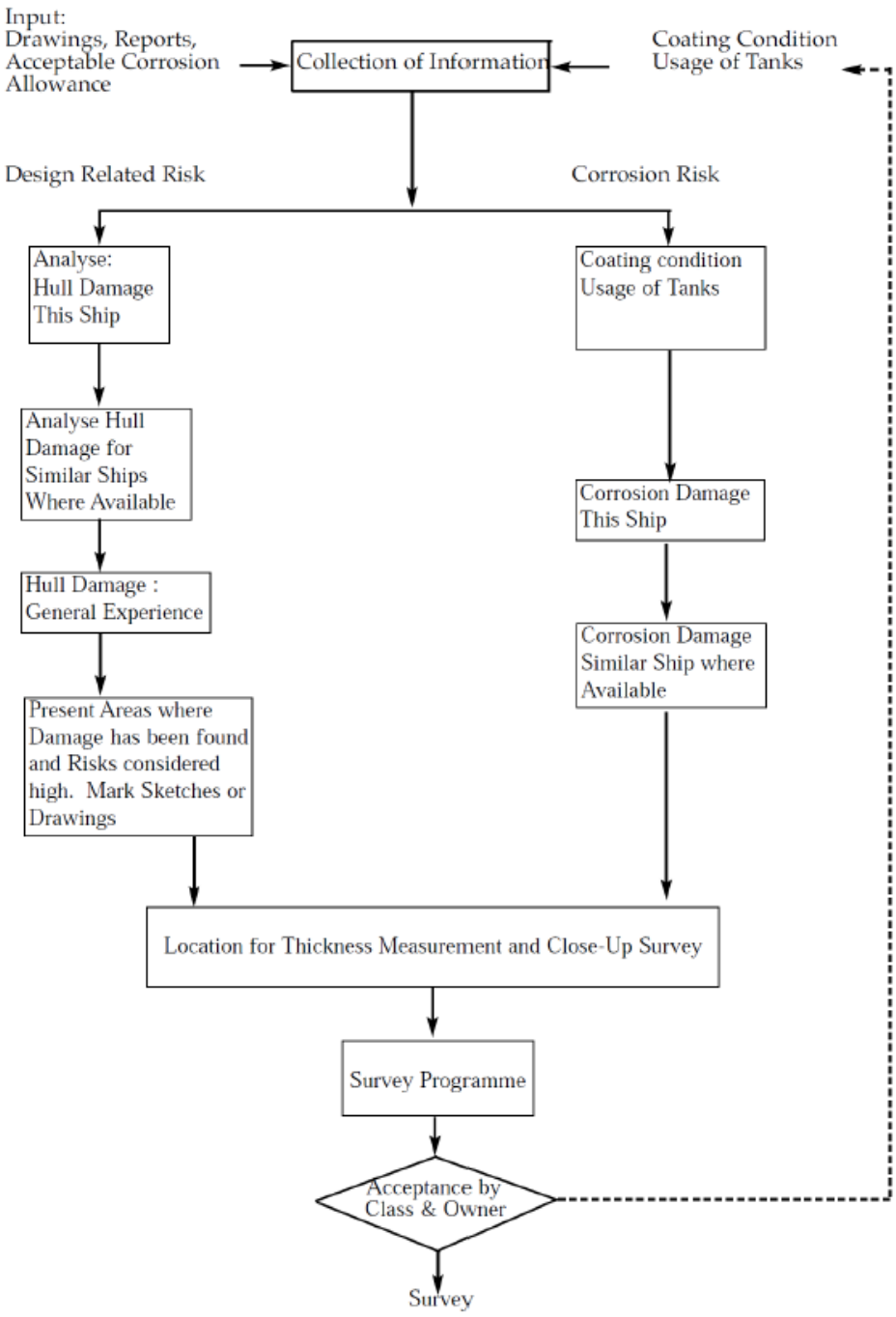


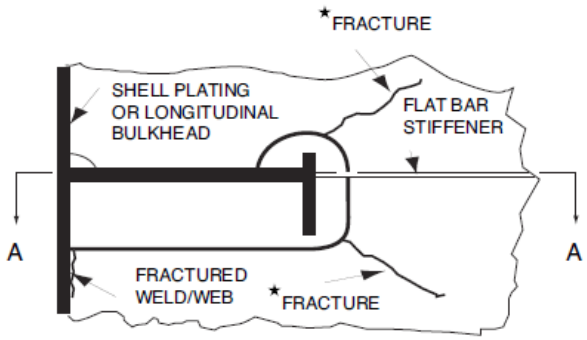
Figure 3.1.5: Typical Damage and Repair Example

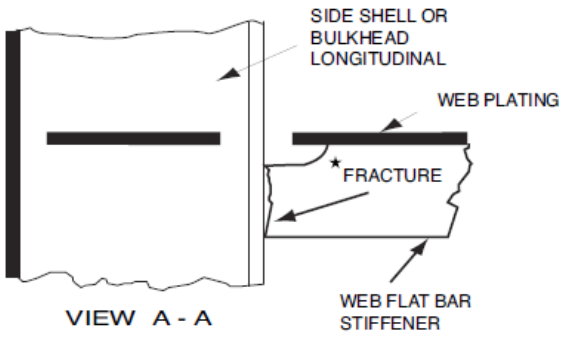
(a) Oil Tankers

LOCATION: Connection of longitudinals to transverse webs

EXAMPLE No. 1 : Web and flat bar fractures at cut-outs for longitudinal stiffener connections

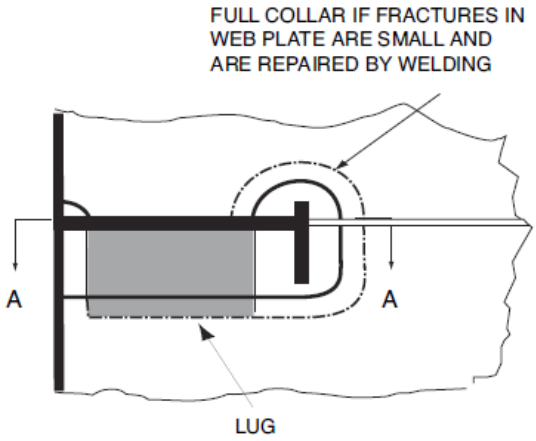
TYPICAL DAMAGE

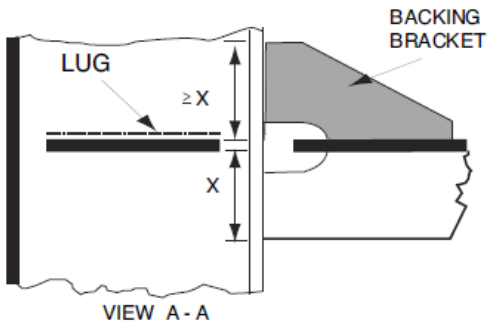




NOTE ★ONE OR MORE FRACTURES MAY OCCUR

PROPOSED REPAIR





WEB AND FLAT BAR CROPPED AND PART RENEWED OR ALTERNATIVELY WELDED

FACTORS CONTRIBUTING TO DAMAGE

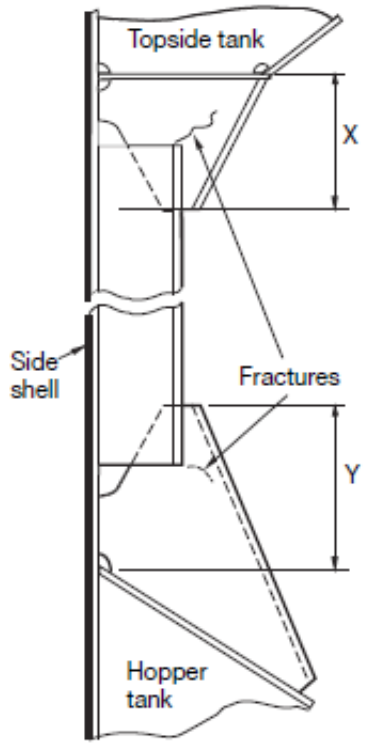
1. Asymmetrical connection of flat bar stiffener resulting in high peak stresses at the heel of the stiffener under fatigue loading.
2. Insufficient area of connection of longitudinal to web plate.
3. Defective weld at return around the plate thickness.
4. High localised corrosion at areas of stress concentration such as flat bar stiffener connections, corners of cut-out for the longitudinal and connection of web to shell at cut-outs.
5. High stress in the web of the transverse.
6. Dynamic sea way load/ship motions.

FIGURE 1	TANKER STRUCTURE CO-OPERATIVE FORUM SUBJECT: CATALOGUE OF STRUCTURAL DETAILS	FIGURE 1

(b) Bulk Carriers

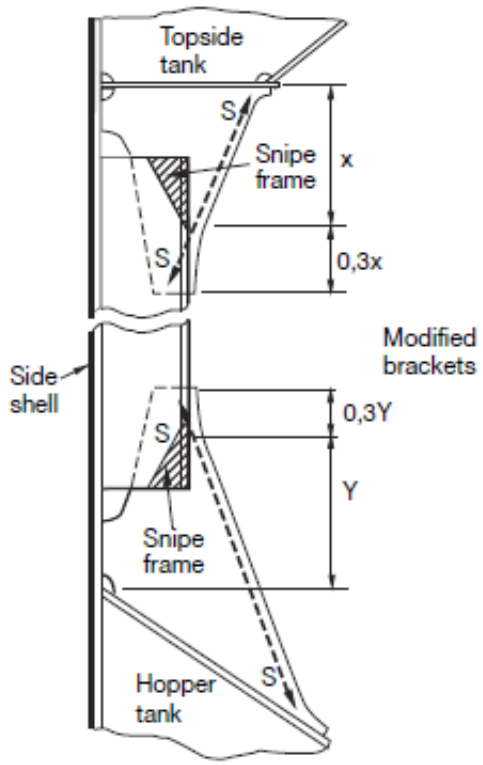
AREA 1	Structural item	Side shell frames and end brackets (separate bracket configuration)	EXAMPLE 1
Detail of damage		Fractures in brackets at termination of frame	

Sketch of damage



Separate Bracket Configuration

Sketch of repair



S = Sniped end

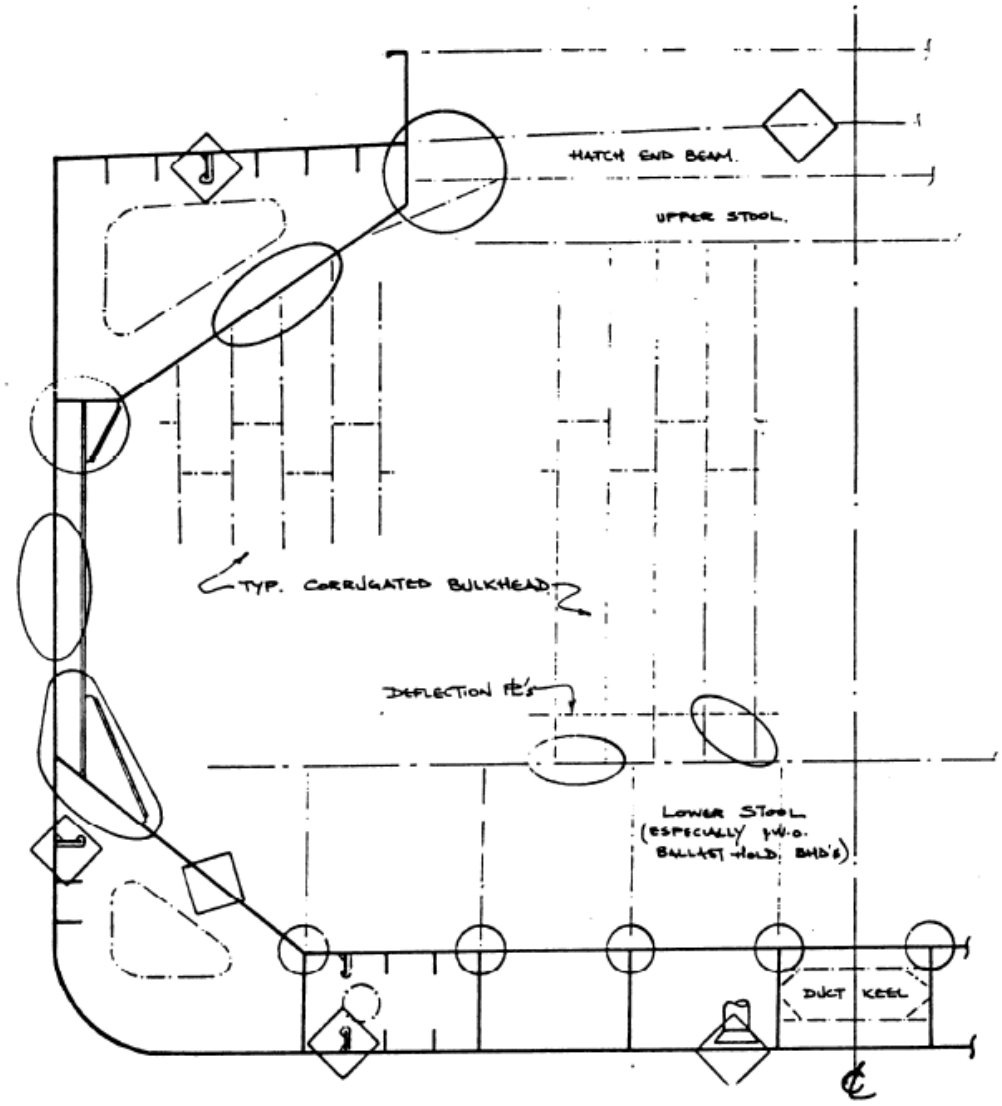
Notes on possible cause of damage

1. This type of damage is due to stress concentration.

Notes on repairs

1. For small fractures e.g. hairline fractures, the fracture can be 'veed' out, welded up, ground and examined by NDT for fractures.
2. For larger/significant fractures consideration is to be given to cropping and partly renewing/renewing the frame brackets. If renewing the brackets, ends of frames can be sniped to soften them.
3. If felt prudent, soft toes are to be incorporated at the boundaries of the bracket to the wing tanks.
4. Attention to be given to the structure in wing tanks in way of the extended bracket arm i.e. reinforcement provided in line with the bracket arm.

Figure 3.1.6: Typical Locations Susceptible to Structural Damage or Corrosion


HATCH END BEAM.
UPPER STOOL.
TYP. CORRUGATED BULKHEAD
DEFLECTION PT's
LOWER STOOL
(ESPECIALLY P.W.O.
BALLAST HOLD. BHD's)
DUCT KEEL

SECTION 2 Hull survey requirements for bulk carriers (IACS UR Z10.2 Rev.36)

2.1 General

2.1.1 The requirements of this Section are applicable to self-propelled Bulk Carriers others than Double Skin bulk carriers, as defined in 1.2.4, assigned the **ESP** class notation.

2.1.2 The requirements of this Section apply to surveys of hull structure and piping systems in way of the cargo holds, cofferdams, pipe tunnels, void spaces, fuel oil tanks within the cargo length area and all ballast tanks. These requirements are additional to the classification requirements applicable to the remainder of the ship.

2.1.3 The requirements contain the minimum extent of examination, thickness measurement and tank testing. The survey should be extended when Substantial Corrosion and/or structural defects are found and include additional Close-Up Survey when necessary.

2.1.4 Ships which are required to comply with Part 4, Chapter 4, SECTION 6, 6.4 are subject to the additional thickness measurement guidance contained in 2.6.7 with respect to the vertically corrugated transverse watertight bulkhead between cargo holds Nos. 1 and 2 for purposes of determining compliance with Part 4, Chapter 4, SECTION 6, 6.4 prior to the relevant compliance deadline stipulated in Part 4, Chapter 4, SECTION 1, 1.4 and at subsequent intermediate surveys (for ships over 10 years of age) and special surveys for purposes of verifying continuing compliance with Part 4, Chapter 4, SECTION 6, 6.4.

2.1.5 Ships which are required to comply with Part 4, Chapter 4, SECTION 4, 4.2 are subject to the additional thickness measurement guidance contained in Part 4, Chapter 4, SECTION 4, 4.3 with respect to the side shell frames and brackets for the purposes of determining compliance with Part 4, Chapter 4, SECTION 4, 4.2 prior to the relevant compliance deadline stipulated in Part 4, Chapter 4, SECTION 4, 4.2 and at subsequent intermediate and special surveys for purposes of verifying continuing compliance with Part 4, Chapter 4, SECTION 4, 4.2.

2.1.6 For bulk carriers with hybrid cargo hold arrangements, e.g. with some cargo holds of single side skin and others of double side skin, the requirements of SECTION 5 are to apply to cargo holds of double side skin and associated wing spaces.

2.1.7 In any kind of survey, i.e. special, intermediate, annual or other surveys having the scope of the foregoing ones, thickness measurements, when required by Table 3.2.3, of structures in areas where close-up surveys are required shall be carried out simultaneously with close-up surveys.

2.2 Annual Survey

2.2.1 General

The survey is to consist of an examination for the purpose of ensuring, as far as practicable, that the hull, hatch covers, coamings and piping are maintained in a satisfactory condition and should take into account the service history, condition and extent of the corrosion prevention system of ballast tanks and areas identified in the survey report file. The satisfactory condition of hatch coaming plating and their stiffener should be checked.

2.2.2 Examination of the Hull

(a) Examination of the hull plating and its closing appliances as far as can be seen.
(b) Examination of watertight penetrations as far as practicable.
(c) External examination of all air pipe heads.

2.2.3 Examination of weather decks, hatch covers and coamings

(a) Confirmation is to 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

(b) A thorough survey of cargo hatch covers and coamings is only possible by examination in the open as well as closed positions and is to include verification of proper opening and closing operation. As a result, the hatch cover sets within the forward 25% of the ship's length and at least one additional set, such that all sets on the ship are assessed at least once in every 5-year period, are to be surveyed open, closed and in operation to the full extent on each direction at each annual survey, including:
- stowage and securing in open condition;
- proper fit and efficiency of sealing in closed condition; and
- operational testing of hydraulic and power components, wires, chains, and link drives.

The closing of the covers is to include the fastening of all peripheral, and cross joint cleats or other securing devices. Particular attention is to be paid to the condition of the hatch covers in the forward 25% of the ship's length, where sea loads are normally greatest.

(c) If there are indications of difficulty in operating and securing hatch covers, additional sets above those required by 2.2.3(b) above, at the discretion of the surveyor, are to be tested in operation.

(d) Where the cargo hatch securing system does not function properly, repairs are to be carried out under the supervision of the Society. Where hatch covers or coamings undergo substantial repairs, the strength of securing devices should be upgraded to comply with Part 4, Chapter 4, SECTION 7.1.5.

(e) For each cargo hatch cover set, at each annual survey, the following items are to be surveyed:
- Cover panels, including side plates, and stiffener attachments that may be accessible in the open position by close-up survey (for corrosion, cracks, deformation);
- sealing arrangements of perimeter and cross joints (gaskets for condition and permanent deformation, flexible seals on combination carriers, gasket lips, compression bars, drainage channels and non return valves);
- clamping devices, retaining bars, cleating (for wastage, adjustment, and condition of rubber components);
- closed cover locating devices (for distortion and attachment);
- chain or rope pulleys;
- guides;
- guide rails and track wheels;
- stoppers
- wires, chains, tensioners, and gypsies;
- hydraulic system, electrical safety devices and interlocks; and
- end and interpanel hinges, pins and stools where fitted.

(f) At each hatchway, at each annual survey, the coamings, with panel stiffeners and brackets are to be checked for corrosion, cracks and deformation, especially of the coaming tops, including close-up survey.

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

(h) Where portable covers, wooden or steel pontoons are fitted, the satisfactory condition of the following should be confirmed:
- wooden covers and portable beams, carriers or sockets for the portable beam, and their securing devices;
- steel pontoons, including close up survey of hatch cover plating;
- tarpaulins;
- cleats, battens and wedges;
- hatch securing bars and their securing devices;
- loading pads/bars and the side plate edge;
- guide plates and chocks;
- compression bars, drainage channels and drain pipes (if any).

(i) Examination of flame screens on vents to all bunker tanks.

(j) Examination of bunker and vent piping systems, including ventilators.

2.2.4 Examination of cargo holds

(a) Bulk carriers 10-15 years of age, the following is to apply:
- overall survey of all cargo holds.
- close-up examination of sufficient extent, minimum 25% of frames, to establish the condition of the lower region of the shell frames including approx. lower than one third length of side frame at side shell and side frame end attachment and the adjacent shell plating in the forward cargo hold. Where this level of survey reveals the need for remedial measures, the survey is to be extended to include a close-up survey of all of the shell frames and adjacent shell plating of that cargo hold as well as a close-up survey of sufficient extent of all remaining cargo holds
- when considered necessary by the surveyor, thickness measurement is to be carried out. If the results of these thickness measurements indicate that substantial corrosion is found, the extent of thickness measurements should be increased in accordance with Table 3.1.2. These thickness measurements are to be carried out before the annual survey is credited as completed. Suspect Areas identified at previous surveys are to be examined. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken.
- For vessels built under the IACS Common Structural Rules, the annual thickness gauging may be omitted where a protective coating has been applied in accordance with the coating manufacturer's requirements and is maintained in good condition.
- where the protective coating in cargo holds, as defined by Part 3, Chapter 1, SECTION 5, 9.1.3 is found to be in GOOD condition as defined in 1.2.14, the extent of close-up surveys and thickness measurements may be specially considered.
- All piping and penetrations in cargo holds, including
- overboard piping, are to be examined.

(b) Bulk carriers over 15 years of age, the following is to apply:
- overall survey of all cargo holds.
- close-up examination of sufficient extent, minimum 25% of frames, to establish the condition of the lower region of the shell frames including approximately lower than one third length of side frame at side shell and side frame end attachment and the adjacent shell plating in the forward cargo hold and one other selected cargo hold. Where this level of survey reveals the need for remedial measures, the survey is to be extended to include a close-up survey of all of the shell frames and adjacent shell plating of that cargo hold as well as a close-up survey of sufficient extent of all remaining cargo holds;
- when considered necessary by the surveyor, or where extensive corrosion exists, thickness measurement should be carried out. If the results of these thickness measurements indicate that substantial corrosion is found, the extent of thickness measurements should be increased in accordance with Table 3.1.2. These extended thickness measurements are to be carried out before the annual survey is credited as completed. Suspect Areas identified at previous surveys are to be examined. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken.
- For vessels built under the IACS Common Structural Rules, the annual thickness gauging
- may be omitted where a protective coating has been applied in accordance with the coating
- manufacturer's requirements and is maintained in good condition.
- where a hard protective coating is fitted in cargo holds, and is found in GOOD condition as defined in 1.2.14, the extent of close-up surveys and thickness measurements may be specially considered.
- All piping and penetrations in cargo holds, including overboard piping, are to be examined.

2.2.5 Examination of ballast tanks

Examination of ballast tanks should be carried out when required as a consequence of the results of the special survey and intermediate survey is to be carried out. When considered necessary by the surveyor, thickness measurements are to be carried out. If the results of these thickness measurements indicate that

substantial corrosion is found, the extent of thickness measurements should be increased in accordance with Table 3.1.2. These extended thickness measurements are to be carried out before the survey is credited as completed. Suspect Areas identified at previous Surveys are to be examined. Areas of substantial corrosion identified at previous survey are to have thickness measurements taken.

For vessels built under the IACS Common Structural Rules, the annual thickness gauging may be omitted where a protective coating has been applied in accordance with the coating manufacturer's requirements and is maintained in good condition.

2.2.6 Additional annual survey requirements for the foremost cargo hold of ships subject to SOLAS XII/9.1

(a) Ships subject to SOLAS XII/9.1 are those meeting all the following conditions:
- Bulk Carriers of 150 m in length and upwards of single side skin construction
- carrying solid bulk cargoes having a density of 1780 kg/m3 and above,
- contracted for construction[8] before 1 July 1999, and
- constructed with an insufficient number of transverse watertight bulkheads to enable them to withstand flooding of the foremost cargo hold in all loading conditions and remain afloat in a satisfactory condition of equilibrium as specified in SOLAS XII/4.3.

(b) In accordance with SOLAS XII/9.1, for the foremost cargo hold of such ships, the additional survey requirements listed below shall apply.

(c) Extent of Survey: (IACS UR Z10.2 ANNEX IV)

- For bulk carriers of 5 - 15 years of age:

(i) An Overall Survey of the foremost cargo hold, including Close-up Survey of sufficient extent, minimum 25% of frames, is to be carried out to establish the condition of:
- Shell frames including their upper and lower end attachments, adjacent shell plating, and transverse bulkheads.
- Areas found suspect as defined in 1.2.12 at the previous Special Survey.

(ii) Where considered necessary by the surveyor as a result of the Overall and Close-up Survey as described in (a) above, the survey is to be extended to include a Close-up Survey of all of the shell frames and adjacent shell plating of the cargo hold.

- For bulk carriers exceeding 15 years of age:

(iii) An Overall Survey of the foremost cargo hold, including Close-up Survey is to be carried out to establish the condition of:
- All shell frames including their upper and lower end attachments, adjacent shell plating, and transverse bulkheads.
- Areas found suspect as defined in 1.2.12 at the previous Special Survey.

(d) Extent of Thickness Measurement:

.1 Thickness measurement is to be carried out to an extent sufficient to determine both general and local corrosion levels at areas subject to Close-up Survey, as described in (i) and (iii) above. The minimum requirement for thickness measurements is areas found to be Suspect Areas according to 1.2.12 at the previous Special Survey.
Where Substantial Corrosion as defined in 1.2.13 is found, the extent of thickness measurements should be increased in accordance with the requirements of Table 3.1.2.

.2 The thickness measurement may be dispensed with provided the surveyor is satisfied by the Close-up Survey, that there is no structural diminution and the Protective Coating where fitted remains effective.

(e) Special Consideration

[8] NOTE: The "contracted for construction" date means the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder.

Where the protective coating in the foremost cargo hold, is found to be in GOOD condition as defined in 1.2.14, the extent of close-up surveys and thickness measurements may be specially considered.

NOTE: For existing bulk carriers, where owners may elect to coat or recoat cargo holds as noted above, consideration may be given to the extent of the close-up and thickness measurement surveys. Prior to the coating of cargo holds of existing ships, scantlings should be ascertained in the presence of a surveyor.

2.2.7 Additional annual survey requirements after determining compliance with SOLAS XII/12 and XII/13

.1 For ships complying with the requirements of SOLAS XII/12 for hold, ballast and dry space water level detectors, the annual survey is to include an examination and a test, at random, of the water ingress detection systems and of their alarms.

.2 For ships complying with the requirements of SOLAS XII/13 for the availability of pumping systems, the annual survey is to include an examination and a test, of 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, and of their controls.

2.3 Intermediate Survey

2.3.1 General

Those items which are additional to the requirements of the Annual Surveys may be surveyed either at or between the 2nd and 3rd Annual Survey.

2.3.2 Concurrent crediting to both Intermediate Survey (IS) and Special Survey (SS) for surveys and thickness measurements of spaces are not acceptable.

2.3.3 Bulk Carriers 5-10 Years of Age, the following is to apply:

2.3.3.1 Ballast Tanks

a) For tanks used for water ballast, an Overall Survey of Representative Spaces selected by the surveyor is to be carried out. The selection is to include fore and aft peak tanks and a number of other tanks, taking into account the total number and type of ballast tanks. If such overall survey reveals no visible structural defects, the examination may be limited to verification that the corrosion prevention system remains efficient.

b) Where POOR Coating Condition as defined in 1.2.14 corrosion or other defects are found in water Ballast tanks or where a Hard Protective Coating was not applied from the time of construction, the examination is to be extended to other Ballast tanks of the same type.

c) In ballast tanks other than double bottom tanks, where a Hard Protective Coating is found in POOR condition as defined in 1.2.14, and it is not renewed, or where soft or semi-hard coating has been applied, or where a Hard Protective Coating was not applied from the time of construction, the tanks in question are to be examined and thickness measurements carried out as considered necessary at annual intervals. When such breakdown of hard breakdown coating is found in ballast double bottom tanks, or where a soft or semi-hard coating has been applied, or where a hard protective coating has not been applied, the tanks in question may be examined at annual intervals. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurements are to be carried out.

d) In addition to the requirements above, suspect areas identified at previous surveys are to be overall and close-up surveyed.

2.3.3.2 Cargo Holds

a) An Overall Survey of all cargo holds, including Close-Up Survey of sufficient extent, minimum 25% of frames, is to be carried out to establish the condition of:

- Shell frames including their upper and lower end attachments, adjacent shell plating, and transverse bulkheads in the forward cargo hold and one other selected cargo hold.
- Areas found Suspect at previous surveys.

b) Where considered necessary by the surveyor as a result of the Overall and Close-up Survey as described in 2.3.3.2(a), the survey is to be extended to include a Close-up Survey of all of the shell frames and adjacent shell plating of that cargo hold as well as a Close-up Survey of sufficient extent of all remaining cargo holds.

2.3.3.3 Extent of Thickness Measurement

a) Thickness measurement is to be carried out to an extent sufficient to determine both general and local corrosion levels at areas subject to Close-up Survey as described in 2.3.3.2(a). The minimum requirement for thickness measurements at the Intermediate Survey are areas found to be Suspect Areas at the previous surveys.
b) The extent of thickness measurement may be specially considered provided the Surveyor is satisfied by the close-up survey, that there is no structural diminution and the hard protective coatings are found to be in a GOOD condition as defined in 1.2.14.
c) Where Substantial Corrosion is found, the extent of thickness measurements is to be increased in accordance with the requirements of Table 3.1.2. These extended thickness measurements are to be carried out before the survey is credited as completed. Suspect Areas identified at previous surveys are to be examined. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken.

   For vessels built under IACS Common Structural Rules, the identified substantial corrosion areas may be:
   i) protected by coating applied in accordance with the coating manufacturer's requirements and examined at annual intervals to confirm the coating in way is still in good condition, or alternatively
   ii) required to be measured at annual intervals.

d) Where the hard protective coating in cargo holds, is found to be in GOOD condition as defined in 1.2.14, the extent of close-up surveys and thickness measurements may be specially considered.

Explanatory Note:

For existing bulk carriers, where owners may elect to coat or recoat cargo holds as noted above, consideration may be given to the extent of the close-up and thickness measurement surveys. Prior to the coating of cargo holds of existing ships, scantlings should be ascertained in the presence of a surveyor.

2.3.4 Bulk Carriers 10 - 15 Years of Age, the following is to apply:

a) The requirements of the Intermediate Survey are to be to the same extent to the previous Special Survey as required in 1.7 and 2.6. However, internal examination of fuel tanks and pressure testing of all tanks are not required unless deemed necessary by the attending surveyor.
b) In application of 2.3.4(a), the intermediate survey may be commenced at the second Annual Survey and be progressed during the succeeding year with a view to completion at the third Annual Survey.
c) In application of 2.3.4(a), an under-water survey may be considered in lieu of the requirements of 2.6.2(a).

2.3.5 Bulk Carriers Over 15 Years of Age. The following is to apply:

a) The requirements of the Intermediate Survey are to be to the same extent as the previous Special Survey as required in 1.7 and 2.6. However, internal examination of fuel tanks and pressure testing of all tanks are not required unless deemed necessary by the attending surveyor.
b) In application of 2.3.5(a), the Intermediate Survey may be commenced at the second Annual Survey and be progressed during the succeeding year with a view to completion at the third Annual Survey.
c) In application of 2.3.5(a), a survey in dry dock is to be part of the Intermediate Survey. The overall and close-up surveys and thickness measurements, as applicable, of the lower portions of the cargo holds and water ballast tanks are to be carried out in accordance with the applicable requirements for intermediate surveys, if not already performed.

NOTE: Lower portions of the cargo holds and ballast tanks are considered to be the parts below light ballast water line.

2.4 Docking Survey

2.4.1 A survey in dry-dock, according to Section 9, 9.4 is to be carried out.

2.5 In-water survey

2.5.1 For ships of less than 15 years of age, alternate inspections of the ship's bottom not conducted in conjunction with the enhanced survey during the Special Survey may be carried out with the ship afloat. Inspection of the ship afloat should only be carried out when the conditions are satisfactory and the proper equipment and suitably qualified staff is available.

2.5.2 For ships of 15 years of age and over, inspection of the outside of the ship's bottom should be carried out with the ship in dry dock.

2.6 Special Survey

2.6.1 General

(a) As part of the preparation for the Special Survey, the thickness measurement and Survey Program, in accordance with 1.7.2, should be dealt with in advance of the Special Survey. The thickness measurement is not to be held before the 4th Annual Survey.
(b) The Special Survey shall include, in addition to the requirements of the Annual Surveys, examination, tests, and checks of sufficient extent to ensure that the hull and related piping in 2.6.1.4 is in a satisfactory condition and that the ship is fit for its intended purpose for the new period of class of 5 years to be assigned subject to proper maintenance and operation and to periodical surveys being carried out at the due dates.
(c) All cargo holds, ballast tanks, including double bottom tanks, pipe tunnels, cofferdams and void spaces bounding cargo holds, decks and outer hull are to be examined, and this examination is to be supplemented by thickness measurement and testing as required in 2.6.6 and 2.6.8, to ensure that the structural integrity remains effective. The aim of the examination is to discover substantial corrosion, significant deformation, fractures, damages or other structural deterioration, that may be present.
(d) All piping systems within the above spaces are to be examined and operationally tested to working pressure to attending Surveyor's satisfaction to ensure that tightness and condition remain satisfactory.
(e) The survey extent of ballast tanks converted to void spaces should be specially considered in relation to the requirements for ballast tanks.
(f) Air pipe heads are to be completely examined, externally and internally, in accordance with the requirements of Table 3.2.5.

2.6.2 Dry-dock Survey

A survey in dry dock is to be a part of the Special Survey. The overall and close-up surveys and thickness measurements, as applicable, of the lower portions of the cargo holds and ballast tanks are to be carried out in accordance with the applicable requirements for special surveys, if not already performed.

NOTE: Lower portions of the cargo holds and ballast tanks are considered to be the parts below light ballast water line.

2.6.3 Tank Protection

(a) Where provided, the condition of corrosion prevention system of ballast tanks is to be examined. For tanks used for salt water ballast, excluding double bottom tanks, where a protective coating is found in POOR condition as defined in 1.2.14, and it is not renewed, where soft or semi-hard coating has been applied, or where a protective coating was not applied from the time of construction, maintenance of class is to be made subject to the tanks in question being examined at annual intervals. When such breakdown of coating is found in salt water ballast double bottom tanks and it is not renewed, where a soft or semi-hard coating has been applied, or where a protective coating was not applied from the time of construction, maintenance of class may be subject to the tanks in question being examined at annual intervals. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurements should be carried out.
(b) Where the protective coating in cargo holds is found to be in GOOD condition as defined in 1.2.14, the extent of close-up surveys and thickness measurements may be specially considered.

2.6.4 Hatch covers and coamings

The hatch covers and coamings are to be surveyed as follows:

(a) A thorough inspection of the items listed in 2.2.3 is to be carried out, in addition to all hatch covers and coamings.
(b) Checking of the satisfactory operation of all mechanically operated hatch covers is to be made, 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) Checking the effectiveness of sealing arrangements of all hatch covers by hose testing or equivalent.
(d) Close-up survey and thickness measurement[9] of the hatch cover and coaming plating and stiffeners is to be carried out as given in Table 3.2.2 and Table 3.2.3.

2.6.5 Extent of Overall and Close-up Survey

(a) An Overall Survey of all tanks and spaces is to be carried out at each Special Survey. Fuel oil tanks in the cargo length area are to be surveyed as following Table 3.2.1:

Table 3.2.1: Minimum requirements for fuel oil tanks examination

Special Survey No. 1 Age ≤ 5	Special Survey No. 2 5 < Age ≤ 10	Special Survey No. 3 10 < Age ≤ 15	Special Survey No. 4 and Subsequent 15 < Age
None	One tank	Two tanks, *Note (3)*	Half, minimum two, *Notes (3), (4)*
NOTES:			

[9] Subject to cargo hold hatch covers of approved design which structurally have no access to the internals, close-up survey/thickness measurement shall be done of accessible parts of hatch covers structures

1. The above requirements apply to tanks of integral (structural) type.
2. If a selection of tanks is accepted to be examined, then different tanks are to be examined at each special survey, on a rotational basis.
3. At special surveys No. 3 and subsequent surveys, one deep tank for fuel oil in the cargo length area is to be included, if fitted.
4. Where 50% of tanks are to be examined, a minimum of two tanks are required to be examined depending upon the overall number of tanks.
5. Peak tanks (all uses) are subject to internal examination at each special survey

(b) The minimum requirements for close-up surveys at special survey are given in Table 3.2.2.

(c) The Surveyor may extend the close-up survey 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.

(d) For areas in spaces where hard protective coatings are found to be in a GOOD condition as defined in 1.2.14, the extent of close-up surveys according to Table 3.2.2 may be specially considered.

Table 3.2.2: Minimum requirement for Close-up Survey at Special Hull Survey of bulk carriers

Special Survey No 1 (Age ≤ 5)	Special Survey No 2 (5 < Age ≤ 10)	Special Survey No 3 (10 < Age ≤15)	Special Survey No 4 and subsequent (15 < Age)
(A) At least 25% of shell frames and their end connections in the forward cargo hold at representative positions. (A) Selected frames in remaining cargo holds. (B) One transverse web with associated plating and longitudinals in two representative water ballast tanks of each type (i.e. topside, or hopper side tank). (C) Two selected cargo hold transverse bulkheads, including internal structure of upper and lower stools, where fitted. (D) All cargo hold hatch covers and coamings (plating and stiffeners).	(A) All shell frames in the forward cargo hold and 25% of shell 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. (B) One transverse web with associated plating and longitudinals in each water ballast tank. (B) Forward and aft transverse bulkhead in one ballast tank, including stiffening system (C) All cargo hold transverse bulkheads, including internal structure of upper and lower stools, where fitted (D) All cargo hold hatch covers and coamings (plating and stiffeners). (E) All deck plating and under deck structure inside line of hatch openings between all cargo hold hatches.	(A) All shell 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. (B) All transverse webs with associated plating and longitudinals in each water ballast tank. (B) All transverse bulkheads in ballast tanks, including stiffening system. Areas (C), (D) and (E) as for Special Survey No. 2	(A) All shell frames in all cargo holds including upper and lower end attachments and adjacent shell plating. Areas (B) - (E) as for Special Survey No. 3

(A) Cargo hold transverse frames
(B) Transverse web frame or watertight transverse bulkhead in water ballast tanks
(C) Cargo hold transverse bulkheads plating, stiffeners and girders
(D) Cargo hold hatch covers and coamings
(E) Deck plating and under deck structure inside line of hatch openings between cargo hold hatches

See Figure 3.2.1 for the areas corresponding to (A), (B), (C), (D) and (E)

See also Part 4, Chapter 4, Figure 4.4.5 for zones of side shell frames for ships subject to compliance with Part 4, Chapter 4, SECTION 4, 4.2,

NOTE: Ballast tanks include peak tanks. Close up Survey of transverse bulkheads to be carried out at four levels:

Level (a): Immediately above the inner bottom and immediately above the line of gussets 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.

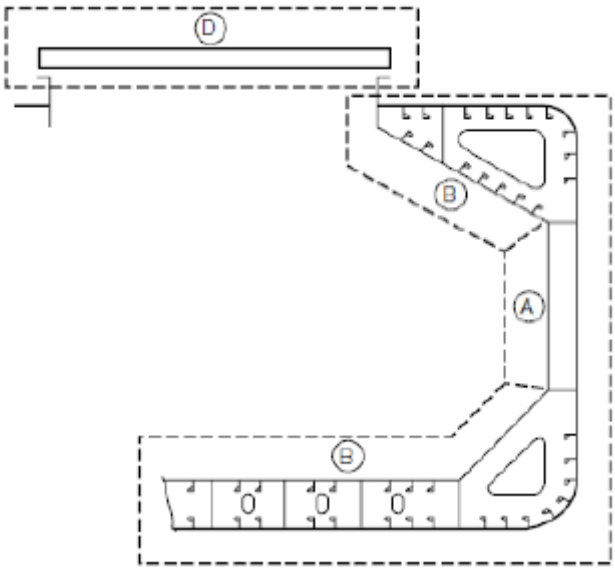
Level (c): About midheight of the bulkhead

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.

Figure 3.2.1: Close-Up Survey and thickness measurement areas

Typical transverse section

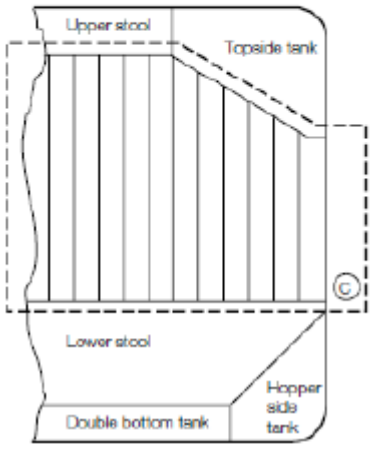
Areas (A), (B) and (D)



Thickness to be reportedd on TM3-BC, TM4-BC, TM6-BC and TM7-BC as appropriate

A cargo hold, transverse bulkhead

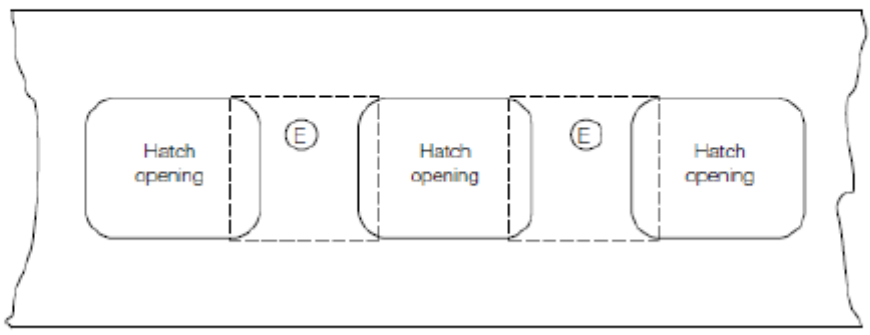
Area (C)



Thickness to be reported on TM5-BC

Typical areas of deck plating inside line of hatch openings between cargo hold hatches

Area (E)



Thickness to be reported on TM6-BC

2.6.6 Extent of thickness measurement

(a) The minimum requirements for thickness measurement at Special Survey are given in Table 3.2.3.

For additional thickness measurement guidelines applicable to the vertically corrugated transverse watertight bulkhead between cargo hold No. 1 and 2 on ships subject to compliance with Part 4, Chapter 4, SECTION 6, 6.4 and Part 4, Chapter 4, SECTION 1, 1.4, reference is to be made to 2.1.4 and Part 4, Chapter 4, SECTION 4, 4.3. For additional thickness measurement guidelines applicable to the side shell frames and brackets on ships subject to compliance with Part 4, Chapter 4, SECTION 4, 4.2, reference is to be made to 2.1.5 and Part 4, Chapter 4, SECTION 4, 4.3.

(b) Provisions for extended measurements for areas with Substantial Corrosion are given in Table 3.1.2 and as may be additionally specified in the Survey Program. These extended thickness measurements are to be carried out before the survey is credited as completed. Suspect Areas identified at previous surveys are to be examined. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken.

(c) For vessels built under IACS Common Structural Rules, the identified substantial corrosion areas may be:

i. protected by coating applied in accordance with the coating manufacturer's requirements and examined at annual intervals to confirm the coating in way is still in good condition, or alternatively

ii. required to be measured at annual intervals.

(d) The Surveyor may further extend the thickness measurements as deemed necessary.

(e) For areas in tanks where hard protective coatings are found to be in a GOOD condition as specified in 1.2.14, the extent of thickness measurement according to Table 3.2.3 may be specially considered.

(f) Transverse sections are to be chosen where the largest reductions are suspected to occur or are revealed from deck plating measurements.

(g) 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 is to be carried out. Thickness measurement is also to 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.

Table 3.2.3: Minimum Requirements for Thickness Measurements at Special Hull Survey of bulk carriers

Special Survey No 1 **(Age ≤ 5)**	**Special Survey No 2** **(5 < Age ≤ 10)**	**Special Survey No 3** **(10 <Age ≤ 15)**	**Special Survey No 4** **(Age > 15)**
Suspect areas	Suspect areas	Suspect areas	Suspect areas
	Within the cargo length: – Two transverse sections of deck plating outside of line of cargo hatch openings	Within the cargo length: – each deck plate outside line of cargo hatch openings – two transverse sections, one in the amidship area, outside line of cargo hatch openings – all wind and water strakes	Within the cargo length: – each deck plate outside line of cargo hatch openings. – three transverse sections, one in the amidship area, outside of line of cargo hatch openings. – each bottom plate
	Wind and water strakes in way of the two transverse sections considered above	Selected wind and water strakes outside the cargo length area	All wind and water strakes, full length

	Selected wind and water strakes outside the cargo length area		
	Measurements of the structural members subject to Close-up Survey according to Table 3.2.2, for general assessment and recording of corrosion pattern.	Measurement of the structural members subject to Close up Survey according to Table 3.2.2, for general assessment and recording of corrosion pattern.	Measurement of the structural members subject to Close-up Survey according to Table 3.2.2, for general assessment and recording of corrosion pattern.
		Additional thickness measurements to the vertically corrugated transverse watertight bulkhead between cargo holds No 1 and 2 (see 2.1.4 and 2.6.7), if applicable, for ships in compliance with Part 4, Chapter 4, SECTION 6, 6.4 and Part 4, Chapter 4, SECTION 1, 1.4	Additional thickness measurements to the vertically corrugated transverse watertight bulkhead between cargo holds No 1 and 2 (see 2.1.4 and 2.6.7), if applicable, for ships in compliance with Part 4, Chapter 4, SECTION 6, 6.4. and Part 4, Chapter 4, SECTION 1, 1.4
	Additional thickness measurements of side shell frames and brackets as required (see 2.1.5) for verification in compliance with Part 4, Chapter 4, SECTION 4, 4.2, if applicable.	Additional thickness measurements of side shell frames and brackets as required (see 2.1.5) for verification in compliance with Part 4, Chapter 4, SECTION 4, 4.2, if applicable	Additional thickness measurements of side shell frames and brackets as required (see 2.1.5) for verification in compliance with Part 4, Chapter 4, SECTION 4, 4.2, if applicable.

2.6.7 Guidelines for the gauging of the vertically corrugated transverse watertight bulkhead between holds nos. 1 and 2 (IACS UR Z10.2 ANNEX III)

.1 Gauging is necessary to determine the general condition of the structure and to define the extent of possible repairs and/or reinforcements of the vertically corrugated transverse watertight bulkhead for verification of the compliance with Part 4, Chapter 4, SECTION 6, 6.4.

.2 Taking into account the buckling model applied in Part 4, Chapter 4, SECTION 6, 6.4in the evaluation of strength of the bulkhead, it is essential to determine the thickness diminution at the critical levels shown in Figure 3.2.2 and Figure 3.2.3.

.3 The gauging is to be carried out at the levels as described in Table 3.2.4. 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 in the Table 3.2.4 are to be gauged.

.4 Where the thickness changes within the horizontal levels, the thinner plate is to be gauged.

.5 Steel renewal and/or reinforcement is to comply with the relevant applicable scantling requirements in Part 4, Chapter 4, SECTION 6, 6.4.

Table 3.2.4: Thickness measurement of transverse corrugated bulkhead between cargo holds No 1 and 2.

Level	Locations
Level (a) Ships without lower stool *(see Figure 3.2.2)*	– The mid-breadth of the corrugation flanges at approximately 200 mm above the line of shedder plates; – The middle of gusset plates between corrugation flanges, where fitted; – The middle of the shedder plates; – The mid-breadth of the corrugation webs at approximately 200 mm above the line of shedder plates.
Level (b) Ships with lower stool *(see Figure 3.2.3)*	– The mid-breadth of the corrugation flanges at approximately 200 mm above the line of shedder plates; – The middle of gusset plates between corrugation flanges, where fitted; – The middle of the shedder plates; – The mid-breadth of the corrugation webs at approximately 200 mm above the line of shedder plates.
Level (c) Ships with or without lower stool *(see Figure 3.2.2 and Figure 3.2.3)*	– The mid-breadth of the corrugation flanges and webs at about the mid-height of the corrugation.

Table 3.2.5: Survey Requirements for automatic pipe heads at Special Surveys (UR Z7 Cor.1, Table 4)

Special Survey No 1 (Age≤5)	**Special Survey No 2 (5<Age≤10)**	**Special Survey No 3 and No 4 (Age>10)**
- Two air pipe heads, one port and one starboard located on the exposed decks in the forward 0,25L, preferably air pipes serving ballast tanks - Two air pipe heads, one port and one starboard on the exposed decks, serving spaces aft of 0,25L, preferably air pipes serving ballast tanks. *Notes 1,2*	- All air pipe heads located on the exposed decks in the forward 0,25L. - At least 20% of air pipe heads on the exposed decks serving spaces aft of 0,25L, preferably air pipes serving ballast tanks *Notes 1,2*	- All air pipe heads located on the exposed decks *Note 3*

NOTES:
1. For designs where the inner parts cannot be properly inspected from outside, this is to include removal of the head from the air pipe. Particular attention is to be paid to the condition of the zinc coating in heads constructed from galvanized steel.
2. The selection of air pipe heads to be inspected is left to the attending Surveyor. According to the results of this inspection, the Surveyor may require the inspection of other air pipe heads located on the exposed decks.
3. Exemption may be considered for air pipe heads where there is substantiated evidence of replacement within the previous five years.

2.6.8 Extent of tank testing

(a) All boundaries of water ballast tanks and deep tanks used for water ballast within the cargo length area are to be pressure tested. For fuel oil tanks, only representative tanks are to be pressure tested.
(b) The Surveyor may extend the tank testing as deemed necessary.
(c) Boundaries of ballast tanks are to be tested with a head of liquid to the top of air pipes.
(d) Boundaries of ballast holds are to be tested with a head of liquid to near to the top of hatches.
(e) Boundaries of fuel oil tanks are to be tested with a head of liquid to the highest point that liquid will rise under service conditions. Tank testing of fuel oil tanks 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.
(f) The testing of 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.

Figure 3.2.2 Ships without lower stool

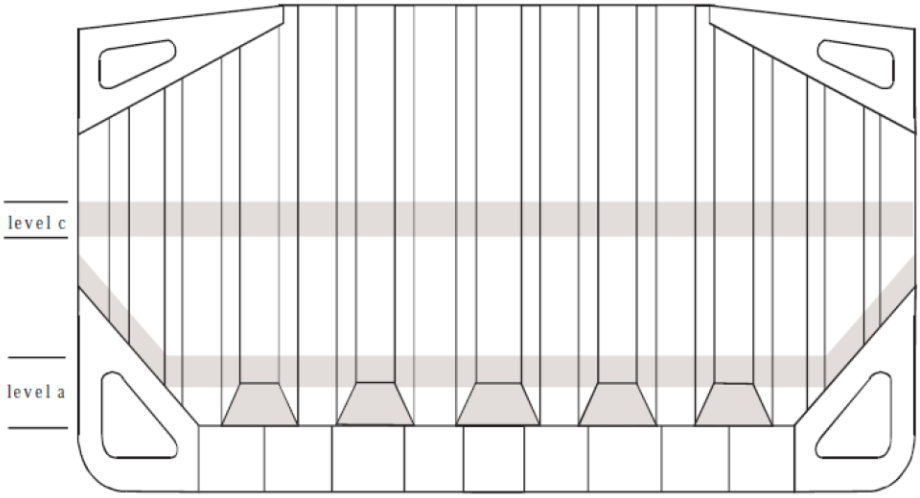
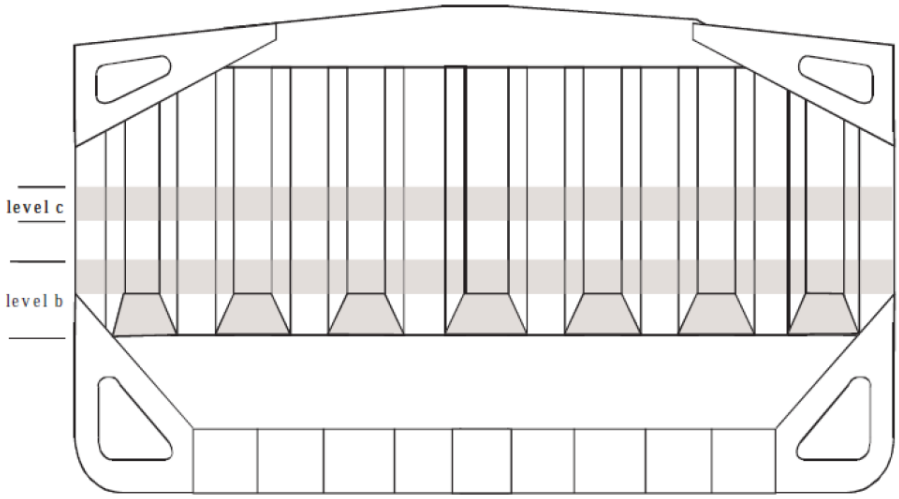


Figure 3.2.3 Ships with lower stool



2.6.9 Additional special survey requirements after determining compliance with SOLAS XII/12 and XII/13

(a) For ships complying with the requirements of SOLAS XII/12 for hold, ballast and dry space water level detectors, the special survey is to include an examination and a test of the water ingress detection systems and of their alarms.

(b) For ships complying with the requirements of SOLAS XII/13 for the availability of pumping systems, the special survey is to include an examination and a test of 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, and of their controls.

SECTION 3 Hull survey requirements for oil tankers (IACS UR Z10.1 Rev.24)

3.1 General

3.1.1 The requirements of this Section are applicable to self-propelled oil tankers, other than Double Hull Oil Tankers, as defined in 6.1.1, assigned the **ESP** class notation.

3.1.2 The requirements of this Section apply to surveys of hull structure and piping systems in way of cargo tanks, pump rooms, cofferdams, void spaces, tunnels within the cargo area and all ballast tanks. They are additional to the classification requirements applicable to the remainder of the ship.

3.1.3 The requirements contain the minimum extent of examination, thickness measurement and tank testing. The survey should be extended when Substantial Corrosion and/or structural defects are found and include additional Close-Up Survey when necessary.

3.1.4 In any kind of survey, i.e. special, intermediate, annual or other surveys having the scope of the foregoing ones, thickness measurements, when required by Table 3.3.2, of structures in areas where close-up surveys are required shall be carried out simultaneously with close-up surveys.

3.2 Annual Survey

3.2.1 General

The survey shall consist of an examination for the purpose of ensuring, as far as practicable, that the hull and piping are maintained in a satisfactory condition and should take into account the service history, condition and extent of the corrosion prevention system of ballast tanks and areas identified in the survey report file.

3.2.2 Hull examination

(a) Examination of the hull plating and its closing appliances as far as can be seen.
(b) Examination of watertight penetrations as far as practicable.
(c) External examination of all air pipe heads.

3.2.3 Examination of weather decks

(a) Examination of cargo tank openings including gaskets, covers, coamings and flame screens.
(b) Examination of cargo tank pressure/vacuum valves and flame screens.
(c) Examination of flame screens on vents to all bunker tanks.
(d) Examination of cargo, crude oil washing, bunker, ballast and vent piping systems, including vent masts and headers.

3.2.4 Examination of cargo pump rooms and pipe tunnels, if fitted.

(a) Examination of all pump room bulkheads for signs of leakage or fractures and in particular the sealing arrangements of all penetrations in these bulkheads.
(b) Examination of the condition of all piping systems.

3.2.5 Examination of ballast tanks

Examination of Ballast Tanks where required as a consequence of the results of the Special Survey and Intermediate Survey is to be carried out. When considered necessary by the surveyor, or when extensive corrosion exists, thickness measurements are to be carried out and if the results of these thickness measurements indicate that Substantial Corrosion is found, the extent of thickness measurements is to be increased in accordance with Table 3.1.3. These extended thickness measurements are to be carried out before the survey is credited as completed. Suspect Areas identified at previous Special Surveys are to be examined. Areas of substantial corrosion identified at previous special or intermediate survey are to have thickness measurements taken.

3.3 Intermediate Survey

3.3.1 General

(a) The survey extent is dependent on the age of the vessel as specified in 3.3.2 to 3.3.4.
(b) For weather decks, an examination as far as applicable of cargo, crude oil washing, bunker, ballast, steam and vent piping systems as well as vent masts and headers is to be carried out. If upon examination there is any doubt as to the condition of the piping, the piping may be required to be pressure tested thickness measured or both.
(c) Concurrent crediting to both Intermediate Survey and Special Survey for surveys and thickness measurements of spaces are not acceptable.

3.3.2 Oil Tankers over 5 years of age, but not more than 10 years ($5 < age \leq 10$)

(a) All Ballast Tanks are to be examined. When considered necessary by the surveyor, thickness measurement and testing are to be carried out to ensure that the structural integrity remains effective.
(b) A Ballast Tank is to be examined at subsequent annual intervals where:
    a. a **hard** protective coating has not been applied from the time of construction, or
    b. a soft or semi-hard coating has been applied, or
    c. substantial corrosion is found within the tank, or
    d. the **hard** protective coating is found to be in less than GOOD condition as defined in 1.2.14 and the **hard** protective coating is not repaired to the satisfaction of the Surveyor.
(c) In addition to the requirements above, suspect areas identified at previous surveys are to be examined.

3.3.3 Oil Tankers over 10 years of age, but not more than 15 years ($10 < age \leq 15$)

(a) The requirements of the Intermediate Survey are to be to the same extent as the previous Special Survey. However, pressure testing of cargo and ballast tanks and the requirements for longitudinal strength evaluation of Hull Girder, as required in 1.9.2(b), are not required unless deemed necessary by the attending Surveyor.
(b) In application of 3.3.3(a), the intermediate survey may be commenced at the second annual survey and be progressed during the succeeding year with a view to completion at the third annual survey in lieu of the application of Part 1, Chapter 2, SECTION 7, 7.4.5.
(c) In application of 3.3.3(a), an under-water survey may be considered in lieu of the requirements of Dry Dock Survey.

3.3.4 Oil Tankers over 15 years of age

(a) The requirements of the Intermediate Survey are to be to the same extent as the previous Special Survey as required in 1.7 and 3.6. However, pressure testing of cargo and ballast tanks and the requirements for longitudinal strength evaluation of Hull Girder, as required in 1.9.2(b), are not required unless deemed necessary by the attending surveyor.
(b) In application of 3.3.4(a), the intermediate survey may be commenced at the second annual survey and be progressed during the succeeding year with a view to completion at the third annual survey in lieu of the application of Part 1, Chapter 2, SECTION 7, 7.4.5.
(c) In application of 3.3.4(a), a survey in dry dock is to be part of the intermediate survey. The overall and close-up surveys and thickness measurements, as applicable, of the lower portions of the cargo tanks and water ballast tanks are to be carried out in accordance with the applicable requirements for intermediate surveys, if not already performed.

NOTE: Lower portions of the cargo and ballast tanks are considered to be the parts below light ballast water line.

3.4 Docking Survey

3.4.1 A survey in dry-dock, according to Section 9, 9.4 is to be carried out.

3.5 In-water survey

3.5.1 For ships over 15 years of age, inspection of the outside of the ship's bottom should be carried out with the ship in dry dock.

3.5.2 For ships of 15 years of age or less, alternate inspections of the ship's bottom not conducted in conjunction with the enhanced survey during the periodical survey may be carried out with the ship afloat. Inspection of the ship afloat should only be carried out when the conditions are satisfactory and the proper equipment and suitably qualified staff is available.

3.6 Special Survey

3.6.1 General

(a) The Special Survey shall include, in addition to the requirements of Annual Surveys, examination, tests, and checks of sufficient extent to ensure that the hull and related piping are in a satisfactory condition and that the ship is fit for its intended purpose for the new period of class of 5 years to be assigned subject to proper maintenance and operation and to periodical surveys being carried out at the due dates.
(b) All cargo tanks, ballast tanks, including double bottom tanks, pump rooms, pipe tunnels, cofferdams and void spaces bounding cargo tanks, decks and outer hull are to be examined, and this examination is to be supplemented by thickness measurement and testing as required in 3.6.5 and 3.6.6, to ensure that the structural integrity remains effective. The aim of the examination is to discover substantial corrosion, significant deformation, fractures, damages or other structural deterioration, that may be present.
(c) Cargo piping on deck, including Crude Oil Washing (COW) piping, Cargo and Ballast piping within the above tanks and spaces are to be examined and operationally tested under working pressure to attending Surveyor's satisfaction to ensure that tightness and condition remain satisfactory. Special attention is to be given to any ballast piping in cargo tanks and any cargo piping in ballast tanks and void spaces, and Surveyors are to be advised on all occasions when this piping, including valves and fittings are open during repair periods and can be examined internally.
(d) Air pipe heads are to be completely examined, externally and internally, in accordance with the requirements of Table 3.2.5.

3.6.2 Dry-dock Survey

A survey in dry dock is to be a part of the Special Survey. The overall and close-up surveys and thickness measurements, as applicable, of the lower portions of the cargo tanks and ballast tanks are to be carried out in accordance with the applicable requirements for special surveys, if not already performed.

NOTE: Lower portions of the cargo and ballast tanks are considered to be the parts below light ballast water line.

3.6.3 Tank Protection

(a) Where provided, the condition of the corrosion prevention system of cargo tanks is to be examined.
(b) A Ballast Tank is to be examined at subsequent annual intervals where:
   a. a **hard** protective coating has not been applied from the time of construction, or
   b. a **soft** or **semi-hard** coating has been applied, or

c. substantial corrosion is found within the tank, or
d. the **hard** protective coating is found to be in less than GOOD condition as defined in 1.2.14 and the **hard** protective coating is not repaired to the satisfaction of the Surveyor.

(c) Thickness measurements are to be carried out as deemed necessary by the surveyor.

3.6.4 Extent of Overall and Close-up Survey

(a) An Overall Survey of all tanks and spaces is to be carried out at each Special Survey.
(b) The minimum requirements for Close-up Surveys during special survey of oil tankers are given in Table 3.3.1.
(c) The Surveyor may extend the Close-up Survey as deemed necessary taking into account the maintenance of the tanks under survey, the condition of the corrosion prevention system and also in the following cases:
   – In particular, tanks having structural arrangements or details, which have suffered defects in similar tanks or on similar ships according to available information.
   – In tanks which have structures approved with reduced scantlings due to an approved corrosion control system.
(d) For areas in tanks where hard protective coatings are found in a GOOD condition as defined in 1.2.14 the extent of the Close-up Survey according to Table 3.3.1 may be specially considered.

3.6.5 Extent of Thickness Measurement

(a) The minimum requirements for thickness measurement at Special Survey are given in Table 3.3.2.
(b) Provisions for extended measurements for areas with substantial corrosion are given in Table 3.1.3 and as may be additionally specified in the Survey Program. These extended thickness measurements are to be carried out before the survey is credited as completed. Suspect Areas identified at previous surveys are to be examined. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken.
(c) The Surveyor may further extend the thickness measurement as deemed necessary.
(d) For areas in tanks where hard protective coatings are found to be in a GOOD condition as defined in 1.2.14, the extent of thickness measurement according to Table 3.3.2 may be specially considered.
(e) Transverse sections should be chosen where the largest reductions are suspected to occur or are revealed from deck plating measurements.
(f) In cases where two or three sections are to be measured, at least one should include a ballast tank within 0,5L amidships.

In case of oil tankers of 130m in length and upwards (as defined in the International Convention on Load Lines in force) and more than 10 years of age, for the evaluation of the ship's longitudinal strength, the sampling method of thickness measurements is given in 1.4.13.

Table 3.3.1: Minimum Requirement to Close-up Surveys at Special Survey of oil tankers, Ore/Oil Ships and etc.

Special Survey No 1 (Age ≤ 5)	**Special Survey No 2 (5 < Age ≤ 10)**	**Special Survey No 3 (10 < Age ≤ 15)**	**Special Survey No 4 (Age > 15)**
A) ONE WEB FRAME RING - in a ballast wing tank, if any, or a cargo wing tank used primarily for water ballast.	A) ALL WEB FRAME RINGS in a ballast wing tank, if any, or a cargo wing tank, used primarily for water ballast.	A) ALL WEB FRAME RINGS - in all ballast tanks	As special survey No.3
B) ONE DECK TRANSVERSE - in a cargo oil tank.	B) ONE DECK TRANSVERSE – in each of the remaining ballast tanks, if any.	A) ALL WEB FRAME RINGS - in a cargo wing tank.	Additional transverses included as deemed necessary by the Classification Society
D) ONE TRANSVERSE BULKHEAD - in a ballast tank	B) ONE DECK TRANSVERSE – in cargo wing tank.	A) A minimum of 30% of all web frame rings in each remaining cargo wing tank. (see Note 1)	
D) ONE TRANSVERSE BULKHEAD - in a cargo oil wing tank.	B) ONE DECK TRANSVERSE - in two cargo centre tanks.	C) ALL TRANSVERSE BULKHEADS - in all cargo and ballast tanks.	
D) ONE TRANSVERSE BULKHEAD - in a cargo oil centre tank.	C) BOTH TRANSVERSE BULKHEADS - in a wing ballast tank, if any, or a cargo wing tank used primarily for water ballast.	E) A minimum of 30% of deck and bottom transverses, including adjacent structural members, in each cargo centre tank.	
	D) ONE TRANSVERSE BULKHEAD - in each remaining ballast tank	F) As considered necessary by the surveyor.	
	D) ONE TRANSVERSE BULKHEAD - in a cargo oil wing tank.		
	D) ONE TRANSVERSE BULKHEAD - in two cargo centre tanks.		

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

Note 1: The 30% is to be rounded up to the next whole integer.

Table 3.3.2: Minimum Requirement to thickness measurements at Special Hull Surveys of Oil Tankers, Ore/Oil Ships and etc.

Special Survey No 1 (Age < 5)	**Special Survey No 2 (5 < Age ≤ 10)**	**Special Survey No 3 (10 < Age ≤ 15)**	**Special Survey No 4 (Age >15)**
2. Suspect Areas	2. Suspect Areas	3. Suspect Areas	3. Suspect Areas

4. One section of deck plating for the full beam of the ship within the cargo area (in way of a ballast tank, if any, or a cargo tank used primarily for water ballast)	4. Within the cargo area: – Each deck plate – One transverse section	4. Within the cargo area: – Each deck plate – Two transverse sections (Note 1) – All wind and water strakes	3. Within the cargo area: – Each deck plate – Three transverse sections (Note 1) – Each bottom plate
	5. Selected wind and water strakes outside the cargo area	4. Selected wind and water strakes outside the cargo area	5. All wind and water strakes, full length
6. Measurements of those structural members subject to close-up survey according to Table 3.3.1, for general assessment and recording of corrosion pattern	5. Measurements of those structural members subject to close-up survey according to Table 3.3.1, for general assessment and recording of corrosion pattern	5. Measurements of those structural members subject to close-up survey according to Table 3.3.1, for general assessment and recording of corrosion pattern	5. Measurements of those structural members subject to close-up survey according to Table 3.3.1, for general assessment and recording of corrosion pattern
NOTE: (1) At least one section is to include a ballast tank within 0,5L amidships.			

3.6.6 Extent of tank testing

(a) The minimum requirements for ballast tank testing at Special Survey are given in 3.6.6(c) and Table 3.3.3.
The minimum requirements for cargo tank testing at Special Survey are given in 3.6.6(d) and Table 3.3.3.
Cargo tank testing carried out by the vessel's crew under the direction of the Master may be accepted by the surveyor provided the following conditions are complied with:
(i) a tank testing procedure, specifying fill heights, tanks being filled and bulkheads being tested, has been submitted by the owner and reviewed by the Society prior to the testing being carried out;
(ii) there is no record of leakage, distortion or substantial corrosion that would affect the structural integrity of the tank;
(iii) the tank testing has been satisfactorily carried out within special survey window not more than 3 months prior to the date of the survey on which the overall or close up survey is completed;

(b) The Surveyor may extend the tank testing as deemed necessary.

(c) Boundaries of ballast tanks are to be tested with a head of liquid to the top of air pipes.

(d) Boundaries of cargo tanks are to be tested to the highest point that liquid will rise under service conditions.

Table 3.3.3: Extent of tank testing during Special Survey of Oil Tankers

Special Survey No. 1 **Age ≤ 5**	**Special Survey No. 2 and Subsequent** **5 < Age**
All ballast tank boundaries	All ballast tank boundaries
Cargo tank boundaries facing ballast tanks, void spaces, All cargo tank bulkheads pipe tunnels, pump-rooms or cofferdams	All cargo tank bulkheads

SECTION 4 Hull survey requirements for chemical tankers (IACS UR Z10.3 Rev.20)

4.1 General

4.1.1 The requirements of this Section are applicable to all self-propelled chemical tankers with integral tanks, i.e. vessels with IMO certificate of fitness for the carriage of dangerous chemicals in bulk and which have been assigned the **ESP** class notation. If a chemical tanker is constructed with both integral and independent tanks, these requirements are applicable only to that portion of the cargo length containing integral tanks. Combined gas carriers/chemical tankers with independent tanks within the hull, are to be surveyed as gas carriers.

4.1.2 The requirements of this Section apply to surveys of hull structure and piping systems in way of cargo tanks, pump rooms, cofferdams, void spaces, pipe tunnels within the cargo area and all ballast tanks. They are additional to the classification requirements applicable to the remainder of the ship. The requirements are not applicable for independent tanks on deck.

4.1.3 The requirements contain the minimum extent of examination, thickness measurements and tank testing. The survey should be extended when Substantial Corrosion and/or structural defects are found and include additional Close-Up Survey when necessary.

4.1.4 In any kind of survey, i.e. special, intermediate, annual or other surveys having the scope of the foregoing ones, thickness measurements, when required by Table 3.4.2, of structures in areas where close-up surveys are required shall be carried out simultaneously with close-up surveys.

4.1.5 Consideration may be given by the attending Surveyor to allow use of Remote Inspection Techniques (RIT) as an alternative to close-up survey. Surveys conducted using a RIT are to be completed to the satisfaction of the attending Surveyor.

4.1.6 The RIT is to provide the information normally obtained from a close-up survey. RIT surveys are to be carried out in accordance with the requirements given here-in and the requirements of IACS Recommendation 42 'Guidelines for Use of Remote Inspection Techniques for surveys'. These considerations are to be included in the proposals for use of a RIT which are to be submitted in advance of the survey so that satisfactory arrangements can be agreed with the Classification Society.

4.1.7 The equipment and procedure for observing and reporting the survey using a RIT are to be discussed and agreed with the parties involved prior to the RIT survey, and suitable time is to be allowed to set-up, calibrate and test all equipment beforehand.

4.1.8 When using a RIT as an alternative to close-up survey, if not carried out by the Society itself, it is to be conducted by a firm approved as a service supplier according to UR Z17 and is to be witnessed by an attending surveyor of the Society.

4.1.9 The structure to be examined using a RIT is to be sufficiently clean to permit meaningful examination. Visibility is to be sufficient to allow for a meaningful examination. The Classification Society is to be satisfied with the methods of orientation on the structure.

4.1.10 The Surveyor is to be satisfied with the method of data presentation including pictorial representation, and a good two-way communication between the Surveyor and RIT operator is to be provided.

4.1.11 If the RIT reveals damage or deterioration that requires attention, the Surveyor may require traditional survey to be undertaken without the use of a RIT.

4.2 Annual Survey

4.2.1 General

The survey shall consist of an examination for the purpose of ensuring, as far as practicable, that the hull and piping are maintained in a satisfactory condition and should take into account the service history, condition and extent of the corrosion prevention system of ballast tanks and areas identified in the survey report file.

4.2.2 Hull examination

(a) Examination of the hull plating and its closing appliances as far as can be seen.
(b) Examination of watertight penetrations as far as practicable.
(c) External examination of all air pipe heads.

4.2.3 Examination of weather decks

(a) Examination of cargo tank openings including gaskets, covers, coamings and flame screens.
(b) Examination of cargo tank pressure/vacuum valves and flame screens.
(c) Examination of flame screens on vents to all bunker tanks.
(d) Examination of cargo, crude oil washing, bunker, ballast and vent piping systems, including vent masts and headers.

4.2.4 Examination of cargo pump rooms and pipe tunnels, if fitted

(a) Examination of all pump room bulkheads for signs of chemical leakage or fractures, and, in particular, the sealing arrangements of all penetrations in these bulkheads.
(b) Examination of the condition of all piping systems.

4.2.5 Examination of ballast tanks

Examination of ballast tanks should be carried out where required as a consequence of the results of the Special Survey (see 4.6.3) and Intermediate Survey (see 4.3.1(a) and 4.3.1(b)) is to be carried out. When considered necessary by the surveyor, or when extensive corrosion exists, thickness measurements are to be carried out. If the results of these thickness measurements indicate that substantial corrosion is found, the extent of thickness measurements should be increased in accordance with Table 3.1.4. These extended thickness measurements are to be carried out before the survey is credited as completed. Suspect Areas identified at previous Surveys are to be examined. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken.

4.3 Intermediate Survey

4.3.1 General

(a) The survey extent is dependent on the age of the vessel as specified in 4.3.2, 4.3.3 and 4.3.4.
(b) For weather decks, an examination as far as applicable of cargo, bunker, ballast, steam and vent piping systems as well as vent masts and headers is to be carried out. If upon examination there is any doubt as to the condition of the piping, the piping may be required to be pressure tested, thickness measured or both.
(c) Those items which are additional to the requirements of the Annual Surveys may be surveyed either at or between the 2nd and 3rd Annual Survey

4.3.2 Chemical Tankers between 5 and 10 years of age ($5 \leq$ age ≤ 10)

(a) For ballast tanks used, an Overall Survey of Representative Tanks selected by the Surveyor is to be carried out. If such inspections reveal no visible structural defects, the examination may be limited to a verification that the Hard Protective Coating remains in GOOD condition as defined in 1.2.14.

(b) A Ballast Tank is to be examined at subsequent annual intervals where:

a. a hard protective coating has not been applied from the time of construction, or

b. a soft coating has been applied, or

c. substantial corrosion is found within the tank, or

d. the hard protective coating is found to be in less than GOOD condition as defined in 1.2.14 and the hard protective coating is not repaired to the satisfaction of the Surveyor.

(c) In addition to the requirements above, suspect areas identified at previous surveys are to be examined.

4.3.3 Chemical Tankers between 10 and 15 years of age ($10 \leq age \leq 15$)

(a) The requirements of the Intermediate Survey are to be to the same extent as the previous Special Survey as required in 1.7.2, inclusive, and 4.6. However, pressure testing of cargo and ballast tanks is not required unless deemed necessary by the attending Surveyor.

(b) In application of 4.3.3(a), the intermediate survey may be commenced at the second annual survey and be progressed during the succeeding year with a view to completion at the third annual survey in lieu of the application of 1.1.5.

(c) In application of 4.3.3(a), an under-water survey may be considered in lieu of the requirements of 4.6.2.

4.3.4 Chemical Tankers over 15 years of age ($age > 15$)

(a) The requirements of the Intermediate Survey are to be to the same extent as the previous Special Survey as required in 1.7.2 and 4.6. However, pressure testing of cargo and ballast tanks is not required unless deemed necessary by the attending surveyor.

(b) In application of 4.3.4(a), the intermediate survey may be commenced at the second annual survey and be progressed during the succeeding year with a view to completion at the third annual survey.

(c) In application of 4.3.4(a), a survey in dry dock is to be part of the Intermediate Survey. The overall and close-up surveys and thickness measurements, as applicable, of the lower portions of the cargo tanks and water ballast tanks are to be carried out surveyed in accordance with the applicable requirements for intermediate surveys, if not already performed.

NOTE: Lower portions of the cargo and ballast tanks are considered to be the parts below light ballast water line.

4.4 Docking Survey

4.4.1 A survey in dry-dock, according to Section 9, 9.4 is to be carried out.

4.5 In-water survey

4.5.1 For ships of less than 15 years of age, alternate inspections of the ship's bottom not conducted in conjunction with the enhanced survey during the Special Survey may be carried out with the ship afloat. Inspection of the ship afloat should only be carried out when the conditions are satisfactory and the proper equipment and suitably qualified staff is available.

4.5.2 For ships of 15 years of age and over, inspection of the outside of the ship's bottom should be carried out with the ship in dry dock.

4.6 Special Survey

4.6.1 General

(a) As part of the preparation for the Special Survey, the thickness measurement and Survey Program, in accordance with 1.7.2, should be dealt with in advance of the Special Survey. The thickness measurement is not to be held before the 4th Annual Survey.

(b) The Special Survey shall include, in addition to the requirements of Annual Surveys, examination, tests, and checks of sufficient extent to ensure that the hull and related piping, as required in (d), are in a satisfactory condition and that the ship is fit for its intended purpose for the new period of class of 5 years to be assigned subject to proper maintenance and operation and to periodical surveys being carried out at the due dates.

(c) All cargo tanks, Ballast Tanks, including double bottom tanks, pump rooms, pipe tunnels, cofferdams and void spaces bounding cargo tanks, decks and outer hull are to be examined, and this examination is to be supplemented by thickness measurement and testing as required in 4.6.5 and 4.6.6, to ensure that the structural integrity remains effective. The aim of the examination is to discover Substantial Corrosion, significant deformation, fractures, damages or other structural deterioration, that may be present.

(d) Cargo piping on deck and cargo and ballast piping within the above tanks and spaces are to be examined and operationally tested to working pressure to attending Surveyor's satisfaction to ensure that tightness and condition remain satisfactory. Special attention is to be given to any ballast piping in cargo tanks and any cargo piping in ballast tanks and void spaces, and Surveyors are to be advised on all occasions when this piping, including valves and fittings are open during repair periods and can be examined internally.

(e) Air pipe heads are to be completely examined, externally and internally, in accordance with the requirements of Table 3.2.5.

4.6.2 Dry-dock Survey

A survey in dry dock is to be a part of the Special Survey. The overall and close-up surveys and thickness measurements, as applicable, of the lower portions of the cargo tanks and ballast tanks are to be carried out in accordance with the applicable requirements for special surveys, if not already performed.

NOTE: Lower portions of the cargo and ballast tanks are considered to be the parts below light ballast water line.

4.6.3 Tank protection

(a) Where provided, the condition of corrosion prevention system of cargo tanks is to be examined.

(b) A Ballast Tank is to be examined at subsequent annual intervals where:

a. a hard protective coating has not been applied from the time of construction, or

b. a soft coating has been applied, or

c. substantial corrosion is found within the tank, or

d. the hard protective coating is found to be in less than GOOD condition as defined in 1.2.14 and the hard protective coating is not repaired to the satisfaction of the Surveyor.

(c) Thickness measurements are to be carried out as deemed necessary by the surveyor, or where extensive corrosion exists.

4.6.4 Extent of Overall and Close-up Survey

(a) An Overall Survey of all tanks and spaces, is to be carried out at each Special Survey.

(b) The minimum requirements for Close-up Surveys during Special Survey of chemical tankers are given in Table 3.4.1. The survey of stainless-steel tanks may be carried out as an overall survey supplemented by Close-up survey as deemed necessary by the Surveyor. For fuel oil tanks the necessity for the Overall Survey is to be determined based on the ship's age.

(c) The Surveyor may extend the Close-up Survey as deemed necessary taking into account the maintenance of the tanks under survey, the condition of the corrosion prevention system and also in the following cases:
- In particular, tanks having structural arrangements or details, which have suffered defects in similar tanks or on similar ships according to available information.
- In tanks which have structures approved with reduced scantlings due to an approved corrosion control system.

(d) For areas in tanks where hard protective coatings are found in a GOOD condition as defined in 1.2.14 the extent of the Close-up Survey according to Table 3.4.1 may be specially considered.

4.6.5 Extent of thickness measurement

(a) The minimum requirements for thickness measurements at Special Survey are given in Table 3.4.2. Thickness measurement of stainless-steel hull structure and piping may be waived, except for clad steel plating.

(b) Provisions for extended measurements for areas with Substantial Corrosion are given in Table 3.1.4, and as may be additionally specified in the Survey Program as required in 1.7.2. These extended thickness measurements are to be carried out before the survey is credited as completed. Suspect Areas identified at previous Special Surveys are to be examined. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken.

(c) The Surveyor may further extend the thickness measurements as deemed necessary.

(d) For areas in tanks where hard protective coatings are found to be in a GOOD condition as defined in 1.2.14, the extent of thickness measurements according to Table 3.4.2 may be specially considered.

(e) Transverse sections should be chosen where largest reductions are suspected to occur or are revealed from deck plating measurements.

(f) In cases where two or three sections are to be measured, at least one should include a ballast tank within 0,5L amidships.

Table 3.4.1(a): Minimum Requirements for Close-up Survey during Special Survey of single skin chemical tankers

Special Survey No 1 **(Age ≤ 5)**	**Special Survey No 2** **(5 < Age ≤ 10)**	**Special Survey No 3** **(10 < Age ≤ 15)**	**Special Survey No 4 and subsequent** **(15 < Age)**
A ONE WEB FRAME - in a ballast wing tank	**A** ALL WEB FRAMES - in a ballast wing tank or ballast double hull tank (see Note 1)	**A** ALL WEB FRAMES - in all ballast tanks	As special survey No.3
B ONE DECK TRANSVERSE - in a cargo tank or on deck	**B** ONE DECK TRANSVERSE - in each remaining ballast tank or on deck	**A** ALL WEB FRAMES - in a cargo wing tank	Additional transverse areas as deemed necessary by the Society
	B ONE DECK TRANSVERSE - in each remaining ballast tank or on deck (for S.H.)		
D ONE TRANSVERSE BULKHEAD (lower part for	**B** ONE DECK TRANSVERSE - in two cargo centre tanks or on deck	**A** ONE WEB FRAME RING - in each remaining cargo tank	

S.H. - complete for D.H.) - in a ballast tank			
D ONE TRANSVERSE BULKHEAD - lower part in a cargo wing tank	**C** BOTH TRANSVERSE BULKHEADS - in a ballast wing tank	**C** ALL TRANSVERSE BULKHEADS - in all cargo tanks	
D ONE TRANSVERSE BULKHEAD - lower part in a cargo centre tank (see Note II)	**D** ONE TRANSVERSE BULKHEAD - lower part in each remaining ballast tank	**C** ALL TRANSVERSE BULKHEADS - in all ballast tanks	
	D ONE TRANSVERSE BULKHEAD - lower part in two cargo centre tanks (see Note II)		
	D ONE TRANSVERSE BULKHEAD - lower part in a cargo wing tank		

Note I: Ballast double hull tank: means double bottom tank plus double side tank plus double deck tank, as applicable, even if these tanks are separate.

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

A-D: are areas to be subjected to close-up surveys and thickness measurements (see Fig. 3.4.1 and 3.4.2).

A) Complete transverse web frame ring including adjacent structural members.

B) Deck transverse including adjacent deck structural members.

C) Transverse bulkhead complete - including girder system and adjacent structural members.

D) Transverse bulkhead lower part - including girder system and adjacent structural members.

Table 3.4.1(b): Minimum Requirements for Close-up Survey during Special Survey of double skin chemical tankers

Special Survey No 1 (Age ≤ 5)	**Special Survey No 2 (5 < Age ≤ 10)**	**Special Survey No 3 (10 < Age ≤ 15)**	**Special Survey No 4 and subsequent (15 < Age)**
(1) ONE WEB FRAME - in a ballast double hull tank (see Note I)	**(1)** ALL WEB FRAMES - in a ballast wing tank or ballast double hull tank (see Note I)	**(1)** ALL WEB FRAMES - in all ballast tanks	As special survey No.3
(2) ONE DECK TRANSVERSE - in a cargo tank or on deck	**(6)** ONE DECK TRANSVERSE - in each remaining ballast tank or on deck	**(7)** ALL WEB FRAMES - in a cargo wing tank	Additional transverse areas as deemed necessary by the Society
(4) ONE TRANSVERSE BULKHEAD - in a ballast tank (see Note I)		**(7)** ONE WEB FRAME RING - in each remaining cargo tank	
(5) ONE TRANSVERSE BULKHEAD - in a cargo wing tank	**(2)** ONE DECK TRANSVERSE - in two cargo tanks	**(3)** ALL TRANSVERSE BULKHEADS - in all cargo tanks	
(5) ONE TRANSVERSE BULKHEAD - in a cargo centre tank (see Note II)	**(4)** ONE TRANSVERSE BULKHEAD - in each ballast tank (see Note I)	**(4)** ALL TRANSVERSE BULKHEADS - in all ballast tanks	
	(5) ONE TRANSVERSE BULKHEAD - in two cargo centre tanks (see Note II)		
	(5) ONE TRANSVERSE BULKHEAD - in a cargo wing tank		

(1), (2), (3), (4), (5), (6) and (7) are areas to be subjected to close-up surveys and thickness measurements (see Figures 3.4.1 – 3.4.3).

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

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

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

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

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

(6): The knuckle area and the upper part (3 metres approximately), including adjacent structural members. Knuckle area is the area of the web frame around the connections of the slope hopper plating to the inner hull bulkhead and the inner bottom plating, up to 2 metres from the corners both on the bulkhead and the double bottom.

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

Note I: Ballast double hull tank: means double bottom tank plus double side tank plus double deck tank, as applicable, even if these tanks are separate.

Note II: Where no centre cargo tanks are fitted (as in the case of centre longitudinal bulkhead), transverse bulkheads in wing tanks are to be surveyed.

Figure 3.4.1: Representative transverse section of chemical tanker. Areas A & B and 1 and 2

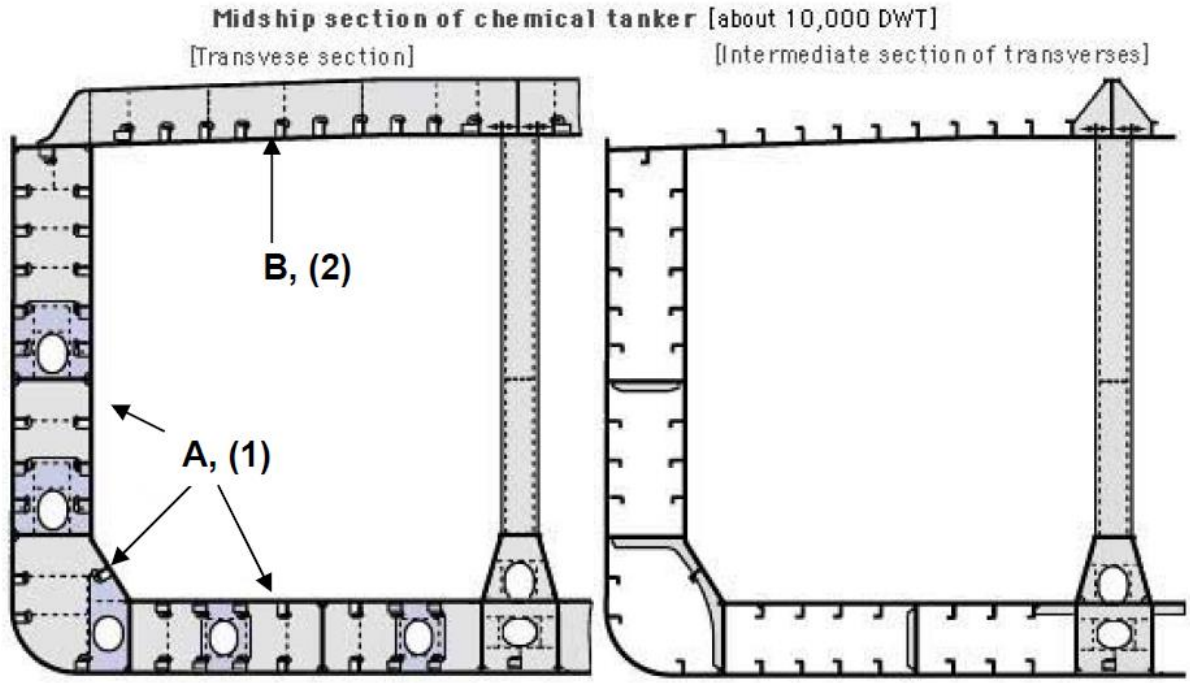


Figure 3.4.2: Representative transverse section Areas C & D and 3, 4 and 5 – Chemical Tanker

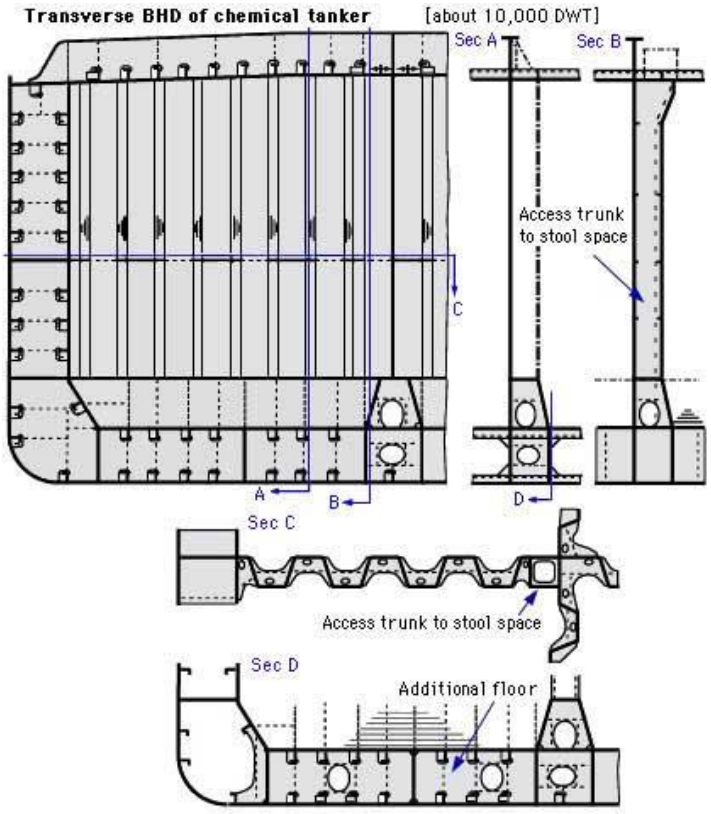


Fig. 3.4.3 Representative transverse section of chemical tanker. Areas 6 and 7

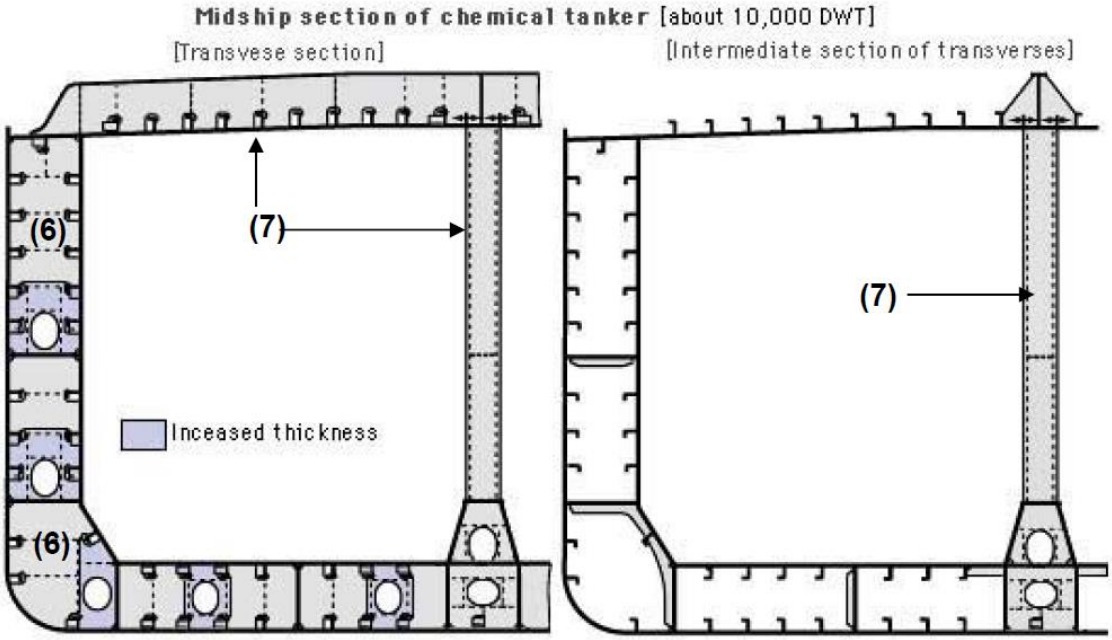


Table 3.4.2: Extent of thickness measurement during Special Survey of chemical tankers

Special Survey No 1 (Age < 5)	**Special Survey No 2 (5 < Age ≤ 10)**	**Special Survey No 3 (10 < Age ≤ 15)**	**Special Survey No 4 (Age >15)**
1. Suspect Areas	1. Suspect Areas	1. Suspect Areas	1. Suspect Areas
2. One section of deck plating for the full beam of the ship within the cargo area (in way of a ballast tank, if any, or a cargo tank used primarily for water ballast)	2. Within the cargo area: – Each deck plate – One transverse section	2. Within the cargo area: – Each deck plate – Two transverse sections (Note 1) – All wind and water strakes	2. Within the cargo area: – Each deck plate – Three transverse sections (Note 1) – Each bottom plate
	3. Selected wind and water strakes outside the cargo area	3. Selected wind and water strakes outside the cargo area	3. All wind and water strakes, full length
4. Measurements of those structural members subject to close-up survey according to Table 3.4.1, for general assessment and recording of corrosion pattern	4. Measurements of those structural members subject to close-up survey according to Table 3.4.1, for general assessment and recording of corrosion pattern	4. Measurements of those structural members subject to close-up survey according to Table 3.4.1, for general assessment and recording of corrosion pattern	4. Measurements of those structural members subject to close-up survey according to Table 3.4.1, for general assessment and recording of corrosion pattern
NOTE: (1) At least one section is to include a ballast tank within 0,5L amidships.			

4.6.6 Extent of tank testing

(a) The minimum requirements for ballast tank testing at Special Survey are given in 4.6.6(c) and Table 3.4.3. The minimum requirements for cargo tank testing at Special Survey are given in 4.6.6(d) and Table 3.4.3. Cargo tank testing carried out by the vessel's crew under the direction of the Master may be accepted by the surveyor provided the following conditions are complied with:
   a. a tank testing procedure, specifying fill heights, tanks being filled and bulkheads being tested, has been submitted by the owner and reviewed by the Society prior to the testing being carried out;
   b. there is no record of leakage, distortion or substantial corrosion that would affect the structural integrity of the tank;
   c. the tank testing has been satisfactorily carried out within special survey window not more than 3 months prior to the date of the survey on which the overall or close up survey is completed;
   d. the satisfactory results of the testing is recorded in the vessel's logbook;
   e. the internal and external condition of the tanks and associated structure are found satisfactory by the surveyor at the time of the overall and close up survey.

(b) The Surveyor may extend the tank testing as deemed necessary.

(c) Boundaries of ballast tanks are to be tested with a head of liquid to the top of air pipes.

(d) Boundaries of cargo tanks are to be tested to the highest point that liquid will rise under service conditions.

(e) The testing of 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.

Table 3.4.3: Extent of tank testing during Special Survey of chemical tankers

Special Survey No. 1 Age ≤ 5	**Special Survey No. 2 and Subsequent 5 < Age**

All ballast tank boundaries	All ballast tank boundaries
Cargo tank boundaries facing ballast tanks, void spaces, All cargo tank bulkheads pipe tunnels, pump-rooms or cofferdams	All cargo tanks bulkheads

4.6.7 Chemical Tankers over 10 Years of Age

Selected steel cargo pipes outside cargo tanks and ballast pipes passing through cargo tanks are to be:

- Thickness measured at random or selected pipe lengths to be opened for internal inspection;
- Pressure tested to the maximum working pressure.

Special attention is to be given to cargo/slop discharge piping through Ballast Tanks and void spaces.

SECTION 5 Hull survey requirements for double skin bulk carriers (IACS UR Z10.5 Rev.19)

5.1 General

5.1.1 The requirements apply to all self-propelled Double Skin Bulk Carriers which have been assigned the **ESP** class notation.

5.1.2 For bulk carriers with hybrid cargo hold arrangements, e.g. with some cargo holds of single side skin and others of double side skin, the requirements of SECTION 2 are to apply to cargo holds of single side skin.

5.1.3 The requirements apply to surveys of hull structure and piping systems in way of cargo holds, cofferdams, pipe tunnels, void spaces, fuel oil tanks within the cargo length area and all ballast tanks. The requirements are additional to the classification requirements applicable to the remainder of the ship.

5.1.4 The requirements contain the minimum extent of examination, thickness measurements and tank testing. The survey is to be extended when Substantial Corrosion and/or structural defects are found and include additional close-up survey when necessary.

5.1.5 In any kind of survey, i.e. special, intermediate, annual or other surveys having the scope of the foregoing ones, thickness measurements, when required by Table 3.5.3, of structures in areas where close-up surveys are required shall be carried out simultaneously with close-up surveys.

5.2 Annual survey

5.2.1 General

The survey is to consist of an examination for the purpose of ensuring, as far as practicable, that the hull, weather decks, hatch covers, coamings and piping are maintained in a satisfactory condition.

5.2.2 Hull examination

(a) Examination of the hull plating and its closing appliances as far as can be seen.
(b) Examination of watertight penetrations as far as practicable.

5.2.3 Examination of weather decks, hatch covers and coamings

(a) Confirmation is to 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.
(b) A thorough survey of cargo hatch covers and coamings is only possible by examination in the open as well as closed positions and is to include verification of proper opening and closing operation. As a result, the hatch cover sets within the forward 25% of the ship's length and at least one additional set, such that all sets on the ship are assessed at least once in every 5-year period, are to be surveyed open, closed and in operation to the full extent on each direction at each annual survey, including:
    .1 stowage and securing in open condition;
    .2 proper fit and efficiency of sealing in closed condition; and
    .3 operational testing of hydraulic and power components, wires, chains, and link drives.
    The closing of the covers is to include the fastening of all peripheral, and cross joint cleats or other securing devices. Particular attention is to be paid to the condition of the hatch covers in the forward 25% of the ship's length, where sea loads are normally greatest.
(c) If there are indications of difficulty in operating and securing hatch covers, additional sets above those required by (b) above, at the discretion of the surveyor, are to be tested in operation.
(d) Where the cargo hatch securing system does not function properly, repairs are to be carried out under the supervision of the Society. Where hatch covers or coamings undergo substantial repairs,

the strength of securing devices should be upgraded to comply with Part 4, Chapter 4, SECTION 7.1.5.

(e) For each cargo hatch cover set, at each annual survey, the following items are to be surveyed:
1. Cover panels, including side plates, and stiffener attachments that may be accessible in the open position by close-up survey (for corrosion, cracks, deformation);
2. sealing arrangements of perimeter and cross joints (gaskets for condition and permanent deformation, flexible seals on combination carriers, gasket lips, compression bars, drainage channels and non return valves);
3. clamping devices, retaining bars, cleating (for wastage, adjustment, and condition of rubber components);
4. closed cover locating devices (for distortion and attachment);
5. chain or rope pulleys;
6. guides;
7. guide rails and track wheels;
8. stoppers;
9. wires, chains, tensioners, and gypsies;
10. hydraulic system, electrical safety devices and interlocks; and
11. end and interpanel hinges, pins and stools where fitted.

(f) At each hatchway, at each annual survey, the coamings, with panel stiffeners and brackets are to be checked for corrosion, cracks and deformation, especially of the coaming tops, including close-up survey.

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

(h) Where portable covers, wooden or steel pontoons are fitted, checking the satisfactory

(i) condition, where applicable, of:
- wooden covers and portable beams, carriers or sockets for the portable beam, and their securing devices;
- steel pontoons, including close-up survey of hatch cover plating;
- tarpaulins;
- cleats, battens and wedges;
- hatch securing bars and their securing devices;
- loading pads/bars and the side plate edge;
- guide plates and chocks;
- compression bars, drainage channels and drain pipes (if any).

(j) Examination of flame screens on vents to all bunker tanks.

(k) Examination of bunker and vent piping systems, including ventilators.

5.2.4 Examination of Cargo Holds

5.2.4.1 Double Skin Bulk Carriers 10-15 years of age. The following is to apply:

(a) Overall survey of two selected cargo holds.

(b) When considered necessary by the Surveyor, or where extensive corrosion exists, thickness measurements are to be carried out. If the results of these thickness measurements indicate that Substantial Corrosion is found, the extent of thickness measurements is to be increased in accordance with Table 3.1.5. These extended thickness measurements are to be carried out before the survey is credited as complete. Suspect Areas identified at previous surveys are to be examined. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken.

For vessels built under the IACS Common Structural Rules, the annual thickness gauging may be omitted where a protective coating has been applied in accordance with the coating manufacturer's requirements and is maintained in good condition.

(c) All piping and penetrations in cargo holds, including overboard piping, are to be examined.

5.2.4.2 Double Skin Bulk Carriers over 15 years of age. The following is to apply:

(a) Overall survey of all cargo holds.
(b) When considered necessary by the Surveyor, or where extensive corrosion exists, thickness measurements are to be carried out. If the results of these thickness measurements indicate that Substantial Corrosion is found, the extent of thickness measurements is to be increased in accordance with Table 3.1.5. These extended thickness measurements are to be carried out before the survey is credited as complete. Suspect Areas identified at previous surveys are to be examined. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken.
(c) All piping and penetrations in cargo holds, including overboard piping, are to be examined.

5.2.5 Examination of ballast tanks

Examination of ballast tanks when required as a consequence of the results of the Special Survey and Intermediate Survey is to be carried out. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurements are to be carried out. If the results of these thickness measurements indicate that Substantial Corrosion is found, the extent of thickness measurements is to be increased in accordance with Table 3.1.5. These extended thickness measurements are to be carried out before the survey is credited as complete.

Suspect Areas identified at previous surveys are to be examined. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken.

For vessels built under the IACS Common Structural Rules, the annual thickness gauging may be omitted where a protective coating has been applied in accordance with the coating manufacturer's requirements and is maintained in good condition.

5.2.6 Additional annual survey requirements after determining compliance with SOLAS XII/12 and XII/13

(a) For ships complying with the requirements of SOLAS XII/12 for hold, ballast and dry space water level detectors, the annual survey is to include an examination and a test, at random, of the water ingress detection systems and of their alarms.
(b) For ships complying with the requirements of SOLAS XII/13 for the availability of pumping systems, the annual survey is to include an examination and a test, of 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, and of their controls.

5.3 Intermediate survey

5.3.1 General

Those items which are additional to the requirements of the Annual Surveys may be surveyed either at or between the 2nd and 3rd Annual Survey.

The survey extent is dependent on the age of the vessel as specified in 5.3.2 to 5.3.4 and shown in Table 3.5.4.

5.3.2 Double Skin Bulk Carriers between 5 and 10 years of age. The following is to apply:

5.3.2.1 Ballast Tanks

(a) For tanks used for water ballast, an overall survey of representative tanks selected by the Surveyor is to be carried out. The selection is to include fore and aft peak tanks and a number of other tanks, taking into account the total number and type of ballast tanks. If such overall survey reveals no

visible structural defects, the examination may be limited to verification that the corrosion prevention system remains efficient.

(b) Where POOR coating condition, corrosion or other defects are found in water ballast tanks or where a hard protective coating was not applied from the time of construction, the examination is to be extended to other ballast tanks of the same type.

(c) In ballast tanks other than double bottom tanks, where a hard protective coating is found in POOR condition as defined in 1.2.14, and it is not renewed, or where soft or semi-hard coating has been applied, or where a hard protective coating was not applied from the time of construction, the tanks in question are to be examined and thickness measurements carried out as considered necessary at annual intervals. When such breakdown of hard protective coating is found in ballast double bottom tanks, or where a soft or semi-hard coating has been applied, or where a hard protective coating has not been applied, the tanks in question may be examined at annual intervals. When considered necessary by the Surveyor, or where extensive corrosion exists, thickness measurements are to be carried out.

(d) In addition to the requirements above, suspect areas identified at previous surveys are to be overall and close-up surveyed.

5.3.2.2 Cargo Holds

(a) An overall survey of all cargo holds is to be carried out.

(b) Where considered necessary by the Surveyor as a result of the overall survey as described in (a), the survey is to be extended to include a close-up survey of those areas of structure in the cargo holds selected by the Surveyor.

5.3.2.3 Extent of Thickness Measurements

(a) Thickness measurements are to be carried out to an extent sufficient to determine both general and local corrosion levels at areas subject to close-up survey, where required as per 5.3.2.2(b), and as provided in 5.3.2.1(c).

(b) The extent of thickness measurement may be specially considered provided the Surveyor is satisfied by the close-up survey that there is no structural diminution and the hard protective coatings are found to be in a GOOD condition as defined in 1.2.14.

(c) Where Substantial Corrosion is found, the extent of thickness measurements is to be increased in accordance with the requirements of Table 3.1.5. These extended thickness measurements are to be carried out before the survey is credited as completed. Suspect Areas identified at previous surveys are to be examined. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken.

For vessels built under IACS Common Structural Rules, the identified substantial corrosion areas may be:

a. protected by coating applied in accordance with the coating manufacturer's requirements and examined at annual intervals to confirm the coating in way is still in good condition, or alternatively

b. required to be measured at annual intervals.

(d) Where the hard protective coating in cargo holds, as defined by Part 3, Chapter 1, SECTION 5 is found to be in GOOD condition as defined in 1.2.14, the extent of close-up surveys and thickness measurements may be specially considered.

NOTE:. For existing bulk carriers, where owners may elect to coat or recoat cargo holds as noted above, consideration may be given to the extent of the close-up and thickness measurement surveys. Prior to the coating of cargo holds of existing ships, scantlings are to be ascertained in the presence of a surveyor.

5.3.3 Double Skin Bulk Carriers between 10 and 15 years of age. The following is to apply:

(a) The requirements of the Intermediate Survey are to the same extent as the previous Special Survey. However, internal examination of fuel oil tanks and pressure testing of all tanks are not required unless deemed necessary by the attending Surveyor.
(b) In application of (a), the intermediate survey may be commenced at the second annual survey and be progressed during the succeeding year with a view to completion at the third annual survey in lieu of the application of 1.1.5.
(c) In application of (a), an under-water survey may be considered in lieu of the requirement of 5.4.2.

5.3.4 Double Skin Bulk Carriers over 15 years of age. The following is to apply:

(a) The requirements of the Intermediate Survey are to be to the same extent as the previous Special Survey. However, internal examination of fuel oil tanks and pressure testing of all tanks are not required unless deemed necessary by the attending Surveyor.
(b) In application of (a), the intermediate survey may be commenced at the second Annual Survey and be progressed during the succeeding year with a view to completion at the third Annual Survey in lieu of the application of 1.1.5.
(c) In application of (a), a survey in dry dock is to be part of the Intermediate Survey. The overall and close-up surveys and thickness measurements, as applicable, of the lower portions of the cargo holds and ballast tanks are to be carried out in accordance with the applicable requirements for Intermediate Surveys, if not already performed.

NOTE: Lower portions of the cargo holds and ballast tanks are considered to be the parts below light ballast water line.

5.4 Special survey

5.4.1 General

(a) The Special Survey is to include, in addition to the requirements of the Annual Survey, examination, tests and checks of sufficient extent to ensure that the hull and related piping is in a satisfactory condition and is fit for its intended purpose for the new period of class of 5 years to be assigned, subject to proper maintenance and operation and to periodical surveys being carried out at the due dates.
(b) All cargo tanks, Ballast Tanks, including double bottom and double side tanks, pipe tunnels, cofferdams and void spaces bounding cargo tanks, decks and outer hull are to be examined, and this examination is to be supplemented by thickness measurement and testing as deemed necessary required in 5.4.5 and 5.4.6, to ensure that the structural integrity remains effective. The aim of the examination is to discover Substantial Corrosion, significant deformation, fractures, damages or other structural deterioration that may be present.
(c) All piping systems within the above spaces are to be examined and operationally tested to working pressure to attending Surveyor's satisfaction to ensure that tightness and condition remain satisfactory.
(d) The survey extent of ballast tanks converted to void spaces is to be specially considered in relation to the requirements for ballast tanks.
(e) Air pipe heads are to be completely examined, externally and internally, in accordance with the requirements of Table 3.2.5.

5.4.2 Dry Dock Survey

A survey in dry dock is to be a part of the Special Survey. The overall and close-up surveys and thickness measurements, as applicable, of the lower portions of the cargo holds and ballast tanks are to be carried out in accordance with the applicable requirements for special surveys, if not already performed.

Note: Lower portions of the cargo holds and ballast tanks are considered to be the parts below light ballast water line.

5.4.3 Tank Protection

(a) Where provided, the condition of the corrosion prevention system of ballast tanks is to be examined. For ballast tanks, excluding double bottom tanks, where a hard protective coating is found in POOR condition as defined in 1.2.14, and it is not renewed, where soft or semi-hard coating has been applied, or where a hard protective coating has not been applied from the time of construction, the tanks in question are to be examined at annual intervals. Thickness measurements are to be carried out as deemed necessary by the Surveyor.
When such a breakdown of hard protective coating is found in water ballast double bottom tanks and it is not renewed, where a soft or semi-hard coating is applied, or where a hard Protective Coating has not been applied from the time of construction, the tanks in question may be examined at annual intervals. When considered necessary by the Surveyor, or where extensive corrosion exists, thickness measurements are to be carried out.

(b) Where a hard protective coating is provided in cargo holds, as defined by Part 3, Chapter 1, SECTION 9, 9.1.3 and is found in GOOD condition as defined in 1.2.14, the extent of close-up surveys and thickness measurements may be specially considered.

5.4.4 Hatch Covers and Coamings

The hatch covers and coamings are to be surveyed as follows:

(a) A thorough inspection of the items listed in 5.2.3 is to be carried out, in addition to all hatch covers and coamings.

(b) Checking of the satisfactory operation of all mechanically operated hatch covers is to be made, 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) Checking the effectiveness of sealing arrangements of all hatch covers by hose testing or equivalent.

(d) Close-up survey and thickness measurement[10] of the hatch cover and coaming plating and stiffeners is to be carried out as given in Table 3.5.1, Table 3.5.2 (as applicable) and Table 3.5.3.

[10] Subject to cargo hold hatch covers of approved design which structurally have no access to the internals, close-up survey/thickness measurement shall be done of accessible parts of hatch covers structures.

Table 3.5.1: Minimum requirements for Close-up Survey at Special Hull Survey of double skin bulk carriers, excluding ore carriers

Special Survey No 1 (Age ≤ 5)	Special Survey No 2 (5 < Age ≤ 10)	Special Survey No 3 (10 <Age ≤ 15)	Special Survey No 4 and subsequent (Age > 15)
One transverse web with associated plating and longitudinals in two representative water ballast tanks of each type. (This is to include the foremost topside and double side water ballast tanks on either side) **(A)**	One tranverse web with associated plating and longitudinals as applicable in each water ballast tank. **(A)** Forward and aft transverse bulkheads including stiffening system in a transverse section including topside, hopper side and double side ballast tanks. **(A)** 25% of ordinary transverse frames for transverse framing system or 25% of longitudinals for longitudinal framing system on side shell and inner side plating at forward, middle and aft parts, in the foremost double side tanks. **(B)**	All tranverse webs with associated plating and longitudinals as applicable each water ballast tank. **(A)** All transverse bulkheads including stiffening system in each water ballast tank. **(A)** 25% of ordinary transverse frames for transverse framing system or 25% of longitudinals for longitudinal framing system on side shell and inner side plating at forward, middle and aft parts, in all double side tanks. **(B)**	All tranverse webs with associated plating and longitudinals as applicable in each water ballast tank. **(A)** All transverse bulkheads including stiffening system in each water ballast tank. **(A)** All ordinary transverse frames for transverse framing system or all of longitudinals for longitudinal framing system on side shell and inner side plating at forward, middle and aft parts, in all double side tanks. **(B)** Areas **(C) – (E)** as for age interval 10 to 15 years.
Two selected cargo hold transverse bulkheads, including internal structure of upper and lower stools, where fitted. **(C)**	One transverse bulkhead in each cargo hold, including internal structure of upper and lower stools, where fitted. **(C)**	All cargo hold transverse bulkheads, including internal structure of upper and lower stools, where fitted. **(C)**	
All cargo hold hatch covers and coamings (platings and stiffeners). **(D)**	All cargo hold hatch covers and coamings (platings and stiffeners). **(D)**	All cargo hold hatch covers and coamings (platings and stiffeners). **(D)**	All cargo hold hatch covers and coamings (platings and stiffeners). **(D)**
	All deck plating and under deck structure inside line of hatch openings between all cargo hold hatches. **(E)**	All deck plating and under deck structure inside line of hatch openings between all cargo hold hatches. **(E)**	

(A), (B), (C), (D) and **(E)** are areas to be subjected to close-up surveys and thickness measurements (see Figure 3.5.1 and Figure 3.5.2).

(A): Transverse web frame or watertight transverse bulkhead in topside, hopper side and double side ballast tanks. In fore and aft peak tanks transverse web frame means a complete transverse web frame ring including adjacent structural members

(B): Ordinary transverse frame in double side tanks

(C): Cargo hold transverse bulkheads plating, siffeners and girders

(D): Cargo hold hatch covers and coamings

(E): Deck plating and under deck structure inside line of hatch openings between cargo hold hatches

NOTE: Close-up survey of transverse bulkheads to be carried out at four 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): Above 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.

Table 3.5.2: Minimum requirements for Close-up Survey at Special Hull Survey of ore carriers

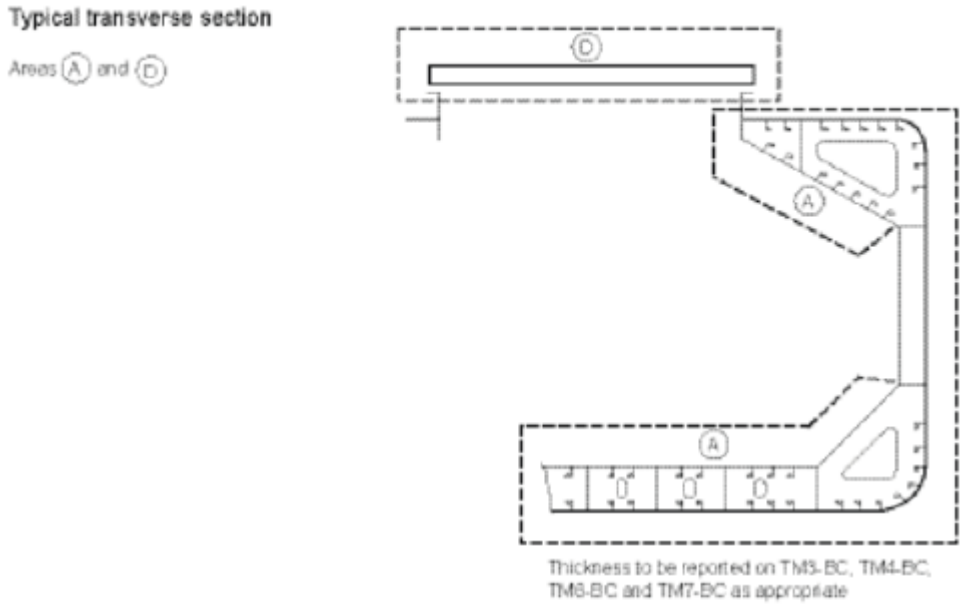
Special Survey No 1 (Age ≤ 5)	**Special Survey No 2 (5 < Age ≤ 10)**	**Special Survey No 3 (10 <Age ≤ 15)**	**Special Survey No 4 and subsequent (Age > 15)**
One web frame ring complete including adjacent structural members in a ballast wing tank. **(A)** One transverse bulkhead lower part -including girder system and adjacent structural members - in a ballast tank. **(A)**	All web frame rings complete including adjacent structural members in a ballast wing tank. **(A)** One deck transverse including adjacent deck structural members in each remaining ballast tank. **(A)** Forward and aft transverse bulkheads comlete – including girder system and adjacent structural members - in a ballast wing tank. **(A)** One transverse bulkhead lower part - including girder system and adjacent structural members - in each remaining ballast tank. **(A)**	All web frame rings complete including adjacent structural members in each ballast tank. **(A)** All transverse bulkheads complete - including girder system and adjacent structural members - in each ballast tank. **(A)** One web frame ring complete including adjacent structural members in each wing void space. **(A)** Additional web frame rings in void spaces as deemed necessary by the Classification Society. **(A)**	As for Special Survey for age from 10 to 15 years.
Two selected cargo hold transverse bulkheads, including internal structure of upper and lower stools, where fitted. **(C)**	One transverse bulkhead in each cargo hold, including internal structure of upper and lower stools, where fitted. **(C)**	All cargo hold transverse bulkheads, including internal structure of upper and lower stools, where fitted. **(C)**	Areas **(C)** - **(E)** as for age interval 10 to 15 years
All cargo hold hatch covers and coamings (plating and stiffeners). **(D)**	All cargo hold hatch covers and coamings (plating and stiffeners). **(D)**	All cargo hold hatch covers and coamings (plating and stiffeners). **(D)**	
	All deck plating and under deck structure inside line of hatch openings between all cargo hold hatches. **(E)**	All deck plating and under deck structure inside line of hatch openings between all cargo hold hatches. **(E)**	

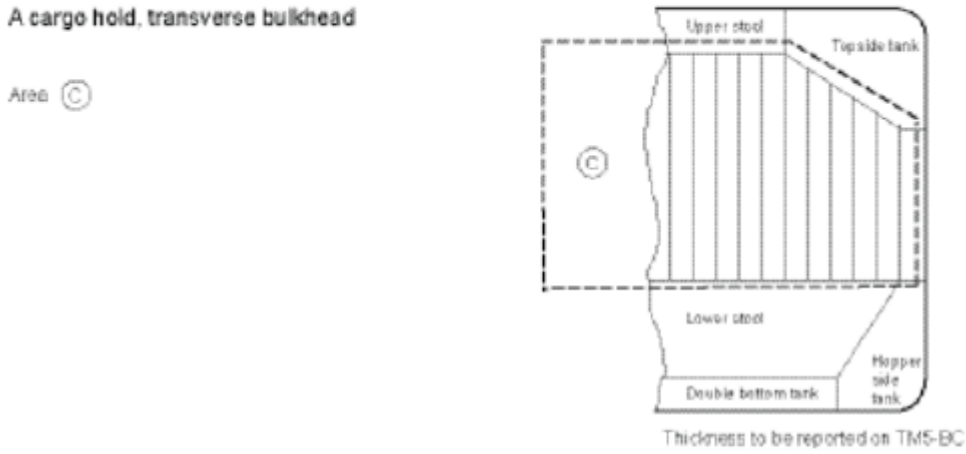
(A), (C), (D) and **(E)** are areas to be subjected to close-up surveys and thickness measurements (see Figure 3.5.1 and Figure 3.5.2).

(A): Transverse web frame or watertight transverse bulkhead in ballast wing tanks and void spaces. In fore and aft peak tanks transverse web frame means a complete transverse web frame ring including adjacent structural members
(C): Cargo hold transverse bulkheads plating, stiffeners and girders
(D): Cargo hold hatch covers and coamings
(E): Deck plating and under deck structure inside line of hatch openings between cargo hold hatches

NOTE: Close-up Survey of transverse bulkheads to be carried out at four 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.

Figure 3.5.1: Close-up Survey and Thickness Measurement Areas





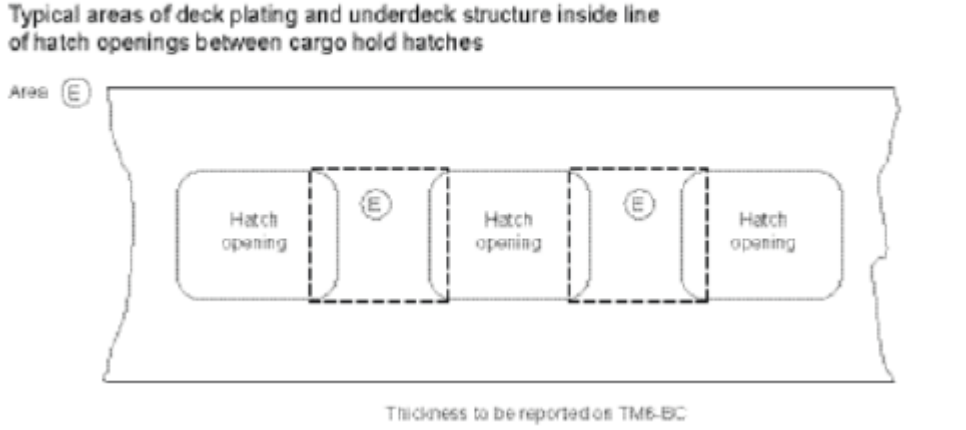


Figure 3.5.2: Close-up Survey and Thickness Measurement Areas, Ordinary transverse frame in double skin tank

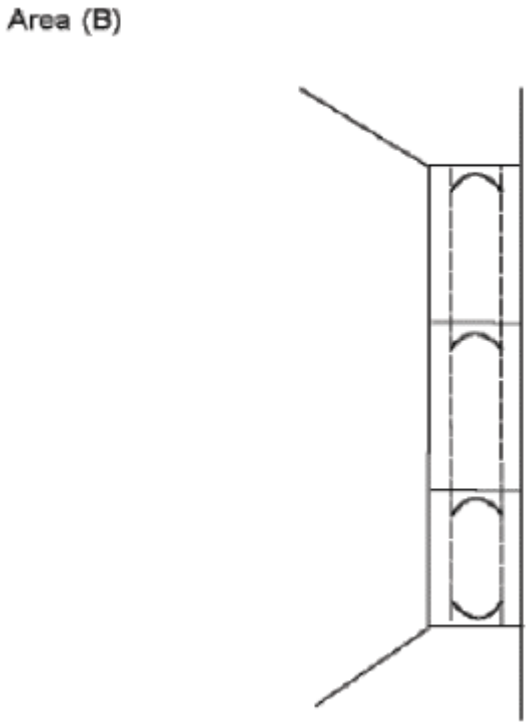


Table 3.5.3: Minimum requirements for thickness measurements at Special Hull Survey of double skin bulk carriers

Special Survey No 1 **(Age ≤ 5)**	**Special Survey No 2** **(5 < Age ≤ 10)**	**Special Survey No 3** **(10 <Age ≤ 15)**	**Special Survey No 4** **(Age > 15)**
Suspect areas	Suspect areas	Suspect areas	Suspect areas
	Within the cargo length: – Two transverse sections of deck plating outside of line of cargo hatch openings	Within the cargo length: – each deck plate outside line of cargo hatch openings – two transverse sections, one in the amidship area, outside line of cargo hatch openings – all wind and water strakes	Within the cargo length: – each deck plate outside line of cargo hatch openings. – three transverse sections, one in the amidship area, outside of line of cargo hatch openings. – each bottom plate
	Wind and water strakes in way of the two transverse sections considered above Selected wind and water strakes outside the cargo length area	Selected wind and water strakes outside the cargo length area	All wind and water strakes, full length
	Measurements of the structural members subject to Close-up Survey according to Table 3.5.1 and Table 3.5.2 for general assessment and recording of corrosion pattern.	Measurement of the structural members subject to Close up Survey according to Table 3.5.1 and Table 3.5.2 for general assessment and recording of corrosion pattern.	Measurement of the structural members subject to Close-up Survey according to Table 3.5.1 and Table 3.5.2 for general assessment and recording of corrosion pattern.

5.4.4 Extent of Overall and Close-up Surveys

(a) An Overall Survey of all tanks and spaces is to be carried out at each Special Survey. Fuel oil tanks in the cargo length area are to be surveyed as follows:

Special Survey No 1 Age ≤ 5	Special Survey No 2 5 < Age ≤ 10	Special Survey No 3 10 < Age ≤ 15	Special Survey No 4 and subsequent 15 < Age
None	One	Two	Half, minimum two

NOTES:
1. These requirements apply to tanks of integral (structural) type.
2. If a selection of tanks is accepted to be examined, then different tanks are to be examined at each special survey, on a rotational basis.
3. Peak tanks (all uses) are subject to internal examination at each special survey.
4. At special survey No. 3 and subsequent special surveys, one deep tank for fuel oil in the cargo area is to be included, if fitted.

(b) The minimum requirements for Close-up Surveys at Special Survey are given in Table 3.5.1 for double skin bulk carriers, excluding ore carriers and in Table 3.5.2 for ore carriers, respectively.

(c) The Surveyor may extend the Close-up Survey 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.

(d) For areas in spaces where hard protective coatings are found to be in a GOOD condition as defined in 1.2.14, the extent of Close-up Surveys according to Table 3.5.1 and Table 3.5.2 may be specially considered.

5.4.5 Extent of Thickness Measurements

(a) The minimum requirements for thickness measurements at Special Survey are given in Table 3.5.3.

(b) Provisions for extended measurements for areas with Substantial Corrosion, are given in Table 3.1.5, and as may be additionally specified in the Survey Program. These extended thickness measurements are to be carried out before the survey is credited as completed. Suspect Areas identified at previous surveys are to be examined. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken.
For vessels built under IACS Common Structural Rules, the identified substantial corrosion areas may be:
   a. protected by coating applied in accordance with the coating manufacturer's requirements and examined at annual intervals to confirm the coating in way is still in good condition, or alternatively
   b. required to be measured at annual intervals

(c) The Surveyor may further extend the thickness measurements as deemed necessary.

(d) For areas in tanks where hard protective coating are found to be in a GOOD condition as defined in 1.2.14, the extent of thickness measurements according to Table 3.5.3 may be specially considered.

(e) Transverse sections are to be chosen where the largest reductions are suspected to occur or are revealed from deck plating measurements.

(f) Representative thickness measurement to determine both general and local levels of corrosion in the transverse web frames in all water ballast tanks is to be carried out. Thickness measurement is also to 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.

5.4.6 Extent of Tank Testing

(a) All boundaries of water ballast tanks, deep tanks and cargo holds used for water ballast within the cargo length area are to be pressure tested. For Fuel Oil Tanks, only representative tanks are to be pressure tested.
(b) The Surveyor may extend the tank testing as deemed necessary.
(c) Boundaries of ballast tanks are to be tested with a head of liquid to the top of air pipes.
(d) Boundaries of ballast holds are to be tested with a head of liquid to near to the top of hatches.
(e) Boundaries of fuel oil tanks are to be tested with a head of liquid to the highest point that liquid will rise under service conditions. Tank testing of fuel oil tanks 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.
(f) The testing of 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.

5.4.7 Additional special survey requirements after determining compliance with SOLAS XII/12 and XII/13

(a) For ships complying with the requirements of SOLAS XII/12 for hold, ballast and dry space water level detectors, the special survey is to include an examination and a test of the water ingress detection systems and of their alarms.
(b) For ships complying with the requirements of SOLAS XII/13 for the availability of pumping systems, the special survey is to include an examination and a test of 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, and of their controls.

Table 3.5.4: Minimum Requirements for Overall and Close-up Survey and Thickness Measurements at Intermediate Survey of Double Skin Bulk Carriers

Age of ship at time of intermediate survey due date		
5 ≤ age < 10	**10 < age ≤ 15**	**age > 15**
Overall survey of Representative ballast tanks selected by the attending surveyor (the selection is to include fore and aft peak tanks and a number of other tanks, taking into account the total number and type of ballast tanks)	The requirements of the previous Special Survey (see 5.3.3)	The requirements of the previous Special Survey (see 5.3.4)
Overall and close-up survey of Suspect Areas identified at previous surveys		
Overall survey of all cargo holds		
Thickness measurements to an extent sufficient to determine both general and local corrosion levels at areas subject to closeup		

survey at 'suspect areas' identified at previous surveys		

SECTION 6 Hull survey requirements for double hull oil tankers (IACS UR Z10.4 Rev.17)

6.1 General

6.1.1 The requirements apply to all self-propelled Double Hull Oil Tankers which have been assigned the **ESP** class notation.

6.1.2 The requirements apply to surveys of hull structure and piping systems in way of cargo tanks, pump rooms, cofferdams, pipe tunnels, void spaces within the cargo area and all ballast tanks. The requirements are additional to the classification requirements applicable to the remainder of the ship.

6.1.3 The requirements contain the minimum extent of examination, thickness measurements and tank testing. The survey is to be extended when Substantial Corrosion and/or structural defects are found and include additional Close-up Survey when necessary.

6.1.4 In any kind of survey, i.e. special, intermediate, annual or other surveys having the scope of the foregoing ones, thickness measurements, when required by Table 3.6.2, of structures in areas where close-up surveys are required shall be carried out simultaneously with close-up surveys.

6.2 Annual survey

6.2.1 General

The survey is to consist of an examination for the purpose of ensuring, as far as practicable, that the hull and piping are maintained in a satisfactory condition and should take into account the service history, condition and extent of the corrosion prevention system of ballast tanks and areas identified in the survey report file.

6.2.2 Hull examination

(a) Examination of the hull plating and its closing appliances as far as can be seen.
(b) Examination of watertight penetrations as far as practicable.
(c) External examination of all air pipe heads.

6.2.3 Examination of weather decks

(a) Examination of cargo tank openings including gaskets, covers, coamings and flame screens.
(b) Examination of cargo tanks pressure/vacuum valves and flame screens.
(c) Examination of flame screens on vents to all bunker tanks.
(d) Examination of cargo, crude oil washing, bunkers and vent piping systems, including vent masts and headers.

6.2.4 Examination of cargo pump rooms and pipe tunnels, if fitted.

(a) Examination of all pump room bulkheads for signs of oil leakage or fractures and, in particular, the sealing arrangements of all penetrations of pump room bulkheads.
(b) Examination of the condition of all piping systems.

6.2.5 Examination of Ballast Tanks

Examination of Ballast Tanks where required as a consequence of the results of the Special Survey and Intermediate Survey is to be carried out. When considered necessary by the surveyor, or when extensive corrosion exists, thickness measurements are to be carried out and if the results of these thickness measurements indicate that Substantial Corrosion is found, the extent of thickness measurements is to be increased in accordance with Table 3.1.6. These extended thickness measurements are to be carried out before the survey is credited as completed. Suspect Areas identified at previous surveys are to be examined. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken.

For vessels built under IACS Common Structural Rules, the identified substantial corrosion areas are required to be examined and additional thickness measurements are to be carried out.

6.3 Intermediate survey

6.3.1 General

(a) Those items, which are additional to the requirements of the Annual Surveys, may be surveyed either at or between the 2nd and 3rd Annual Survey.
(b) The survey extent is dependent on the age of the vessel as specified in 6.3.2 to 6.3.4 and shown in Table 3.6.4.
(c) For weather decks, an examination as far as applicable of cargo, crude oil washing, bunker, ballast, steam and vent piping systems as well as vent masts and headers is to be carried out. If upon examination there is any doubt as to the condition of the piping, the piping may be required to be pressure-tested, thickness measured or both.
(d) For vessels built under IACS Common Structural Rules, the identified substantial corrosion areas are required to be examined and additional thickness measurements are to be carried out.

6.3.2 Double Hull Oil Tankers between 5 and 10 years of age. The following is to apply:

(a) For tanks used for salt-water ballast, an Overall Survey of Representative Tanks selected by the Surveyor is to be carried out. If such inspections reveal no visible structural defects, the examination may be limited to a verification that the Hard Protective Coating remains in GOOD condition as defined in 1.2.14.
(b) A Ballast Tank is to be examined at subsequent annual intervals where:
    a. a hard protective coating has not been applied from the time of construction, or
    b. a soft or semi-hard coating has been applied, or
    c. substantial corrosion is found within the tank, or
    d. the hard protective coating is found to be in less than GOOD condition as defined in 1.2.14 and the hard protective coating is not repaired to the satisfaction of the Surveyor.
(c) In addition to the requirements above, suspect areas identified at previous surveys are to be examined.

6.3.3 Double Hull Oil Tankers between 10 and 15 years of age. The following is to apply:

(a) The requirements of the Intermediate Survey shall are to be to the same extent as the previous Special Survey as required in 1.7.2 and 6.4. However, pressure testing of cargo and ballast tanks and the requirements for longitudinal strength evaluation of Hull Girder as required in 1.9.2(b) are not required unless deemed necessary by the attending Surveyor.
(b) In application of 6.3.3(a), the intermediate survey may be commenced at the second annual survey and be progressed during the succeeding year with a view to completion at the third annual survey.
(c) In application of 6.3.3(a), an under-water survey may be considered in lieu of the requirements of 6.4.2.

6.3.4 Double Hull Oil Tankers over 15 years of age. The following is to apply:

(a) The requirements of the Intermediate Survey are to be to the same extent as the previous Special Survey as required in 1.7.2 and 6.4. However, pressure testing of cargo and ballast tanks and the requirements for longitudinal strength evaluation of Hull Girder as required in 1.9.2(b) are not required unless deemed necessary by the attending surveyor.
(b) In application of 6.3.4(a), the intermediate survey may be commenced at the second annual survey and be progressed during the succeeding year with a view to completion at the third annual survey.
(c) In application of 6.3.4(a), a survey in dry dock is to be part of the intermediate survey. The overall and close-up surveys and thickness measurements, as applicable, of the lower portions of the cargo tanks and water ballast tanks are to be carried out in accordance with the applicable requirements for intermediate surveys, if not already carried out.

NOTE: Lower portions of the cargo and ballast tanks are considered to be the parts below light ballast water line.

6.4 Special survey

6.4.1 General

(a) The Special Survey is to include, in addition to the requirements of the Annual Survey, examination, tests and checks of sufficient extent to ensure that the hull and related piping, as required in 6.4.1(c) is in a satisfactory condition and is fit for its intended purpose for the new period of class of 5 years to be assigned, subject to proper maintenance and operation and to periodical surveys being carried out at the due dates.
(b) All cargo tanks, Ballast Tanks, including double bottom tanks, pump rooms, pipe tunnels, cofferdams and void spaces bounding cargo tanks, decks and outer hull are to be examined, and this examination is to be supplemented by thickness measurement and testing as deemed necessary required in 6.4.5 and 6.4.6, to ensure that the structural integrity remains effective. The aim of the examination is to discover Substantial Corrosion, significant deformation, fractures, damages or other structural deterioration that may be present.
(c) Cargo piping on deck, including Crude Oil Washing (COW) piping, Cargo and Ballast piping within the above tanks and spaces are to be examined and operationally tested to working pressure to attending Surveyor's satisfaction to ensure that tightness and condition remain satisfactory. Special attention is to be given to any ballast piping in cargo tanks and any cargo piping in ballast tanks and void spaces, and Surveyors are to be advised on all occasions when this piping, including valves and fittings are open during repair periods and can be examined internally.
(d) Air pipe heads are to be completely examined, externally and internally, in accordance with the requirements of Table 3.2.5.

6.4.2 Dry Dock Survey

A survey in dry dock is to be a part of the Special Survey. The overall and close-up surveys and thickness measurements, as applicable, of the lower portions of the cargo tanks and ballast tanks are to be carried out in accordance with the applicable requirements for special surveys, if not already performed.

NOTE: Lower portions of the cargo and ballast tanks are considered to be the parts below light ballast water line.

6.4.3 Tank Protection

(a) Where provided, the condition of the corrosion prevention system of cargo tanks is to be examined.
(b) A Ballast Tank is to be examined at subsequent annual intervals where:
    a. a hard protective coating has not been applied from the time of construction, or

b. a soft or semi-hard coating has been applied, or
c. substantial corrosion is found within the tank, or
d. the hard protective coating is found to be in less than GOOD condition as defined in 1.2.14 and the hard protective coating is not repaired to the satisfaction of the Surveyor.

(c) Thickness measurement is to be carried out as considered necessary by the Surveyor.

6.4.4 Extent of Overall and Close-up Surveys

(a) An Overall Survey of all tanks and spaces is to be carried out at each Special Survey.
(b) The minimum requirements for Close-up Surveys at Special Survey are given in Table 3.6.1.
(c) The Surveyor may extend the Close-up Survey as deemed necessary taking into account the maintenance of the tanks under survey, the condition of the corrosion prevention system and also in the following cases:
- in particular, tanks having structural arrangements or details which have suffered defects in similar tanks or on similar ships according to available information,
- in tanks which have structures approved with reduced scantlings due to an approved corrosion control system.

(d) For areas in tanks where hard protective coatings are found to be in a GOOD condition as defined in 1.2.14, the extent of Close-up Surveys according to Table 3.6.1 may be specially considered.

6.4.5 Extent of Thickness Measurements

(a) The minimum requirements for thickness measurements at Special Survey are given in Table 3.6.2.

(b) Provisions for extended measurements for areas with Substantial Corrosion, are given in Table 3.1.6, and as may be additionally specified in the Survey Program as required in 1.7.2. These extended thickness measurements are to be carried out before the survey is credited as completed. Suspect Areas identified at previous surveys are to be examined. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken.

For vessels built under IACS Common Structural Rules, the identified substantial corrosion areas are required to be examined and additional thickness measurements are to be carried out at annual and intermediate surveys.

(c) The Surveyor may further extend the thickness measurements as deemed necessary.

(d) For areas in tanks where hard protective coating are found to be in a GOOD condition as defined in 1.2.14, the extent of thickness measurements according to Table 3.6.2 may be specially considered.

(e) Transverse sections are to be chosen where the largest reductions are suspected to occur or are revealed from deck plating measurements.

(f) In cases where two or three sections are to be measured, at least one is to include a Ballast Tank within 0,5L amidships.

In case of oil tankers of 130m in length and upwards (as defined in the International Convention on Load Lines in force) and more than 10 years of age, for the evaluation of the ship's longitudinal strength as required in 1.9.2(b), the sampling method of thickness measurements is given in 1.4.13.

6.4.6 Extent of Tank Testing

(a) The minimum requirements for ballast tank testing at Special Survey are given in 6.4.6(c) Table 3.6.3.
The minimum requirements for cargo tank testing at Special Survey are given in 6.4.6(d) Table 3.6.3.
Cargo tank testing carried out by the vessel's crew under the direction of the Master may be accepted by the surveyor provided the following conditions are complied with:

a. a tank testing procedure, specifying fill heights, tanks being filled and bulkheads being tested, has been submitted by the owner and reviewed by the Society prior to the testing being carried out;
b. there is no record of leakage, distortion or substantial corrosion that would affect the structural integrity of the tank;
c. the tank testing has been satisfactorily carried out within special survey window not more than 3 months prior to the date of the survey on which the overall or close up survey is completed;
d. the satisfactory results of the testing is recorded in the vessel's logbook;
e. the internal and external condition of the tanks and associated structure are found satisfactory by the surveyor at the time of the overall and close up survey.

(b) The Surveyor may extend the tank testing as deemed necessary.
(c) Boundaries of ballast tanks are to be tested with a head of liquid to the top of air pipes.
(d) Boundaries of cargo tanks are to be tested to the highest point that liquid will rise under service conditions.
(e) The testing of 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.

Table 3.6.1: Extent of Close-up Survey at Special Survey of Double Hull oil tankers

Special Survey No 1 (Age ≤ 5)	Special Survey No 2 (5 < Age ≤ 10)	Special Survey No 3 (10 <Age ≤ 15)	Special Survey No 4 and subsequent (Age > 15)
One web frame (1) in a complete ballast tank. (see Note 1)	- All web frame (1) in a complete ballast tank (see Note 1). - The knuckle area and the Upper part (5 m approximately) of one web frame in each remaining ballast tank (6)	All web frames (1), in all ballast tanks.	As for special survey for age from 10 to 15 years. Additional transverse areas as deemed necessary by the Society.
One deck transverse, in a cargo oil tank. (2)	One deck transverse in two-cargo oil tanks. (2)	All web frames (7), including deck transverse and cross ties, if fitted in a cargo oil tank. One web frame (7), including deck transverse and cross ties, if fitted, in each remaining cargo oil tank.	
One transverse bulkhead (4) in a complete ballast tank. (see Note 1)	One transverse bulkhead (4), in each complete ballast tank (see Note 1)	All transverse bulkheads in all cargo oil (3) and ballast (4) tanks.	
One transverse bulkhead (5), in a cargo oil center tank. One transverse bulkhead (5), in a cargo oil wing tank. (see Note 2)	One transverse bulkhead (5), in two-cargo oil center tanks. One transverse bulkhead (5), in a cargo oil wing tank (see Note 2)		

(1), (2), (3), (4), (5), (6) and (7) are areas to be subjected to close-up surveys and thickness measurements (see Figure 3.6.1 and Figure 3.6.2).

(1) Web frame in a ballast tank means vertical web in side tank, hopper web in hopper tank, floor in double bottom tank and deck transverse in double deck tank (where fitted), including adjacent structural members. In fore and aft peak tanks web frame means a complete transverse web frame ring including adjacent structural members.
(2) Deck transverse, including adjacent deck structural members (or external structure on deck in way of the tank, where applicable)
(3) Transverse bulkhead complete in cargo tanks, including girder system, adjacent structural members (such as longitudinal bulkheads) and internal structure of lower and upper stools, where fitted
(4) Transverse bulkhead complete in ballast tanks, including girder system and adjacent structural members, such as longitudinal bulkheads, girders in double bottom tanks, inner bottom plating, hopper side, connecting brackets
(5) Transverse bulkhead lower part in cargo tank, including girder system, adjacent structural members (such as longitudinal bulkheads) and internal structure of lower stool, where fitted
(6) The *knuckle area* and the upper part (5 m approximately), including adjacent structural members. *Knuckle area* is the area of the web frame around the connections of the slope hopper plating to the inner hull bulkhead and the inner bottom plating, up to 2 m from the corners both on the bulkhead and the double bottom
(7) Web frame in a cargo oil tank means deck transverse, longitudinal bulkhead vertical girder and cross ties, where fitted, including adjacent structural members

Note 1: Ballast tank: Apart from the fore and aft peak tanks, the term "ballast tank" has the following meaning:

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

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

Figure 3.6.1: Close-up Survey requirements for Double Hull Oil Tankers Areas (1) to (5)

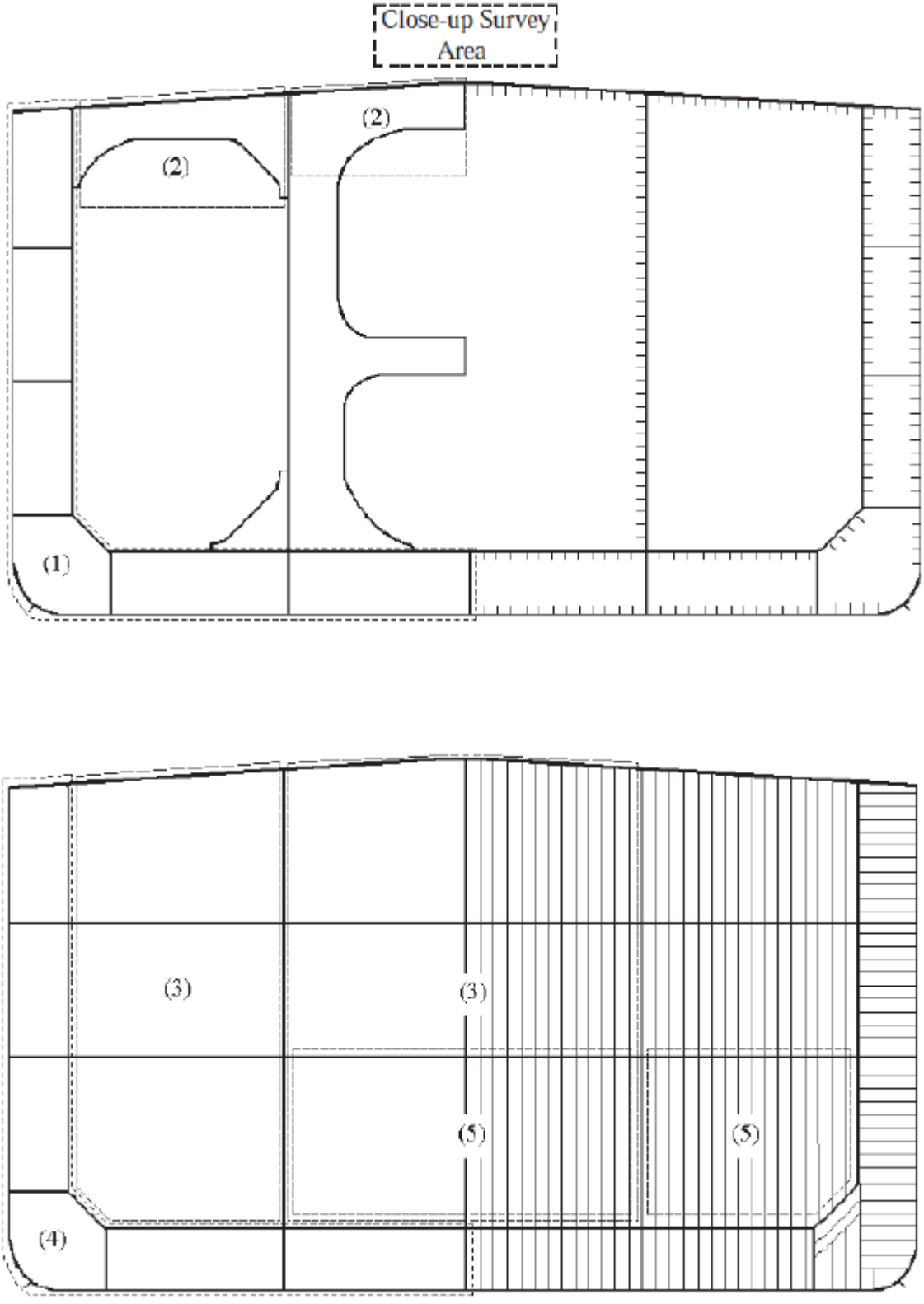


Figure 3.6.2: Close-up Survey Requirements for Double Hull Oil Tankers Areas (6) and (7)

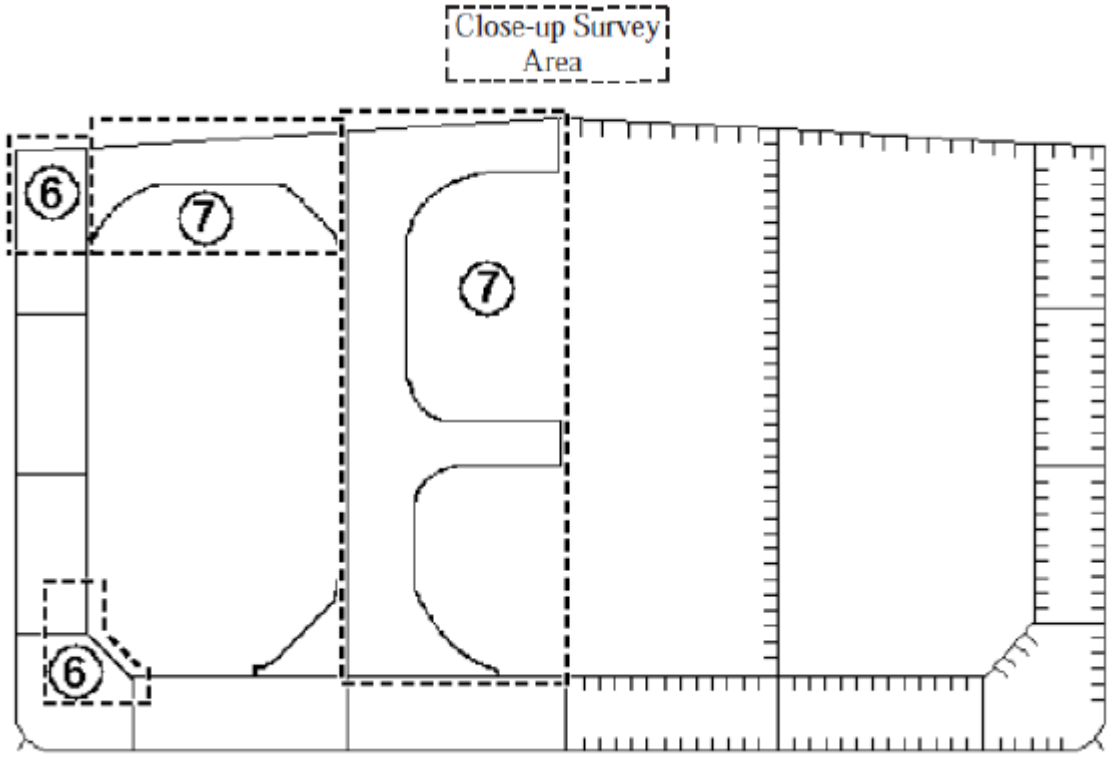


Table 3.6.2: Minimum requirements for thickness measurement during Special Survey of Double Hull Oil Tankers

Special Survey No 1 (Age < 5)	**Special Survey No 2 (5 < Age ≤ 10)**	**Special Survey No 3 (10 < Age ≤ 15)**	**Special Survey No 4 (Age >15)**
1. Suspect Areas	1. Suspect Areas	1. Suspect Areas	1. Suspect Areas
2. One section of deck plating for the full beam of the ship within the cargo area	2. Within the cargo area: – Each deck plate – One transverse section	2. Within the cargo area: – Each deck plate – Two transverse sections (Note 1) – All wind and water strakes	2. Within the cargo area: – Each deck plate – Three transverse sections (Note 1) – Each bottom plate
	3. Selected wind and water strakes outside the cargo area	3. Selected wind and water strakes outside the cargo area	3. All wind and water strakes, full length
4. Measurements of those structural members subject to close-up survey according to Table 3.6.1, for general assessment and recording of corrosion pattern	4. Measurements of those structural members subject to close-up survey according to Table 3.6.1, for general assessment and recording of corrosion pattern	4. Measurements of those structural members subject to close-up survey according to Table 3.6.1. for general assessment and recording of corrosion pattern	4. Measurements of those structural members subject to close-up survey according to Table 3.6.1. for r general assessment and recording of corrosion pattern
NOTE: (1) At least one section is to include a ballast tank within 0,5L amidships.			

Table 3.6.3: Minimum requirements for tank testing during Special Survey of Double Hull Oil Tankers

Age of ship (in years at time of special survey due date)	
Special Survey No.1 **Age ≤ 5**	**Special Survey No.2 and Subsequent** **5 < Age**
All ballast tank boundaries	All ballast tank boundaries
Cargo tank boundaries facing ballast tanks, void spaces, pipe tunnels, pump-rooms or cofferdams	All cargo tank bulkheads

Table 3.6.4: Minimum Requirements for Overall and Close-up Survey and Thickness Measurements at Intermediate Survey of Double Hull Oil Tankers

Age of ship at time of intermediate survey due date		
5 ≤ age < 10	**10 < age ≤ 15**	**age > 15**
Overall survey of Representative ballast tanks selected by the attending surveyor (see 6.3.2)	The requirements of the previous Special Survey (see 6.3.3)	The requirements of the previous Special Survey (see 6.3.4)
Suspect areas identified at previous surveys are to be examined (see 6.3.2)		

SECTION 7 Hull survey requirements for General Dry Cargo Ships

7.1 General (IACS UR Z7.1, 1.1 Rev.15)

7.1.1 The requirements of this Section apply to all self-propelled General Dry Cargo Ships of 500gt and above, which have not been assigned the **ESP** class notation, carrying solid cargoes other than[11]:

- ships subject to SECTION 2 or SECTION 5;
- dedicated container carriers;
- ro-ro cargo ships;
- refrigerated cargo ships;
- dedicated wood chip carriers;
- dedicated cement carriers;
- livestock carriers;
- deck cargo ships[12];
- general dry cargo ships of double-side skin construction, with double-side skin extending for the length of the cargo area, and for the height of the cargo hold to the upper deck[13]

NOTE: A deck cargo ship is a ship that is designed to carry cargo exclusively above deck without any access for cargo below deck.

7.1.2 The requirements of this Section apply to surveys of hull structure and piping systems in way of cargo holds, cofferdams, pipe tunnels, void spaces and fuel oil tanks within the cargo area and all ballast tanks. The requirements are additional to the classification requirements applicable to the remainder of the ship.

7.1.4 The requirements contain the minimum extent of examination, thickness measurements and tank testing. The survey is to be extended when Substantial Corrosion and/or structural defects are found and include additional Close-up Survey when necessary.

7.1.5 In any kind of survey, i.e. special, intermediate, annual or other surveys having the scope of the foregoing ones, thickness measurements, when required by Table 3.7.2, of structures in areas where close-up surveys are required, shall be carried out simultaneously with close-up surveys.

7.1.6 Consideration may be given by the attending Surveyor to allow use of Remote Inspection Techniques (RIT) as an alternative to close-up survey. Surveys conducted using a RIT are to be completed to the satisfaction of the attending Surveyor. When RIT is used for a close-up survey, temporary means of access for the corresponding thickness measurements is to be provided unless such RIT is also able to carry out the required thickness measurements.

7.1.7 The RIT is to provide the information normally obtained from a close-up survey. RIT surveys are to be carried out in accordance with the requirements given here-in and the requirements of IACS Recommendation 42 'Guidelines for Use of Remote Inspection Techniques for surveys'. These considerations are to be included in the proposals for use of a RIT which are to be submitted in advance of the survey so that satisfactory arrangements can be agreed with the Classification Society.

7.1.8 The equipment and procedure for observing and reporting the survey using a RIT are to be discussed and agreed with the parties involved prior to the RIT survey, and suitable time is to be allowed to set-up, calibrate and test all equipment beforehand.

7.1.9 When using a RIT as an alternative to close-up survey, if not carried out by the Society itself, it is to be conducted by a firm approved as a service supplier according to UR Z17 and is to be witnessed by an attending surveyor of the Society.

[11] The requirements of 7.2.8 and 7.4.8 also apply to those cargo ships, which, although belonging to the ship types listed in 7.1.1 that are excluded from the application of this Section, are fitted with a single cargo hold.
[12] A deck cargo ship is a ship that is designed to carry cargo exclusively above deck without any access for cargo below deck.
[13] Special consideration may also be given to ships that are of double side-skin construction but with single skin in way of several frame spaces e.g. in way of a cargo hold entrance or in way of forebody hull form at the forward end of the foremost cargo hold.

7.1.10 The structure to be examined using a RIT is to be sufficiently clean to permit meaningful examination. Visibility is to be sufficient to allow for a meaningful examination. The Classification Society is to be satisfied with the methods of orientation on the structure.

7.1.11 The Surveyor is to be satisfied with the method of data presentation including pictorial representation, and a good two-way communication between the Surveyor and RIT operator is to be provided.

7.1.12 If the RIT reveals damage or deterioration that requires attention, the Surveyor may require traditional survey to be undertaken without the use of a RIT.

7.1.13 For structure built with a material other than steel, alternative thickness measurement requirements may be developed and applied as deemed necessary by the Society.

7.2 Annual Survey (IACS UR Z7.1, 3 Rev.15)

7.2.1 Schedule

Annual Surveys are to be held within 3 months before or after anniversary date from the date of the initial classification survey or of the date credited for the last Special Survey.

7.2.2 General

The survey is to consist of an examination for the purpose of ensuring, as far as practicable, that the hull, hatch covers, coamings and piping are maintained in a satisfactory condition.

7.2.3 Examination of the Hull

(a) Examination of the hull plating and its closing appliances as far as can be seen.
(b) Examination of watertight penetrations as far as practicable.

7.2.4 Examination of weather decks, hatch covers and coamings

(a) Confirmation is to be obtained that no unapproved changes have been made to the hatch covers, hatch coamings and their securing and sealing devices since their last survey.
(b) Where mechanically operated steel covers are fitted, checking the satisfactory condition of:
  - hatch covers; including close-up survey of hatch cover plating;
  - tightness devices of longitudinal, transverse and intermediate cross junctions (gaskets, gasket lips, compression bars, drainage channels);
  - clamping devices, retaining bars, cleating;
  - chain or rope pulleys;
  - guides;
  - guide rails and track wheels;
  - stoppers, etc;
  - wires, chains, gypsies, tensioning devices;
  - hydraulic system essential to closing and securing;
  - safety locks and retaining devices.

(c) Where portable covers, wooden or steel pontoons are fitted, checking the satisfactory condition where applicable of:

- wooden covers and portable beams, carriers or sockets for the portable beam, and their securing devices;
- steel pontoons;
- tarpaulins;
- cleats, battens and wedges;
- hatch securing bars and their securing devices;
- loading pads/bars and the side plate edge;
- guide plates and chocks;
- compression bars, drainage channels and drain pipes (if any).

(d) Checking the satisfactory condition of hatch coaming plating and their stiffeners including close-up survey.

(e) Random checking of the satisfactory operation of mechanically operated hatch covers is to be made including:

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

(f) Checking of the positions of the deck line and load line which, if necessary, are to be remarked and re-painted. Checking that no alterations have been made to the hull or superstructures that would affect the calculations determining the position of the load lines.

(g) Examination of the superstructure end bulkheads and the openings therein.

(h) Examination of the means of securing the weathertightness of cargo hatchways, other hatchways and other openings on the freeboard and superstructure decks

(i) Examination of the ventilators and air pipes, including their coamings and closing appliances

(j) Examination of the watertight integrity of the closures to any openings in the ship's side below the freeboard deck

(k) Examination of the scuppers, inlets and discharges the side scuttles and deadlights

(l) Examination of the bulwarks including the provision of freeing ports, special attention being given to any freeing ports fitted with shutters

(m) Examination of the guardrails, gangways, walkways and other means provided for the protection of the crew and for gaining access to and from crew's quarters and working spaces

(n) Examination, when applicable, of the special requirements for ships permitted to sail with reduced freeboards

(o) Checking, when applicable, of the fittings and appliances for timber deck cargoes

7.2.5 Suspect Areas

Suspect Areas identified at previous surveys are to be examined. Thickness measurements are to be taken of the areas of substantial corrosion and the extent of thickness measurements is to be increased to determine the extent of areas of substantial corrosion. Table 3.1.7 may be used as guidance for these additional thickness measurements. These extended thickness measurements are to be carried out before the annual survey is credited as completed.

7.2.6 Examination of Cargo Holds

(a) For Ships 10-15 years of age, the following is to apply:

- Overall Survey of one forward and one after cargo hold and their associated tween deck spaces.

- When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurement is to be carried out. If the results of these thickness measurements indicate that Substantial Corrosion is found, then the extent of thickness measurements is to be increased to determine the extent of areas of substantial corrosion. Table 3.1.7 may be used as guidance for these additional measurements. These extended thickness measurements are to be carried out before the annual survey is credited as completed.

(b) For Cargo Ships over 15 years of age, the following is to apply:

- Overall Survey of all cargo holds and tween deck spaces.
- Close-up examination of sufficient extent, minimum 25% of frames, to establish the condition of the lower region of the shell frames including approx. lower one third length of side frame at side shell and side frame end attachment and the adjacent shell plating in a forward lower cargo hold and one other selected lower cargo hold. Where this level of survey reveals the need for remedial measures, the survey is to be extended to include a Close-up Survey of all of the shell frames and adjacent shell plating of those cargo holds and associated tween deck spaces (as applicable) as well as a Close-up Survey of sufficient extent of all remaining cargo holds and tween deck spaces (as applicable).
- When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurement is to be carried out. If the results of these thickness measurements indicate that Substantial Corrosion is found, then the extent of thickness measurements is to be increased to determine the extent of areas of substantial corrosion. Table 3.1.7 may be used as guidance for these additional measurements. These extended thickness measurements are to be carried out before the annual survey is credited as completed.
- Where the protective coating in cargo holds, as applicable, is found to be in a GOOD condition as defined in 1.2.14, the extent of close-up surveys may be specially considered.
- All piping and penetrations in cargo holds, including overboard piping, are to be examined.

7.2.7 Examination of Ballast Tanks

Examination of ballast tanks when required as a consequence of the results of the Special Survey and Intermediate Survey is to be carried out. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurement is to be carried out. If the results of these thickness measurements indicate that Substantial Corrosion is found, then the extent of thickness measurements are to be increased to determine the extent of areas of substantial corrosion. Table 3.1.7 may be used as guidance for these additional measurements. These extended thickness measurements are to be carried out before the annual survey is credited as completed.

7.2.8 Additional requirements for single hold cargo ships (see 7.1.2) after determining compliance with SOLAS II-I/25

For ships complying with the requirements of SOLAS II-I/25 for hold water level detectors, the annual survey is to include an examination and a test, at random, of the water ingress detection system and of their alarms.

7.3 Intermediate Survey (IACS UR Z7.1, 4, Rev.15)

7.3.1 Ships 5 - 10 Years of Age, the following is to apply:

(a) Ballast tanks

- For ballast tanks, an Overall Survey of Representative Tanks selected by the Surveyor is to be carried out. If such overall survey reveals no visible structural defects, the examination may be limited to verification that the corrosion prevention system remains efficient.

- Where POOR coating condition, soft or semi-hard coating, corrosion or other defects are found in ballast tanks or where a hard protective coating was not applied from the time of construction, the examination is to be extended to other ballast tanks of the same type.
- In ballast tanks other than double bottom tanks, where a hard protective coating is found in POOR condition as defined in 1.2.14, and it is not renewed, where soft or semi-hard coating has been applied, or where a hard protective coating was not applied from time of construction, the tanks in question are to be examined and thickness measurements carried out as considered necessary at annual intervals. When such breakdown of hard protective coating is found in double bottom ballast tanks, where a soft or semi-hard coating has been applied, or where a hard protective coating has not been applied, the tanks in question may be examined at annual intervals. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurements are to be carried out.
- In addition to the requirements above, areas found suspect at previous surveys are to be surveyed in accordance with the provisions indicated in 7.2.5.

(b) Cargo Holds
- An Overall Survey of one forward and one after cargo hold and their associated tween deck spaces.
- Areas found suspect at previous surveys are to be surveyed in accordance with the provisions indicated in 7.2.5.

7.3.2 Ships 10-15 Years of Age, the following is to apply:

(a) Ballast Tanks
- For ballast tanks, an overall survey of all tanks is to be carried out. If such overall survey reveals no visible structural defects, the examination may be limited to a verification that the corrosion prevention system remains efficient.
- In ballast tanks other than double bottom tanks, where a hard protective coating is found in POOR condition as defined in 1.2.14, and it is not renewed, where soft or semi-hard coating has been applied, or where a hard protective coating was not applied from time of construction, the tanks in question are to be examined and thickness measurements carried out as considered necessary at annual intervals. When such breakdown of hard protective coating is found in water ballast double bottom tanks, where a soft or semi-hard coating has been applied, or where a hard protective coating has not been applied, the tanks in question may be examined at annual intervals. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurements are to be carried out.
- In addition to the requirements above, areas found suspect according to 1.2.12 at the previous surveys are to be overall and close-up surveyed in accordance with the provisions indicated in 7.2.5.

(b) Cargo Holds
- An Overall Survey of all cargo holds and tween deck spaces.
- Areas found suspect at previous surveys are to be surveyed in accordance with the provisions indicated in 7.2.5.
- When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurement is to be carried out. If the results of these thickness measurements indicate that Substantial Corrosion is found, then the extent of thickness measurements is to be increased to determine the extent of areas of substantial corrosion. Table 3.1.7 may be used as guidance for these additional measurements. These extended thickness measurements are to be carried out before the annual survey is credited as completed.

7.3.3 Ships over 15 Years of Age, the following is to apply:

- The requirements of the Intermediate Survey are to be to the same extent as the previous Special Survey as required in 7.4, except for item 2(c) in column 4 of Table 3.7.2. However, tank testing specified in 7.4.7, survey of automatic air pipe heads (see Table 3.2.5) and internal examination of fuel oil, lube oil and fresh water tanks (see 7.4.5(a)) are not required unless deemed necessary by the attending surveyor.
- In application of the above mentioned, the intermediate survey may be commenced at the second annual survey and be progressed during the succeeding year with a view to completion at the third annual survey
- In lieu of the requirements of 7.4.2, an in-water survey, according to the provisions of SECTION 9, 9.4, 9.4.1(b) may be considered as equivalent.

7.3.4 Concurrent crediting to both Intermediate Survey and Special Survey for surveys and thickness measurements of spaces are not acceptable.

7.4 Special Survey (IACS UR Z7.1, 2 Rev.15)

7.4.1 General

(a) The Special Survey is to include, in addition to the requirements of the Annual Surveys, examination, tests and checks of sufficient extent to ensure that the hull and related piping, as required in (d), are in a satisfactory condition and fit for the intended purpose for the new period of class of 5 years to be assigned, subject to proper maintenance and operation and to periodical surveys being carried out at the due dates.

(b) All cargo holds, water ballast tanks, including double bottom tanks, pipe tunnels, cofferdams and void spaces bounding cargo holds, decks and outer hull are to be examined, and this examination is to be supplemented by thickness measurement and testing as required in 7.4.6 and 7.4.7, to ensure that the structural integrity remains effective.

(c) The aim of the examination is to discover Substantial Corrosion, significant deformation, fractures, damages or other structural deterioration, that may be present.

(d) All piping systems within the above spaces are to be examined and operationally tested to working pressure to attending Surveyor's satisfaction to ensure that tightness and condition remain satisfactory.

(e) The survey extent of ballast tanks converted to void spaces is to be specially considered in relation to the requirements for ballast tanks.

(f) Air pipe heads are to be completely examined, externally and internally, in accordance with the requirements of Table 3.2.5.

(g) Concurrent crediting to both Intermediate Survey and Special Survey for surveys and thickness measurements of spaces are not acceptable.

7.4.2 Dry Dock Survey

A survey in dry dock is to be a part of the Special Survey. The overall and close-up surveys and thickness measurements, as applicable, of the lower portions of the cargo holds and ballast tanks are to be carried out in accordance with the applicable requirements for special surveys, if not already performed.

NOTE: Lower portions of the cargo holds and ballast tanks are considered to be the parts below light ballast water line.

7.4.3 Tank Protection

Where provided, the condition of corrosion prevention system of ballast tanks is to be examined. For ballast tanks, excluding double bottom tanks, where a hard protective coating is found in POOR

condition as defined in 1.2.14 and it is not renewed, where soft or semi-hard coating has been applied, or where a hard protective coating was not applied from time of construction, the tanks in question are to be examined at annual intervals. Thickness measurements are to be carried out as deemed necessary by the surveyor.

When such breakdown of hard protective coating is found in double bottom ballast tanks and it is not renewed, where a soft or semi-hard coating has been applied, or where a hard protective coating was not applied from the time of construction, the tanks in question may be examined at annual intervals. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurements are to be carried out.

Where the hard protective coating in tanks is found to be in a GOOD condition as defined in 1.2.14 of this Chapter, the extent of close-up surveys and thickness measurements may be specially considered.

7.4.4 Hatch Covers and Coamings

The hatch covers and coamings are to be surveyed as follows:

(a) A thorough inspection of the items listed in 7.2.4 is to be carried out.
(b) Checking of the satisfactory operation of all mechanically operated hatch covers is to be made, including:
  - stowage and securing in open condition;
  - proper fit, locking and efficiency of sealing in closed conditions;
  - operational testing of hydraulic and power components, wires, chains and link drives.
(c) Checking the effectiveness of sealing arrangements of all hatch covers by hose testing or equivalent is to be carried out.
(d) Close-up survey and thickness measurement[14] of the hatch cover and coaming plating and stiffeners is to be carried out as given in Table 3.7.1 and Table 3.7.2.

7.4.5 Extent of Overall and Close-up Survey

(a) An Overall Survey of all tanks and spaces, excluding fuel oil, lube oil and fresh water tanks, is to be carried out at each Special Survey.

  NOTE: For fuel oil, lube oil and fresh water tanks, reference is to be made to Table 3.9.2.

(b) The minimum requirements for close-up surveys at special survey are given in Table 3.7.1.

(c) The Surveyor may extend the close-up survey 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.

(d) For areas in spaces where hard protective coatings are found to be in a GOOD condition as defined in 1.2.14, the extent of close-up surveys according to Table 3.7.1 may be specially considered.

  NOTE: For examination of automatic air pipe heads, reference is to be made to Table 3.2.5

7.4.6 Extent of Thickness Measurement

(a) The minimum requirements for thickness measurements at Special Survey are given in Table 3.7.2.
(b) The Surveyor may extend the thickness measurements as deemed necessary. When thickness measurements indicate substantial corrosion, the extent of thickness measurements is to be increased to determine the extent of areas of substantial corrosion. Table 3.1.7 may be used as guidance for these additional thickness measurements.

[14] Subject to cargo hold hatch covers of approved design which structurally have no access to the internals, close-up survey/thickness measurement shall be done of accessible parts of hatch covers structures

(c) For areas in tanks where hard protective coatings are found to be in a GOOD condition as defined in 1.2.14, the extent of thickness measurement according to Table 3.7.2 may be specially considered.
(d) Transverse sections are to be chosen where the largest reductions are suspected to occur or are revealed from deck plating measurements.

7.4.7 Extent of tank testing

(a) All boundaries of ballast tanks and deep tanks used for water ballast within the cargo length area are to be pressure tested. For fuel oil tanks, the representative tanks are to be pressure tested.
(b) The Surveyor may extend the tank testing as deemed necessary.
(c) Tank testing of fuel oil tanks is to be carried out with a head of liquid to the highest point that liquid will rise under service conditions. Tank testing of fuel oil tanks 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.

7.4.8 Additional requirements for single hold cargo ships (see 7.1.2) after determining compliance with SOLAS II-I/25.

For ships complying with the requirements of SOLAS II-I/25 for hold water level detectors, the special survey is to include an examination and a test of the water ingress detection system and their alarms

Table 3.7.1: Minimum requirements for close-up survey at hull special surveys of general dry cargo ships

Special Survey No.1 Age ≤ 5	**Special Survey No.2 5 < Age ≤ 10**	**Special Survey No. 3 10 < Age ≤ 15**	**Special Survey No. 4 and Subsequent Age > 15**
(A) Selected shell frames in one forward and one aft cargo hold and associated tween deck spaces. **(B)** One selected cargo hold transverse bulkhead. **(D)** All cargo hold hatch covers and coamings (plating and stiffeners).	**(A)** Selected shell frames in all cargo holds and tween deck spaces. **(B)** One transverse bulkhead in each cargo hold. **(B)** Forward and aft transverse bulkhead in one side ballast tank, including stiffening system. **(C)** One transverse web with associated plating and framing in two representative ballast tanks of each type (i.e. topside, hopper side, side tank or double bottom tank). **(D)** All cargo hold hatch covers and coamings (plating and stiffeners). **(E)** Selected areas of all deck plating and underdeck structure inside line of hatch openings between cargo hold hatches. **(F)** Selected areas of inner bottom plating.	**(A)** All shell frames in the forward lower cargo hold and 25% frames in each of the remaining cargo holds and tween deck spaces including upper and lower end attachments and adjacent shell plating. **(B)** All cargo hold transverse bulkheads. **(B)** All transverse bulkheads in ballast tanks, including stiffening system. **(C)** All transverse webs with associated plating and framing in each ballast tanks. **(D)** All cargo hold hatch covers and coamings (plating and stiffeners). **(E)** All deck plating and underdeck structure inside line of hatch openings between cargo hold hatches. **(F)** All areas of inner bottom plating.	**(A)** All shell frames in all cargo holds and tween deck spaces including upper and lower end attachments and adjacent shell plating. Areas (B –F) as for Special Survey No. 3.

(A) Cargo hold transverse frames.

(B) Cargo hold transverse bulkhead plating, stiffeners and girders.

(C) Transverse web frame or watertight transverse bulkhead in ballast tanks.

(D) Cargo hold hatch covers and coamings. Subject to cargo hold hatch covers of approved design which structurally have no access to the internals, close-up survey/thickness measurement shall be done of accessible parts of hatch covers structures.

(E) Deck plating and underdeck structure inside line of hatch openings between cargo hold hatches.

(F) Inner bottom plating.

See Figure 3.7.1 and Figure 3.7.2 for the areas corresponding to (A), (B), (C), (D), (E) and (F)

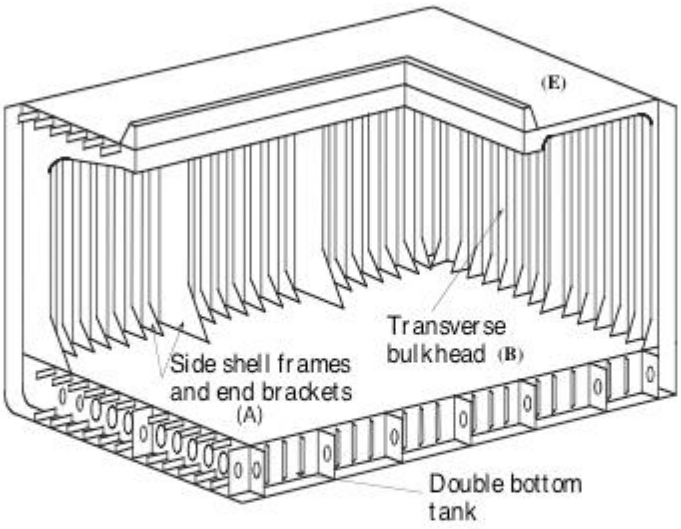
Note:

Close-up survey 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.
- Mid-height of the bulkheads for holds without tween decks.
- Immediately below the main deck plating and tween deck plating.

Figure 3.7.1: Areas for Close-Up Survey of General Dry Cargo Ships

a) **Single Deck Ship**



b) **Tween Deck Ship**

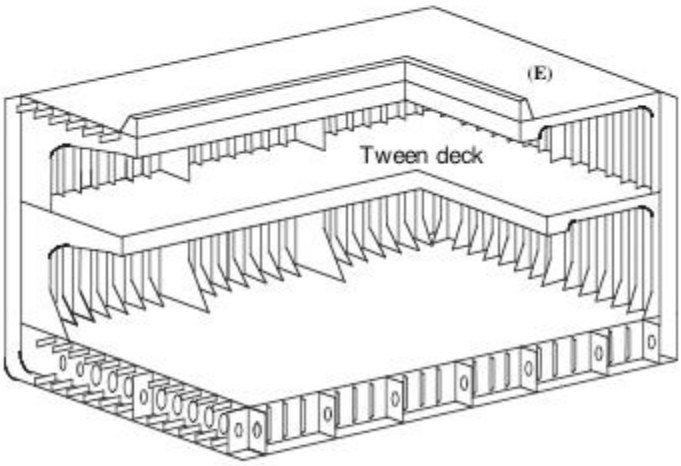


Figure 3.7.2: Areas for Close-Up Survey of General Dry Cargo Ships

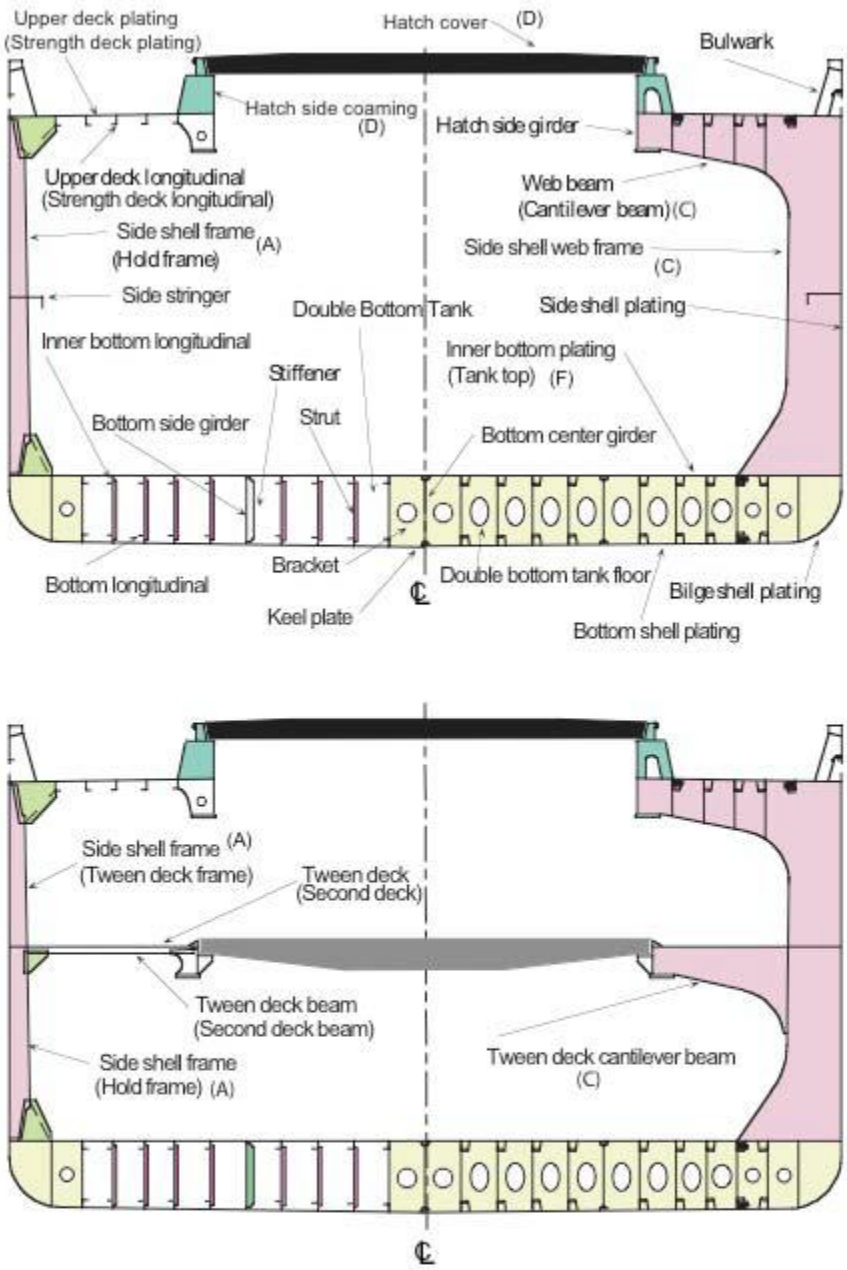


Table 3.7.2: Minimum requirements for the thickness measurement at hull special surveys of general dry cargo ships

Special Survey No. 1 **Age≤5**	**Special Survey No. 2** **5< Age ≤10**	**Special Survey No. 3** **10 < Age ≤15**	**Special Survey No. 4 and Subsequent** **Age > 15**
1. Suspect areas.	1. Suspect areas. 2. One transverse section of deck plating in way of a cargo space within the amidships 0.5L. 3. Measurement for general assessment and recording of corrosion pattern of those structural members subject to close-up survey according to Table 3.7.1.	1. Suspect areas. 2. Two transverse sections within the amidships 0.5L in way of two different cargo spaces. 3. Measurement for general assessment and recording of corrosion pattern of those structural members subject to close-up survey according to Table 3.7.1. 4. Within the cargo length area, each deck plate outside line of cargo hatch openings. 5. All wind and water strakes within the cargo length area. 6. Selected wind and water strakes outside the cargo length area.	1. Suspect areas. 2. Within the cargo length area: a) A minimum of three transverse sections within the amidships 0.5L. b) each deck plate outside line of cargo hatch openings. c) Each bottom plate, including lower turn of bilge. d) Duct keel or pipe tunnel plating and internals. 3. Measurement for general assessment and recording of corrosion pattern of those structural members subject to close-up survey according to Table 3.7.1. 4. All wind and water strakes full length
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 metres in length, the number of transverse sections required at Special survey No. 3 may be reduced to one and the number of transverse sections at Special Survey No. 4 and subsequent surveys may be reduced to two.			

SECTION 8 Hull survey requirements for Liquefied Gas Carriers

Currently LHR does not intend to classify Liquefied Gas Carriers. Therefore this Section is intentionally left blank.

SECTION 9 Hull survey requirements for Other ship types (IACS UR Z7 Rev.29)

9.1 General

9.1.1 The requirements of this Section apply to all ships other than those assigned the **ESP** class notation and other than ships falling within the scope of SECTION 7 or SECTION 8.

9.1.2 Special consideration may be given in application of relevant sections of this section to commercial vessels owned or chartered by Governments, which are utilized in support of military operations or service.

9.1.3 Concurrent crediting to both Intermediate Survey and Special Survey for surveys and thickness measurements of spaces is not acceptable.

9.2 Annual Survey

9.2.1 The survey is to consist of an examination for the purpose of ensuring, as far as practicable, that the hull, hatch covers, hatch coamings, closing appliances, equipment and related piping are maintained in a satisfactory condition. In particular, the Surveyor is to satisfy himself as to the efficient condition of the following:

- Hatchways on freeboard and superstructure decks, weather deck plating, ship side plating above water line, ventilator coamings and air pipes, exposed casings, fiddley openings, skylights, flush deck scuttles, deckhouses and companionways, superstructure bulkheads, side, bow and stern doors, side scuttles and deadlights, chutes and other openings, together with all closing appliances and flame screens.
- Vent piping, including that of inert gas installations, where applicable within the cargo tank area, together with associated flame arresters and pressure/vacuum valves, also cargo and bunker deck piping of tankers. All air pipe heads are to be externally examined.
- Means of ensuring weather tightness of steel hatch covers.
- Scuppers and sanitary discharges (so far as is practicable); valves on discharge lines (so far as is practicable) and their controls; guard rails and bulwarks, freeing ports, gangways and life-lines; fittings and appliances for timber deck cargoes.
- The Surveyor is to confirm that, where required, an approved loading instrument together with its operation manual are available on board. The operation of the loading instrument is to be verified in accordance with LHR certification procedure.
- The anchoring and mooring equipment.
- All watertight doors in watertight bulkheads are to be examined and tested (locally and remotely), together with examination of watertight bulkhead penetrations, so far as is practicable.
- The Surveyor is to satisfy himself regarding the freeboard marks on the ship's side

9.2.2 Examination of weather decks, ship side plating above water line, hatch covers and coamings

This examination consists of:

(a) Checking that no unapproved changes have been made to the hatch covers, hatch coamings and their securing and sealing devices since the last survey.
(b) Where mechanically operated steel covers are fitted, checking the satisfactory condition of:
- hatch covers;
- tightness devices of longitudinal, transverse and intermediate cross junctions (gaskets, gaskets lips, compression bars, drainage channels);
- clamping devices, retaining bars, cleating;
- chain or rope pulleys;
- guides;
- guide rails and track wheels;
- stoppers, etc.;
- wires, chains, gypsies, tensioning devices;
- hydraulic system essential to closing and securing;
- safety locks and retaining devices.

(c) Where portable covers, wooden or steel pontoons are fitted, checking the satisfactory condition of:
- wooden covers and portable beams, carriers or sockets for the portable beams, and their securing devices
- steel pontoons
- tarpaulins
- cleats, battens and wedges

- hatch securing bars and their securing devices
- loading pads/bars and the side plate edge
- guide plates and chocks
- compression bars, drainage channels and drain pipes (if any)

(d) Checking the satisfactory condition of hatch coamings plating and their stiffeners.
(e) Random checking of the satisfactory operation of mechanically operated hatch covers:

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

(f) Checking of the positions of the deck line and load line which, if necessary, are to be remarked and re-painted. Checking that no alterations have been made to the hull or superstructures that would affect the calculations determining the position of the load lines.
(g) Examination of the superstructure end bulkheads and the openings therein.
(h) Examination of the means of securing the weathertightness of cargo hatchways, other hatchways and other openings on the freeboard and superstructure decks
(i) Examination of the ventilators and air pipes, including their coamings and closing appliances, if any
(j) Examination of the watertight integrity of the closures to any openings in the ship's side below the freeboard deck
(k) Examination of the scuppers, inlets and discharges the side scuttles and deadlights
(l) Examination of the bulwarks including the provision of freeing ports, special attention being given to any freeing ports fitted with shutters
(m) Examination of the guardrails, gangways, walkways and other means provided for the protection of the crew and for gaining access to and from crew's quarters and working spaces
(n) Examination, when applicable, of the special requirements for ships permitted to sail with reduced freeboards
(o) Checking, when applicable, of the fittings and appliances for timber deck cargoes
(p) Examination of the weld connection between air pipes and deck plating
(q) External examination of all air pipe heads installed on the exposed decks
(r) Examination of flame screens on vents to all bunker tanks

9.2.3 Suspect Areas

Suspect areas identified at previous surveys are to be examined. Thickness measurements are to be taken of the areas of substantial corrosion and the extent of thickness measurements is to be increased to determine areas of substantial corrosion. These extended thickness measurements are to be carried out before the annual survey is credited as completed.

9.2.4 Examination of Ballast Tanks

Examination of ballast tanks when required as a consequence of the results of the Special Survey and Intermediate Survey is to be carried out. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurement is to be carried out. If the results of these thickness measurements indicate that Substantial Corrosion is found, then the extent of thickness measurements is to be increased to determine areas of substantial corrosion. These extended thickness measurements are to be carried out before the annual survey is credited as completed.

9.2.5 Where required, owing to the coating condition assessed at Special and Intermediate Surveys, internal examination of applicable salt water ballast spaces is to be carried out. Thickness measurements are to be taken as considered necessary by the Surveyor.

9.2.6 For ships assigned a **Ro-Ro Ship** class notation fitted with bow doors, inner doors, side doors and stern doors, in addition to the requirements of 9.2.1, the following are to be satisfactorily dealt with as applicable:

- Examination of the door structure and surrounding ship structure.
- Verification of the operation of doors and their power units.
- Examination of the door hinging arrangements.
- Examination of the door sealing arrangements including gaskets and retaining bars.
- Examination of the door cleating, locking and securing arrangements.
- Verification of the local and/or remote control of the securing devices/cleats.
- Verification of the tightness of the doors.
- Examination of all equipment associated with the opening, closing and securing of the door, e.g. wire ropes, chains, sheaves, rollers, guides, shackles, etc.
- Examination of the required notice boards and verification of log entries.
- Verification of the satisfactory testing of the bilge systems for the space between the inner and outer bow doors and of the vehicle deck.
- Examination and testing of remote-control panels and associated indicator lights, closed circuit television systems, water leakage indicator lights and alarm systems.
- Verification that the approved Operation and Maintenance Manual is on board and satisfactorily maintained.

9.3 Intermediate Survey

9.3.1 The requirements of this paragraph are to be complied with in addition to those stated in 9.2. Those items which are additional to the requirements of the Annual Surveys may be surveyed either at or between the 2nd and 3rd Annual Survey. Concurrent crediting to both Intermediate Survey and Special Survey for surveys and thickness measurements of spaces is not acceptable.

9.3.2 In the case of all ships over five years and up to ten years of age, an internal general examination of representative ballast tanks is to be carried out as follows:

(a) Salt-water ballast spaces other than independent double bottom tanks:
- If such inspections reveal no visible structural defects the examination may be limited to a verification that the protective coating remains in GOOD or FAIR condition as defined in 1.2.14.
- Where a protective coating is found to be in POOR condition as defined in 1.2.14 and it has not repaired, or where soft or semi-hard coating has been applied, or where a protective coating was not applied from the time of construction, the examination is to be extended to other ballast spaces of the same type.
- Where a protective coating is found to be in POOR condition as defined in 1.2.14 and it has not repaired, or where soft or semi-hard coating has been applied, or where a protective coating was not applied from the time of construction, maintenance of Class is to be made subject to the spaces in question being internally examined and gauged as necessary at annual intervals. Waiver of internal examination at annual intervals for tanks of 12 m^3 or less in size, with soft or semi-hard coating, may be consider.

(b) Independent double bottom tanks:
- If such inspections reveal no visible structural defects the examination may be limited to a verification that the protective coating remains in GOOD or FAIR condition as defined in 1.2.14.
- Where a protective coating is found to be in POOR condition as defined in 1.2.14 and it has not repaired, or where soft or semi-hard coating has been applied, or where a protective coating was not applied from the time of construction, the examination is to be extended to other ballast spaces of the same type.

– Where a protective coating is found to be in POOR condition as defined in 1.2.14 and it has not repaired, or where soft or semi-hard coating has been applied, or where a protective coating was not applied from the time of construction, maintenance of Class may, at the discretion of the Society, be made subject to the spaces in question being internally examined and gauged as necessary at annual intervals.

Note:

Independent double bottom tanks are those double bottom tanks, which are separate from topside tanks, side tanks or deep tanks.

9.3.3 In the case of all ships over ten years of age an internal general examination of all salt-water ballast tanks is to be carried out as follows:

(a) Salt-water ballast spaces other than independent double bottom tanks:

– If such inspections reveal no visible structural defects, the examination may be limited to a verification that the protective coating remains in GOOD or FAIR condition as defined in 1.2.14.

– Where a protective coating is found to be in POOR condition as defined in 1.2.14 and it has not repaired, or where soft or semi-hard coating has been applied, or where a protective coating was not applied from the time of construction, maintenance of Class is to be made subject to the spaces in question being internally examined and gauged as necessary at annual intervals. Waiver of internal examination at annual intervals for tanks of 12 m^3 or less in size, with soft or semi-hard coating, may be consider.

(b) Independent double bottom tanks:

– If such inspections reveal no visible structural defects, the examination may be limited to a verification that the protective coating remains in GOOD or FAIR condition as defined in 1.2.14.

– Where a protective coating is found to be in POOR condition as defined in 1.2.14 and it has not repaired, or where soft or semi-hard coating has been applied, or where a protective coating was not applied from the time of construction, maintenance of Class may, at the discretion of the Society, be made subject to the spaces in question being internally examined and gauged as necessary at annual intervals.

9.3.4 In the case of ships over 15 years old carrying dry cargoes and not assigned the **ESP** class notation, an internal examination of selected cargo holds is to be carried out.

9.4 Docking Survey (IACS UR Z3 1, 2 Rev.8)

9.4.1 General

(a) The Owner is to notify the Society whenever the outside of the ship's bottom and related items can be examined in drydock or on a slipway.

(b) There is to be a minimum of two examinations of the outside of the ship's bottom and related items during each five-year special survey period. One such examination is to be carried out in conjunction with the special survey. In all cases the interval between any two such examinations, is not to exceed 36 months. An extension of examination of the ship's bottom of 3 months beyond the due date can be granted in exceptional circumstances[15].

[15] '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.

(c) Examinations of the outside of the ship's bottom and related items of ships is normally to be carried out with the ship in drydock. However, consideration may be given to alternate examination while the ship is afloat as an In-water Survey, subject to provisions of 9.5. Special consideration is to be given to ships of 15 years or over before being permitted to have such examinations. For ESP ships exceeding 15 years of age, such examinations are to be carried out with the ship in drydock.

(d) The interval between examinations of the outside of the ship's bottom and related items for ships operating in fresh water and for certain harbor or non-self-propelled craft may be greater than that given in point (b).

(e) Compliance with this Section does not absolve the Owner from compliance with the requirements of SOLAS as amended, especially when shorter intervals between examination of the ship's bottom for certain types of ship are required.

(f) For Oil Tankers, Combination Carriers, Bulk Carriers, Chemical Tankers, Double Side Skin Bulk Carriers, Double Hull Oil Tankers, General Dry Cargo Ships and Liquefied Gas Carriers, reference is also be made to SECTION 2, SECTION 3, SECTION 4, SECTION 5 and SECTION 6, SECTION 7, 7.1 and SECTION 7, 7.4 as applicable

9.4.2 Scope of the survey

During each Docking Survey the following requirements are to be complied with:

(a) When a ship is in drydock or on a slipway, it is to be placed on blocks of sufficient height and with the necessary staging to permit the examination of shell plating including bottom and bow plating, stern frame and rudder, sea chests and valves, propeller, etc.

(b) The shell plating is to be examined for excessive corrosion or deterioration due to chafing or contact with the ground and for any undue unfairness or buckling. Special attention is to be paid to the connection between the bilge strakes and the bilge keels. Important plate unfairness or other deterioration which do not necessitate immediate repairs are to be recorded.

(c) Sea chests and their gratings, sea connections and overboard discharge valves and cocks and their fastenings to the hull or sea chests are to be examined. Valves and cocks need not be opened up more than once in the Speciasl Survey period of five years, unless considered necessary by the Surveyor.

(d) Visible parts of rudder, rudder pintles, rudder shafts and couplings and stern frame are to be examined. If considered necessary by the Surveyor, the rudder is to be lifted or the inspection plates removed for the examination of pintles. The clearance in the rudder bearings is to be ascertained and recorded. Where applicable, pressure test of the rudder may be required as deemed necessary by the Surveyor.

(e) Visible parts of propeller and stern bush are to be examined. The clearance in the stern bush and the efficiency of the oil gland if any, are to be ascertained and recorded. For controllable pitch propellers, the Surveyor is to be satisfied with the fastenings and tightness of hub and blade sealing. Dismantling need not be carried out unless considered necessary by the Surveyor.

(f) Visible parts of side thrusters are to be examined. Other propulsion systems which also have manoeuvring characteristics (such as directional propellers, vertical axis propellers, water jet units) are to be examined externally with focus on the condition of gear housing, propeller blades, bolt locking and other fastening arrangements. Sealing arrangement of propeller blades, propeller shaft and steering column shall be verified.
NOTE:
For the survey of propeller shafts, refer to SECTION 19.

(g) Anchors, chain cables are to be examined and checked. Worn out chain lengths are to be removed (see also 9.6.3(c)). This operation need not to be carried out more than once in a five-year period unless considered necessary by the Surveyor. (Note: This operation may be taken into account towards the Special Survey).

(h) Special consideration may be given in application of relevant dry-docking requirements to commercial vessels owned or chartered by Governments, which are utilized in support of military operations or service.

9.5 In-water Survey (IACS UR Z3, 3, Rev.8)

9.5.1 The Society may accept an In-water Survey in lieu of the intermediate docking between Special Surveys required in a five-year period on ships where suitable protection is applied to the underwater portion of the hull.

9.5.2 The In-water Survey is to provide the information normally obtained from a Docking Survey, so far as is practicable. Special consideration shall be given to ascertaining rudder bearing clearances and stern bush clearances of oil stern bearings based on a review of the operating history, on board testing and stern oil sample reports. These considerations are to be included in the proposals for in-water survey which are to be submitted in advance of the survey so that satisfactory arrangements can be agreed with LHR.

9.5.3 The In-water Survey is to be carried out by professional and qualified diver(s) under surveillance of a Surveyor. The diver(s) has/have to be employed by a firm approved by the Society according to 9.5.10. In addition, for certain aspects of the In-Water Survey, consideration may be given to the use of a Remotely Operated Vehicle (ROV) operated by the LHR approved firm.

9.5.4 The equipment and the procedure for observing and reporting the survey are to be discussed with the parties involved prior to the in-water survey, and suitable time is to be allowed to permit the diving company to test all equipment beforehand.

9.5.5 The In-Water Survey is to be carried out at an agreed geographical location under the surveillance of a Surveyor to LHR, with the ship at suitable draught in sheltered water and with weak tidal streams and currents. The in-water visibility is to be good and the hull below waterline is to be sufficiently clean to permit meaningful examination. The Society is to be satisfied with the methods of localization of the divers or Remotely Operated Vehicle (ROV) on the plating, which should make use where necessary of permanent markings on the plating at selected points.

9.5.6 The Surveyor is to be satisfied with the method of pictorial representation, and a good two-way communication between the Surveyor and divers is to be provided. It is advisable that both the Surveyor and the divers be provided with photographs, preferably in color and with the scale specified-of main hull parts and attachments below the waterline: rudder and rudder pintles, shell openings, including main inlets and discharges and tailshaft stern tube sealing arrangements.

9.5.7 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.

9.5.8 Special consideration shall also be given to ascertaining rudder bearing clearances and stern bush clearances of oil stern bearings based on a review of the operating history, on board testing and stern oil sample reports.

9.5.9 Detailed plans of the hull and hull attachments below the waterline are to be available on board, that is:

- all shell openings,
- stem,
- rudder and fittings,
- sternpost,
- propeller, including the means used for identifying each blade,
- anodes, including securing arrangements,
- bilge keels,

- welded seams and butts,
- identification marks and system will be supplied to facilitate the In-water Survey, in particular the position of transverse watertight bulkheads and corresponding markings on the hull.

The plans submitted shall include all the necessary instructions to facilitate the divers' work, especially for the taking of clearance measurements.

The above plans and information will be submitted to the Society for examination together with the Owner's application for In-water Survey.

9.5.10 Approval of firms for In-water Surveys

Before carrying out the In-water Surveys referred to in these Rules, the firm concerned is to be approved by the Society (according to *LHR's Requirements for Service Suppliers*).

9.6 Special Survey No. 1 for ships five years old

9.6.1 General

(a) The Special Survey shall include, in addition to the requirements of Annual Surveys, examination, tests, and checks of sufficient extent to ensure that the hull and related piping, as required in 9.6.3(g), are in a satisfactory condition and that the ship is fit for its intended purpose for the new period of class of 5 years to be assigned subject to proper maintenance and operation and to periodical surveys being carried out at the due dates.
(b) A Docking Survey in accordance with the requirements of 9.4 or 9.5 is to be carried out.
(c) The examination of the hull in the context of the special surveys is to be efficient to discover Substantial Corrosion, significant deformation, fractures or other structural deterioration, that may be present.
(d) The overall and close-up surveys and thickness measurements, as applicable, of the lower portions of the cargo holds and water ballast tanks are to be carried out in accordance with the applicable requirements for special surveys, if not already performed.

NOTE: Lower portions of the cargo holds and ballast tanks are considered to be the parts below light ballast water line.

(e) In any kind of survey, i.e. special, intermediate, annual or other surveys having the scope of the foregoing ones, thickness measurements of structures in areas where close-up surveys are required, shall be carried out simultaneously with close-up surveys.
(f) Concurrent crediting to both Intermediate Survey and Special Survey for surveys and thickness measurements of spaces is not acceptable

9.6.2 Preparation

(a) The holds, tweendecks, peak tanks, deep tanks, engine and boiler spaces and other spaces, are to be cleared and cleaned as necessary and the bilges and limbers all fore and aft are to be cleaned and prepared for examination. Platform plates in engine and boiler spaces are to be lifted as may be necessary for the examination of the structure below. Where necessary, close and spar ceiling, lining and pipe casings are to be removed for examination of the structure.
(b) In ships having a single bottom, a sufficient amount of close ceiling is to be lifted all fore and aft on each side from the bottom and bilges to permit the structure below to be examined.
(c) In ships having a double bottom, a sufficient amount of ceiling is to be removed from the bilges and inner bottom to enable the condition of the plating to be ascertained. If it is found that the plating is clean and in good condition and free from rust, the removal of the remainder of ceiling may be dispensed with. The Surveyor may waive the removal of heavy reinforced compositions if there is no evidence of leakages, cracking or other faults in the composition.
(d) Where holds are insulated for the purpose of carrying refrigerated cargoes and the hull in way of the insulation was examined by LHR Surveyors at the time such insulation was fitted, it will be

sufficient to remove the limbers and hatches to enable the framing and plating in way to be examined. In other cases, additional insulation is to be removed as necessary to satisfy the Surveyor as to the condition of the structure.

(e) The steelwork is to be exposed and cleaned as may be required for its proper examination by the Surveyor.

9.6.3 External examination

(a) The external examination consists of:
- a general examination of the hull and hull equipment as detailed under 9.2.1 and 9.2.2 for the Annual Hull Survey and
- in addition, the inspections listed below from (b) to (f).

(b) Decks are examined, with particular attention being given to the areas where high stress concentrations or increased corrosion are likely to arise, such as hatch corners and other discontinuities. Deck erections such as hatch coamings, deckhouses and superstructures are examined. Worn out, worm-eaten or rotten parts of wooden decks are to be renewed to the Surveyors discretion. The same applies to wood-sheathed steel decks, the sheathing of which may be removed in places to ascertain the condition of plating underneath.

(c) Anchors, chain cables and windlasses are to be ranged, examined and the required complement and condition verified. Worn out lengths of chain cables over than 12% from its nominal diameter are to be renewed. The chain locker, holdfasts, hawse pipes and chain stoppers are to be examined and pumping arrangements of the chain locker tested.

(d) Masts and standing rigging are to be examined.

(e) The hatch covers and coamings are to be surveyed as follows:
(i) A thorough inspection of the items listed in 9.2.2, including close-up survey of hatch cover plating and hatch coaming plating, is to be carried out. Subject to cargo hold hatch covers of approved design which structurally have no access to the internals, close-up survey shall be done of accessible parts of hatch covers structures.
(ii) Checking of the satisfactory operation of all mechanically operated hatch covers is to be made, including:
- stowage and securing in open condition;
- proper fit, locking and efficiency of sealing in closed conditions:
- operational testing of hydraulic and power components, wires, chains and link drives

(iii) Checking the effectiveness of sealing arrangements of all hatch covers by hose testing or equivalent is to be carried out.

(f) Survey of air pipe heads:

Air pipe heads are to be completely examined, externally and internally as indicated in Table 3.2.5.

For designs where the inner parts cannot be properly inspected from outside, this is to include removal of the head from the air pipe. Particular attention is to be paid to the condition of the zinc coating in heads constructed from galvanized steel.

(g) All bilge and ballast piping systems are to be examined and operationally tested to working pressure to attending Surveyor's satisfaction to ensure that tightness and condition remain satisfactory.

9.6.4 Internal examination

(a) All spaces including holds and their tween decks where fitted; double bottom, deep, ballast, peak and cargo tanks; pumprooms, pipe tunnels, duct keels, machinery spaces, dry spaces, cofferdams and voids are to be internally examined including the plating and framing, bilges and drain wells, sounding, venting, pumping and drainage arrangements. Internal examination of fuel oil, lubricating oil and fresh water tanks is to be carried out in accordance with Table 3.9.2. At special survey No.3 and subsequent special surveys, structural Downflooding ducts and structural ventilation ducts are to be internally examined.

(b) Engine room structure is to be examined. Particular attention is to be given 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. Particular attention is to be given to the sea suctions, sea water cooling pipes and overboard discharged valves and their connections to the shell plating. Where wastage is evident or suspect, thickness measurements are to be carried out, and renewals or repairs made when wastage exceeds allowable limits.

(c) Where provided, the condition of corrosion prevention system of ballast tanks is to be examined. For tanks used for water ballast, excluding double bottom tanks, where a hard protective coating is found in POOR condition as defined in 1.2.14 and it is not renewed, where soft or semi-hard coating has been applied, or where a hard protective coating was not applied from time of construction, the tanks in question are to be examined at annual intervals. Thickness measurements are to be carried out as deemed necessary by the surveyor.

(d) When such breakdown of hard protective coating is found in water ballast double bottom tanks and it is not renewed, where a soft or semi-hard coating has been applied, or where a hard protective coating was not applied from the time of construction, the tanks in question may be examined at annual intervals. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurements are to be carried out.

9.6.5 Tank testing

(a) Boundaries of double-bottom, deep, ballast, peak, and other tanks, including holds adapted for the carriage of salt water ballast, are to be tested with a head of liquid to the top of air pipes or to near the top of hatches for ballast/cargo holds.

(b) Boundaries of fuel oil, lube oil and fresh water tanks are to be tested with a head of liquid to the highest point that liquid will rise under service conditions. Tank testing of fuel oil, lube oil and fresh water tanks may be specially considered based on 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. The Surveyor may extend the testing as deemed necessary.

(c) Independent tanks in the engine room containing fuel or lubricating oil need not be tested, if after an external examination the Surveyor considers their condition satisfactory.

(d) For integral tanks which are intended to contain liquid cargoes such as edible oil the Surveyor may waive the requirement specified in (b) subject to a satisfactory internal examination.

Table 3.9.1: Minimum Requirements for Thickness Measurements at Special Survey

Special Survey No. 1 Age≤5	**Special Survey No. 2 5< Age ≤10**	**Special Survey No. 3 10 < Age ≤15**	**Special Survey No. 4 and Subsequent Age > 15**
1. Suspect areas throughout the vessel.	1. Suspect areas throughout the vessel.	1. Suspect areas throughout the vessel.	1. Suspect areas throughout the vessel.
	2. One transverse section of deck plating within the amidships 0.5L (in way of cargo space, if applicable).	2. Two transverse sections within the amidships 0.5L (in way of two cargo spaces, if applicable).	2. A minimum of three transverse sections within the amidships amidships 0.5L (in way of cargo spaces, if applicable).
		3. All cargo hold hatch covers and coamings (plating and stiffeners).	3. All cargo hold hatch covers and coamings (plating and stiffeners).
		4. Internals in forepeak and afterpeak ballast tanks.	4. Internals in forepeak and afterpeak ballast tanks.
			5. All exposed main deck plating full length.
			6. Representative exposed superstructure deck plating (poop, bridge and forecastle deck).

			7. Lowest strake and strakes in way of twin decks of all transverse bulkheads in cargo spaces together with internals in way.
			8. All wind-and-water strakes, port and starboard full length.
			9. All keel plates full length. Also, additional bottom plates in way of cofferdams, machinery space, and aft end of tanks.
			10. Plating of seachests. Shell plating in way of overboard discharges as considered necessary by the attending surveyor.

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. Thickness measurements of internals may be specially considered by the Surveyor if the hard protective coating is in GOOD condition
3. For ships less than 100 metres in length, the number of transverse sections required at Special survey No. 3 may be reduced to one (1) and the number of transverse sections at Special Survey No. 4 and subsequent surveys may be reduced to two (2).
4. For ships more than 100 meters in length, at Special Survey No. 3, thickness measurements of exposed deck plating within amidship 0.5 L may be required.
5. Subject to cargo hold hatch covers of approved design which structurally have no access to the internals, thickness measurement shall be done of accessible parts of hatch covers structures.

Table 3.9.2 Minimum requirements for internal examination at hull special surveys of fuel oil, lube oil and fresh water tanks.

Tank	Special Survey No. 1 Age ≤ 5	Special Survey No. 2 5 < Age ≤ 10	Special Survey No. 3 10 < Age ≤ 15	Special Survey No. 4 and Subsequent 15 < Age
Fuel Oil Bunkertanks				
- Engine Room	None	None	One tank	One tank
- Cargo Length Area	None	One tank	Two tanks, *Note (3)*	Half, minimum two, *Notes (3), (4)*
-If no tanks in Cargo Length Area, additional fuel tank(s) outside of Engine Room (if fitted)	None	One tank	One tank	Two tanks
Lubricating Oil	None	None	None	One tank
Fresh Water	None	One tank	All tanks	All tanks
Peak tanks (all used)	All tanks	All tanks	All tanks	All tanks
Salt water ballast, *Note (5)*	All tanks	All tanks	All tanks	All tanks

NOTES:
1. The above requirements apply to tanks of integral (structural) type.
2. If a selection of tanks is accepted to be examined, then different tanks are to be examined at each special survey, on a rotational basis.
3. At special surveys No. 3 and subsequent surveys, one deep tank for fuel oil in the cargo length area is to be included, if fitted.
4. Where 50% of tanks are to be examined, a minimum of two tanks are required to be examined depending upon the overall number of tanks.
5. The requirements for Salt-water ballast tanks are applicable to Bilge water, Sewage and Grey water tanks.

9.6.6 Thickness measurements

(a) Thickness measurements are to be carried out in accordance with Table 3.9.1 (column 1).
(b) The Surveyor may extend the thickness measurements as deemed necessary. When thickness measurements indicate substantial corrosion, the extent of thickness measurements is to be increased to determine areas of substantial corrosion. Table 3.1.7 may be used as guidance for these

additional thickness measurements. These extended thickness measurements are to be carried out before the survey is credited as completed.

(c) When tanks are suitably coated or otherwise protected and if the condition of the coating is considered satisfactory, the Surveyor may, at his discretion, accept a reduced Program of thickness measurements in the corresponding areas. Other effective protective arrangement may also be considered.

(d) In any kind of survey, i.e. special, intermediate, annual or other surveys having the scope of the foregoing ones, thickness measurements of structures in areas where close-up surveys are required, shall be carried out simultaneously with close-up surveys.

9.7 Special Survey No. 2 for ships ten years old

9.7.1 General

The requirements of 9.6 are to be complied with.

9.7.2 Preparation

In addition to the requirements specified in 9.6.2 the following are to be complied with:

(a) A sufficient amount of ceiling in the holds and other spaces is to be removed from the bilges and inner bottom to enable the condition of the structure in the bilges, the inner bottom plating, pillar feet and the bottom plating of bulkheads and tunnel sides to be examined. If the Surveyor considers it necessary, the whole of the ceiling is to be removed.

(b) In ships having a single bottom, the limber boards and ceiling equal to not less than three strakes, all fore and aft on each side are to be removed, one such strake being taken from the bilges. Where the ceiling is fitted in hatches, the whole of the hatches and at least one strake of ceiling in the bilges are to be removed. If the Surveyor considers it necessary the whole of the ceiling and limber boards are to be removed.

(c) The chain locker is to be cleaned internally. The chain cables are to be ranged for inspection. The anchors are to be cleaned and placed in an accessible position for inspection.

9.7.3 Examination and testing

(a) In addition to the requirements specified in 9.6.3, 9.6.4 and 9.6.5, tanks (excluding peak tanks) used exclusively for oil fuel or fresh water need not all be examined internally provided that, from an external examination and testing and from an internal examination of the aft end of one forward double bottom tank and of one selected deep tank, the Surveyor is satisfied with the condition observed. Lubricating oil tanks need not be examined internally.

(b) When the ship is more than five and not more than ten years old, one integral fresh water tank is to be examined internally. The other tanks may be examined externally from all accessible boundaries.

(c) Survey of air pipe heads:

Air pipe heads are to be completely examined, externally and internally as indicated in Table 3.2.5. The selection of air pipe heads to be inspected is left to the attending Surveyor. According to the results of this inspection, the Surveyor may require the inspection of other air pipe heads located on the exposed decks. For designs where the inner parts cannot be properly inspected from outside, this is to include removal of the head from the air pipe. Particular attention is to be paid to the condition of the zinc coating in heads constructed from galvanized steel.

9.7.4 Thickness measurements

(a) Thickness measurements are to be carried out in accordance with Table 3.9.1 (column 2).

(b) In any kind of survey, i.e. special, intermediate, annual or other surveys having the scope of the foregoing ones, thickness measurements of structures in areas where close-up surveys are required shall be carried out simultaneously with close-up surveys.

9.8 Special Survey No. 3 for ships fifteen years old

9.8.1 General

The requirements of paragraphs 9.6 and 9.7 are to be complied with.

9.8.2 Preparation

In addition to the requirements of 9.6.2 and 9.7.2 the following are to be complied with:

- The steelwork is to be cleaned and the rust removed.
- Casings of air, sounding, steam and other pipes, spar ceiling and lining in way of the side scuttles are to be removed, as required by the Surveyor.
- If the Surveyor is satisfied, after removal of portions of the ceiling in the holds, that the steelwork is in good condition, free from rust and coated the removal of the whole may be dispensed with.
- All double bottom and other tanks are to be cleaned as necessary to permit their internal examination, where this is required.
- Portions of the cement chocks on the ship's sides at bilges and decks are to be removed, as considered necessary by the Surveyor, so that the condition of the shell plating and adjacent steelwork can be ascertained.
- Portions of wood sheathing or other covering, on steel decks are to be removed, as considered necessary by the Surveyor, in order to ascertain the condition of the plating.
- Where the holds are insulated for the purpose of carrying refrigerated cargoes, the limbers and hatches are to be lifted and sufficient insulation is to be removed in each of the chambers to enable the Surveyor to satisfy himself of the condition of the framing and plating.
- All mast wedging is to be removed for inspection.
- Attention is to be given by the Surveyor to the parts of the ship's structure in way of the boilers. Attention is also to be paid to the possibility of local wastage and grooving, e.g. at the shell plating along the heel of framing members.

9.8.3 Examination and testing

(a) The requirements specified in 9.6.3, 9.6.4, 9.6.5 and 9.7.3 are to be complied with.

(b) Integral tanks which are used exclusively for fresh water are to be examined internally.

(c) Independent tanks in the engine room containing fuel or lubricating oil are to be filled to the top of the tank for testing.

(d) Survey of air pipe heads:

All air pipe heads located on the exposed decks are to be completely examined, externally and internally, as indicated in Table 3.2.5. For designs where the inner parts cannot be properly inspected from outside, this is to include removal of the head from the air pipe. Particular attention is to be paid to the condition of the zinc coating in heads constructed from galvanized steel.

9.8.4 Thickness measurements

(a) Thickness measurements are to be carried out in accordance with Table 3.9.1 (column 3).

(b) In any kind of survey, i.e. special, intermediate, annual or other surveys having the scope of the foregoing ones, thickness measurements of structures in areas where close-up surveys are required shall be carried out simultaneously with close-up surveys.

9.9 Special Survey No. 4 for ships twenty years old and every Special Survey thereafter

9.9.1 General

The requirements of 9.6 to 9.8 are to be complied with.

9.9.2 Examination and testing

(a) The requirements specified in 9.6.3, 9.6.4, 9.6.5, 9.7.3 and 9.8.3 are to be complied with.

(b) A minimum of two selected integral oil fuel tanks are to be examined internally. The other tanks may be examined externally from all accessible boundaries.

(c) Integral tanks which are used for lubrication oil need not be examined internally subject to external examination of all accessible boundaries.

(d) Independent tanks, which are used for fresh water, oil fuel or lubricating oil need not be examined internally subject to external examination of all accessible boundaries.

(e) For ships over twenty years old, all tanks are to be examined internally, but in those ships operating on a Continuous Survey basis and fitted with nested deep tanks comprising six or more adjoining tanks, such tanks need not all be examined internally provided that at each year of the survey cycle one selected tank from each nest is found from internal examination to be in good condition.

9.9.3 Thickness measurements

(a) Thickness measurements are to be carried out in accordance with Table 3.9.1 (column 3).

(b) All paint and rust are to be entirely removed before the plates are gauged by the Surveyor and the actual thicknesses are to be reported in detail to the Society. Where gauged plates are renewed, the thicknesses of adjacent plates in the same strake are to be reported.

(c) The thickness of bottom plating in way of cement is to be ascertained unless the Surveyor, after making an internal and external examination, is entirely satisfied that this is unnecessary. Selected portions of the cement are to be removed from the bottom and bilge, if required by the Surveyor.

(d) Where the holds are insulated for the purpose of carrying refrigerated cargoes, the limbers and hatches are to be lifted and sufficient additional insulation is to be removed in each of the chambers to enable the Surveyor to satisfy himself of the condition of the steel structure and to enable the thickness of the shell plating to be ascertained as required above.

(e) In any kind of survey, i.e. special, intermediate, annual or other surveys having the scope of the foregoing ones, thickness measurements of structures in areas where close-up surveys are required shall be carried out simultaneously with close-up surveys.

SECTION 10 Machinery Surveys (IACS UR Z18, Rev.9)

10.1 General

10.1.1 In this Section, survey requirements for the machinery and related systems are given. Additional requirements applicable to several machinery subsystems are also given in the following Section of this Chapter.

10.1.2 Special consideration may be given in application of relevant sections of this section to commercial vessels owned or chartered by Governments, which are utilized in support of military operations or service.

10.2 Machinery Verification Runs

(a) As part of the Special Survey of Machinery, a dock trial is to be carried out to attending Surveyors' satisfaction to confirm satisfactory operation of main and auxiliary machinery. If significant repairs are carried out to main or auxiliary machinery or steering gear, consideration should be given to a sea trial to attending Surveyor' satisfaction.

(b) If the significant repairs as stated in (a), is considered by classification society to have any impact on response characteristics of the propulsion systems, then the scope of sea trial shall also include a test plan for astern response characteristics based on those required for such an equipment or systems when fitted to the new ship. Refer to Part 5, Chapter 1, Section 5 for astern testing requirements.
The tests are to demonstrate the satisfactory operation of the equipment or system under realistic service conditions at least over the manoeuvring range of the propulsion plant, for both ahead and astern directions.
Depending on the actual extent of the repair, the Society may accept a reduction of the test plan.

10.2 Annual Survey

10.2.1 The Surveyor is to satisfy himself as to the efficient condition of the following:

- The general condition of the machinery and boiler spaces with particular attention being given to the existence of any fire and explosion hazards. Emergency escape routes are to be checked to ensure that they are free of obstruction.
- The bilge pumping systems and bilge wells, including operation of extended spindles and level alarms where fitted.
- Bilge level detection and alarm systems on ships assigned a **UMS** notation.
- Satisfactory operation of the bilge pumps is to be proven.
- Boilers, other pressure vessels including safety devices, foundations, controls and relieving gear.
- The main auxiliary and emergency electrical machinery, the switchgear and other electrical equipment are to be generally examined under operating conditions so far as is practicable. Earth bonding straps are to be examined where fitted.
- The Surveyor is to examine and test in operation all main and auxiliary steering arrangements including their associated equipment and control systems, and verify that logbook entries have been made in accordance with statutory requirements where applicable.
- All means of communication between the navigating bridge and the machinery control positions, as well as the bridge and the alternative steering position.
- Inert gas plant overboard discharges through the shell in so far as is practicable.

10.2.2 The fire protection systems and arrangements are to be examined and are to include:

- Verification, so far as is practicable, that no significant changes have been made to the arrangement of structural fire protection.

- Verification of the operation of manual and/or automatic doors where fitted.
- Verification that fire control plans are properly posted.
- Examination, so far as is possible, and testing as feasible, of the fire and/or smoke detection system(s).
- Examination of fire main system, and confirmation that each fire pump, including the emergency fire pump can be operated separately so that the two required powerful jets of water can be produced simultaneously from different hydrants.
- Verification that fire hoses, nozzles, applicators and spanners are in good working condition and situated at their respective locations.
- Examination of fixed fire-fighting systems controls, piping, instructions and marking, checking for evidence of proper maintenance and servicing, including date of last systems tests.
- Verification that all portable and semi-portable fire extinguishers are in their stowed positions, checking for evidence of proper maintenance and servicing, conducting random checks for evidence of discharged containers.
- Verification, so far as is practicable, that the remote control for stopping fans and machinery and shutting off fuel supplies in machinery spaces are in good working order.
- Examination of the closing arrangements of ventilators, funnel annular spaces, skylights, doorways and tunnels where applicable.
- Verification that the firemen's' outfits are complete and in good condition and properly stored.
- Surveys carried out by the National Authority of the country in which the ship is registered may be accepted, at the discretion of the Surveyor, as meeting these requirements.

10.2.3 Additional requirements for **oil tankers**

The Surveyor is to satisfy himself as to the efficient condition of the following:

- Cargo tank openings including gaskets, covers coamings and screens.
- Cargo tank pressure/vacuum valves and flame screens.
- Flame screens on vents to all bunker, oily ballast and oily slop tanks and void spaces, so far as is practicable.
- Cargo, crude oil washing, bunker, ballast and vent piping systems, including vent masts and headers.
- Verification that no potential sources of ignition such as loose gear, excessive products in the bilges, excessive vapours, combustible materials, etc., are present in or near the cargo pump room and that access ladders are in good condition.
- Pump room bulkheads for signs of leakage or fractures, and in particular, the sealing arrangements of all penetrations in these bulkheads.
- Pump room ventilation system, ducting, dampers and screens.
- Piping and cut-out valves of cargo tank and cargo pump room fixed fire-fighting system.
- Deck foam system and deck sprinkler system.
- Electrical equipment in dangerous zones.
- Piping systems in the cargo pump room so far as is practicable.
- Cargo, bilge, ballast and stripping pumps for excessive gland seal leakage, and electrical and mechanical remote operating and shutdown devices, as well as pump room bilge system.
- Verification that installed pressure gauges on cargo discharge lines and level indicator systems are operational.

10.2.4 Special requirements for inert gas systems where fitted:

- External examination of the condition of all piping and components for signs of corrosion or gas leakage/effluent leakage.
- Verification of the proper operation of both inert gas blowers.
- Checking the scrubber room ventilation system.
- Checking so far as is practicable, of the deck water seal for automatic filling and draining and checking for presence of water carry-over. Checking the operation of the non-return valve.

- Testing of all remotely operated or automatically controlled valves including the flue gas isolating valve(s).
- Checking the interlocking features of soot blowers.
- Checking that the gas pressure-regulating valve automatically closes when the inert gas blowers are secured.
- Checking so far as is practicable the following alarms and safety devices of the inert gas system using simulated conditions where necessary:
  - high oxygen content of gas in the inert gas main;
  - low gas pressure in the inert gas main;
  - low pressure in the supply to the deck water seal;
  - high temperature of gas in the inert gas main;
  - low water pressure to the scrubber;
  - accuracy of portable and fixed oxygen measuring equipment by means of calibration gas.

10.3 Intermediate Survey

10.3.1 Additional requirements for **oil tankers** between 5 and 10 years of age:

Examination of cargo, crude oil washing, bunker, ballast, steam and vent piping on the weather decks, as well as vent mast and headers. If upon examination there is any doubt as to the condition of the piping, the piping may be required to be pressure tested, gauged, or both.

10.3.2 Additional requirements for **oil tankers** over 10 years of age:

Machinery and boiler spaces including tank tops, bilges and cofferdams, sea suctions and overboard are to be generally examined. Particular attention is to be given to the propulsion system and fire and explosion hazards. It is to be confirmed that emergency escape routes are unobstructed.

It is to be ascertained that the routine surveys of boilers and other pressure vessels have been carried out as determined by statutory requirements and/or the Rules and the safety devices have been tested.

10.4 Special Survey of machinery

10.4.1 When the vessel is in drydock all openings to the sea including sanitary and overboard discharges with the valves and cocks and their fastenings in the machinery and pump room spaces are to be examined.

10.4.2 The Surveyor is to satisfy himself concerning the efficient condition of the following:

- Shafts thrust blocks, shaft line and bearings.
- Reduction gears, pinions, wheels with their shafts' bearings and clutch arrangements.
- Auxiliary engines, air compressors, oil separators, coolers, filters and all pumps and components used for essential services.
- Main and emergency steering arrangements.
- Windlass and mooring winches.
- Holding down bolts and chocks of main engines and diesel generators.
- Evaporators and their safety devices.
- Air receivers, their mountings, valves and safety devices are to be cleaned internally and thoroughly examined. In case internal examination of air receivers is unpractical they are to be hydraulically tested at 1,5 times the working pressure.
- The bilge system including valves, cocks, strainers, emergency bilge suction valve, pumps, remote reachrods and level alarms, if fitted, are to be opened up, examined and tested under working conditions.

- The oil fuel, feed, lubricating oil, cooking water and ballast systems and blanking arrangements to deep tanks which may carry cargoes, liquid or dry, as well as pressure filters, heaters, coolers and their safety devices used for essential services are to be examined and tested as considered necessary by the Surveyor.
- Fuel tanks not forming part of the ship's structure are to be examined externally one at the first survey and internally and externally at each Special Survey thereafter and tested to the pressure specified for new tanks. Mountings, fittings and remote controls are also to be examined.
- Automatic and remote controls if fitted for essential machinery are to be tested under working conditions.

10.4.3 Additional requirements for tankers

For tankers in addition to the preceding requirements, the following are to be complied with:

- Cargo, bilge, ballast and stripping pumps in cargo pump rooms are to be opened up as considered necessary by the Surveyor and examined including pump foundations.
- Electrical and mechanical remote operating and shutdown devices in cargo pump rooms are to be tested in operation.
- All electrical equipment and cables in dangerous spaces are to be examined to verify that they are in good order.
- Insulation resistance of the electrical circuits in dangerous spaces is to be tested and adjusted if it is found not to comply with the relevant requirements.

10.5 Continuous Survey

10.5.1 In case of authorization of a Chief Engineer for carrying out surveys in the context of the Continuous Survey Program only the following items of machinery may be accepted for examination by the Chief Engineer:

1. Main engine cylinder covers
2. Main engine cylinder liners
3. Main engine valves and valve gears
4. Main engine pistons and piston rods
5. Main engine top end connecting rod bearings, cross-heads and relevant slides and guides
6. Main engine fuel-oil injection and booster pumps
7. Scavenge pumps, except for the case where only one such pump is provided
8. Pumps driven by the main engine, such as bilge, lubricating oil and cooling water pumps
9. Independently driven pumps, such as bilge, ballast, fire, fresh and sea cooling water, lubricating oil and fuel oil transfer pumps
10. Main engine water and oil coolers, except for the case where only one such cooler for each service is provided
11. Low pressure coolers employed in heavy fuel-oil systems of main propulsion internal combustion engines
12. Air compressors
13. Fans and relevant prime movers for forced and induced ventilation
14. Steam and internal combustion auxiliary machinery, with relevant coolers and pumps, provided that their number is such that all essential services for the propulsion and safety of the ship, as well as for the preservation of the cargo, may be effectively ensured with any machinery out of service for survey.

10.5.2 The survey referred in 10.3.1 should be carried out according to the applicable LHR Requirements.

10.5.3 The following items are not allowed to be surveyed by the Chief Engineer:

1. Main and auxiliary boilers
2. Pressure vessels
3. Main and auxiliary turbines
4. Main reduction gears
5. Crankshafts, with relevant main bearings and bottom end connecting rod bearings, of main propulsion internal combustion engines. Bottom end connecting rod bearings of diesel engines having trunk pistons may however be inspected by Chief Engineers when the complete relevant cylinder is inspected in the course of the engine maintenance program.
6. Turboblowers of main propulsion internal combustion engines
7. Shafting and relevant bearings

10.6 Planned Maintenance Scheme (PMS) for Machinery (IACS UR Z20 Rev.2)

10.6.1 General

10.6.1.1 Application

These requirements apply to an approved Planned Maintenance Scheme for Machinery (PMS) as an alternative to the Continuous Machinery Survey (CMS).

It considers surveys to be carried out on the basis of intervals between overhauls recommended by manufacturers, documented operator's experience and a condition monitoring system, where fitted, and is limited to components and systems covered by CMS.

Any items not covered by PMS shall be surveyed and credited in the usual way.

10.6.1.2 Maintenance Intervals

In general, the intervals for PMS shall not exceed those specified for CMS. However, for components where the maintenance is based on running hours longer intervals may be accepted as long as the intervals are based on the manufacturer's recommendations.

10.6.1.3 Onboard responsibility

The chief engineer shall be the responsible person on board in charge of the PMS.

Documentation on overhauls of items covered by the PMS shall be reported and signed by the chief engineer.

Access to computerized systems for updating of the maintenance documentation and maintenance program shall only be permitted by the chief engineer or other authorized person.

10.6.2 Procedures and conditions for approval of a PMS

10.6.2.1 System Requirements

The PMS shall be programmed and maintained by a computerized system.

The system shall be approved in accordance with the Society's procedure.

Computerized systems shall include back-up devices, such as disks/tapes, CDs, which are to be updated at regular intervals.

10.6.2.2 Documentation and information

(a) The following documentation shall be submitted for the approval of the scheme:

(i) organization chart identifying areas of responsibility;
(ii) documentation filling procedures;
(iii) listing of equipment to be considered by classification in PMS;
(iv) machinery identification procedure;
(v) preventive maintenance sheet(s) for each machine to be considered;
(vi) listing and specifications of condition monitoring equipment;
(vii) baseline data for equipment with condition monitoring,
(viii) listing and schedule of preventive maintenance procedures.

(b) In addition to the above documentation the following information shall be available on board:
(i) all clauses in 10.6.2.2(a) above in an up-to-date fashion;
(ii) maintenance instructions (manufacturer's and shipyard's);
(iii) condition monitoring data including all data since last opening of the machine and the original base line data;
(iv) reference documentation (trend investigation procedures etc.),
(v) records of maintenance including repairs and renewals carried out.

10.6.2.3 Approval validity

(a) When the PMS is approved a "Certificate of Approval for Planned Maintenance Scheme" is issued. The certification is to be kept on board.
(b) An implementation Survey shall be carried out to confirm the validity of the certificate (see 10.6.3.1).
(c) An annual report covering the year's service, including the following information, shall be reviewed by the Society:
– clauses (iii), and (v) as well as changes to other clauses in 10.6.2.2(a);
(d) An Annual Audit shall be carried out to maintain the validity of the PMS (see 10.6.3.2).
(e) The survey arrangement for machinery under PMS can be cancelled by the Society if PMS is not being satisfactorily carried out either from the maintenance records or the general condition of the machinery, or when the agreed intervals between overhauls are exceeded.
(f) The case of sale or change of management of the ship or transfer of class shall cause the approval to be reconsidered. Change or a major upgrade of the PMS shall always be notified to the Society and will be subject to new approval.
(g) The shipowner may, at any time, cancel the survey arrangement for machinery under PMS by informing the Society in writing and for this case the items which have been inspected under the PMS since the last annual survey can be credited for class at the discretion of the attending surveyor.

10.6.3 Surveys

10.6.3.1 Implementation Survey

(a) The Implementation Survey shall be carried out by the Society's surveyor within one year from the date of approval.
(b) During the implementation survey the following shall be verified by a surveyor to ensure:
(i) the PMS is implemented according to the approval documentation and is adapted to the type and complexity of the components/system on board;
(ii) the PMS is producing the documentation required for the Annual Audit and the requirements of surveys and testing for retention of class are complied with;
(iii) the onboard personnel is familiar with the PMS.
(c) When this survey is carried out and the implementation is found in order, a report describing the system shall be submitted to the Society and the system may be put into service and the approved PMS may replace the CMS.

10.6.3.2 Annual Audit

(a) An annual audit of the PMS shall be carried out by a LHR's surveyor and preferably concurrently with the annual survey of machinery.
(b) The surveyor shall review the annual report or verify that it has been reviewed by LHR.
(c) The purpose of this survey shall be to verify that the scheme is being correctly operated and that the machinery has been functioning satisfactorily since the previous survey. A general examination of the items concerned shall be carried out.
(d) The performance and maintenance records shall be examined to verify that the machinery has functioned satisfactorily since the previous survey or action has been taken in response to machinery operating parameters exceeding acceptable tolerances and the overhaul intervals have been maintained.
(e) Written details of break-down or malfunction shall be made available.
(f) Description of repairs carried out shall be examined. Any machinery part, which has been replaced by a spare one, due to damage, is to be retained on board - where possible - until examined by a LHR's Surveyor.
(g) Upon satisfactory completion of the above requirements, the Society shall retain the PMS.

10.6.3.3 Damage and repairs

(a) The damage of components/machinery shall be reported to LHR. The repairs of such damaged components / machinery shall be carried out to the satisfaction of the LHR's surveyor.
(b) Any repair and corrective action regarding machinery under PMS system shall be recorded in the PMS logbook and repair verified by the Society s surveyor at the Annual Audit.
(c) In the case of overdue outstanding conditions of class or a record of unrepaired damage which would affect the PMS the relevant items shall be kept out of the PMS until the condition of class is fulfilled or the repair is carried out.

SECTION 11 Steam engines

11.1 General

11.1.1 The requirements of SECTION 10 are to be complied with.

11.2 Reciprocating steam engines - Special Survey requirements

11.2.1 Reciprocating steam engines main and auxiliary for essential service are to be opened out and the following working parts are to be examined:

– cylinders and their covers,
– pistons, piston rods, connecting rods, crosshead and guides,
– slide valves and valve gears,
– crankshafts and bearings.

11.3 Steam turbines - Special Survey requirements (IACS UR Z18 Rev.9)

11.3.1 Turbines blading, rotors and bearings, casings, condensers and couplings between turbine and reduction gears are to be examined.

11.3.2 Bulkhead stop valves and manoeuvering valves are to be opened out and examined.

11.3.3 During Special Survey No.1, for ships with more than one main propulsion ahead turbines of well-known type and emergency cross-over arrangements, the turbine casings need not be opened out provided vibration indicators and rotor position indicators are fitted and the operating records are

considering satisfactory by the Surveyor. Turbine casings should be opened at the next Special Survey and subsequent Special Surveys.

11.3.4 Condensers, steam reheaters, desuperheaters which are not incorporated in the boilers are to be examined to the Surveyor's satisfaction and if considered necessary they are to be tested.

11.4 Main steam piping - Special Survey requirements

11.4.1 Selected number of main steam pipes are to be removed and examined externally. If the piping is jointed together by welding and it is impracticable to be removed, alternative means such as inspection through inspection holes by an optical mean or the checking of the pipe wall thickness by ultrasonic test may be accepted. In this case welded seams are to be examined and crack detected to an extent as considered necessary by the Surveyor.

11.4.2 During Special Survey No.3 and subsequent Special Surveys, pipes submitted to internal examination are to be hydraulically tested to twice the working pressure.

11.4.3 Where the temperature of the steam at the superheater outlet does not exceed 450°C, steam pipes need not be surveyed during Special Survey No.1.

SECTION 12 Gas turbines

12.1 General

12.1.1 The requirements of SECTION 6 are to be complied with.

12.2 Special Survey requirements

12.2.1 In gas turbines and free piston gas generators the following parts are to be opened out and examined: Blading, rotors, compressors casings, combustion chambers, burners, intercoolers, head exchangers, gas and air piping starting and reversing arrangements.

12.2.2 In free piston gas generators the following parts are to be opened up for examination: Gas and air compressor cylinders and pistons, compressor end covers, valves and valve gear, cooling system explosion relief devices, synchronizing and control gear and the gas and air piping including by-pass arrangement.

SECTION 13 Internal combustion engines

13.1 General

13.1.1 The requirements of SECTION 10 are to be complied with.

13.2 Special Survey requirements

13.2.1 The following parts are to be opened up and examined:

Cylinders, covers, valves and valve gears, fuel pumps and fittings, scavenge blowers and their driving devices, turbochargers, pistons, piston rod crossheads, guides, connecting rods, crankshafts and all bearings, crankcase fastening and explosion relief devices, camshafts and their driving gears, attached pumps and coolers, vibration dampers, balancers and couplings to the shafting.

13.2.2 Crankshaft alignment is also to be checked and rectified if necessary.

SECTION 14 Electrical equipment

14.1 Annual Survey

14.1.1 The Surveyor is to satisfy himself as to the efficient condition of the following:

The main auxiliary and emergency electrical machinery, the switchgear and other electrical equipment are to be generally examined under operating conditions so far as is practicable. Earth bonding straps are to be examined where fitted.

14.2 Intermediate Survey

14.2.1 For **oil tankers** over 5 years of age but not more than 10 years:

General examination of the electrical equipment and cables in dangerous zones such as cargo pump rooms, and areas adjacent to cargo tanks for defective explosion-proof lights and fixtures, improperly installed wiring, non-approved lighting and fixtures and dead-end wiring and a testing of the insulation resistance of the circuits. In cases where a proper record of testing is maintained, consideration may be given to accepting recent readings. If any of the readings are marginal or if the condition of the cables, fixtures or equipment appears defective in any way, verification measurements may be required. These measurements are not to be attempted until the ship is in a gas free condition and are to be carried out within an acceptable time period.

14.3 Special Survey requirements

14.3.1 The following requirements are to be complied with:

- The fittings on switchboards, section boards and distribution boards are to be examined. Over current protective devices and fuses are to be inspected to verify that they provide suitable protection for their respective circuits.
- The electric cables are to be examined as far as is practicable without undue disturbance of fixtures.
- All generators are to be run under loaded condition, either separately or in parallel, and the performance of speed governors, generator circuit breakers and their associated relays are to be checked as far as is practicable.
- The insulation resistance of generators, switchboards, motors, heaters, lighting fittings and cables is to be tested and adjusted as necessary.
- The emergency source of power and its associated equipment are to be tested to demonstrate that the whole system is in good working order, and if they are automatic, in the automatic mode.
- Navigation light indicators and all the means of communication between the navigating bridge and the machinery control positions as well as the bridge and the alternative steering position, if fitted, are to be tested to ascertain that they function satisfactorily. Where considered necessary by the Surveyor, emergency stopping means of motors for fuel oil pumps, ventilating fans and similar loads, interlocking devices for safety operation of electrical equipment, and motors and their control gears for essential services are to be tested to ascertain that they are in good working order.

SECTION 15 Inert gas systems

15.1 Frequency of surveys

15.1.1 Inert gas systems installed on board ships intended for the carriage of oil or liquid chemicals in bulk are to be surveyed annually in accordance with the requirements of 6.2.5. A Special Survey of the inert gas system in accordance with the following requirements is to be held at intervals not exceeding five years. The survey of inert gas systems, when fitted, consists of:

- general examination of the installation in operation condition,
- external examination of the condition of all piping and components for signs of corrosion or gas leakage/effluent leakage,
- confirmation of the proper operation of inert gas blowers,
- observation of the operation of the scrubber room ventilation system,
- checking of deck water seal for automatic filling and draining and checking for presence of water carry-over and checking the condition of the non-return valve,
- examination of the operation of all remotely operated or automatically controlled valves and, in particular, the flue gas isolating valve(s),
- observation of a test of the interlocking feature of soot blowers,
- observation that the gas pressure regulating valve automatically closes when the inert gas blowers are secured,
- checking, as far as is practicable, the following alarms and safety devices of the inert gas system using simulated conditions where necessary:
    - high oxygen content of gas in the inert gas main,
    - low gas pressure in the inert gas main,
    - low pressure in the supply to the deck water seal,
    - high temperature of gas in the inert gas main,
    - low water pressure to the scrubber,
    - accuracy of portable and fixed oxygen measuring equipment by means of calibration gas,
    - high water level in the scrubber,
    - failure of the inert gas blowers,
    - failure of the power supply to the automatic control system for the gas regulating valve and to the instrumentation for continuous indication and permanent recording of pressure and oxygen content in the inert gas main,
    - high pressure of gas in the inert gas main.

15.1.2 When at the request of an Owner it has been agreed by the Society that the complete survey of the inert gas systems may be carried out on the Continuous Survey basis, the various items of machinery are to be opened for survey in rotation, so far as is practicable to ensure that the interval between consecutive examinations of each item will not exceed five years. In general, approximately one-fifth of the machinery is to be examined each year.

15.1.3 If any examination during Continuous Survey reveals defects, further parts are to be opened up and examined as considered necessary by the Surveyor and the defects are to be made good to his satisfaction.

SECTION 16 Refrigerated cargo installations

16.1 General

16.1.1 For the requirements for surveys of refrigerated cargo installations see Part 7, Chapter 2.

SECTION 17 Boilers (IACS UR Z18 Rev.9)

17.1 Frequency of surveys

17.1.1 All boilers, economizers, steam receivers, steam heated steam generators, thermal oil and hot water units intended for essential services, together with boilers used exclusively for non-essential services having a working pressure exceeding 3,5 bar and a heating surface exceeding 4,5 m^2 are to be surveyed internally. There is to be a minimum of two internal examinations during each 5-year special survey period. In all cases the interval between any two such examinations is not to exceed 36 months.

17.1.2 An extension of the internal examination of the boiler up to 3 months beyond the due date can be granted in exceptional circumstances. The extension may be granted by the Society after the following is satisfactorily carried out:

(i) External examination of the boiler
(ii) Boiler safety valve relieving gear (easing gear) is to be examined and operationally tested
(iii) Boiler protective devices operationally tested
(iv) Review of the following records since the last Boiler Survey:
- Operation
- Maintenance
- Repair history
- Feedwater chemistry

17.1.3 An external survey of boilers including tests of safety and protective devices, and tests of safety valves using their relieving gear, is to be carried out annually within the range dates of the Annual Survey of the ship. For exhaust gas heated economizers, the safety valves are to be tested by the Chief Engineer at sea within the range dates of the Annual Survey. This test is to be recorded in the log book and reviewed by the attending Surveyor prior to crediting the Annual Survey.

17.2 Examination and testing

17.2.1 During the surveys described in 17.1 the boilers, superheaters, economizers and air heaters are to be examined internally on water-steam side and fire side. When direct visual internal inspection is not feasible due to the limited size of the internal spaces, the pressure parts are to be tested by hydraulic pressure and the thicknesses of plates and tubes and sizes of stays are to be ascertained to determine a safe working pressure.

The principal mountings on boilers, superheaters and economizers are to be opened up and examined, and the safety valves are to be set under steam to a pressure not greater than the approved design pressures of the respective parts. As a working tolerance, the setting is acceptable provided that the valves lift at not more than 103% of the approved design pressure. The remaining mountings are to be examined externally and if considered necessary by the Surveyor, are to be opened up for internal examination. Collision chocks, rolling stays and boiler stools are to be examined and maintained in an efficient condition.

The adjustment of the safety valves is to be verified during each boiler internal survey. Boiler safety valve and its relieving gear are to be examined and tested to verify satisfactory operation. However, for exhaust gas heated economizers, if steam cannot be raised at port, the safety valves may be set by the Chief Engineer at sea, and the results recorded in the log book for review by the Society.

Review of the following records since the last Boiler Survey is to be carried out as part of the survey:

- Operation
- Maintenance
- Repair history
- Feedwater chemistry

17.2.2 In fired boilers employing forced circulation, the pumps used for this service are to be opened and examined at each Boiler Survey.

17.2.3 The fuel oil burning system is to be examined under working conditions and a general examination made of fuel tank valves, pipes, deck control gear and oil discharge pipes between pumps and burners.

17.2.4 During surveys of cylindrical boilers fitted with smoke tube superheaters, the saturated steam pipes are to be examined as detailed in SECTION 18.

17.2.5 Exhaust Gas Heated Economizers

In addition to the other requirements of 17.1.1 (internal examination) in exhaust gas heated economizers of the shell type, all accessible welded joints are to be subjected to a visual examination for cracking. Non-destructive Testing may be required for this purpose.

SECTION 18 Steam pipes

18.1 Frequency of Surveys

18.1.1 Saturated steam pipes, and superheated steam pipes where the temperature of the steam at the superheater outlet does not exceed 450°C are to be surveyed ten years from the date of build (or installation) and thereafter at five-year intervals.

18.1.2 Superheated steam pipes where the temperature of the steam at the superheater outlet is over 450°C are to be surveyed five years from the date of build (or installation) and thereafter at five-year intervals.

18.1.3 At ten years from the date of build (or installation) and thereafter at five-year intervals, all copper or copper alloy steam pipes over 75 mm external diameter supplying steam for essential services at sea, are to be hydraulically tested to twice the working pressure.

18.2 Examination and testing

18.2.1 At each survey a selected number of main steam pipes, also of auxiliary steam pipes which:

- are over 75 mm external diameter,
- supply steam for essential services at sea, and
- have bolted joints,

are to be removed for internal examination and are to be hydraulically tested to 1,5 times the working pressure. If these selected pipes are found satisfactory in all respects, the remainder need not be tested. So far as is practicable, the pipes are to be selected for examination and hydraulic test in rotation so that in the course of surveys all sections of the pipeline will be tested.

18.2.2 Where main and/or auxiliary steam pipes of the category described in 18.2.1(a) and (b) have welded joints between the lengths of pipe and/or between pipes and valves, the lagging in way of the welds is to be removed and the welds examined and if considered necessary by the Surveyor, crack detected. Pipe ranges having welded joints are to be hydraulically tested to 1,5 times the working pressure. Where lengths having ordinary bolted joints are fitted in such pipe ranges and can be readily disconnected, they are to be removed for internal examination and hydraulically tested to 1,5 times the working pressure.

18.2.3 Where, on cylindrical boilers having smoke tube superheaters, the saturated steam pipes adjoining the saturated steam headers are situated partly in the boiler smoke boxes, all such pipes adjoining and cross-connecting these headers in the smoke boxes are, at the surveys required by 18.1, to be included in the pipes selected for examination and testing, as defined in 18.2.1. Where the saturated steam pipes inside the smoke boxes consist of steel castings of substantial construction, these requirements need only be applied to a sample casting. Where steel castings are not fitted, the Surveyor is to satisfy himself of the condition of the ends of the saturated steam pipes in the smoke boxes at each Boiler Survey and if considered necessary, a sample pipe is to be removed for examination.

18.2.4 During the surveys specified in 18.1.3, any of the copper or copper alloy pipes, such as those having expansion or other bends, which may be subject to bending and/or vibration, are to be annealed before being tested. This procedure is to be followed also for the closing lengths adjacent to steam driven machinery.

18.2.5 Where it is inconvenient for the Owner to fulfil all the requirements of a steam pipe survey at its due date, the Society will be prepared to consider postponement of the survey, either wholly or in part.

SECTION 19 Propeller Shafts and Tube Shafts Surveys (IACS UR Z21 Rev.4)

19.1 General

19.1.1 Application

Unless alternative means are provided to assure the condition of the propeller shaft assembly, these requirements apply to all vessels with conventional shafting fitted with a propeller as follows:

- from 1 January 2016 for ships delivered on or after 1 January 2016;
- after the first shaft survey scheduled on or after 1 January 2016, for ships delivered before 1 January 2016*.

* Upon the completion of the first shaft survey scheduled on or after 1 January 2016, the designation of dates for the next shaft survey is to be made based upon these requirements.

19.1.2 Definitions

(1) Shaft

For the purpose of this Unified Requirement shaft is a general definition that includes:

- Propeller shaft
- Tube shaft

The definition does not include the intermediate shaft(s) which is(are) considered part of the propulsion shafting inside the vessel.

(2) Propeller Shaft

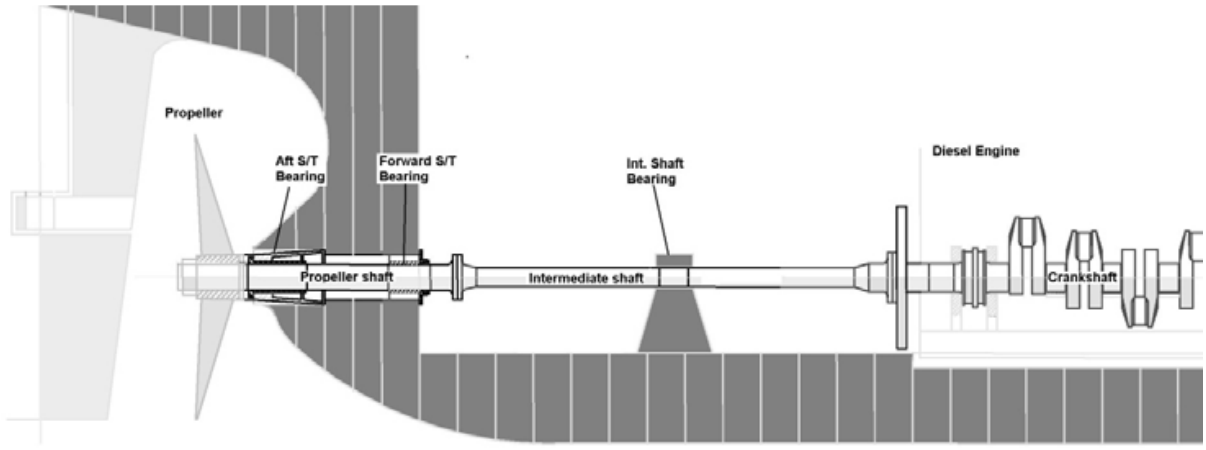
Propeller shaft is the part of the propulsion shaft to which the propeller is fitted. It may also be called screwshaft or tailshaft.

(3) Tube Shaft

Tube shaft is a shaft placed between the intermediate shaft and propeller shaft, normally arranged within a stern tube or running in open water.

It may also be called Stern Tube Shaft.

Figure 3.19.1: Typical Shafting Arrangement



(4) Sterntube

Tube or pipe fitted in the shell of a ship at the stern (or rear part of the ship), below the water-line, through which passes the tube shaft or aftermost section of the propeller-shaft. Sterntube is the housing of the shaft bearings, generally two (one aft and one fore), that sustain the shaft and allows its rotation with less frictional resistance. The stern tube also accommodates the shaft sealing arrangement.

(5) Close Loop (system) Oil Lubricated bearing

Closed loop oil lubricating systems use oil to lubricate the bearings and are sealed against the environment (seawater) by adequate sealing / gland devices.

(6) Water Lubricated Bearing

Water lubricated bearings are bearings cooled / lubricated by water (fresh or salt).

(7) Closed Loop System Fresh Water Lubricated Bearing

Closed loop water lubricating systems use fresh water to lubricate the bearings and are sealed against the environment (such as seawater) by adequate sealing / gland devices.

(8) Open Systems (water)

Open water lubricating systems use water to lubricate the bearings and are exposed to the environment.

(9) Adequate means for protection against corrosion

An adequate means for protection against corrosion is an approved means for full protection of the core shaft against sea water intrusion and subsequent corrosion attack. Such means are used for the protection of common steel material against corrosion particularly in combination with water lubricated bearings.

Typical means are for example:

- continuous metallic, corrosion resistant liners,
- continuous cladding,
- multiple layer synthetic coating,
- multiple layers of fiberglass,
- combinations of above mentioned,

– rubber / elastomer covering coating.

The means for protection against corrosion are installed / applied according to class approved procedures.

(10) Corrosion Resistant Shaft

Corrosion resistant shaft is made in approved corrosion resistant steel as core material for the shaft.

(11) Sterntube Sealing System

Sterntube Sealing system is the equipment installed on the inboard extremity and, for closed systems, at outboard extremity of the sterntube.

Inboard Seal is the device fitted on the fore part of the sterntube that achieve the sealing against the possible leakage of the lubricant media in to the ship internal.

Outboard seal is the device fitted on the aft part of the sterntube that achieve the sealing against the possible sea water ingress and the leakage of the lubricant media.

(12) Service records

Service records are regularly recorded data showing in-service conditions of the shaft(s) and may include, as applicable: lubricating oil temperature, bearing temperature and oil consumption records (for oil lubricated bearings) or water flow, water temperature, salinity, pH, make-up water and water pressure (for closed loop fresh water lubricated bearings depending on design).

(13) Oil sample examination

An oil sample examination is a visual examination of the stern tube lubricating oil taken in presence of the surveyor with a focus on water contamination.

(14) Lubricating oil analysis

Lubricating oil analysis is to be carried out at regular intervals not exceeding six (6) months taking into account IACS Rec. 36.

The documentation on lubricating oil analysis is to be available on board.

Oil samples, to be submitted for the analysis, should be taken under service conditions.

(15) Fresh Water sample test

Fresh water sample test should be carried out at regular intervals not exceeding six (6) months

Samples are to be taken under service conditions and are to be representative of the water circulating within the sterntube.

Analysis results are to be retained on board and made available to the surveyor.

At time of survey the sample for the test has to be taken at the presence of the surveyor.

Fresh water sample test shall include the following parameters:

– chlorides content,
– pH value,
– presence of bearing particles or other particles (only for laboratory analysis, not required for tests carried out in presence of the surveyor)

(16) Keyless connection

Keyless connection is the forced coupling Methodology between the shaft and the propeller without a key achieved through interference fit of the propeller boss on the shaft tapered end.

(17) Keyed connection

Keyed connection is the forced coupling Methodology between the shaft and the propeller with a key and keyway achieved through the interference fit of the propeller boss on the shaft tapered end.

(18) Flanged connection

Flanged connection is the coupling Methodology, between the shaft and the propeller, achieved by a flange, built in at the shaft aft end, bolted to propeller boss.

(19) Alternative means

Shafting arrangements such as, but not limited to, an approved Condition Monitoring Scheme and / or other reliable approved means for assessing and monitoring the condition of the tail shaft, bearings, sealing devices and the stern tube lubricant system capable to assure the condition of the propeller shaft assembly with an equivalent level of safety as obtained by survey methods as applicable in this Section.

19.2 Oil Lubricated shafts or Closed Loop System Fresh Water Lubricated Shafts (closed system)

19.2.1 Shaft Survey Methods

(1) METHOD 1

The survey is to consist of:

- Drawing the shaft and examining the entire shaft, seals system and bearings
- For keyed and keyless connections:
  - Removing the propeller to expose the forward end of the taper,
  - Performing a non-destructive examination (NDE) by an approved surface crack-detection method all around the shaft in way of the forward portion of the taper section, including the keyway (if fitted). For shaft provided with liners the NDE shall extended to the after edge of the liner.
- For flanged connection:
  - Whenever the coupling bolts of any type of flange-connected shaft are removed or the flange radius is made accessible in connection with overhaul, repairs or when deemed necessary by the surveyor, the coupling bolts and flange radius are to be examined by means of an approved surface crack detection method.
- Checking and recording the bearing clearances.
- Verification that the propeller is free of damages which may cause the propeller to be out of balance.
- Verification of the satisfactory conditions of inboard and outboard seals during the re- installation of the shaft and propeller.
- Recording the bearing weardown measurements (after re-installation)

(2) METHOD 2

The survey is to consist of:

- For keyed and keyless connections:
  - Removing the propeller to expose the forward end of the taper,
  - Performing a non-destructive examination (NDE) by an approved surface crack-detection Method all around the shaft in way of the forward portion of the taper section, including the keyway (if fitted).
- For flanged connection:
  - Whenever the coupling bolts of any type of flange-connected shaft are removed or the flange radius is made accessible in connection with overhaul, repairs or when deemed necessary by the surveyor, the coupling bolts and flange radius are to be examined by means of a an approved surface crack detection Method.
- Checking and recording the bearing weardown measurements.
- Visual Inspection of all accessible parts of the shafting system.
- Verification that the propeller is free of damages which may cause the propeller to be out of balance.
- Seal liner found to be or placed in a satisfactory condition.

– Verification of the satisfactory re-installation of the propeller including verification of satisfactory conditions of inboard and outboard seals.

Pre-requisites to satisfactorily verify in order to apply METHOD 2:

– Review of service records.
– Review of test records of:
  ▪ Lubricating Oil analysis (for oil lubricated shafts), or
  ▪ Fresh Water Sample test (for closed system fresh water lubricated shafts).
– Oil sample Examination (for oil lubricated shafts), or Fresh Water Sample test (for closed system fresh water lubricated).
– Verification of no reported repairs by grinding or welding of shaft and/or propeller.

(3) METHOD 3

The survey is to consist of:

– Checking and recording the bearing weardown measurements.
– Visual Inspection of all accessible parts of the shafting system.
– Verification that the propeller is free of damages which may cause the propeller to be out of balance.
– Seal liner found to be or placed in a satisfactory condition.
– Verification of the satisfactory conditions of inboard and outboard seals.

Pre-requisites to satisfactorily verify in order to apply METHOD 3:

– Review of service records.
– Review of test records of
  ▪ Lubricating Oil analysis (for oil lubricated shafts), or
  ▪ Fresh Water Sample test (for closed system fresh water lubricated shafts).
– Oil sample Examination (for oil lubricated shafts), or Fresh Water Sample test (for closed system fresh water lubricated).
– Verification of no reported repairs by grinding or welding of shaft and/or propeller.

19.2.2 Shaft extension surveys - Extension types

(1) Extension up to 2.5 years

The survey is to consist of:

– Checking and recording the bearing weardown measurements, as far as practicable.
– Visual Inspection of all accessible parts of the shafting system.
– Verification that the propeller is free of damages which may cause the propeller to be out of balance.
– Verification of the effectiveness of the inboard seal and outboard seals.

Pre-requisites to satisfactorily verify in order to apply EXTENSION UP TO 2.5 YEARS:

– Review of service records.
– Review of test records of
  ▪ • Lubricating Oil analysis (for oil lubricated shafts), or
  ▪ • Fresh Water Sample test (for closed system fresh water lubricated shafts).
– Oil sample Examination (for oil lubricated shafts), or Fresh Water Sample test (for closed system fresh water lubricated).
– Verification of no reported repairs by grinding or welding of shaft and/or propeller.
– Confirmation from the Chief Engineer that the shafting arrangement is in good working condition.

(2) Extension up to 1 year

The survey is to consist of:

– Visual Inspection of all accessible parts of the shafting system.
– Verification that the propeller is free of damages which may cause the propeller to be out of balance.

- Verification of the effectiveness of the inboard seal and outboard seals.
- Pre-requisites to satisfactorily verify in order to apply EXTENSION UP TO 1YEAR:
- Review of the previous weardown and/or clearance recordings.
- Review of service records.
- Review of test records of
  - Lubricating Oil analysis (for oil lubricated shafts), or
  - Fresh Water Sample test (for closed system fresh water lubricated shafts).
- Oil sample Examination (for oil lubricated shafts), or Fresh Water Sample test (for closed system fresh water lubricated).
- Verification of no reported repairs by grinding or welding of shaft and/or propeller.
- Confirmation from the Chief Engineer that the shafting arrangement is in good working condition.

(3) Extension up to 3 months

The survey is to consist of:

- Visual Inspection of all accessible parts of the shafting system.
- Verification of the effectiveness of the inboard seal.

Pre-requisites to satisfactorily verify in order to apply EXTENSION UP TO 3 MONTHS:

- Review of the previous weardown and/or clearance recordings.
- Review of service records.
- Review of test records of.
  - Lubricating Oil analysis (for oil lubricated shafts), or
  - Fresh Water Sample test (for closed system fresh water lubricated shafts).
- Oil sample Examination (for oil lubricated shafts), or Fresh Water Sample test (for closed system fresh water lubricated).
- Verification of no reported repairs by grinding or welding of shaft and/or propeller.
- Confirmation from the Chief Engineer that the shafting arrangement is in good working condition.

19.2.3 Oil lubricated shafts

(1) Survey intervals

For surveys completed within 3 months before the shaft survey due date, the next period will start from the shaft survey due date.

(i) Flanged propeller connection

The following Methods are applicable:

(a) Method 1 every 5 years, or
(b) Method 2 every 5 years (pre- requisites have to be fulfilled), or
(c) Method 3 every 5 years (pre-requisites have to be fulfilled).

(ii) Keyless propeller connection

The following Methods are applicable:

(a) Method 1 every 5 years, or
(b) Method 2 every 5 years (pre-requisites have to be fulfilled), or
(c) Method 3 every 5 years (pre-requisites have to be fulfilled). The maximum interval between two surveys carried out according to Method 1 or Method 2 shall not exceed 15 years, except in the case when one extension for no more than three months is granted.

(iii) Keyed propeller connection

The following Methods are applicable:

(a) Method 1 every 5 years, or
(b) Method 2 every 5 years (pre-requisites have to be fulfilled).

(2) Survey extensions

For all types of propeller connections, the interval between two consecutive surveys may be extended after the execution of extension survey as follows:

(a) Extension up to a maximum of 2.5 years: no more than one extension can be granted. No further extension, of other type, can be granted.
(b) Extension up to a maximum of 1 year: no more than two consecutive "one-year extensions" can be granted. In the event an additional extension is requested the requirements of the "2.5-year extension" are to be carried out and the shaft survey due date, prior to the previous extension(s), is extended for a maximum of 2.5 years.
(c) Extension up to a maximum of 3 months: no more than one "three months extension" can be granted. In the event an additional extension is requested the requirements of the "one year extension" or "2.5 years extension" are to be carried out and the shaft survey due date, prior to the previous extension, is extended for a maximum of one year or 2.5 years.

The extension survey should normally be carried out within 1 month of the shaft survey due date and the extension counts from the shaft survey due date.

If the extension survey is carried out more than 1 month prior to the shaft survey due date, then the period of extension counts from the date of the extension survey was completed.

19.2.4 Closed loop system fresh water lubricated shafts

The maximum interval between two surveys carried out according to Method 1 shall not exceed 15 years. An extension for no more than three months can be granted.

(1) Survey intervals

For surveys completed within 3 months before the shaft survey due date, the next period will start from the shaft survey due date.

(i) Flanged propeller connection

The following Methods are applicable:

(a) Method 1 every 5 years, or
(b) Method 2 every 5 years (pre-requisites have to be fulfilled), or
(c) Method 3 every 5 years (pre-requisites have to be fulfilled).

(ii) Keyless propeller connection

The following Methods are applicable:

(a) Method 1 every 5 years, or
(b) Method 2 every 5 years (pre-requisites have to be fulfilled), or
(c) Method 3 every 5 years (pre-requisites have to be fulfilled).

(iii) Keyed propeller connection

The following Methods are applicable:

(a) Method 1 every 5 years, or
(b) Method 2 every 5 years (pre-requisites have to be fulfilled).

(2) Survey extensions

For all types of propeller connections, the interval between two consecutive surveys may be extended after the execution of extension survey as follows:

(a) Extension up to a maximum of 2.5 years, no more than one extension can be granted. No further extension, of other type, can be granted.
(b) Extension up to a maximum of 1 year, no more than two consecutive extensions can be granted. In the event an additional extension is requested the requirements of the "2.5-year extension" are to be carried out and the shaft survey due date, prior to the previous extension(s), is extended for a maximum of 2.5 years.
(c) Extension up to a maximum of 3 months, no more than one "three months extension" can be granted. In the event an additional extension is requested the requirements of the "one year extension" or "2.5 years extension" are to be carried out and the shaft survey due date, prior to the previous extension, is extended for a maximum of one year or 2.5 years.

The extension survey should normally be carried out within 1 month of the shaft survey due date and the extension counts from the shaft survey due date.

If the extension survey is carried out more than 1 month prior to the shaft survey due date, then the period of extension counts from the date of the extension survey was completed.

The maximum interval between two surveys carried out according to Method 1 shall not exceed 15 years, except in the case when one extension for no more than three months is granted.

Table 3.19.1: Survey Intervals (closed systems)

Oil Lubricated			
	Flanged Propeller Coupling	Keyless Propeller Coupling	Keyed Propeller Coupling *(note b)*
Every five years *(note a)*	Method 1 or Method 2 or Method 3	Method 1 or Method 2 or Method 3 *(note c)*	Method 1 or Method 2
Extension 2.5 years	Yes *(note d)*	Yes *(note d)*	Yes *(note d)*
Extension 1 year	Yes *(note e)*	Yes *(note e)*	Yes *(note e)*
Extension 3 months	Yes *(note f)*	Yes *(note f)*	Yes *(note f)*
Closed Loop System Fresh Water Lubricated			
Every five years *(note a)*	Method 1 *(note g)* or Method 2 or Method 3	Method 1 *(note g)* or Method 2 or Method 3	Method 1 *(note g)* or Method 2
Extension 2.5 years	Yes *(note d)*	Yes *(note d)*	Yes *(note d)*
Extension 1 year	Yes *(note e)*	Yes *(note e)*	Yes *(note e)*
Extension 3 months	Yes *(note f)*	Yes *(note f)*	Yes *(note f)*

General notes:
For surveys (Method 1, or Method 2, or Method 3) completed within 3 months before the shaft survey due date, the next period will start from the shaft survey due date.
The extension survey should normally be carried out within 1 month of the shaft survey due date and the extension counts from the shaft survey due date. If the extension survey is carried out more than 1 month prior to the shaft survey due date, then the period of extension counts from the date of the extension survey was completed.
Notes:
(a) unless an Extension type (Extension 2.5 Y, Extension 1 Y, Extension 3 M) is applied in between.
(b) Method 3 not allowed.
(c) The maximum interval between two surveys carried out according to Method 1 or Method 2 shall not exceed 15 years, except in the case when one extension for no more than three months is granted.
(d) no more than one extension can be granted. No further extension of other type can be granted.
(e) no more than two consecutive extensions can be granted. In the event an additional extension is requested the requirements of the "2.5-year extension" are to be carried out and the shaft survey due date, prior to the previous extension(s), is extended for a maximum of 2.5 years.
(f) no more than one three months extension can be granted. In the event an additional extension is requested the requirements of the "one year extension" or "2.5 years extension" are to be carried

out and the shaft survey due date, prior to the previous extension, is extended for a maximum of one year or 2.5 years.

(g) The maximum interval between two surveys carried out according to Method 1 shall not be more than 15 years.

19.3 Water Lubricated shafts (open systems)

19.3.1 Shaft Survey Methods

(1) METHOD 4

The survey is to consist of:

- Drawing the shaft and examining the entire shaft (including liners, corrosion protection system and stress reducing features, where provided), inboard seal system and bearings.
- For keyed and keyless connections:
  - removing the propeller to expose the forward end of the taper,
  - performing a non-destructive examination (NDE) by an approved surface crack- detection Method all around the shaft in way of the forward portion of the taper section, including the keyway (if fitted). For shaft provided with liners the NDE shall be extended to the after edge of the liner
- For flanged connection:
  - Whenever the coupling bolts of any type of flange-connected shaft are removed or the flange radius is made accessible in connection with overhaul, repairs or when deemed necessary by the surveyor, the coupling bolts and flange radius are to be examined by means of an approved surface crack detection method.
- Checking and recording the bearing clearances.
- Verification that the propeller is free of damages which may cause the propeller to be out of balance.
- Verification of the satisfactory conditions of inboard seal during re-installation of the shaft and propeller.

19.3.2 Shaft extension surveys - Extension types

(1) Extension up to 1 year

The survey is to consist of:

- Visual Inspection of all accessible parts of the shafting system.
- Verification that the propeller is free of damages which may cause the propeller to be -out of balance.
- Checking and recording the clearances of bearing.
- Verification of the effectiveness of the inboard seal.

Pre-requisites to satisfactorily verify in order to apply EXTENSION UP TO 1 YEAR:

- Review of the previous clearance recordings.
- Service records.
- Verification of no reported repairs by grinding or welding of shaft and/or propeller.
- Confirmation from the Chief Engineer that the shafting arrangement is in good working condition.

(2) Extension up to 3 months

The survey is to consist of:

- Visual Inspection of all accessible parts of the shafting system.
- Verification that the propeller is free of damages which may cause the propeller to be out of balance.
- Verification of the effectiveness of the inboard seal.

Pre-requisites to satisfactorily verify in order to apply EXTENSION UP TO 3 MONTHS:

- Review of the previous clearance recordings.
- Service records.
- Verification of no reported repairs by grinding or welding of shaft and/or propeller.
- Confirmation from the Chief Engineer that the shafting arrangement is in good working condition.

19.3.3 Shaft Survey Intervals

(1) Survey Intervals

The following survey intervals between surveys according to Method 4 are applicable to all types of propeller connections.

- For keyless propeller connections the maximum interval between two consecutive dismantling and verifications of the shaft cone by means of non-destructive examination (NDE) shall not exceed 15 years.
- For surveys completed within 3 months before the shaft survey due date, the next period will start from the shaft survey due date.

(i) Configurations allowing 5-year intervals

- Single shaft operating exclusively in fresh water.
- Single shaft provided with adequate means of corrosion protection, single corrosion resistant shaft.
- All kinds of multiple shafts arrangements.

(ii) Other systems

Shaft not belonging in one of the configurations listed in 3.3.1.1 has to be surveyed according to Method 4 every 3 years.

(2) Survey extensions

For all types of propeller connections, the interval between two consecutive surveys may be extended after the execution of extension survey as follows:

(a) Extension up to a maximum of 1 year: no more than one extension can be granted. No further extension, of other type, can be granted.
(b) Extension up to a maximum of 3 months: no more than one "three months extension" can be granted. In the event an additional extension is requested the requirements of the "one year extension" are to be carried out and the shaft survey due date prior to the previous extension is extended for a maximum of one year.

The extension survey should normally be carried out within 1 month of the shaft survey due date and the extension counts from the shaft survey due date.

If the extension survey is carried out more than 1 month prior to the shaft survey due date, then the period of extension counts from the date of the extension survey was completed.

Table 3.19.2: Survey Intervals (open systems)

Oil Lubricated	
– Single Shaft operating exclusively in Fresh Water. – Single Shaft provided with adequate means of corrosion protection, Single corrosion resistant shaft. – All kinds of Multiple shafts arrangements.	Other shaft configuration.

All kinds of Propeller Coupling *(note d)*		All kinds of Propeller Coupling *(note d)*	
Every five years *(note a)*	Method 4	Every three years *(note a)*	Method 4
Extension 1 year	Yes *(note b)*	Extension 1 year	Yes *(note b)*
Extension 3 months	Yes *(note c)*	Extension 3 months	Yes *(note c)*

General notes:
For surveys (Method 4) completed within 3 months before the shaft survey due date, the next period will start from the shaft survey due date.
The extension survey should normally be carried out within 1 month of the shaft survey due date and the extension counts from the shaft survey due date. If the extension survey is carried out more than 1 month prior to the shaft survey due date, then the period of extension counts from the date of the extension survey was completed.
Notes:
(a) unless an Extension type (Extension 1 Y, Extension 3 M) is applied in between.
(b) no more than one extension can be granted. No further extension, of other type, can be granted.
(c) no more than one extension can be granted. In the event an additional extension is requested the requirements of the one-year extension are to be carried out and the shaft survey due date prior to the previous extension is extended for a maximum of one year.
(d) For keyless propeller connections the maximum interval between two consecutive dismantling and verifications of the shaft cone by means of non-destructive examination (NDE) shall not exceed 15 years

19.4 National Requirements

For vessels engaged in domestic voyages, and upon owner's request, the applicable National Legislation concerning the propeller shaft surveys may be applied instead of the requirements of 19.1.

SECTION 20 Periodical Surveys of cargo installations on ships carrying liquefied gases in bulk

Currently LHR does not intend to classify Liquefied Gas Carriers. Therefore, this Section is intentionally left blank.

SECTION 21 Hull Survey for New Construction

21.1 Scope

The scope of this Section includes the following main activities:

21.1.1 Examination of the parts of the ship covered by classification rules and by applicable statutory regulations for hull construction, to obtain appropriate evidence that they have been built in compliance with the rules and regulations, taking account of the relevant approved drawings.

21.1.2 Appraisal of the manufacturing, construction, control and qualification procedures, including welding consumables, weld procedures, weld connections and assemblies, with indication of relevant approval tests.

21.1.3 Witnessing inspections and tests as required in the classification rules used for ship construction including materials, welding and assembling, specifying the items to be examined and/or tested and

how (e.g. by hydrostatic, hose or leak testing, non destructive examination, verification of geometry) and by whom.

21.1.4 Appraisal of material and equipment used for ship construction and their inspection at works is not included in this Section. Details of requirements for hull and machinery steel forgings and castings and for normal and higher strength hull structural steel are given in Part 2, Chapter 5, SECTION 2, Part 2, Chapter 4, SECTION 2 and Part 2, Chapter 3, SECTION 3, ANNEX B and ANNEX C respectively. Acceptance of these items is verified through the survey process carried out at the manufacturer's works and the issuing of the appropriate certificates.

21.2 Definitions

21.2.1 The hull structure is defined as follows:

hull envelope including all internal and external structures;

superstructures, deckhouses and casings;

welded foundations, e.g. main engine seatings;

hatch coamings, bulwarks;

all penetrations fitted and welded into bulkheads, decks and shell,

the fittings of all connections to decks, bulkheads and shell, such as air pipes and ship side valves - all ILLC 1966, as amended, items;

welded attachments to shell, decks and primary members, e.g. crane pedestals, bitts and bollards, but only as regards their interaction on the hull structure.

21.2.2 Reference to documents also includes electronic transmission or storage.

21.2.3 Definition of survey methods which the surveyor is directly involved in: Patrol, Review, Witness.

21.2.3.1 Patrol, the act of checking on an independent and unscheduled basis that the applicable processes, activities and associated documentation of the shipbuilding functions identified in Table 3.21.1 continue to conform with classification and statutory requirements.

21.2.3.2 Review, the act of examining documents in order to determine traceability, identification and to confirm that processes continue to conform with classification and statutory requirements.

21.2.3.3 Witness, attendance of scheduled survey items as defined within the shipbuilding functions.

21.3 Applications

21.3.1 This Section covers the survey of all new construction of steel ships intended for classification and for international voyages except for:

those defined in SOLAS I/3;

high speed craft as defined in I/1.3.1 of the 2000 High Speed Craft Code;

Mobile Offshore Drilling Units as defined in I/1.2.1 of the MODU Code.

21.3.2 This Section covers all statutory items, relevant to the hull structure, i.e. Load Line and SOLAS Safety Construction.

21.3.3 This Section does not cover the manufacture of equipment, fittings and appendages regardless whether they are made inside or outside of the shipyard, examples being as follows. Evidence of acceptance shall be provided by accompanying documentation from class surveyor at manufacturer and verified at the shipyard:

hatch covers;

doors and ramps integral with the shell and bulkheads;

rudders and rudder stock;

all forgings and castings integral to the hull.

21.3.4 This Section applies to the installation into the ship, welding and testing of:

21.3.4.1 the items listed in 21.3.3 above;

21.3.4.2 equipment forming part of the watertight and weather tight integrity of the ship.

21.3.5 This Section applies to the hull structures constructed at any of the following:

21.3.5.1 shipbuilder's facilities;

21.3.5.2 sub-contractors at the shipbuilder's facilities;

21.3.5.3 sub-contractors at their own facilities or at other remote locations.

21.4 Qualification and monitoring of personnel

21.4.1 Exclusive surveyors of the Society, as defined in QP 05, QP 06 and QP 16 (IACS PR5), are to verify that the ships are built using approved plans in accordance with the relevant rules and statutory requirements. The surveyors are to be qualified to be able to carry out the tasks and procedures are to be in place to ensure that their activities are monitored. Details are specified in QP 09 (IACS PR6) and QP 06 (IACS PR7).

21.5 Survey of the hull structure

21.5.1 Table 3.21.1 provides a list of surveyable items for the hull structure covered by this Section, including:

21.5.1.1 description of the shipbuilding functions;

21.5.1.2 classification and statutory survey requirements;

21.5.1.3 survey method required for classification;

21.5.1.4 relevant IACS and statutory requirement references;

21.5.1.5 documentation to be available for the classification surveyor during construction.

The shipbuilder is to provide the classification surveyors access to documentation required by classification, this includes documentation retained by the shipbuilder or other third parties.

The list of documents approved or reviewed by the Society for the specific new construction are as follows:

plans and supporting documents

examination and testing plans

NDE plans

welding consumable details

welding procedure specifications

welding plan or details

welder's qualification records

NDE operators qualification records

21.5.1.6 Documents to be inserted into the ship construction file.

21.5.1.7 A list of specific activities which are relevant to the shipbuilding functions. This list is not exhaustive and can be modified to reflect the construction facilities or specific ship type.

21.5.2 Evidence is also to be made available, as required, by the shipbuilder, to the surveyor whilst the construction process proceeds to prove that the material and equipment supplied to the ship has been built or manufactured under survey relevant to the classification rules and statutory requirements.

21.6 Review of the construction facility

21.6.1 The society is to review the construction facilities prior to any steelwork or construction taking place in the following circumstances:

21.6.1.1 where the society has none or no recent experience of the construction facilities - typically after a one year lapse - or when significant new infrastructure has been added;

21.6.1.2 where there has been a significant management or personnel restructuring having an impact on the ship construction process;

21.6.1.3 or where the shipbuilder contracts to construct a vessel of a different type or substantially different in design.

21.7 Newbuilding survey planning

21.7.1 Prior to commencing any newbuilding project, the society is to discuss with the shipbuilder at a kick off meeting the items listed in Table 3.21.1. The purpose of the meeting is to agree how the list of specific activities shown in Table 3.21.1 is to be addressed. The meeting is to take into account the shipbuilder's construction facilities and ship type and deal with sub-contractors if it is known that the builder proposes to use them. The shipyard is to be informed of likely intervals for sampling and patrol activities. A record of the meeting is to be made, based upon the contents of the Table 3.21.1 - Table 3.21.1 can be used as the record with comments made into the appropriate column. If the society has nominated a surveyor for a specific newbuilding project then the surveyor is to attend the kick off

meeting. The builder is to be asked to agree to undertake ad hoc investigations during construction where areas of concern arise and for the builder to agree to keep the Society advised of the progress of any investigation. Whenever an investigation is undertaken, the builder is to be requested, in principle, to agree to suspend relevant construction activities if warranted by the severity of the problem.

21.7.2 The records are to take note of specific published Administration requirements and interpretations of statutory requirements.

21.7.3 The record of the meeting is to be updated as the construction process progresses in the light of changing circumstances, e.g. if the shipbuilder chooses to use or change sub-contractors, or to incorporate any modifications necessitated by changes in production or inspection methods, rules and regulations, structural modifications, or in the event where increased inspection requirements are deemed necessary as a result of a substantial non-conformance or otherwise.

21.7.4 Shipbuilding quality standards for the hull structure during new construction are to be reviewed and agreed during the kick-off meeting. Structural fabrication is to be carried out in accordance with IACS Recommendation 47, "Shipbuilding and Repair Quality Standard for New Construction", or a recognized fabrication standard which has been accepted by the Society prior to the commencement of fabrication/construction. The work is to be carried out in accordance with the Rules and under survey of the Society.

21.7.5 The kick-off meeting may be attended by other parties as defined in WI/C1/SW/01 and WI/C1/RB/01 (IACS PR3) (owner, administrations, etc.) subject to agreement by the shipbuilder.

21.7.6 In the event of series ship production and where the Society has a continual presence in the shipyard, consideration may be given to modification of the kick off meeting. The agenda would include essential variables from previous ships, e.g. flag requirements, modifications from previous ships, effects of key dates etc. subject to mutual agreement with the builder. In any instance the Society must maintain records to demonstrate compliance with Table 3.21.1. The Society will still need to demonstrate that changes described in 21.7 have been addressed.

21.8 Examination and test plan for newbuilding activities

21.8.1 The shipbuilder is to provide plans of the items which are intended to be examined and tested. These plans need not be submitted for approval and examination at the time of the kick off meeting. They are to include:

21.8.1.1 proposals for the examination of completed steelwork - generally referred to as the block plan and are to include details of joining blocks together at the pre-erection and erection stages or at other relevant stages;

21.8.1.2 proposals for fit up examinations where necessary;

21.8.1.3 proposals for testing of the structure (leak and hydrostatic) as well as for all watertight and weathertight closing appliances;

21.8.1.4 proposals for non-destructive examination;

21.8.1.5 any other proposals specific to the ship type or to the statutory requirements.

21.8.2 The plans and any modifications to them are to be submitted to the surveyors in sufficient time to allow approval before the relevant construction phase commences. The Society is to require sample rates of NDE, proposals for steelwork survey, tank testing requirements, etc. if the actual construction process warrants it. The Society is to demonstrate proof to justify the request.

21.9 Proof of the consistency of surveys

21.9.1 The Society is to be able to provide evidence, e.g. through records, check lists, inspection and test records, etc. that its surveyors have complied with the requirements of the newbuilding survey planning and duly participated in the relevant activities shown in the shipbuilder's examination and test plans.

21.9.2 For audit purposes, the information specified in 21.9.1 is to be made available.

21.10 Ship Construction File

21.10.1 The shipbuilder is to deliver documents for the Ship Construction File. In the event that items have been provided by another party such as the shipowner and where separate arrangements have been made for document delivery which excludes the shipbuilder, that party has the responsibility.

21.10.2 It is recognised that the purpose of documents held in the Ship Construction File on board the ship, is to facilitate inspection (survey) and repair and maintenance, and, therefore, is to include in addition to documents listed in Table 3.21.1, but not be limited to:

(a) as-built structural drawings including scantling details, material details, and, as applicable, wastage allowances, location of butts and seams, cross section details and locations of all partial and full penetration welds, areas identified for close attention and rudders (SECTION 2, SECTION 3, SECTION 4, SECTION 5, SECTION 6 and SECTION 7 for COT, holds and ballast tanks of oil tankers, bulk carriers and chemical carriers);
(b) manuals required for classification and statutory requirements, e.g. loading and stability, bow doors and inner doors and side shell doors and stern doors - operations and maintenance manuals (Part 4, Chapter 6, SECTION 5, 5.1 and 5.2);
(c) ship structure access manual, as applicable;
(d) copies of certificates of forgings and castings welded into the hull (Part 2, Chapter 4, SECTION 2 and Part 2, Chapter 5, SECTION 2);
(e) details of equipment forming part of the watertight and weather tight integrity of the ship;
(f) tank testing plan including details of the test requirements (Part 3, Chapter 1, SECTION 7);
(g) corrosion protection specifications (9.1.2 and 9.1.3);
(h) details for the in-water survey, if applicable, information for divers, clearances measurements instructions etc., tank and compartment boundaries;
(i) docking plan and details of all penetrations normally examined at drydocking;
(j) Coating Technical File, for ships subject to compliance with the IMO Coating Performance Standard (PSPC) as a class requirement under the IACS Common Structural Rules.

Table 3.2.1: Hull Surveyable Items Activities (IACS UR Z23)

Reference	Shipbuilding Function	Survey Requirements for Classification	Survey Method required for Classification	Reference (*)	Statutory requirements and relevant reference	Documentation available to surveyor during construction	Documentation for Ship Construction file	Specific activities	Proposals for the project
	SHIPBUILDING QUALITY CONTROL FUNCTION								
1	**WELDING**								
1.1	**welding consumables**	Classification approved separately at the manufacturer	Review approval status and patrol, verify storage, handling and treatment in accordance with manufacturer's requirements	Part 2, Chapter 10 (IACS UR W17)		Consumable specification and approval status	not required	Identity consumables against approved list	
								Verify temporary and permanent storage facilities	e.g. kept dry, covered, where applicable heated
								Verify traceability	e.g. random batch number checking
1.2	**Welder qualification**	Qualified welders	Review of welder certification and patrol	IACS Recommendation 47		Shipyard records with individual's identification	not required	Verify welder qualification standard, e.g. class or recognized standard approval	
								Verify welder approved for weld position	
								Verify validity of qualification certificate	
1.3	**Welding mechanical properties (welding procedures)**	All weld joint configurations, positions and materials to be covered by weld procedures approved by the classification society or by another IACS member available	review and patrol	Part 2, Chapter 9, SECTION 2 (IACS UR W28)		Approved weld procedure specification and welding plan relevant to the ship project or process	not required	verify procedures are available at relevant workstations	
		the classification society witnesses all new weld procedure qualification tests carried out in the shipyard whenever the classification society is surveying in the shipyard	witness					verify weld procedures records have been approved and cover all weld processes and positions in accordance with classification or recognized standards and are available for the surveyors reference	
1.3a	**welding equipment**	correctly calibrated and maintained	patrol and review			Shipbuilders maintenance and calibration records	not required	verify condition of machinery and equipment.	
								verify machines are calibrated by appropriate staff	

Reference	Shipbuilding Function	Survey Requirements for Classification	Survey Method required for Classification	Reference (*)	Statutory requirements and relevant reference	Documentation available to surveyor during construction	Documentation for Ship Construction file	Specific activities	Proposals for the project
								verify calibration carried out in accordance with manufacturer's recommendations	
								verify calibration in accordance with maintenance schedule	
1.3b	**welding environment**	satisfactory environment	patrol	IACS Recommendation 47			not required	Verify welding areas clean, dry, well lit.	
								Confirm relevant measures taken for any pre or post heat treatment, drying of surfaces prior to welding	
								Confirm shielding gases, fluxes protected	
1.3c	**welding supervision**	sufficient number of skilled supervisors	Review and patrol	IACS UR W33, IACS Recommendation 47				verify supervision is effective	
1.4	**welding- surface discontinuities**	Substantially free from significant indications, satisfactory profile and size	Visual examination, surface detection techniques, review of documents and patrol of operator	IACS UR W33, IACS Recommendation 47		Shipbuilders and recognised standards and Rules as applicable, welding and NDE plans, NDE reports, operator qualifications	not required	Identify workstations where NDE is carried out, e.g. panel line butt welds, castings into hull structure	
								Verify NDE carried out in accordance with approved plans where applicable	
								Verify suitability of NDE methods	
								Verify operators suitably qualified particularly where sub-contractors have been employed	
								Verify NDE is carried out according to the acceptable process	
								Review NDE records	
1.5	**Welding - embedded discontinuities**	NDE is to be carried out by qualified operators capable of ensuring that welds are substantially	Radiography and ultrasonic testing, review of documents and patrol	IACS UR W33, IACS Recommendation 47		Shipbuilders and recognized standards and Rules as applicable, welding	not required	Identify workstations where NDE is carried out, e.g. panel line butt welds, castings into hull structure	

Reference	Shipbuilding Function	Survey Requirements for Classification	Survey Method required for Classification	Reference (*)	Statutory requirements and relevant reference	Documentation available to surveyor during construction	Documentation for Ship Construction file	Specific activities	Proposals for the project
		free from significant indications	of operator, examination of films			and NDE plans, NDE reports, operator qualifications		Verify NDE carried out in accordance with approved plans where applicable	
								Verify suitability of NDE method	
								Verify operators suitably qualified particularly where sub-contractors have been employed	
								Verify that records have been completed and in accordance with recognized standards, e.g. IQI and sensitivity recorded	
								Verify that reports and radiographs have been evaluated correctly by the shipbuilder. Systematic review of radiographs carried out by the surveyor	
								Verify equipment calibration satisfactory and in accordance with manufacturers and recognized standards requirements	
								Verify NDE is carried out according to the acceptable process	
2	**Steel preparation and fit up:**								
2.1	**surface preparation, marking and cutting**	traceability and acceptability of material, check of steel plates& profiles materials type, scantling identification, testing marks	patrol	IACS Recommendation 47		material certificates, shipbuilder's marking/cutting production documents at the Workstage - documents retained at the facility	not required	Verify stockyard storage satisfactory	
								Verify material traceability, e.g. stamping identification β against material certification, archiving of records	
								Verify transfer marking after treatment line	
								Verify standard of shotblasting and priming	
								Verify suitability of primer	

Reference	Shipbuilding Function	Survey Requirements for Classification	Survey Method required for Classification	Reference (*)	Statutory requirements and relevant reference	Documentation available to surveyor during construction	Documentation for Ship Construction file	Specific activities	Proposals for the project
								Verify that steel grades can be identified	
								Verify machinery adjusted to maintain within IACS or manufacturers recommendations	
								Verify accuracy of marking and cutting	
								Verify storage of piece parts.	
2.2	**straightening**	Approval of straightening methods/ procedures against deformation	patrol and review	IACS Recommendation 47		recognized standards, approved procedures	not required	Verify that straightening processes are approved for the grade and type of steel, e.g. tmcp, z plate	
								Verify that plates and sections are within recognized tolerances	
2.3	**forming**	Maintain material properties. Acceptance of forming method against unproper deformations	patrol	IACS Recommendation 47		Shipbuilders procedure for hot forming	not required	Verify that temperature control is exercised by the operator.	
								Verify that suitable methods of temperature control are available when forming special steels and materials	
								Verify that forming processes are acceptable	
2.4	**conformity with alignment/fit up/gap criteria**	Check alignment/fit up/gap against reference standards	patrol	IACS Recommendation 47		Shipbuilders and recognized standards and Rules as applicable,	not required	Verify the processes to ensure satisfactory fit up and alignment at all workstations	
								Verify that edge preparations are reinstated where lost during fitting operations	
								Verify remedial procedures are in place to compensate for wide gaps and alignment deviations	
2.5	**conformity for critical areas with alignment/fit up**	Check alignment/fit up/gap against approved drawings	witness and review	IACS Recommendation 47		Shipbuilders and recognized standards and Rules as applicable, approved	Approved plans of critical areas if applicable	Verify that the information relevant to the latest approved drawings is available at the workstations	

Reference	Shipbuilding Function	Survey Requirements for Classification	Survey Method required for Classification	Reference (*)	Statutory requirements and relevant reference	Documentation available to surveyor during construction	Documentation for Ship Construction file	Specific activities	Proposals for the project
	or weld configuration					plan or standard, builder's records		Verify the processes to ensure satisfactory fit up and alignment at all workstations	
								Verify that edge preparations are reinstated where lost during fitting operations	
								Verify remedial procedures are in place to compensate for wide gaps and alignment deviations	
3	**Steelwork process, e.g. sub assembly, block, grand and mega block assembly, pre-erection and erection, closing plates**	compliance with approved drawings, visual examination of welding and material, check alignment and deformations	patrol of the process and witness of the completed item	IACS Recommendation 47		approved plans, shipbuilders inspection records, Shipbuilders and recognized standards and Rules as applicable, construction plan (steelwork subdivision		Verify that the information relevant to the latest approved drawings is available at the workstation	
								Verify that correct weld sizes have been adopted	
								Verify operation of the welding processes at the different work stages is satisfactory	
								Verify that piece parts are identifiable	
								Verify that fit ups are within recognised tolerances	
								Verify that correct welding requirements specified in reference 1 of this table have been adopted	
								Verify processes for closing plates etc. are acceptable	
								Confirm that steelwork is in accordance with the approved plan	
4	**Remedial work and alteration**	welding, check against deformation, alignment	review records and witness	IACS Recommendation 47		permanent record of shipyard surveyable item		Verify that records have been maintained of significant deviations from the approved plans, for situations such as mis cut openings, re-routing outfit items	
								Verify that all deviations brought to the attention of the	

Reference	Shipbuilding Function	Survey Requirements for Classification	Survey Method required for Classification	Reference (*)	Statutory requirements and relevant reference	Documentation available to surveyor during construction	Documentation for Ship Construction file	Specific activities	Proposals for the project
								classification society by the shipbuilder are acceptable	
5	**Tightness testing, including leak and hose testing, hydropneumatic testing**	Absence of leaks	Review and witness of the test	Part 3, Chapter 1, SECTION 7 (IACS UR S14)	Reg. II-1/11 of SOLAS as amended;	approved tank testing plan, shipbuilders inspection records	approved tank testing plan	Confirm that tank testing is carried out in accordance with the approved plan	
								Confirm the methods used to carry out leak testing	
								Confirm that correct test pressures maintained for leak, hose and hydro and hydropneumatic testing is satisfactory	
								Verify that adequate records of the tank testing have been maintained	
6	**Structural testing**	structural adequacy of the design	Review and witness of the test	Part 3, Chapter 1, SECTION 7 (IACS UR S14)	Reg. II-1/11 of SOLAS as amended;	approved tank testing plan, shipbuilders inspection records	approved tank testing plan	Confirm that tank testing is carried out in accordance with the approved plan	
								Confirm that correct test pressures maintained for testing is satisfactory	
								Verify that adequate records of the tank testing have been maintained	
7	**corrosion protection systems, e.g. coatings, cathodic protection, impressed current except for coating system subject to PSPC**	Salt water ballast tanks with boundaries formed by the hull envelope, and also bulk carrier hold internal surfaces, coamings and hatch covers shall have an efficient protective coating. Safety aspects of cathodic systems to be dealt with separately.	Review and report on builder's & manufacturer's documentation	Part 3, Chapter 1, SECTION 9, 9.1.2 Part 3, Chapter 1, SECTION 9, 9.1.3, IACS UI SC122, IACS UR F1	Reg. II-1/3-2 of SOLAS as amended;	manufacturer's and builder's specification	corrosion protection specifications	Verify that applied coatings are approved and review records of application	
								Verify that adequate records have been maintained and copied to the ship construction file	

Reference	Shipbuilding Function	Survey Requirements for Classification	Survey Method required for Classification	Reference (*)	Statutory requirements and relevant reference	Documentation available to surveyor during construction	Documentation for Ship Construction file	Specific activities	Proposals for the project
	Application Antifouling Systems		Review		AFS Convention	Paint Specification and Mfg. Declaration	Painting Specification	Verify that adequate records have been maintained and copied to the ship construction file	
8	**Installation, welding and testing of the following:**								
8.1	**hatch covers**	tightness and securing	witness	Part 3, Chapter 1, SECTION 7 (UR S14) IACS Recommendation 14	Reg. 13-14-15 and 16 of ILLC '66	approved tank testing plan, shipbuilders' inspection records,	details required, structural drawings	Confirm leak test of hatch covers	
								Confirm operation and securing test	
8.2	**doors and ramps integral with the shell and bulkheads**	tightness and securing	witness	Part 3, Chapter 1, SECTION 7 (IACS UR S14)	Reg. II-1/18 of SOLAS as amended; Reg. 12 and 21 of ILLC '66	approved tank testing plan, shipbuilders inspection records,	details required	Confirm leak test	
								Confirm operation and securing test	
								Confirm safety device operation Confirm operation and securing test	
								Ensure correct maintenance logs/manuals supplied with the ship construction file	
8.3	**Rudders**	Fitting	witness	Part 3, Chapter 1, SECTION 7 (IACS UR S14)		approved plan, shipbuilders inspection records,	details required, structural drawings	Confirm alignment and mounting and fitting up to the connection to the tiller	
								Confirm function test	
								Verify fitting of pintles and all securing bolt	
								Verify all fit up records including all clearances maintained and placed into ship construction file	
8.4	**forgings and castings**	compliance with approved drawings, visual examination of welding and material, check	patrol of the process and witness of the completed item	Part 2, Chapter 5, SECTION 2 (IACS UR W7)		approved plans, shipbuilders inspection records, Shipbuilders and	copies of certificates of forgings and castings	Verify casting and forgings against material certificate	
								Verify that correct	

Reference	Shipbuilding Function	Survey Requirements for Classification	Survey Method required for Classification	Reference (*)	Statutory requirements and relevant reference	Documentation available to surveyor during construction	Documentation for Ship Construction file	Specific activities	Proposals for the project
		alignment and deformations		Part 2, Chapter 4, SECTION 2 (IACS W8)		Recognized standards and Rules as applicable, construction plan (steelwork sub-division)		welding and fit up requirements specified in reference 1, 2.4 and 2.5 of this table have been adopted	
								Verify that material certificates are included in the ship construction file	
	appendages							Verify that correct welding and fit up requirements specified in reference 1, 2.4 and 2.5 of this table have been adopted	
8.5	**equipment forming the watertight and weathertight integrity of the ship, e.g. overboard discharges, air pipes, ventilators**	tightness and securing	witness		Reg. II-1/16 and Reg. II-1/16-1 of SOLAS as amended; Reg. 17-18-19-20-22-23 of ILLC '66	approved tank testing plan, shipbuilders inspection records,	details required,	Verify that correct welding and fit up requirements specified in reference 1, 2.4 and 2.5 of this table have been adopted	
								Verify Compliance with Load line Convention 1966 as amended - i.e. all fittings in accordance with the record of freeboard assignment	
				Part 5, Chapter 9, SECTION 10, 10.14 (IACS UR P3)				Verify air pipes, vents etc closing device are approved type	
								Verify material certificates for overboard discharges where applicable	
								Verify record of freeboard assignment and all material certificates included in the ship construction file	
	Freeboard marks and draft marks	within allowable tolerances and in accordance with the	witness	IACS UI LL4	Reg. 4-5-6-7 and 8 of ILLC '66		details required	Verify freeboard marks in accordance with load line assignment	
								Verify draft marks in accordance with the agreed	

Reference	Shipbuilding Function	Survey Requirements for Classification	Survey Method required for Classification	Reference (*)	Statutory requirements and relevant reference	Documentation available to surveyor during construction	Documentation for Ship Construction file	Specific activities	Proposals for the project
		freeboard assignment						tolerances specified by the builder unless more onerous flagstate requirements	
	Principal dimensions	within allowable tolerances	review and witness	IACS Recommendation 47			details required	Verify principal dimensions in accordance with recognised standard	
								Verify dimensions included in ship construction file	
	Safety Construction certification	no outstanding imperfections or defects	witness		Reg. I/7 or Reg. I/10 of SOLAS as amended, as appropriate			Verify that Administration requirements have been incorporated into the hull structure	
8.6	**watertight cable transit seal systems**	compliance with approved drawings, visual examination of fitting, check alignment and securing	patrol of the process and witness of the completed item		Reg. II-1/13 and 13-1 of SOLAS as amended	shipbuilder's inspection records, manufacturer's specification	Cable Transit Seal Systems Register	Verify that correct welding and fit up requirements, including as specified in reference 1, 2.4 and 2.5 of this table have been adopted	
								Verify watertight cable transit seal systems are type approved	
								Verify the format and content of the Register	

(*) IACS RECOMMENDATIONS ARE NOT MANDATORY

Shipbuilder's name	
Project	
Project duration	
Kick off meeting date	
Representing builder	
Representing class society	